TRANSACTIONS

OF THE

AMERICAN INSTITUTE,

OF THE

CITY OF NEW-YORK,

FOR THE YEAR

1856.

ALBANY:
C. VAN BENTHUYSEN, PRINTER TO THE LEGISLATURE.
No. 407 Broadway.
1857.

AMERICAN INSTITUTE.

Trustees and Committees for 1856.

State of New-York.

No. 171.

IN ASSEMBLY, MAR. 31, 1857.

New-York, *March* 28, 1857.

To the Hon. Dewitt C. Littlejohn,

Speaker of the Assembly:

I herewith transmit the Annual Report of the American Institute of the city of New-York, for the year 1856.

Very respectfully,

Your obedient servant,

W. B. LEONARD,

Corresponding Secretary.

FIFTEENTH ANNUAL REPORT

OF THE TRUSTEES OF THE AMERICAN INSTITUTE.

The Trustees of the American Institute respectfully present, in accordance with the Law of May 5, 1841, a report of the acts of the Institute for the year 1856:—

When the Crystal Palace was first proposed as the place for holding our annual exhibitions, it was with some doubt and hesitation that we undertook it, fearing that so large a space could not be filled with articles of sufficient interest to attract the public. From our last annual report, it will be seen that long ere the exhibition closed all doubts were dispelled by the attractiveness of the exhibition and the appreciation of the public.

This year we looked forward to the exhibition with far more hope than fear of the success; but we did not expect to surpass that of the previous year. How agreeable, then, it is to report that throughout every department, in variety, in usefulness, in attractiveness, the exhibition of 1856 surpassed all others. The number of visitors also greatly exceeded that of the previous year, thus demonstrating that the exertions of the American Institute to advance the interest of the consumer as well as the producer, is appreciated by both.

When we compare those countries fostering the mechanical, manufacturing and scientific interests with those which are indifferent to all these, how vast is the difference in their prosperity; even thus in our own country, we compare those States which have in years past been most active in the promotion of the arts and sciences, how rapid is their advancement beyond those which have given less attention to the same; indeed, so important has this subject become, that we find every State in the Union, and almost every county in the States, giving attention to the promotion of societies, whose object shall be what the American Institute has ever been—to promote by fair and honorable competition the growth and improvement in all that tends to make the life of the farmer, the mechanic and the merchant less a life of labor and more a life of science. In view of all this, and the position which the American Institute has ever held as first in rank, we cannot let this opportunity pass without suggesting the importance of some movement by which the Crystal Palace may be secured to us for future exhibitions—a building well adapted for the exhibition of the many new and useful inventions which are annually added to the number already in existence, and properly arranged, would give the American Institute an opportunity long desired of collecting, classifying and displaying not only new inventions, but rare productions of the soil, and whatever may best contribute to the interest of the farmer, the mechanic and the man of science; this institution to be always open for inspection throughout the year, thereby giving to the people, what they now demand, a grand repository where at any and all times they may repair and find whatever may contribute to the advancement of their particular interest.

The cattle show of the Institute was held on Hamilton square, a beautiful plot of ground granted by the corporation of the city of New-York, under the direction of the Agricultural Committee. Notwithstanding the greatly increased number of cattle shows in our country at this season, there were gathered together some 400 animals of great worth in their origin and breeding quality; horses of fine quality, sheep, swine and poultry. Although the exhibition was not quite equal in numbers to those of past years, yet in point of quality it has never been surpassed. The exhibition of poultry was very fine—some 60 coops of various choice breeds in great perfection. We may here observe that premiums for poultry was first offered by the American Institute many years ago.

The act to promote agriculture, passed by the Legislature in 1841, has been the means of establishing agricultural societies in nearly every county of our State, at whose yearly exhibitions the products of the farm are brought together for comparison. The emulation thus excited cannot be but of infinite benefit to the whole country.

The first farmers' club in the United States was held under the auspices of the American Institute in June, 1843, from which has sprung the various farmers' clubs now being held in the Union. These meetings have been held with great regularity since that time, at which are discussed the most improved methods of cultivating the soil, the raising and improvement in stock, chemistry applied to agriculture, and the adaptation of useful labor-saving machinery and implements to the work of the farm; large quantities of choice seeds and grafts are annually distributed. In fact the farmers' club has become one of the institutions of our city.

An important branch of the Institute is the Mechanics' Club, which hold meetings on the 2d and 4th Wednesdays of each month during the year, at which inventors with new discoveries in the arts are allowed to explain their machines and elicit the opinion of scientific gentlemen of their merits; in addition to which philosophical and mechanical subjects are discussed and examined. These clubs are free, and are generally appreciated by all who attend their deliberations. The information diffused by this and kindred branches of the American Institute, will only be appreciated in future years, when the seed sown at these meetings shall have matured, and become incorporated in the great improvements of our country.

We refer with pride to the geological survey of our State which was made on the petition of this Institute. The Legislature, carrying out our recommendation, has given to the public the resources of our State that would otherwise have remained dormant for years to come.

By literary exchanges with foreign nations, our Institute has become widely known abroad, and its advantages appreciated everywhere. The works transmitted to us from France are immediately translated by our Secretary, the Hon. Henry Meigs, and distributed free throughout the length and breadth of our land, and are appreciated as worthy additions to science.

Our library has been increased by contributions and purchase, and now contains 8,000 volumes, which, if estimated by the character of the works, may be considered of inestimable value.

The correspondence during the year has been greater than at any former period, and consists chiefly in applications for scientific information relative to various branches of knowledge. Our Farmers' and Mechanics' clubs, together with our Annual Fair, give rise to a very extensive enquiry, the results of all which, will not fail to benefit our people. The trustees are satisfied that the Legislature is doing immense good by establishing and fostering all institutions of like character, so that all our citizens may share in the good resulting from them.

ROBERT L. PELL,
D. M. REESE,
WILLIAM HALL,
EDWIN SMITH,
E. T. BACKHOUSE,
H. MEIGS,
W. B. LEONARD, *Trustees.*

NEW-YORK, *March* 10, 1857.

FINANCES.

The following is the financial condition of the American Institute, on the first day of February, 1857.

Balance in the treasury, Feb. 1, 1856,		$5,789 49
The RECEIPTS of the year have been—		
From rent of store, &c., No. 351 Broadway, Nov., 1855, to Nov., 1856,	$3,250 00	
From Managers of the 28th Annual Fair, 1856,	5,000 00	
From admission fees and annual dues,	2,807 00	
From certificates of award,	132 00	
From sales of transactions,	6 00	
From 2 duplicate silver medals,	10 00	
		11,205 00
Carried forward,		$16,994 49

Brought forward,			$16,994 49

PAYMENTS.

Real Estate.

Interest on mortgage, Nov. 1, 1855, to Nov. 1, 1856,	$845 00		
Taxes, 1855 and 1856, including water tax of 1854,	1,474 77		
Water tax, 1856,	19 00		
Insurance,	140 50		
Painting roof, &c.,	56 60		
Graining doors,	15 00		
		$2,550 87	

Library Committee.

Books,	$80 87		
Periodicals,	97 70		
Binding books,	64 32		
Labels for cases,	13 75		
Subscription to newspapers,	62 00		
		318 64	

Committee on Agriculture.

Premium on farm, 1854,		50 00	

On account of 27th Annual Fair, 1855.

Gold and silver medals,	$1,038 01		
Silver cups and plate,	97 05		
Engraving premiums,	286 25		
Medal cases,	114 00		
Cash premiums,	69 00		
Books for premiums,	191 74		
Printing and filling diplo's,	191 86		
Printing,	120 92		
Bill posting,	19 50		
Taking down shafting, &c.,	40 01		
Advertising,	93 80		
		2,262 14	
Carried forward,		$5,181 65	$16,994 49

Brought forward,		$5,181 65	$16,994 49
Miscellaneous Bills.			
Insurance on library and fixtures,	$42 50		
Printing blank circulars, &c.	38 50		
Stationery,	45 95		
Tables, &c.,	13 50		
Gas,	67 78		
Coal,	40 00		
Advertising,	31 00		
Transactions American Institute,	8 00		
Impressions, likeness of Gen. Chandler for Transactions,	25 00		
Freight of Transactions from Albany,	8 05		
Copying Mss. for Transactions,	10 00		
New dies for medals,	225 00		
Ice,	12 00		
Repairs of furnace, clock, chairs, &c.,	28 67		
Agent's traveling expenses,	100 00		
Agent's expenses at Albany,	21 28		
Services procuring terms of Tabernacle property,	25 00		
Filling certificates of award,	10 40		
Engraving duplicate medals,	2 50		
Commissions on collections,	5 60		
Inspectors of election, expenses,	11 50		
Directory,	2 50		
Petty cash expenses—postages, advertising, cleaning, &c., &c.,	130 61		
		907 34	
Carried forward,		$6,088 99	$16,994 49

Brought forward,			$6,088 99	$16,994 49
Salaries.				
Agent,		$1,200 00		
Recording Sec'y,	$600 00			
as Sec'y Farmers Club,	195 00			
		795 00		
Clerk,		1,050 00		
Librarian,		600 00		
Boy,		66 00		
			3,711 00	
				9,799 99
Balance in the treasury, Feb. 1, 1857,				$7,194 50

AMOUNT OF PROPERTY HELD BY THE INSTITUTE, FEBRUARY 1, 1857.

Real estate, No. 351 Broadway, cost,	$45,000 00	
Building, 89½ Leonard-st.,	800 00	
	$45,800 00	
Less mortgage,	13,000 00	
		$32,800 00
Library and fixtures, per report made to the Institute April 30, 1856,	$11,419 46	
Books and periodicals added since,	79 15	
		11,498 61
Office furniture, safes, &c.,		350 00
Other property:		
Steam boilers at Castle Garden,	$500 00	
Chandeliers, at Castle Garden,	60 00	
Shafting, pullies, steam and gas pipes, &c., at the Crystal Palace,	1,000 00	
		1,560 00
		$46,208 61
Cash in the treasury, Feb. 1, 1857,		7,194 50
Total,		$53,403 11

JOHN A. BUNTING,
N. G. BRADFORD,
JOHN McILVEEN,
BENEDICT LEWIS, Jr.
Finance Committee.

REPORT

Of the Board of Managers of the Twenty-Eighth Annual Fair of the American Institute.

The Board of Managers of the Twenty-Eighth Annual Fair of the American Institute, beg leave to

REPORT:

That in pursuance of the important duties assigned them by the American Institute, they organized on the 13th day of May last, by the appointment of Mr. George F. Nesbitt as chairman, Mr. Charles A. Whitney, as vice-chairman, and Mr. John W. Chambers as secretary.

The success of the exhibition last year, at the Crystal Palace, gave them encouragement that no better arrangement could be made than by securing the same building in which to hold the Twenty-Eighth Annual Fair.

The rent we had to pay was double that paid last year, and fears were expressed by some members that the exhibition of 1856 would prove disastrous, in a financial point of view, to the American Institute; but this, we are happy to say, proved not to be the case. It was apprehended that the number of visitors would be greatly lessened in consequence of the excitement which followed the first appearance of yellow fever at Quarantine; and as our success depends in no small measure upon strangers, who would be deterred from visiting our city from fear of this dread disease, it was feared the result would be *disastrous;* but the statements herewith presented contain the evidence of a great success.

The managers lost no time in informing the manufacturers, griculturists, mechanics and others, by advertisements and circulars, that the exhibition would be held in this city early in the fall. The agent of the Institute visited the principal manufacturing towns in the New-England States, and impressed manufacturers and mechanics with the importance of exhibiting their productions at the Fair of this Institute.

The number of entries in the manufacturing and mechanical department, were	2,964
In the horticultural department,	263
At the cattle show,	94
Making a total of	3,321

The Institute, at the stated meetings in June, instructed the trustees to prepare new dies for the gold and silver medals. These have been executed by Mr. George H. Lovett, in a satisfactory manner. The gold medals are now struck from double eagles, instead of the eagle, as heretofore. The silver medals have been increased one-half in weight. The bronze medals are struck in the silver medal dies, and weigh four ounces. They are a new feature in the awards of this Institute.

Great pains were taken by the premium committee to secure impartial judges to examine the various articles exhibited, and they believe, with few exceptions, have given satisfaction to the exhibiters.

The managers take pleasure in this place, of returning their acknowledgments to the gentlemen who voluntarily performed this very important duty, as the success of the Institute depends, in a great measure, on the manner in which the awards are made.

They have been as follows:

In the Manufacturing and Mechanical Department.

19 gold medals.
26 gold medals, certified.
80 silver medals.
60 silver medals, certified.
4 silver cups.
181 bronze medals.
365 diplomas.

In the Horticultural Department.

13 silver cups.
19 silver medals.
28 bronze medals.
13 diplomas.
75 volumes of books.

In the Agricultural Department, (embracing the Cattle Show, and Plowing and Spading.)

110 silver cups.
30 silver medals.
44 volumes of books.
$48 in cash.

It is unnecessary for your Board of Managers to particularize the numerous articles on exhibition; suffice to say, there never has been such an array of new and useful improvements as were exhibited in the mechanic arts, especially in the department of machinery. To give motion to the several articles, steam engines and boilers to an amount of over ninety horses were required. The space to locate the same extended into and occupied a large portion of the main building, after filling the machine arcade. Steam engines with massive belt wheels, steam fire engines, pumps in great variety, stone sawing, wood turning, sawing and planing machines, barrel machinery, and all the varieties of mortising, tenoning, and other tools for working wood in all forms. An atmospheric trip-hammer, of great value, gold and quartz separators, cotton and wool machinery, printing presses, a book folding machine of great novelty, lathes and planers for iron, gas and electrical apparatus, with various other machines, too extensive to enumerate, gave life and great interest to the grand display of American industry.

The managers beg leave to acknowledge the courtesy extended to them by railroad and steamboat companies, who agreed to return free of charge all articles brought by them to the exhibition, which had not changed ownership.

The following is a statement of the Receipts and Expenditures of the Twenty-eighth Annual Fair:

RECEIPTS.

Sales of tickets at the Crystal Palace:

Saturday,	September	20,	$10 87
Monday,	"	22,	20 00
Tuesday,	"	23,	62 00
Wednesday,	"	24,	190 50
Thursday,	"	25,	250 00
Friday,	"	26,	380 00
Saturday,	"	27,	375 50
Monday,	"	29,	285 00
Tuesday,	"	30,	170 00
Wednesday,	October	1,	534 00
Thursday,	"	2,	638 00
Friday,	"	3,	900 00
Saturday,	"	4,	825 00
Monday,	"	6,	700 00
Tuesday,	"	7,	1,550 00
Wednesday,	"	8,	1,060 00
Thursday,	"	9,	1,125 00
Friday,	"	10,	1,760 00
Saturday,	"	11,	1,000 00
Monday,	"	13,	726 00
Tuesday,	"	14,	1,211 00
Wednesday,	"	15,	815 00
Thursday,	"	16,	910 00
Friday,	"	17,	900 00
Saturday,	"	18,	652 00
Monday,	"	20,	810 00
Tuesday,	"	21,	1,800 00
Wednesday,	"	22,	1,146 00
Thursday,	"	23,	1,150 00
Friday,	"	24,	1,900 00
Saturday,	"	25,	1,020 00
Carried forward,			$24,875 87

Brought forward,			$24,875 87
Monday, " 27,			110 00
Tuesday, " 28,			
Wednesday, " 29,			166 63
Thursday, " 30,			
Friday, " 31,			
			$25,152 50
Rents of saloons,		$1,336 00	
Rent of stands,		70 00	
Schools,		99 55	
Tickets,		181 20	
Wm. Hall and Son, tickets,		32 37	
			1,719 26
Sales of tickets, cattle show, Oct. 14,		30 00	
" " " 15,		300 00	
" " " 16,		500 00	
" " " 17,		129 50	
Stands at cattle show,		30 00	
			989 50
Total receipts,			$27,861 26

EXPENDITURES.

By Finance Committee.			
Ticket sellers,		$215 00	
By Ticket Committee.			
Ticket receivers,	$162 50		
Rubber bands,	9 50		
		172 00	
Carpenters' Work and Lumber.			
Carpenters' work,	$171 63		
Lumber,	418 54		
		590 17	
By Committee on Light.			
Gas,	$2,158 44		
Gas fitting,	321 22		
Labor, lighting, etc.,	165 34		
Oil, alcohol, etc.,	25 92		
		2,670 92	
Carried forward,		$3,648 09	$27,861 26

Brought forward,		$3,648 09	$27,861 26
By Committee on Music.			
Music,		1,415 00	
By Flag Committee.			
Banner across Broadway,	$71 19		
Flag poles for stages and mounting,	21 00		
Rope for flags,	8 00		
Insurance on U. S. flags,	2 50		
		102 69	
By Police Committee.			
Superintendent,	$230 00		
Police,	406 00		
Night watch,	804 00		
Floor clerks,	738 75		
Laborers,	449 63		
Delivering goods after close of the Fair,	35 50		
Taking charge of articles at the entrance,	22 50		
		2,686 38	
By Printing and Publication Committee.			
Printing circulars, tickets, posting bills, blanks, etc.	$694 77		
Printing addresses,	104 95		
Advertising,	658 47		
Bill posting,	36 30		
Muslin for bills and flags,	71 80		
Books, stationery, etc.,	90 22		
Postage stamps,	99 93		
		1,756 44	
By Gallery Committee.			
Hanging pictures,	$46 00		
Hooks, cords, etc.,	18 26		
		64 26	
Carried forward,		$9,672 86	$27,861 26

Brought forward,		$9,672 86	$27,861 26
Machine Department.			
Superintendent,	$144 38		
Engineer, fireman and laborers,	943 85		
Use of boilers, shafting, &c.,	555 98		
Putting up old shafting,	70 00		
Steam pipes, repairs, &c.,	611 73		
Smoke pipes,	123 75		
Mason work,	235 51		
Flagging,	20 00		
Plumbers' work,	63 96		
Croton water,	34 00		
Lumber,	36 27		
Oil,	78 85		
Coal,	321 25		
Wood,	83 01		
		3,322 54	
By Horticultural Committee.			
Clerk and assistants,	$390 95		
Box wood, twine, &c.,	23 85		
Painting stands, boxes, &c.,	8 00		
Use of crockery,	38 60		
		461 40	
By Agricultural Committee.			
Erecting fences, sheds, &c.,	$960 00		
Lead pipe, for conveying water,	59 50		
Badges for committee and cattle,	22 04		
Filling in earth,	33 07		
Printing tickets, list of awards, &c.,	52 93		
Advertising, in part,	26 32		
Carried forward,		$13,456 80	$27,861 26

Brought forward,		$13,456 80	$27,861 26
Clerk police and laborers,	106 50		
Ticket sellers and receivers,	33 00		
Cartage,	5 50		
Refreshments, committees, and judges,	76 50		
Casks, tubs, &c.,	12 63		
Plowing match and testing of mowers, &c.,	28 84		
		1,416 83	
Refreshments.			
Dinners for managers while detailed on duty,		368 19	
By Premium Committee.			
Silver cups and silver ware,	$1,092 25		
Gold, silver, and bronze medals,	1,212 09		
Engraving,	267 75		
Cases for medals,	178 00		
Diplomas and filling up,	181 91		
Cash, instead of cups and medals,	569 00		
		3,584 81	
Miscellaneous Bills.			
Rent of the Crystal Palace,	$3,000 00		
Desk clerks,	161 50		
Agent's clerk,	150 00		
Muslin, for covering tables and bleaching old muslin,	98 42		
Cartage,	61 37		
Freight,	23 74		
Trucks and repairs,	49 50		
Badges for managers, trustees, &c.,	11 93		
Stove pipes, for offices,	25 12		
Carried forward,	$3,581 58	$18,826 63	$27,861 26

Brought forward,	$3,581 58	$18,826 62	$27,861 26
Glass, for repairing cases,	6 00		
Books for signatures,	9 00		
Hardware,	10 74		
Broadway Tabernacle and expenses of annual address,	109 00		
Expenses of lectures,	15 00		
Painting and signs,	12 12		
Repairs of settees,	5 00		
Sundry disbursements,	37 83		
		3,786 27	
Total disbursements,			22,612 90
Which being deducted from the receipts, leaves			$5,248 36
Of which $5,000 has been paid into the treasury,			5,000 00
Leaving a balance on hand, of			$248 36

The cattle show was held on Hamilton Square, under the direction of the Agricultural Committee, and although the exhibition was not quite equal in numbers to those of past years, yet in point of quality it has never been surpassed.

The following is the description of stock entered:

Cattle of all breeds	153
Horses,	92
Mules,	6
Sheep,	89
Swine,	55
Poultry of various choice breeds,	60 coops.
Pigeons,	50 pairs.
Rabbits, &c.,	10

The weather for the two first days was very cold and inclement. Had it been favorable, as was hoped, the results no doubt would have fully met the expectations of the committee. The expense of erecting the enclosure, sheds, pens and buildings are necessarily large, and has nearly taken the whole receipts, leaving the expenses of printing, advertising, labor and premiums, which amount to $2,321.48, a charge to the fair. This amount added to the $5,000 paid into the treasury of the Institute, would have made the surplus of the fair at the Crystal Palace $7,321.48.

The expenses of the machine department amount to $3,322.54. By some this amount may seem large. The steam power necessary to propel the machinery requiring power, and the use of several large steam boilers, with additional shafting, steam pipes, &c., will always make this department expensive, until arrangements are made for a permanent location. In such case, after the first outlay the cost of keeping them in order will be but small in comparison to the annual charge of erecting them for a few weeks, and then taking them away, leaving the same to be done by each successive board.

It may be thought that the expenses incurred by the police committee are large; but when we take into consideration the immense amount of property placed under the charge of the American Institute, and the great extent of the premises to be protected both by day and night it was deemed necessary to have a force sufficient for that purpose.

During the fair 112 persons signified their intention to become members of the Institute. The managers accepted the applications, and ordered the initiation fees to be received and tickets of admission granted, eleven of whom became life members, making

the amount received from this source,	$725 00
There was also received during the exhibition for arrears of dues,	810 00
Making a total of	$1,535 00

These names were reported to the Institute at the stated meeting in November, and were duly admitted members of the American Institute.

A gratifying feature in our efforts was the following preamble and resolutions, unanimously adopted at a meeting of the exhibitors held at the close of the fair.

The meeting was organized by the appointment of J. P. Ross, of Penn., to the Chair, and D. M. Grant, of N. Y., Secretary, after which the following preamble and resolutions were unanimously adopted:

"That, in the American Institute, for the promotion of science and art, we recognize an organization which merits the support of all connected with the objects of its patronage, and that the liberality of its directors, and their judicious management of the exhibition of 1856, affords fresh incentives to honorable competition and zealous efforts amongst all inventors, mechanics, and artists in our country. Therefore,

"*Resolved*, That we, the exhibiters of 1856, do most cordially tender our sincere acknowledgments to the directors of the American Institute, and their assistants in every department, for the satisfactory manner in which they have enabled us to display our inventions and manufactures, and for their generous endeavors to forward our interests and insure our success, and that at the close of the present exhibition we assure them of our ardent hope that their eminent abilities and impartial discernment may on all future occasions be crowned with that success which they so richly deserve.

"*Resolved*, That this preamble and resolutions be published in the New-York city papers, and that a copy also be furnished to the managers of the American Institute:

"*Resolved*, That the secretary of this meeting and G. R. Lillibridge, be a committee to present these proceedings and resolutions to the managers of the American Institute."

The managers have cause to congratulate the members of the Institute on the final results of this jubilee of the arts.

Respectfully submitted,

GEORGE F. NESBITT, *Chairman*,
CHARLES A. WHITNEY, *Vice-Chairman*.

F. W. GEISSENHAINER, Jr.,
JOHN A. BUNTING,
EDWIN SMITH.
ALFRED BRIDGEMAN,
JOHN V. BROWER,
HENRY SPEAR,
THOMAS F. DE VOE,
JOSEPH COWDIN,
PETER B. MEAD,
SAMUEL D. BACKUS,
B. J. HATHAWAY,
JAMES R. SMITH,
DAVID R. JAQUES,
HENRY STEELE.
CHARLES TURNER
WILLIAM HALL,
BENEDICT LEWIS, Jr.,
JOHN GRAY,
JOHN F. CONREY,
WILLIAM EBBITT,
JAMES N. WELLS, Jr.,
W. H. DIKEMAN,

WM. B. LEONARD, *Cor. Sec., Ex. Off.*

JOHN W. CHAMBERS, *Secretary*.
NEW-YORK, Jan. 1, 1857.

OPENING ADDRESS

AT THE TWENTY-EIGHTH ANNUAL FAIR OF THE AMERICAN INSTITUTE, SEPTEMBER 24, 1856.

By the Hon. HENRY MEIGS, *Recording Secretary.*

LADIES AND GENTLEMEN.—The managers request me to salute you on the opening of the twenty-eighth Annual Fair of the American Institute, in this splendid Crystal Palace. It is my highest pleasure to obey their request in opening to America, old and young, the abundant new demonstrations of their noble progress in these, the God-bidden works of their hands.

You see that there can be few folded *far-niente* arms in our republic. The *do-nothings* are almost as scarce as the mammoths. We are all, from the first planting of our feet on this great continent, carrying out, with unexampled energy, every work which can make it the greatest wonder of the world. The old world looks to this new one as a new star of the first magnitude now. Truly, we do talk magniloquently of ourselves. The rest of mankind will soon do it for us, when our flying cars and steamers shall have bound our four thousand-mile-wide republic together. Nor is this a phantom of the present, but a solemn verity, looked at from the first days of our ancestry at Plymouth rock and the land of Pocahontas.

The wisest and best men have never ceased to proclaim the mission of our race to be—*all America,—the Bible,—the books, industry of all,*—a continent entirely cleared of barbarism in manners as well as sterility of soil,—all over "dotted with school houses and churches," like stars in the heavens, as our orator, A. H. H. Stuart, once said here. Look at our poet, Barlow, (whose epic, "The Columbiad," is not read as much as it should be)—he and Colonel Humphreys, (afterwards distinguished by being one of the first importers of merino sheep, some fifty or sixty years ago,) and Timothy Dwight, (President of Yale College)—all three poets, who made animating verses for the benefit of the soldiers of the revolution, and their spirited songs availed our patriot soldiers much, in their severe toils and dangers, and no-pay sufferings. In the meantime, while our great revolution was in progress, Barlow was planning an American epic poem, which he baptized "The Vision of Columbus;" who saw

"The star of empire westward take its way."

This "Vision" was first published in 1787. The poem distinctly pointed out the way we have now gone, and the future. Dwight had the same views, and took occasion (July 25th, 1776) to address a class, and point out the same grand prospect of the republic—"covering the whole continent, from sea to sea." He even said that some of his young hearers would live to see it; and several have lived to see California added to the great map.

Let me remind you, ladies and gentlemen, as to the special business for which the American Institute received its charter from this State, so that all may judge as to its performance of the duties assigned to it, viz.: "To promote agriculture, commerce, manufactures and the arts."

To carry out the first great duty, we have established a central and convenient repository in the heart of this city, (351 Broadway,) with large, well-ventilated, warm, and gas-lighted rooms, with a library of 8,000 volumes, (selected,) a librarian, a special secretary for the Farmers club, a corresponding secretary, and an able clerk. All this is free to visitors,—is a place for reception and distribution of seeds and plants, for which we constantly owe thanks to our intelligent and patriotic mercantile and United States naval marine, for contributions from all parts of the globe. At the same repository the great mechanic interest is sustained by a free club, which meets twice in every month; and where all models of machines are deposited for examination, and remain long enough to be well understood. New models of vessels of all kinds, and any matters of interest to commerce, are placed for examination. All works of art are also welcomed to the repository. All these free of expense to the owners.

As it has been in former days,—and far worse than these—fashionable to consider a human being degraded by labor, (so that the peasant of old times was called a *villein*, and not long ago a "clodhopper," because he was obliged to be busy among the clods turned up by the old-fashioned wooden, or, occasionally iron-pointed, miserable bull-nosed plough, not better as a tiller of the ground than the snout of a good sized hog a rooting;) and the mechanic degraded likewise to many degrees below the fashionable; and as in modern reformed society it has already become fashionable to admire and practise some gardening, some farming, and to praise even hogs and little pigs, we vote this the most glorious age yet seen by man; nor can the great classes of men on which the glory and safety of the world depends remain any longer unfashionable.

Our position is antiquity. The common notion that the ancients were older than ourselves, stands reversed. When the world was young, so were the productions of the world. As progress has shown in millions of forms, the character of plants, of many animals, and of man, all have advanced. The young world of a few thousand years ago has grown to be manly; almost every work of his has advanced with his age, and he must go on. This beautiful globe, which he was appointed to keep, has never yet been used by him, except in small portions. The greater part of its surface has never felt the civilizing power of man,—the immense continent of Africa yet unexplored—the mighty valley of the Amazon, nearly four thousand miles long, just lifted up to view, under the hands of our Maury.

Some say, now a days, that we abound in *old fogies.* Very good! and they are three thousand years ahead of all those *young fogies,* whose blunderings through a number of dark, very dark ages, began to vanish before the dawn, and now, the broad noonday light of letters and the press.

The farmer is justly entitled to much; but one may put such questions as these to him : Who made your hat, shirt, jacket, coat, wheelbarrow, cart, plough, hoe, scythe, horse-shoes, house, glass windows? Come on. Answer. Or your book and newspaper? Aye, and the paper you write on? Aye, who made the mill which grinds your corn? or the wonder of the world, steam machinery, ships, &c?

Come on. Let me take from you all that has been supplied by the mechanics of the world, and you will instantly find yourself stripped stark naked, with neither house, nor bed, nor bread,—naked as an earth-worm.

Glory, then, to the mechanic arts, granted by the Almighty to man, whom He, of his infinite goodness created "after his own image," and endowed with the mighty power given to no other being—that of *creating myriads of things which God himself was pleased to leave uncreated*,—a power which all thinking men view with solemnity, and many, less strong-minded, look at with superstitious dread. Even now, tens of thousands of men deem Franklin almost, if not quite, impious, for daring to attempt to ward off a thunderbolt from heaven;—the same men, who build tight houses to ward off rains and tempests, cold, and the heat of the heavens.

You cannot fail to admire the works of our fellow-citizens displayed in this palace of the people. I will not attempt (for it would be vain in me) to describe to you all that is here. But among other mighty matters, I see some little things whose power of wholesome revolution among the best half of us (the *ladies*,) strikes me as wonderful. I mean the sewing-machines. From creation to this day have all the women of the globe been condemned to the painful, stooping, injurious, minute stitching, of all the clothing of the human race, and that much of it, very imperfectly. How noble, then, is this little magical implement, restoring woman to her proper upright posture, and a power to do with ease the work formerly requiring a large number of hands, and that, too, with inimitable accuracy. Speaking, as I now do, for the managers of this interesting annual of the republic, I must ask you to consider well this great collection of the works of American citizens, of one year only,—the new, the altered, the amended—all, all for some useful purpose.

Look at the progress made, and look for more in the near future! To substitute mechanic powers for animal powers is a grand object now. Since the astounding displacement of tens of thousands of post-horses at ten miles an hour, by steam-horses at fifty to one hundred miles an hour, Boydell of London has contrived a steam traction engine, which, under view of a committee of the British government, July last dragged a heavy siege cannon and its accompaniments, weighing eighteen tons, up a hill of one in ten, and down the other side one in eight, and then over a marsh where horses mire, using what is termed "endless railways"—something like a snow-shoe, continually placed before and under the wheels. The committee say, that all the horses in the artillery service could not have dragged that cannon over that marsh.

Newton's London Journal of May or June last, gives us notice that the editor, who had been familiar with the progress of the steam engine from the day of Watt, now believes that the world is on the eve of a discovery of power which will utterly supersede steam everywhere, and intimates that motor to be electro-magnetic. Lardner, in 1851, speaks thus on that point: "And we may safely pronounce that, ere long, we shall have other, and more powerful agents than steam. Philosophy already directs her finger at sources of inexhaustible power, in the phenomena of electricity and magnetism. The alternate decomposition, and recomposition of water by electric action, has too close an analogy to the alternate processes of vaporization and condensation, not to occur at once to every mind. All things justify the expectation that we are *on the eve of mechanical discoveries still greater than any which have yet appeared;* and that the *steam-engine itself, with all its gigantic powers, will dwindle into insignificance, in comparison with the energies of nature which are soon to be revealed; and the day will come when the steam engine will cease to exist, except in the pages of history.*"

The American Institute feels inspired, by its own title, to try to promote all good over all America. Nor will the Institute fail to fill up all the mighty space allotted and yet to be given to us, with good things; nor is it willing to diminish the republic, on either end or either ocean, "the ninth part of a hair."

The laboring world has now, after some thousands of years, found its lawful way to a palace of crystal, equal to any of Aladdin's. Here are enthroned the precious things of the earth, instead of the dynasties of the old world. Here are the real powers of the world, those true *sine qua nons*, worth all the *cannons and kings* of the earth. And here are the ballots of the people, which make tremendous revolutions, and kill nobody.

A citizen of Illinois asks some one to join him in giving fifty thousand dollars for a steam-plough. He wants a hundred citizens to give, with himself, *five hundred dollars each.* Our powerful mechanics will soon put the horses for farm uses as entirely out of the question as they are on the mail routes of the Union, on which none can be seen in a thousand miles, unless unhappily strayed on the track and run over by the cars. So great is the revolution in this particular, that we now find horses and oxen on the railroad track plenty, but they are *all inside the freight cars.*

Instead of a month's foot travel to market, from the West, and a loss of flesh, we have them by thousands in a few hours, and a gain in place of loss of flesh.

I have been speaking of the solids of our country. Now let me say a word or two of the fine arts. The other day I watched with some anxiety the uncovering of a bronze equestrian statue of the illustrious Washington, at Union Square. Is it an artistic success, thought I. When the veil was removed I felt a thrill, beholding him in the same position on horse as I have seen him saluting citizens. Yes, it is a glorious success; and, in my judgment, one of the most difficult of arts.

And the companion art, painting, has made great progress among us. Charming landscapes, peculiarly truthful, together with portraits, not easily excelled anywhere, give life and interest to the rooms of our dwellings.

The lovely arts of design are fast gaining stability among us, making ready to beautify the works of our looms, and all other works of pleasure and utility also.

Music, the companion of every happy family, receives more and more encouragement among us—so much so, that we draw off from old Europe her best artists. Her "Jenny Linds" must all sing here, before their career ends. We have proved our love for the best music, albeit Republics have been charged with the barbarism of "having no music in their souls."

Now, our dwellings are, many of them, more costly than the palaces of old Europe, and not inferior in style or execution. It seems to us demonstrated, that the grand benefit of palaces for exhibition of works of the industrious world, is a *rapid reputation* for an invention that deserves it. A vast assembly from everywhere meets in the palace. Persons knowing and inquisitive in every branch of knowledge, come here to gratify themselves with the success of others; and when an invention presents itself of distinguished merit, the happy inventor, who had hardly money enough to get here, goes to his home with pockets full of money; whereas if he had, as of old, staid in his workshop, with none to praise, because they knew nothing, he would have gained nothing, but who cry out to him, as I heard some of Eli Whitney's friends did to him, while he was poring over his contrivances for ginning cotton, without a dollar in his pocket: "Whitney, you are a clever, ingenious fellow; what a pity you should waste your precious time over these foolish gimcracks of yours. Why not go and do something for a living?"

In truth, it is justly believed that many inventions, greater in value than any we have, have been lost, for want of such an opportunity for fame and for profit. It is believed that we have lost malleable glass. We lost the reaper of the Gauls, used before the time of Julius Cesar until now—a lapse of nearly two thousand years. The Gauls used wagons of a suitable height to receive the heads of wheat, having cutters moving by the power of the wheels, pushed forward through the standing grain by horses or cattle—more wisely than we now do, for they took only the wheat, and trampled the straw into the earth, to keep up its fertility. We can no longer make cutting implements out of copper, as was done three thousand years ago; nor have we now the art of making the steel of Damascus, nor the wootz of India, nor the sword-blades of old Seville.

Truth to say, inventors have so often ruined themselves in pursuit of noble plans, under the pity or contempt, the ingratitude, or, worst of all, utter neglect of mankind, it is not to be wondered at that one who had discovered the elixir vitæ by which man might live a hundred years, and at the end of that term take another glass and live another century, should dash his alembic to the ground. Many a man of great genius has lost his reputation by discoveries ahead of his time, and where there was no place to bring him out properly. The inventor of the art of printing still companions with Satan, for "The Devil and Dr. Faustus" are still not quite out of fashion. Five hundred years ago, a very clever fellow obtained universal infamy by publishing true accounts of China, as he found it, for all the world. For several ages, when they wanted to stamp an enemy with a bad name which would stick to him, they had only to call him "as great a liar as Marco Polo."

All that I desire to say is, that we should be as careful of the interests of our ingenious men as we are of our lives and property—for they are of our property, and deserve the longest, best, and happiest lives. Benefactors as we know them to be, we do not always reflect upon the great value of a single individual genius. One of the best politico-economical writers of any age, (John Baptiste Say,) of Paris, said, in 1804: "How proud is our beloved France of her vast superiority in Arts and Sciences over all the rest of the world. And yet," said he, "all the men that give creation to all this grandeur of France, can meet comfortably at any time *in any one of the smaller rooms of Paris.*

These lights of the world are few at any time, and become fixed stars of the first magnitude. A Newton, a Pope, a Garrick, a Watt, a Washington, a Franklin, a Whitney, a Fulton, a Morse, a Halleck—how small a catalogue can truly be made in a hundred years! We always find about one genius to one million of men, and so quote Horace as to the rest of them: "*Imitatores servum pecus.*"

Before I close, I beg to say a few words in reference to the staff of life—bread.

I have remarked for many years the increasing anxiety, both here and in the most civilized nations, relative to their annual supplies of grain. England and France often show panic on account of deficient crops. This has nothing new in it. Ancient nations, after suffering the horrors of famine, which were almost always followed by a dreadful pestilence, found it necessary to provide for such events. They therefore continued, while they were wise, to store up grain in years of abundance, and no speculation was ever permitted in grain, on pain of death. Sixteen hundred and thirty years ago, the Emperor of Rome, Septimius Severus, kept stored up, for the city of Rome only, grain sufficient to make nearly thirteen millions of barrels of flour, which was enough to give the city five thousand barrels of flour a day, for seven years and that supplied one million eight hundred thousand citizens with their daily bread.

We think ourselves wiser than they in many things. We store up *money debts by hundreds and millions of dollars*, but it is nobody's business to provide for famine years now-a-days. What occurred lately in Ireland and elsewhere, may easily occur to great nations, by means of a moderate increase in the recent maladies in our great crops. Even here, on one of our broadest grain-growing fields of the world, and with the wonderful advantage unknown in the old world until lately—our glorious Indian corn—we have been paying almost famine prices for our daily bread! The memory of this large audience hardly recalls such prices. I remember only a few such cases in this century.

Ladies and gentlemen,—We thank you for your presence here. That ladies should be found applauding good deeds, is not new—civilization in every branch of it—from the flower of the garden—the excellency of domestic life—for virtues worldly and heavenly. Gentlemen, we are happy to see you in the line of your duty, promoting those arts without which our country might as well be returned into the hands of the red men, whose war-whoop for ages raised horror on the land covered by this palace. You have the mighty work before you of tilling and adorning a continent. Vast is the prospect before you. Learn to be as great as the continent you command. Little islands, with little creeks—

islands that would be lost in one of our lakes, would not do for you. Your republic is four thousand miles wide, and there is room enough in it for ten times the number of the Chinese.

Save your principles!—save your corn!—and the grandeur of your Republic will make all governments, past and present, in comparison miniatures.

God save the Republic!

ADDRESS

ON HUMAN PROGRESS, AND THE SOURCES OF THE TRUE AND PERMANENT GREATNESS OF NATIONS,

By JOSEPH ASHBURY SMITH, M. D., M. R. C. S. E.

LADIES AND GENTLEMEN :—I come before you this night to speak of the history of progress, more especially in reference to these United States.

If any expression of mine should grate harshly on the ear, I beg that judgment may be suspended until formed, not from isolated expressions, but rather from the general scope and tenor of my illustrations, and the argument thence arising.

The poet philosopher Goethe, the giant of the literature of Germany, has well observed, that "nature knows no pause in unceasing movement, development and production;" and that, "whether we speak of the earth on which we tread, or of the intellect on its surface, THERE IS A CURSE ATTACHED TO STANDING STILL."

Now, that which is true of individuals, is true also of nations. That curse can only be averted by the earnest cultivation (in the first instance) of natural science. For, if it be contended that moral science is of highest importance to man as a responsible agent, the foundations of morality are closely related to a correct knowledge of the laws and phenomena of the physical and material world around us. It is in the absence of this knowledge that the untutored savage now, as in the infancy of the world, worships the central source of light and heat, or the stars of the glittering, midnight sky, and that with more than pardonable poetic fancy, to giants, fairies, and even to devils, have even in comparatively modern ages been ascribed the construction of those appearances in nature which were once devoutly believed to be supernatural in their origin.

Let us not forget that it is only two centuries and a half since a King of England wrote a book against "demonology," in which he declared that the "fearful abounding in his time in England of those detestable slaves of the devil, the enchanters, moved him to haste in writing this treatise; to resolve thereby the doubting hearts of many; both that such assaults of Satan are certainly practised, and that the instruments thereof ought most severely to be punished."

To the slow progress of the physical sciences during the past two centuries must be referred the negation of the aphorism of Bacon, that "Knowledge is Power," or why would a distorted conception of the divine command and of human duty have consigned, even in this country, hundreds of trembling, ignorant and imbecile old women to the doom of witchcraft. Their conscientious judges, even with their limited capacity and knowledge, more truly deserving to be hanged or drowned than they. Yes, Knowledge is Power; and, if knowledge be not identical with goodness, it yet stands so immediately related to goodness that inspiration itself has asserted that for the soul to be without knowledge is "NOT good." Knowledge is power, and both must sink or rise together, and if knowledge be not goodness—ignorance and crime (such is the unfailing experience of mankind in all ages) have been ever found inseparable.

If there be no necessary connection between the study of the physical sciences and our highest interests, then, every wider view that astronomy discloses respecting the extent of this magnificent universe, would serve only to tantalize with fruitless curiosity the beings that have been endowed with intellects able needlessly to glance at such glories, and then—to lie down in darkness forever. Not astronomy alone, but every department of human investigation impresses upon humanity the conviction,

> "'Tis but a part we see, and not the whole."

And do not such studies irresistibly lead to the conclusion that faculties so susceptible of improvement, will hereafter find more enlarged and fitting scope for their *permanent* rather than their transitory exercise? Besides, the improvement of our faculties in the study of nature, (even so, is best to apply our knowledge to human progress,) is but the study of one form of that revelation which the Divinity has made to man,—the foot-prints of that Infinite Mind, pervading mind as well as matter, living in all the forms of life, acting in all the grandest, in all the most subtle operations of nature. Most carefully in this place would I abstain from any reference to interdicted topics, yet my audience will bear to be reminded that scientific truth is but another name for the laws of nature, and that such laws are merely the expression of the uniformity of the mode in which the Great Author of Nature operates in the created universe. All science then, is only a history of the divine operations, and all scientific truth is but the proof of the existence or the illustration of the perfections of Deity. Let it not be said then, that in advocating the unlimited freedom of the exercise of the human faculties upon all that is legitimately within their grasp, there is the danger of fostering the pride of human intellect. Nobly has Sir John Herschel vindicated science, and even the cultivation of a national and secular education from the charge of sceptical tendencies; and the aphorism of Lord Bacon is much to the same purpose, that though a smattering of philosophy may lead to atheism, a thorough acquaintance with it, instead of fostering an overweening self-conceit, only furnishes the best safeguard against enthusiasm and self deception, and inevitably leads to the recognition of the elementary outlines of all practical religious truth.

Knowledge and thought, or the power of accumulating facts and then combining and reasoning upon them, constitutes at once the delight and the exclusive prerogative of Man, and as such, form the basis of all national wealth and true supremacy. Plato has told us that Socrates desired that "reason should be held as the sole interpreter of nature." But when in after ages intolerance held up the mirror to nature's face, or attempted the support of her own prescriptive dogmas by denying the apparently irreconcilable truths presented by the telescope to the senses; when science paralysed by fear, tremblingly refused to look her own truths in the face, because they contradicted assumptions based upon a most venerable antiquity—what could be expected in behalf of human progress from such weak renunciation of human privileges? "*It does move*," obstinately persisted the immortal Galileo, when priestcraft threw him into an Italian dungeon for denying that literally the sun "hastened to go down to his place," for asserting the daily and annual revolution of the earth. Even in our day, when conventional opinion is yet open to a wider freedom, a more charitable liberalism to every newly demonstrated fact; there are yet a few who have not bowed the knee to Mammon or cried "Great is Diana of the Ephesians," men who would dare the gloom of a prison rather than yield upon any department of human investigation their opinions to authority, or waive their inalienable human birthright of freedom of thought and speech, those social, intellectual and moral rights, which, while they contend for as their own, they would extend free as the viewless winds to all mankind irrespective of creed and race. These are men to whom true science is that element in which they "live, move and have their being"—men whose object is truth, fearless of the results of its diffusion—men who trace degradation stamped on the spirit of that slave who is too idle or too fearful to rejoice in the onward spirit of enquiry—who cannot perceive in it the element and source of every fresh acquisition in the path of progress, who dare not examine the current opinions of his age and nation; branding as idle curiosity, useless speculation, or it may be irreverent restlessness, the efforts of those who would extend the boundaries of human knowledge, and throw down the barriers which thus far have reflected back its rays upon only the privileged few.

Let us rejoice that we live in this latter and better age. Formerly, partly from mistaken fear as to the consequences of its diffusion, but more from an ungenerous, exclusive and tyrannical wish to fetter the human mind, and that, because ignorant masses are the most subservient slaves of every political despotism, the simplest truths were veiled in studied obscurity. Ignorant of the grand and glorious truth that education is the mainstay of that government which ought to be exercised over human beings regarded as *free*, the policy of past ages has characteristically been directed rather to repress than to energise that intellectual progress which alone can make men good subjects under any government. The results are sufficiently apparent. The whole of the eastern hemisphere forms a grand arena upon which, for the in-information and instruction of the west, for the past 6,000 years, has silently yet loudly been demonstrated the fact, that, just in proportion as liberty of thought and speech has been crippled by power, in equivalent ratio has been the decrepitude of national greatness. What is it that has enabled the present generation to appreciate the truth of this great general principle? What but the popularization of physical knowledge, the multiplication of cheap and intelligible books, the existence of such institutions as this. This, as I hope to convince you, is the true progress of society—the lasting and real emancipation of the many from that most base of all thraldoms—the thraldom of fear founded upon ignorance.

There is a close, immediate, and necessary relation between the progress (even of the physical sciences) and the march of freedom. It must be so. Each involves the privilege of thinking, examining, freely, and of speaking openly. Exclusive knowledge is exclusive power, and the experience of all ages proves that such knowledge and power are invariably employed for the mistaken and selfish purpose of the perpetuation of popular ignorance. If social rights be at this day and on this side the water better understood, insisted upon, and enjoyed, than formerly, it is traceable to no other fact than this, namely, that men cease to be the slaves of tyrants when they begin to think. From the moment in which they commence the employment of their observant and reflective faculties, in the acquisition of even any species of knowledge, whether it be the age of a fossil, the distance of a planet, the nature of a mineral, or the truth of a moral principle—from that moment may be dated the downfall of the ignorant, selfish, and cruel influences that oppress and degrade them.

> "He is the freeman whom the truth makes free,
> And all are slaves beside."

The parent of that stupid admiration extended to the past tyrants and destroyers of our race, is ignorance. The men who silently worship such greatness are akin in spirit and intelligence to the pagan idolaters of a comet. On the contrary, rational admiration rises with the tide of knowledge, with what we can appreciate and love, whether it be associated with the name of a Washington or a Franklin, a Newton or a Maury. Led by the hand of men who loved truth and liberty that they might diffuse it, every step into a more intimate acquaintance with physical and moral truth, leads to the entrance of new and delightfully interesting enquiries—to the presentment of fresh mysteries to be unveiled, fresh truths to be held up to the approval of legislators and statesmen. All this is suggestive of enjoyment. Mind, like the gem once entombed in the earth, is susceptible of a polish and a resulting brilliancy that is more than ornamental. Eliza Cook has beautifully put it, in her pretty woman-like way, that charcoal and the diamond are both, chemically speaking, the selfsame thing; it is only the varying arrangement of the particles, and the cutting and polishing on the surface that constitute the difference. Yes, you may drag this black and seemingly valueless charcoal from its dark prison house in the Five Points, you may vainly expect ignorant, untutored mind to perform all the pleasing duties of educated intelligence, you may seek to restrain by penal enactments all the vices and crimes untaught, uneducated, uncivilized mind is perpetually and painfully obtruding upon society. Now, what is there in our anger more rational than in bidding the dead man to rise and walk? Our regrets in this matter are somewhat hypocritical. The wagoner was told by Jupiter to set his shoulder to the wheel, and that then he might expect assistance. Before we seek for new forms of coercion, and erect more jails and prison houses as the evidence that no higher or better instrumentality is available to deter men from crime, instead of whining over the ignorance of mankind and its results, would it not be better to ask ourselves if individually we have aided the collective effort to remove it? It is not half a century, since every month about twenty men were regularly strung on the gibbet at Newgate, for sheep-stealing, and similar enormities. But what a sanguinary legislative code could not effect, the progress of education is effectually doing for my native land.

The political position of every man, and the social position of every man, how lofty or how humble soever it may be, is indissolubly linked with his ultimate and permanent position as a moral being. A man is a good man or a bad man—in greater or less degree, he is either a taint upon his country's mind, or he is a throb of hope in its great heart. And, if it be upon the vigor and soundness of that spirit—upon the moral sum of the casting of this great account that the well-being of a State depends; how can it comport with the security of the whole, that any great or essential portion of the people should remain untaught, unlifted from the daily drudgery of the life-scuffle for food?

Away then with the idle fear, and more emphatically away with it here, in this country, this resting place for the weary foot of the wanderer, who, in the spirit of the Pilgrim fathers, asks for the unfettered exercise of his birthright. Away with the apprehension that knowledge will become degraded, dishonored and absolutely perverted if the portals of her temple be flung wide for the multitude. Fortunately even the most laggard nations of the old world are beginning not very dimly to discern the fallacy of the assumption that the masses will only secure an imperfect and therefore useless amount of information which they will inevitably apply to bad purposes. *Do not believe it.* It is one of the most gratifying features of American intelligence and greatness that *you do not believe it.* Already we hear the distant roll of the chariot wheels, the railway train is but the material and tangible type of what is present as a significant emblem of the pregnant future—already the dawn of that day is breaking—already a bright and parting spot is seen in the murky sky—the clouds of ignorance are rolling away, and soon the tear will be wiped from the smiling face of oppressed humanity. Even now, no longer can a privileged class arrogate the exclusive right to the Tree of Knowledge, or monopolize rest under the shadow of those wide spreading branches whose "leaves were for the healing of the Nations." Mind, glorious, emancipated mind, while it reverently bows at the footstool of rational rather than authoritative proof of the existence of a revelation from God to man, interprets it under His guidance rather than that of beings equally fallible with himself, and, shaking off the fetters of 6,000 years exultingly leaps to new life and activity. For what is Liberty but the offspring of Knowledge—the darling first-born of mind when left to its own unfettered impulse? What is it but the enunciation or practical enforcement of the doctrine of our common participation and right to the enjoyment and application of all truths—that Common Right, ill understood, worse defined and associated with a perfectibility as ill defined and even more imperfectly comprehended; a Progress that has for its necessary and inevitable end the amalgamation of all men, simply because they are men, into one common fraternity—a brotherhood the object of which is the free development of the best powers of every man and of all men for the mutual good of himself and of the beings upon which he is socially dependent around him.

To such a man, the earth and the starry heavens, the powers of steam and electricity, of every invention and discovery, are virtually, nay, actually his own. He realizes all that can arise from their existence. All nature is the workshop of his untiring, studious activity, and to this end was this "universal frame" and his own adaptation to its condition. Deeply rooted in his inmost nature is the spirit of enquiry, and closely related do we find it to the full recognition of the bond of humanity. The Brahmin tells us that this huge round world rests on the back of an elephant, and that the elephant rests upon a tortoise. But if curiosity go profanely further, and asks what supports the tortoise, the enquirer is referred to authority, and might if he would or if he dare, question its value. Reason will always bow to authority in matters that are not susceptible of the same kind and amount of proof as the physical sciences. But in that case it is absolutely essential that the existence of that authority should be demonstratively authenticated.

It has been said by the historian of America, (need I say, by your own George Bancroft,) "The child now at school could instruct Columbus respecting the figure of the earth, or Newton respecting light, or Franklin on electricity; the husbandman or mechanic in a christian congregation solves questions as to man's destiny which perplexed the most gifted heathen philosophers of the old world." This is a startling assertion, but it is not in such a man to utter a paradox. The onward progress of practical intelligence is a serious subject for contemplation, and it is indeed difficult to define the line of demarcation between the possible known, and the impossible unknown. If Newton could say concerning his own sublime discoveries, that he felt as a child might feel that had picked up some pretty pebbles and shells on the shores of the fathomless ocean of truth, it is certain that the immense successes which the inductive philosophy has realized, have enabled us to approach the horizon no nearer than when our footsteps were first directed across the apparently interminable waste of waters. And yet, there is a process by which human progress is susceptible of admeasurement. The traveller gains (it may be) with toilsome effort, the summit of some lofty mountain path. While ascending, the horizon, distant as ever, rises at every step, retreating as he advances. The dividing line between sea and sky, between earth and heaven, is as sharply marked, as impassable, as unapproachable, as at the outset of his journey. But he may pause for a moment, he may look back, downwards and across the wide plain, he may gaze into the dim distance, where half hid in purple shadow and vapor, nestles the cottage home he left in the morning. From that elevated point of vision he may measure the intervening space with some accuracy. And thus in reference to Human Progress. The only correct mode of estimating our position, or of forming any conception of our possible future triumphs is *comparative*, and is closely connected with the accurate determination of the original condition of humanity. Noting its history through six thousand years, we may easily detect the operation of those influences which have obstructed its march, and the circumstances which have favored the development of its most useful energies. History, rightly studied, is only the detail of very varied experiments, in which are involved the deterioration or the elevation of the great family of man. The process has been continued sufficiently long, through at least 150 generations, and it is for us, upon whom the "ends of the world" are come, to say, whether as yet the lessons deducible from history are intelligible.

Thus, then, before we speak of what the diffusion of intelligence is doing for the age in which we have the happiness and the responsibility to live, let us advert, as briefly as possible, to the past moral and social history of our race. We shall then be better enabled to institute this comparative estimate, and by determining the positive amount and character of our progress, ascertain not merely what may favor or impede it in future, but even more than this, form some approximation to the idea of what ultimately we may reasonably expect to realise.

The nations of Europe, now the most powerful section of the globe, are of Asiatic origin. In that cradle of the human race the most firmly rooted despotisms have maintained their original character and tendency through a long series of ages. The voice of the primitive Asiatic world is yet heard in the ancient cosmogonies of India, Burmah and China. Much of the early tradition of these nations is lost.

Passing from scene to scene of the world drama, the great facts in the *intellectual history* of the nations upon which have hung their destiny are easily traceable. We shall find that the permanent greatness of a people does not depend upon mountain barriers or ocean girdles, but upon that *self-respect* and *self-reliance*, which are at once both cause and effect, the result of Education, in the largest acceptation of the term, and the *incentive* to its *wider* extension.

Which of the empires founded, not upon nature, not upon a due recognition of the wants and destiny of an intellectual, free, responsible and ever advancing being; which of these, founded upon violence done to nature, have long endured? While Athens and Carthage were content with their own toil, (though there were other causes of certain but prolonged decay,) they were invincible and free. When they took to foreign spoliation, the compact fabric of their greatness burst asunder like the attenuated soap bubble. How long did the empire of Charlemagne endure? Not till his corpse was cold. Over the dead body of Alexander the Great his feeble successors quarreled. To come to later times, what in all human probability *might* have been the issue had Napoleon avoided the disastrous attempt upon Russia in 1812; or think you would Louis Philip have been compelled, in his old age and after so much good fortune, to style himself *Mr. Smith*, and escape in an open boat, but for the madness which impelled and determined his ambitious grasp at the succession for his family to the Spanish crown? On the contrary, what has kept Switzerland free? Assuredly not her Alpine bastions. These have been crossed as often as they have been attempted. The tide of aggression has oft swept over her icy walls; why has it not remained? Is it because her people are all of one mind in habits, customs, opinions, religion? The same diversities exist there as here. No population in the old world is so divided in creed, dialect and local institutions. But they have one national faith, it is the inextinguishable *love of their country*, and, next to this, they love because they understand and enjoy that freedom which springs out of a rational and cultivated intelligence. Knowing not the aristocratic distinctions which in other countries obtain among privileged classes; having never sought to make a slave, they are therefore never doomed to recognize a master. And, I would ask, appealing to the proud and ennobling nationality of the American, is the name of William Tell more sacred to humanity than that of George Washington? Is there a spot among the snow clad peaks of Switzerland more holy than that where repose the martyrs of the prison ships; or that where sleep the brave spirits that fell at Bunker's Hill? Well did the great historic antiquarian say, "Not only in the divine Tyrol, but on moor or heath I could live happy and feel no want of the arts, among a people who had a history."

Enough of the traditions of ancient nations remain to justify the conclusion that the character and unchanging political and social degradation of these countless millions, this immense majority of our race, is traceable to the perpetuation of a system inimical to the free exercise of the faculties of the human mind. How the ancient mythological traditions of the Hindoos originated is not within the range of our present inquiry. It is enough now, if we can trace in close connection the *perpetuation* of legendary fictions, and the establishment of privileged classes, through the organization of *caste*, the domination of a priestly class confining the human intellect within their narrow prescription; and, *as the result of all this*, the fact that they present in their political degradation under the British yoke, the most remarkable phenomenon in the modern history of the world. Remarkable it may be, but not unaccountable. Conquered from conquerors, the government being virtually landlord, the utmost, the sole attention of the ten thousand white officials, seems concentrated upon methods of taxing the one hundred and sixty millions of this inoffensive and servile race—of shifting and balancing the burdens under which the peasantry "totter through their weary lives." Were it ascribable to any other than to the causes we have indicated, how would it be possible to account for the fact that the more intelligent inhabitants of a little island in the distant north Atlantic, separated from them by a sea route of more than 12,000 miles, have, to this hour, with a mere handful of soldiery been able, spite of a few convulsive struggles, to hold them in unresisting and miserable subjection. A low and mournful plaint rises to heaven with every fresh record on the pages of the history of India. The day of *Retribution* WILL come; nor will its vengeance be less sore because the overruling agency of the moral Governor of the universe has permitted her spoilers to carry with them a civilization, a literature and education that will be felt in its recoil. The day of retribution *will* come. The haughty Spaniard has desolated long ago the fair fields of the southern hemisphere. He has felt it, and now, like a crippled, toothless old beldame, Spain sits helpless, proud and poor among the nations, grasping with fear the few remaining links that yet are left her of the chains of slavery and of conquest. Does not the past teach as with a tongue of thunder what are the elements which secure the real greatness of a people, and form the surest safeguard against the rapacity of less truly intelligent powers? But for other agencies which may prolong her existence, the fate of Carthage may be the fate of Britain; and not only of Britain but of every nation that seeks to grow rich chiefly by foreign conquest. For then it is that *wealth* becomes the chief qualification of *power*, and the calm, honest love of country becomes superseded by the reeling intoxication of an unsound prosperity secured by robbery—a prosperity that can only be perpetuated by a denial of the first principles of public justice.

While a great part of Europe down to a comparatively late period was covered with forests, the finest fruits of the earth, the grape, the fig, the pomegranate, the orange, the peach, almost all the productions of our fields and gardens were brought first from Asia. Nature had lavishly bestowed upon India and China every facility for the cultivation of the useful arts, and even of the sciences that have a practical application. Yet a withering blight arrested their progress—petrified humanity into a fossil, curious indeed, singularly interesting, but still a fossil specimen of a living thing susceptible of the highest cultivation, yet arrested in a very early stage of its development. What was this deadly influence that could even perpetuate decay—was it the power of a ruling priesthood? Let the multiplying millions of a new continent rejoice in their exemption. Egypt perished early; of the land of the Pharaohs and of the social and political destiny of the descendants of Abraham, we have no time to speak. Of the four great empires that successively disappeared Greece and Rome are chiefly deserving of attention. Of the Persian monarchy we may remark that under the guidance of Cyrus, after the subjugation of Egypt, she utterly overthrew and superseded the Assyrian empire. At that time, her government was most excellent. Her youth were all educated at Public Schools provided by the State. How then after much provision for the intellectual culture of the people came it to pass that Persia in her turn fell prostrate after the lapse of only two centuries under the victorious arms of Alexander and 30,000 Greeks? A warm luxurious climate, a departure from the simplicity of their laws and habits, the adoption of foreign manners, the lust of conquest, generated by the supposed possibility of adding to their enormous wealth; these threw into the shade the cultivation of that knowledge related to social progress, such as is compatible only with peace; and, enfeebled from these causes they in turn became the ready prey of the hardy invader. It is for us to ponder the lesson of the governments that have passed away; it may be said that their stability during the period of their existence was chiefly dependant not upon the maintenance of a priesthood, but of a less ancient, in fact, a new agent, the Power of the Sword. Alexander wept because there were no more worlds to conquer, and Rome once covered with her victorious legions the greater part of the then known habitable globe. Greece and Rome had their periods of increment and decay. Evidently then, the spirit of Universal Annexation, the cultivation of the military spirit is not the element destined to perpetuate the existence, much less the greatness of any people.

Is the stamp of vitality associated with peculiar forms of government? Monarchs have done much for the promotion of the fine arts. Statuary, poetry, architecture—which reached their culminating point among the republican nations of the old world, owe much to the patronage of modern tyrants. But there is something in Life higher than the cultivation of the Ideal. The poetry of existence is only an ornamental not an essential condition. Of most of these men it may be said, as Evelyn remarked of Charles the 2nd, "He is governed by his passions, and by the women and the rogues about him." So Louis 15th, plunged his kingdom into the ruinous war of 1756, to gratify the anger of Madame de Pompadour, who had been pointed at in an epigram; while Charles IX., under the control of his mother, Catharine de Medicis, madly gloated over the horrible slaughter in one night of seventy thousand persons, merely because of the peculiarity of their religious creed. Could this have occurred among an educated people?

Of the early social history of the republics of Greece we know comparatively little. The denizens of its lovely isles and of the continent where Athens was once the chief seat of polite learning, as they gazed from Olympus or from the lofty Acropolis, crowned by that magnificent temple which though now a ruin yet lives an indestructible model for all successive ages, could not but be enamoured of the grace and beauty of that picturesque region. Music, poetry and painting took their tinge from sky, rock, wood and water, distributed in graceful groups around them.

Education among the Greeks appears to have been directed rather to purposes of elegant accomplishment, than to what in these utilitarian days we should designate as the acquisition of useful knowledge.

Deriving their alphabet from the Phœnicians, their melodious and deeply significant language became the embodiment of the poetry of Homer and the oratory of Demosthenes. Euripides and Sophocles have left imperishable monuments of dramatic power, while Socrates, Plato, Aristotle and Epicurus have left the materials from which it is easy to determine not alone what was the influence of these great minds upon their own countrymen, but from the fact that all successive ages have been employed in their examination, what was their value. Grammar, rhetoric, logic, arithmetic, music, geometry and astronomy, constituted the circle of seven liberal arts which formed the range of their study. In one important respect they excelled modern nations, I allude to the fact that next to the acquisition of a critical knowledge of their own language, the object of Athenian education was to develop the physical powers of the human body, to strengthen the muscles by athletic exercises and public games. The result is seen in the artistic delineations yet remaining in the works of their sculptors, of figures evidently drawn not from imagination but from the life. Those schools were called Gymnasia, and upon the necessity and importance of imitating their example, or rather upon the degeneracy of the moderns who have neglected it, I forbear to enlarge. From tables embracing nine centuries, and terminating 300 years before the commencement of the Christian era, it would appear that out of a list of 863 distinguished names, more than 400 were poets, painters and musicians, 152 were legislators and philosophers, ninety-five were statuaries and sculptors, twenty-eight were astronomers, mathematicians and geometers, but of mechanics there were only nine, and of founders and metallurgists only six. From these data it appears that among the Greeks far more persons were engaged in poetry, music and painting, and in statuary and sculpture than in all the other classes collectively. In the absence of the art of printing, their public libraries hardly deserved the name.

In genius and taste, perhaps, the Greeks have ever been unrivalled. In learning, their profound and curious examination of metaphysical subjects has never been surpassed. They indulged the spirit of patriotism, of love of country, to an extent incompatible with the slightest respect for any language except their own. To the polished Greek every other man was a barbarian. But the elements of permanent greatness were wanting. Greece boasted of great names, but the masses of the people were immersed in slavish ignorance. For them there was no provision. The female sex were maintained in intentional seclusion. It was only by throwing off the restraints of social and domestic life and becoming openly infamous, that woman could be indulged in the gratification of her literary tastes, or be allowed to associate with philosophers and men of learning.

Can we wonder that among such a people, the standard both of public and private morality was always very low? Gazing on the imperishable memorials of their genius, the mind invests the age of her orators, poets, architects and sculptors, with a glory before which, thoughtlessly, the social blessings of a later age become comparatively dim. We copy her temples and adopt the models of the Grecian republics. But neither the philosophy of Plato, the poetry of Homer, nor the genius of Phidias and Praxiteles, could redeem the most tasteful nation of antiquity from inevitable destruction.

Of Rome it may be justly said, that she added little to what she derived from Greece. Athens became during the Augustan age what Edinburgh is to London, the fashionable university of the Roman youth. In Rome, even at the period when Augustus felicitated himself upon the fact, that he found a city built of brick and had left it marble, the study of the fine arts was superseded by a race of political capitalists not materially differing from those who add so little to our own social greatness.

In relation to Social progress, we cannot overlook that the most remarkable feature of the Roman constitution was the early division of the people into the patrician and plebeian classes, a peculiarity which has found its way into the laws of every modern European nation. The strangers who gradually added to her population were not admitted to a participation of civic privileges. Those who possessed the exclusive powers of legislation, struggled hard to maintain their hereditary supremacy. In India, the slaves of *caste* have always silently submitted; to them submission was a sacred duty. They never knew the agitation of that popular strife which, in Rome, ultimately sank under the domination of aristocratic power, and of a soldiery always under its influence. Yet the existence of such divisions, and of class legislation as its results, produced, even after many centuries, the downfall of Roman power and greatness. Public baths—public roads—aqueducts—and a system of drainage and sewerage for the city, such as modern ages have never equalled, were nevertheless among the few efforts that Rome made for the social and permanent elevation of the people.

We have spoken briefly of what the Greeks and Romans knew in the best ages of the republic and the Cæsars. What they did not know is deducible from the fact that their astronomers had no telescope, their navigators no compass; their knowledge of military tactics was such as a rude and ferocious soldiery might acquire who never smelt powder; their literature, their limited familiarity with the exact sciences, confined of necessity to the few, and insusceptible of diffusion among the many, and this because the printing press was to them a more distant and unknown wonder than was the magnetic telegraph to Faust and Guttenburgh.

Rome fell, under the savage crowds from northern Europe The fifth century passed away, and through the long night of the dark ages, a thousand years leave no trace of Human Progress. Alexandria had been destroyed, and its library of manuscripts devoted by Mahometan authority to light the fires of the public baths. The Saracenic power had been established and then driven from Spain, leaving nothing better than the ruins of the Alhambra and similar attestations of a power grand in its isolation, but inimical to social freedom. The feudal system, the age of chivalry, the establishment of the monastic orders and the inquisition, the separation of the eastern and western churches, the mad crusades, in which millions of men perished miserably—these, and the early promise of that which terminated in an open renunciation of priestly authority by the great spirits of the Reformation, might well occupy our attention, not for an hour, but for a life. Nor from this stand point of the world's progress can America, looking with equal eye over the old continent, omit to notice the rise of the Mahometan power in the seventh century, nor fail to enquire what have been the relations of the Mahometan creed to human liberty and progress during the 1,200 years that have elapsed since the coffin of the arch-imposter was suspended between earth and heaven.

She will not forget that whatever be the social predicament of the Mahometan millions of the old world, their notions of liberty and progress have been enforced and perpetuated at the point of the sword by one who assumed at once the regal and sacerdotal office. Comparing results with the instrumentality employed, America will experience no difficulty in determining whether such combined agencies are ever likely to be exerted for the advancement either of national greatness or of social progress.

Nor, with equal fairness, will she fail to investigate the claims of christianity to an alliance with the spirit of liberty—to a relation more close and immediate than that of parent and child—that is, when untrammelled by the degrading chain that in other countries than this, links national creed in disreputable and detrimental connection with the civil government.

We have seen how the institution of "caste" among the miliions of India stands in direct relation to the power of priestly prescription, and how the present degradation of that fertile and prosperous territory, first to the Mahometan then to the British yoke, is the result. The degrading influence we deprecate spreads itself through all gradations of society among every nation that permits itself to forget its own privileges. In the House of Lords Lord King enquired of Bishop Horsley what was the meaning of "heterodoxy" and "orthodoxy." "My lord," replied the bishop, "*orthodoxy is my doxy, and heterodoxy is another man's doxy.*" So, similarly, we have a very illustrative instance of the spirit that animates not alone the priests of a state establishment, but all ecclesiastical dynasties, in the very candid and unmistakable answer which Lord Ellenborough (then Chancellor) gave to a deputation of dissenters who sought some relaxation of the penal law: "*You kept us down in Cromwell's day when you had the power; and now we have got you down, we intend to keep you there.*"

What is the history of persecution which, wielded in turn by men of every creed, has in all ages perpetrated the most abominable cruelties? What is this frightful catalogue of horrors other than the natural result of IGNORANCE of *the great fundamental law of our being*, namely, that civil and religious freedom were never destined to flow in two separate channels, that the attempt to separate them is unnatural and impossible, that they mutually reproduce each other, and cannot exist asunder? Of the Scandinavian hordes that over-ran Europe during the early part of the middle ages, little could be expected in the direction of social or intellectual progress. Their arts and inventions were rude, their passions and pursuits were violent. We yet retain in the names of the days of the week the traces of their mythology. Nor were the victorious followers of Mahomed more disposed to the cultivation of the arts of peace. While all Europe was convulsed with the wild agitation of the Crusades, could it be expected that fanaticism would give way to the spirit of useful progress in those arts which tend to the promotion of human comfort?

Commencing at a time of the profoundest ignorance, that blind and fanatical devotion to the will of the priesthood, in which the Feudal system originated, and without which the people could never have been seduced into enterprises so wild, mad and disastrous, continued undiminished, unbroken by the remotest glimmering of a perception that there was nothing in the wars of the Crusades, and in the sacrifice of two millions of lives to compensate for acquisitions that never could be realized, or to justify a struggle in which the human mind had first renounced its freedom. The military resources of the most powerful nations of Europe were with unexampled bigotry and servility, placed for this purpose at the disposal of a class that in all ages have held in subservient vassalage the intellects of mankind. At the bidding of Peter the Hermit, the warrior unsheathed his shining blade, and deluged for two centuries this fair earth with blood, leaving this only memento, that, neither to the military nor to the priestly power regarded as dominant must man look for the advancement of Social Progress. Nor would it be during the existence of the feudal system that we should naturally look for the exemplification of progress. Every landed proprietor was a mere soldier, and eager for the opportunity of a fray. Prompted by pride, avarice, or revenge, he was ever engaged in some petty quarrel; vice and idleness were perpetually engendering new sources of animosity; the grossest ignorance disabled all men from reasonable adjustment; law became merged in brute force, coarse obstinacy rendered such disputes hereditary, and the social history of the age became embodied in the distich:

> "Theirs was the good old rule,
>   The plain and simple plan,
> That those should get who had the power,
>   And they should keep who can."

Even in a later age of society, we note a king of England imprisoned a Jew and ordered one of his teeth to be drawn daily until he consented to yield up his wealth to his tormentor, or later still the absence of all lower emotions than those which consigned to the headsman's axe and the continually reeking block the lives of a Russell, a Sidney, a Mary Stuart, or oh! shame upon human nature, a Lady Jane Grey! Ferocious and bloody were the legitimate political movements of our ancestors; truly in all ages have the "dark places of the earth" been "the habitations of cruelty." Novelists may gild those later ages with the glittering tinsel of romance, but the verdict of common sense and sober history consigns them to a barbarism unredeemed by even the wild hospitalities of the savage. The compilers of such erroneous illustrations of past ages, the writers of historical novels, care little whether their feudal chiefs, their middle ages burgher, or their Puritan portraits be like the reality or not. Why should they? They know well that the mass of mankind are quite as ignorant of the matter as themselves.

In endeavoring to form a comparative estimate of ancient and modern intellect, and of the respective bearings of the two upon the masses of the people, the first and the most obvious matter for investigation is, the mode in which respectively it has been exercised in past and modern times. It was once a matter of grave debate how many thousand angelic spirits could dance upon the point of a needle without jostling each other, but it was reserved for modern ages to dwell upon the fact that "all our knowledge is derived from experience;" and while the philosophers of Greece and Rome were wasting their energies in abstract metaphysical enquiries, the world, as to any practical advance in useful knowledge, was standing still. The scholastic learning of the middle ages was merely the acquisition of an intimate acquaintance with the creatures of the imagination of Plato or Pyrrho, or with the systematic reveries of Aristotle and his followers. In later days Locke, Beattie, Reid and Dugald Stewart have endeavored to ascertain and define the amount and value of the researches of the elder metaphysicians, but, like the attempt to extract "sunbeams from cucumbers," the practical results of such studies, though enveloped in the learned dust of ages, are more glittering than valuable. It was well said as to the definition of the term "metaphysical science," that when one man was talking obscurely about what he did not and could not comprehend, and another did not understand him, he was talking "metaphysics." There is some truth in this popular witticism. The great defect in the philosophy of the ancient world was, that though it might by transmission deserve the name of learning, it scarcely deserved in any age the name of knowledge, that is, as we understand the terms, applying it to something we can reduce to useful practice. It was not until Bacon and Newton gave a new direction to human intellect, that the age of progress was fully inaugurated. The Greeks and Romans were learned and polished in a species of intellectual gladiatorship, and they excelled, as we have seen, in the cultivation of human genius as developed in many branches of the fine arts. But in this they differed from the moderns, namely, that their ignorance of the works of nature and of the laws which are impressed upon the material universe were not only extreme, but more than this; they sought to interpret the facts impressed upon the senses by the aid of *preconceived theories.* They failed to question nature aright. The universe of matter is made up of facts, which, observed, traced out, arranged, lead up to the knowledge of certain laws and forces, of which all true and practical science is but the exposition. Of science based upon such grounds, whatever might have been their intellectual ingenuity, the ancients were profoundly ignorant.

And yet the physical philosopher is a man of cultivated intellect. The observation of facts forms the only foundation of science; and a fact isolated and unexplained has no scientific value. The fall of an apple, regarded as a fact, is extremely commonplace. It was reserved for the mind of a Newton to eliminate from that simple fact the great doctrine of gravitation, and its application to the explanation of the tides of the ocean as well as to the orbital path of the planetary bodies. Every successive step in the onward path of science has demanded the utter negation of that philosophy which formed the basis of all previous enquiries. It has been sententiously and well remarked of the *inductive* philosophy, which has formed the keystone upon which Newton was content to build his imperishable conclusions, that "two words form the key of the Baconian doctrine, Utility and Progress." The ancient philosophy disdained to be useful, and was content to be stationary. It dealt largely in theories of moral perfection, which were so sublime that they never could be more than theories; in attempts to solve insoluble enigmas; in exhortations to the attainment of unattainable stoicism. It could not condescend to the humble office of ministering to the comfort of human beings. According to Liebig, the quantity of soap consumed by a nation would be no bad or inaccurate measure of its progress in civilization. The rich, in the middle ages, concealed a want of cleanliness under a profusion of perfumes, a practice which, unhappily, has descended to the fashion of the present day. The manufacture of soda from common salt, as preliminary to the cheap production of soap, affords a striking illustration of the processes of inductive modern science. Soap and glass, both among the first necessaries of social life, depend for their manufacture upon the formation of sulphuric acid from sulphur. Thus the chemist becomes the pioneer of civilization, opening a mutually advantageous traffic with Sicily, exchanging our own productions, and not indirectly promoting the extension of the highest blessings of which our moral nature is susceptible.

The connection between the modern and physical sciences, and even between the realized comforts of practical commerce and the great principles which underlie all scientific discoveries and their application, is so intimate that it might be traced in a thousand instances. The only difficulty is in the selection. The magnet, in the hands of one of the sages of antiquity, would have remained a mere curiosity. But the compass was invented precisely when the world was emerging from the old philosophy, and the instantaneous reward of the examination and application of the magnet was the discovery of America and the passage round the Cape to India. Now, if a new world had not been thus opened, if cotton had never been exported to England, and iron for her railways been sent in return, not only would millions on both sides the water have been left without profitable exchange of labor, but the masses of mankind would have been worse clothed than the serfs of the middle ages, and the scanty and expensive quantity of "fine linen" would have been monopolized by the rich as effectually as when manufactured by hand labor in the days of Solomon.

The boast of the ancient philosophers was, that their teachings formed the minds of men to a high degree of wisdom and virtue. What that was, may be well ascertained from that authentic portraiture of the morals and manners of the classic world left on record by that polished scholar, Paul, in the opening section of his epistle to the Romans, as well as from the concurrent voice of all profane history. The aim of the Platonic philosophy was to exalt man into a God, but it was based upon absolute ignorance of human nature, ignorance that gained nothing by its own speculations. The aim of the modern philosophy and the secret of its success has been to provide man with what he requires while he continues to be man.

The philosophy of the ancients began in words and ended in words, in speculations so abstract that their unintelligible obscurity can pass for sublimity only upon minds incapable of forming an estimate of the actual value of what is presented.

But modern science owes all her triumphal acquisitions to the fact of her character as modern. Discarding all hypothesis, the firm footing of each inductive step gave to Laplace the law of planetary motion; to Dalton, the fact and the consequences of the combination of the ultimate atoms of matter in unalterable and definite proportions; to the now lamented Hugh Miller, and to Hitchcock, arguments in support of revelation from the fossils entombed in the stony recesses of the earth.

Do you ask the results of that philosophic inquiry which is alone deserving of the name? "It has lengthened life, and it has mitigated pain; it has increased the fertility of the soil; it has given new securities to the mariner; it has furnished new arms to the warrior; it has spanned great estuaries and rivers with bridges unknown to our fathers; it has guided the thunderbolt harmlessly from heaven to earth; it has lighted up the night with the splendor of the day; it has extended the range of the human vision; it has multiplied the power of the human muscle; it has facilitated intercourse; it has enabled man to soar into the air, and to descend into the depths of the sea; to traverse the land on cars which whirl along without horses, and the ocean in ships which sail against the wind." These things has it done, but these are only its first fruits; presently it will girdle the earth with the means of instantaneous communication. It is a philosophy which never rests, which has never attained it, and which is never perfect. Its law is progress. A point which yesterday was invisible, is its goal to day, and will be its starting post to-morrow. It is the philosophy of common sense, and if there be aught that is feeling in the language of some men in our day, whose minds are seemingly lost in the admiration of the greatness of the ancients, let us bequeath to them their metaphysical rubbish and learned lumber, while, instead of pondering upon the past, it is for us to "act as in the living present;" to examine physical facts, to seize and use them.

Very much astonished, undoubtedly, must that monk have been, Bertholdus Schwartz, who, in some of his experiments, about the year 1320, putting "villainous saltpetre" with other unknown yet explosive materials into a mortar, saw, when a spark of fire accidentally dropped into the mixture, the pestle fly off into the air. He would have been still more astonished could any one have told him in prophetic vision the future uses, the results of this accidental discovery.

War is an evil, perhaps one of the greatest of evils that can afflict humanity. However, it is a result of the deficient intelligence of mankind.

> "War is a game
> Which, were their subjects wise, Kings
> Would not play at."

Still, while from the ordinary course of human and perverted impulse, wars must exist, whatever lessens the duration of war, lessens its worst evils. In this respect, then, even the discovery and application of gunpowder must be ranked among the agencies of Modern Progress.

The Cape of Storms was doubled in 1497. The riches of India having become known, a wish was entertained to discover a western route thither, and in searching for this western route, Columbus discovered America. The names of Sebastian Cabot, De Solis, Aubert, Jacques Cartier, Vespucius, Cortez, and others, are associated with the early determination of her coast line, both on the Atlantic and Pacific. The year 1492 forms the commencement of the modern and most important era in the history of the world. Let me call your attention to the fact, that after that date, nearly a century elapsed before Elizabeth, of England, attempted to form a permanent British colony in North America, and that whether we speak of England or of Spain, of the northern or southern divisions of this mighty continent, the indications afforded by the past are, that no European nation is destined for more than a brief period in her early history to obtain more than a temporary footing.

And of this great country and people, how shall I speak. The mind staggers under the effort adequately to conceive what the United States has done and is doing in her onward path. We must premise that it is not 300 years since on this northern continent, extending nearly from the Atlantic to the Mississippi, and from the Canadian lakes to the Gulf of Mexico, 2,000 miles in length, with an average breadth of 1,000, there was then one vast forest. As to her extent and resources, we must remember that the valley of the Mississippi alone is wide, large, sufficiently deep to absorb all the nations of Europe into her capacious bosom, and afford them sustenance and fuel for ages to come. So prodigal is

America of her physical resources, that even Americans themselves pardonably fail in the selections of expressions that can afford any conception of them to minds accustomed to some limitation. Here we have a continent 10,000 miles in length, with an average breadth of 1,600, and embracing an area of nearly eighteen millions of square miles, intersected by the noblest rivers and mountain chains on the surface of the globe, possessing every variety of climate, and constituting in every product of her surface and soil the granary and storehouse of the world. Eighty years have hardly passed away since the younger Pitt congratulated her in the British House of Commons as successful in throwing off the English yoke, branding the war that would have perpetuated her slavery, as a war "*conceived in injustice and nurtured in folly—of victories obtained over men fighting in the holy cause of liberty*, or *of defeats which filled the land with mourning for the loss of dear relatives slain in a detested and impious quarrel.*"

So spake one of England's greatest statesmen, and you will pardon me, if, in this connection, I say that if there be aught in the history of my country that is calculated to make my bosom swell with pride at the thought that I also am an Englishman, it would be found, not in the recollection of her victories, not because the names of Trafalgar and Waterloo, of Nelson and of Wellington, are imperishable. It would be, rather, because her senate house is a spot sacred to the memories of Hampden, and of Sidney, because that not with "bated breath" but boldly, openly, fearlessly, the manly recognition and avowal of broad principles of the equal rights of all men, is language which *there* any man may utter, and all will gladly more than tolerate.

Since the hour that Pitt uttered those memorable words what has this country accomplished? Her population, (I speak of the United States,) then a few thousands is now 27,000,000; her cities rival those of the old world in extent, in intelligence, and importance. Her seaboard is dotted with ports upon which depend the prosperity of Liverpool, of Bremen, of Havre. New-York and New Orleans stand at the northern and southern portals of her prosperity, while Charleston, Boston, Philadelphia, Baltimore, (like a chain of pearls strung on the brow of the Atlantic), seem destined to a greatness imperishable as the silken thread that forms the Union. While the annual exports from her most southerly port alone, amount to at least twenty millions of dollars, consisting not of the luxuries but mainly of the necessaries of life, sugar, cotton, indigo and rice, New-York receives annually into her harbor more than 4,000 foreign and coasting vessels; she employs 50,000 seamen, and so far back as 1850, in less than one year, has built thirty-seven ships averaging 1150 tons each, while at the end of that year thirty-one more were building of the same average tonnage. Of the whole sixty-eight vessels, thirty-eight were steamers. Of the United States generally, (so long ago as 1841,) the mercantile marine of the Union amounted to 2,180,764 tons, owned chiefly in the northern states, and her annual imports to nearly 130 millions of dollars, her exports being then-107 millions.

So long as six years ago, the entire capital invested in manufactures in the United States, (not including any establishments producing less than the annual value of $500,) amounted in round numbers to 530 millions of dollars. The value of the raw material 550 millions, amount paid for labor 240 millions, the value of manufactured articles was 1020 millions, and the number of persons employed in these manufactures a million and fifty thousand. According to the census of 1840 the corn crop of the United States was 377 millions of bushels; in 1852, it had extended to 592,326,612 bushels. Of rice, tobacco and other materials, the produce has been equally enormous. Of cotton the average annual yield (terminating with 1850;) is more than three millions of bales of 400 pounds each bale. Of sugar, ten million pounds were made in 1815, on the banks of the Mississippi, in 1850, it had reached the enormous quantity of 226 millions of pounds, besides about twelve million gallons of molasses.

The cash value of farms in 1850 was 3270 millions, value of farming implements 152 millions, value of live stock 543 millions. Of wheat, rye, indian corn and oats, there were raised in the states during 1850, no less than eight hundred and fifty-three million five hundred and ninety-seven thousand and twenty-nine (853,597,029) bushels, besides 215 million pounds of rice and

200 million pounds of tobacco, five million bushels of barley, potatoes in fabulous quantities and fifty-two million pounds of wool. Without passing through the entire list these illustrations may serve to shew what is the rate of progress in this direction in this comparatively young country.

Regarding mankind as one great family, alike interested in the moral government and providence of God, and in that social progress which constitutes the glory of humanity, is there nothing in the fact that the southern States of the Union supply England, the greatest manufacturing nation in the world, annually with sixty million dollars worth of their staple production? Is there in this no guarantee for peace and for the consequent social progress of the two most intelligent nations on the face of the earth? Great Britain excepted, the external commerce and navigation of the United States, exceed that of any other nation. It is not that there is any thing so wonderful in this if it were not that it *has been the growth of less than a century.*

Among the most interesting features of the present age, steam navigation must not be overlooked. Several lines of steam communication between Europe and America are now in existence. Magnificent vessels have been constructed, chiefly by American shipbuilders, which connect the two continents twice every week by a voyage occupying only nine days.

It is neither unfair nor unkind to say that the mercantile marine of America, amounting to one-ninth of all the sea-going ships of the world, excels them all in most of the requisites which can confer distinction, and holds out models which cannot but be generally adopted.

Honor to the memory of George Steers. Conceived when he was a mere boy, his system of ship-building, (now well illustrated in the Niagara and Adriatic, those magnificent ships whose splendid proportions have excited so much admiration,) is based on the assumption, that, for a vessel to sail easily, steadily and rapidly, the displacement of water must be nearly uniform along her line. This principle he has carried out in every vessel he has built. When he laid the keel of the Mary Taylor, he engaged to make her a faster, dryer, and steadier craft than had ever left the port of New-York. He was confident of his power and he succeeded. Before his time a vessel had never been built where the centre of displacement had not been "forward" of the beam. Fears were entertained that this new form would prove a failure. Some predicted that the vessel would plunge under water. Others thought that in rough weather no one could remain on deck, all which prophecies are contradicted by experience. For, encountering less resistance from the narrow bows the vessel went faster, and experienced no corresponding strain, suffering no more in rough weather than in a summer breeze.

What a magnificent FACT is an Ocean Steam-Ship. How completely such a floating palace transcends the wildest dream of which the builder of the gigantic Pyramids or even Archimedes himself might be supposed capable. The social results of steam navigation are yet in their infancy. No man can predict their ultimate character. The old continent and the new are engaged in a glorious rivalry, demonstrating how infinitely the conquests of Peace exceed the glittering and evanescent triumphs of War.

Of the application of steam to railroads, you will permit me briefly to characterize it as one of the most direct applications of modern practical science to the general diffusion of human intelligence and comfort.

From the latest returns, we learn that there were at the commencement of the year 1852, more than ten thousand miles of railroads completed and in use in the United States alone, and more than ten thousand miles in course of construction. It is not extravagant to assume that before the year 1860 we shall have more than 35,000 miles of railroad. At that period, the whole of Europe had only 14,142 miles of rail in active operation of which 6,890 form a network over the little islands of the British crown. Since that time, comprehensive railway systems have been formed by nearly every European power. Hindostan, Algeria, Egypt, and even Cuba have their railways, and it is expected that Canada will soon have open for traffic a line that for length will even eclipse the 461 miles of the Erie Railroad. The great facts are, that the United States possess an extent of road nearly equal to that of the rest of the world combined, and that the independence of America dates only from the latter half of the last century.

Here, where railways were so much needed the average expense of their formation has been about $27,000 per mile. In Europe, the excess of expenditure has been 280 per cent, or on an average at the rate of $96,000 per mile.

Aided by the power of steam and water, what a picture does modern commerce present of the boundless desires of man, and of the advancement he is perpetually making in intellect, knowledge and the permanent elevation of his race. It is only because things familiar to us cease to attract our surprise, otherwise we should be struck with the fact that the breakfast table of the poorest person is supplied from countries lying in the remotest parts of the world of which Greece and Rome, in the plentitude of their power and knowledge, were totally ignorant. But the benefits which mankind derive from commerce are not confined to the acquisition of a greater share and variety of the comforts, luxuries, or even of the necessaries of life. Commerce has repaid the benefits it has received from geographical science; it has opened new sources of industry; it has contributed to the maintenance of health, wealth and comfort, and is the surest pledge of the peace of the world. It effects this mainly by removing national prejudices, and by effecting, directly as well as indirectly, the inevitable diffusion of all practical and useful knowledge. The world (spite of itself) becomes gradually wiser through the operation of the agencies even of commercial speculation. And it would seem that though some purely poetic and ideal minds have repudiated the wholesome homely thought, the multiplication of commercial relations between distant countries is destined not merely to enlarge the boundaries of civilization, but to carry to its utmost limit of development the facilities for the promotion of the "greatest happiness to the greatest number" of mankind.

There is only another gem in the coronal of Science, which is more priceless : the application of Electricity to the instantaneous interchange of thought across the intervening sweep of waters that, for thousands of miles, separate the old continent from the new. It was reserved for your own Maury to point to the possibility of gauging the depth of the Atlantic; to demonstrate the existence of a comparatively shallow plateau across its northern portion, and for American intrepidity and pertinacity to complete the requisite soundings preparatory to threading the bosom of the deep with the submarine cable. That which has already been effected on a smaller scale in connecting the British isles with the Continent, is only the prelude to the more gigantic operation which will instantaneously connect New-York with London, St. Petersburgh and Calcutta.

There lived in the city of Mayence, about the year 1430, two men, the inventors of moveable types and the printing press, one by trade a carver in wood; the other by inheritance a man of fortune. The name of the mechanic was Peter Schoffer, and the name of the gentleman was John Guttenberg. For years they lived apart, unknown to each other, ignorant that the minds of both were at work on the same thought, how they might make moveable letters of the alphabet in wood or metal, and so hold them together as to produce impressions. A plan of types struck the mind of Guttenberg, and a plan of a mould for these types occurred to Schoffer. They found each other out as men will do instinctively, when they want each other. The rich man could do nothing without the mechanic; the mechanic needed the necessary materials. *Between them they have revolutionized the world.* The Emperor of Germany might have built a magnificent palace upon the most approved Grecian model. He might have adorned it with statuary and with paintings such as won for Rubens the honor of knighthood from Charles the First of England. But neither emperor nor king could direct the invention of the printing press, nor the steam engine. No! That originated with the TAXED PEOPLE. As Burns has exquisitely expressed it:

> "The king may make a belted knight,
> A duke, an earl, an' all that,
> A man, is god's handiwork."

Or, as Henry the Eighth was candid enough to admit when defending Holbein, the painter, from the anger of some of his courtly parasites, "I can when I please make seven lords of seven plowmen, but I cannot make one Holbein even out of seven lords."

Luther shook all Europe, and bearded in his den the lion of the Vatican, the priestly keeper of the consciences and intellects of men, precisely at the moment when by the providence of God at least two hundred printing presses were in existence in Europe. I speak not of the reformation in its religious, but in its civil, social and political aspects. How many printing presses are there in Europe, in America, now? Even in reference to ephemeral productions, the newspapers, for instance?

In America, which has set the example of an unstamped press, there were in circulation (six years ago) more than 2,800 newspapers and periodicals, circulating annually four hundred and twenty-two million six hundred thousand copies. Of these, three hundred and fifty were daily papers. At this hour, the number has been increased almost indefinitely. The average circulation of newspapers in the States is such as to allow one publication for every seven thousand of the free population. And though this is scarcely the place for the enumeration, there is one church or place of worship for every six hundred and forty-six of the entire population.

In America, at the commencement of the revolutionary war, there were only thirty-nine newspapers. Sixteen years after the establishment of a paper in Boston, it was proposed to issue a half sheet every other week. By this hazardous enterprise it was hoped that the time between the publication of the paper and the latest European news, then thirteen months, might be reduced to five; and for many years the Boston "News Letter," averaged two advertisements. But when, after the trial of the celebrated Zenger, for libel, and his acquittal, the press became the organ of the spirit of freedom, it assumed a more elevated tone, and exerted a powerful influence in carrying the cause of the revolution to a triumphant issue.

The details of the operations connected with the publication of a daily newspaper, afford a striking illustration of the character of the age. Seventy-two columns of the London Times (a daily paper not larger than many published here,) contain 17,500 lines. It is made up of more than a million pieces of type, of which matter more than one-half is written, set up, corrected, and the whole printed and published between seven in the evening and four o'clock the following morning. The surface printed every night is about 30 acres, seven tons of type are in constant use, and about 120 persons are employed. The greatest number of a single issue have been 54,000. When the paper duty, the advertisement duty, and all other duties are removed, and England can compete with America in the cheapness with which she can supply the masses with useful information, she may then do wonders in the publication and demand for newspapers. But at present America has the lead, and manufactures for England her largest and most effective steam presses. As to the quantity of books, properly so called, printed and published annually, it is more interesting to note the amount of the annual issue in America, simply because she is among the youngest of the nations. It appears that in the twelve years ending in 1842, nearly half the publications issued in the United States were reprints of English books, and that the entire number of works (not of copies or editions,) did not exceed two thousand. The increase and comparative *nationality* of American literature during the past five years are very striking, one popular work of fiction, the effort of a feminine mind, having been translated and sold by countless thousands throughout every country in Europe. The position, strength and value of American literature at the present hour, are such as to challenge comparison with the productions of older nations. In 1852, there were published in this country 966 new books and new editions; 312 of these were reprints of English books, and 56 were translations. During 1853, 879 new books and new editions, including 298 reprints of English books, and translations. During 1854, 765 new books and new editions, of which 277 were reprints of English books, and 41 translations. During 1855, 1,092 new books and new editions, including 250 reprints of English books, and 38 translations. And during the six months to July, 1856, 751 new books and new editions, of which but 102 were reprints of English books, and 26 translations.

Apropos of books. If there be anything of which America may justly be proud, it is of her school books. Neither French nor even English are to be compared with American school books. Mrs. Marcet's works are not in every hand, and the catechisms of

Pennock will bear no comparison with the cleverly condensed elementary outlines of all possible human science which tempt us for an English sixpence on every bookstall, and which, albeit they have been provided professedly for American schoolboys, are found even by children of larger growth particularly refreshing to the memory when used as books of reference for an escaped fact. A French writer of some eminence who has lately spent three years in the States, is compelled to make the admission that "America is the country which has furnished the best epitome of all branches of instruction and of all the sciences." England possesses at this moment no better school history of her country than the miserable catalogue of battles and political changes compiled by Goldsmith, a century ago; an abridgment which furnishes the young mind with not the faintest hint of the causes upon which depend the prosperity or the decline of nations. The French writer to whom I have just alluded, cannot avoid adding, "that these books are for the most part summaries of books printed in Germany, France, and England." Even admitting this, the art of saying in a few words what a laborious and diffuse writer has obscured and overwhelmed in many, is a most valuable facility; and the Frenchman is quite right in saying that in this respect, (and perhaps in some others,) "the Americans have no scruple in taking what's good, wherever they find it." As to the crowning glory of America, her Public Schools, it may be satisfactory to state that nearly four millions of young persons, of both sexes, were receiving instruction in 1850, or at the rate of one in five free persons. The teachers number more than 115,000, the colleges and schools nearly a hundred thousand.

"*Educate your children*," said Daniel Webster, "*and then the country is safe*." Send out broadcast over this land the benign blessings of your educational system, and then, even from the grasp of demagogues will emerge a population that will not seek in more extended territory, in warlike aggression, nor in military power, to maintain the supremacy and permanency of your institutions, only by the same agencies as now support the tottering thrones of the old world.

Let this rapidly growing nation fully adopt the conviction that if America must follow in the "decline and fall" of empires, the result will be determined by her own suicidal hand. Navies and standing armies, so necessary for the monarchical despotisms of Europe cannot defend a people against itself. Here, the people are their own rulers, and whatever be the moral, social and even national attitude of the country, their intelligence and morality has made it what it is. Education renders a standing army unnecessary here as one of the permanent institutions of the land, and education, had its influence been felt earlier in Britain, would have rendered a standing army unnecessary there. As it is, general education will prolong and stay their fall as the want of it precipitated overgorged and all-conquering Rome. You will find that those portions of your country that are most ignorant are infested with the most noisy of demagogues, and if it were possible that the United States could retrograde in the work of general education, the altered character of her laws and institutions would soon subject her to a worse subserviency, to a more vivid and fearful struggle between classes than is now convulsing the worn out despotisms of Europe; the end being only a question of time. Here then, is the true secret of national greatness. The question of general education is not one of many among matters of social progress, it rises to the importance of identification with the causes that have produced and shall perpetuate your very existence as a nation. The moral suasion of the bayonet, the convincing argument of cannon balls, may for awhile rivet the chain that drags slavish millions at the chariot wheels of prescriptive authority; there, where every crowned head trusts to the strong arm of military power as its last its only resort, such institutions may be demanded by the artificial circumstances in which both kings and people are placed.

But, for this western cradle of renovated Liberty, while Maury lifts the curtain and unfolds the stupendous drama of the ocean, and Morse—men upon whose shoulders the mantle of a Franklin has assuredly fallen—while spirits like these adorn your history and render even the very elements of air and earth subservient to human comfort—while the practical and useful are sought and cherished rather than the speculative and metaphysical—while humanity is permitted the unfettered exercise of reason and the free cultivation of those faculties that alone constitute the distinction between man and the brute, there is little fear for human progress in a country which, if Greece could boast of her Phidias, has produced the sculptor of the Greek slave, Hiram Powers.

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BEFORE THE AMERICAN INSTITUTE OF THE CITY OF NEW-YORK, DELIVERED AT THE CLOSE OF THE 28TH ANNUAL FAIR, NOV. 1856.

By Prof. A. D. BACHE, *of the U. S. Coast Survey.*

MR. PRESIDENT, LADIES AND GENTLEMEN—If mind produces material improvement, this reacts equally upon mental progress. Society as it exists comes, humanly speaking, out of these actions and reactions. The state of society in our country at this day is modified by communication by telegraph; by easy personal communication by steam; by facilities for transportation by steam, and wind, and life, which determine the conditions of commerce and navigation,—commerce internal and external. For all practical purposes of communication between man and man, the large area of our country is but as one of the former States of our confederation. The Postmaster-General of the confederation traveling on his way from Boston and Philadelphia, and making it a point to stop at the good inn of Tower Hill, Rhode Island, on his ten days' journey, is typical of that day of small and slow things. He, of the United States, is carried through the same country by the railway, avoiding "Tower Hill," and making no pauses in his way by land and water in a journey of sixteen hours; or, if he prefer land, in twelve hours of travel. Days have thus nearly shrunk into hours. Five days and a half carry one to the far west, near the limits of our interior civilization, reached with months of toil by Lewis and Clark, and by Pike and Long, not fifty years ago. The improvement in dwellings, in dress, in food; the appliances for comfort, for luxury, for knowledge—how great. Compare the Fifth Avenue palace, with its comforts of gas, and warm air, and water; its splendid exterior and interior; its spacious parlors, and chambers, and offices; its inlaid floors, its polished doors, its stained or plate glass windows, and their gorgeous curtains; its frescoed ceilings and walls. Compare these with the front of chequered black and red brick of sixty years ago, the contracted parlor, and the small, illy-ventilated chamber, the "watery dip" candle, and the wide open fire-place, the rough floors coarsely carpeted, the small doors painted ; the windows with nine by six glass, full of veins and streaks, and distorting everything seen through them ; the prim blinds, white-washed ceiling, and clumsily papered walls stained with paste. Life in these dwellings must have its features as characteristic as the dwellings themselves. The arts and sciences thus mould society. Mind is indebted to them for its facility of acting upon mind, and literature pays its tribute, which it returns with interest to the arts.

Through all these changes in the face of society, it would be curious to follow, if we could, the thread which runs through the same families, the same portions of a country, the same races of men. The omniscient eye takes all this in at a glance, and sees how peculiar traits descend from father to child, and are modified as they pass; how particular characteristics stick to the same localities; how they tipify particular races of men. How the descendants of those who resisted tyrants in the olden times are friends of popular rights to-day; how those of the bold warrior of former ages now make the enterprising navigator or merchant. How the Cavaliers and Round-heads of the past re-appear in the gayeties and gravities of modern times. How those races who persecuted, for opinion's sake, with sword and stake, now persecute with tongue and pen. New conditions are enforced by public opinion; but the world is not all free to-day, even in countries of free governments.

Masses of men have their aggregate character, and, as climate is inferred from means of varying temperatures, so may an average typify men in the aggregate. As we may describe climate by its extremes, or by striking peculiarities, or by average indications—so men.

The wants of society express themselves in the institutions which society creates, though those wants may exist long before they are supplied. Christianity was a necessary preparation for the establishments of public charities, the asylums for the destitute and the unfortunate, the halt, the maimed, and the blind, though this want existed before the Gospel was preached to the poor.

It may not employ us unprofitably during the brief time allotted to this address, to consider some of the institutions connected with the wants of our country and of our day; and especially at the close of the Annual Fair for the exhibition of products of the arts and manufactures, to examine some of those devoted to the progress of the arts and sciences.

In this discussion I must necessarily limit myself to those establishments which are generic. After noticing the classes of institutions which are devoted to the education of youth, I shall pass to those for adult education or improvement, and for the improvement of the arts and sciences themselves, such as the American Institute, and the Franklin Institute of Philadelphia, as the types of this class of mechanical institutions, and shall notice the modes adopted by them for progress. The wants which they represent are, mutual improvement by the members, and advancement in the arts and sciences. Next, commerce will claim our attention, and the doings of the Chamber of Commerce of New-York will serve us as text. The great library of the merchant prince, John Jacob Astor, and the Union of that most excellent of men, Peter Cooper, will also be noticed. From these efforts already made, I shall pass to the examination of what I consider the great want of the day, yet unsatisfied—a University of the Arts and Sciences.

You may consider this address as a nook, or a very small corner of the Crystal Palace Exhibition. These institutions are so many frames upon which I intend to hang the objects to be exhibited to you. The frames themselves, like those of the great glass house, shall be put together according to general mechanical principles, and the articles shall be so arranged as not to strike you as "confusion worse confounded;" but the smaller ones, and the pegs on which they hang, may be stuck about in some little disorder, and even some of the wares may be pinned on loosely, for the hours of preparation have been few and short.

In the United States almost everything is done on the voluntary plan. It has produced splendid results, but results wanting, of course, in system. When New Berlin was built, whole streets of buildings upon the same general plan arose, and the palace was set off by the plainer dwelling, the effects of massive uniformity and the more pleasing ones of variety being all studied according to a general design. The materials of the individual buildings were not of a costly sort. With us brown stone, granite and marble, and costly pressed bricks, and highly ornamented iron, are gathered together, and, without order or method, each one builds one, two or more structures as he lists, and the effect of the whole is poor, and even sometimes repulsive. Many of our separate institutions are admirable in their way, but what a heterogeneous mass they form. Each of them expresses a want of the community, for unless they are wanted they die out—but there is no more method in them than in the grouping of the Broadway houses. I know that it is supposed by some that, as a crowd in which each one attends to his own business, is for many purposes of society as effective as one directed by police officers, so these self-directed institutions, separately organized, may be as good as a systematic arrangement of establishments. No one, however, who reflects deeply upon this proposition, divested of the figure, will, I think, come to such a conclusion. Figures are sometimes admirable as illustrations, but they are not arguments.

I was present at a keen encounter of wits between an officer connected with one of the executive departments of the government, who had prepared a report which was to be printed, and a gentleman connected with the public printing. The officer who had prepared the report desired to superintend its printing. The other desired that it should take its place with other matter for public printing. Why, said the latter, it is like the contrast between carrying on a wholesale and retail business; it stands to reason that the wholesale way is cheapest, and from the division of labor, the best. I regard it, rather (said the other) as like the difference between rearing a child born to one, under the parent's eye, in the family, until he is prepared for the world, and the handing him over to an asylum to be dealt with as one of many bantlings, and so be introduced into society. Now the report was neither a piece of cotton nor linen, nor a bantling of flesh and blood and mind. The figures could both be pictured, and therefore, according to Blair, were good figures—but neither of them proved anything.

Let us, now, for awhile, study some of the prominent institutions of education and improvement in science and the arts, and consider the wants of which they are the exponents.

Schools, Academies, Colleges.

At the basis of the whole—sunk deep in the national soil—below, as I doubt not, the reach of every frost—are the common schools, common to all as a rule. Neglected in some parts of our country, and worthy of the other sense of the word common, but generally appreciated, and, having employed some of the best minds in their organization and advancement—I feel a profound conviction that no substitute for these schools, adapted to the wants of society in the United States, can be found; and that they should be fostered and improved, until they supersede all other establishments of their grade. Neither private education, nor that by associations, either religious or charitable, can take the place of general public education. Where the public schools are not as good as the private ones, these institutions have not supplied the want of which they are the index, and require further development. The public schools should be the best schools—the training in them the most thorough that can be had anywhere.

Above these schools, adapted to a different age, comes the academy, or high school, or college. Over a large portion of the country, these institutions, representing the want of a culture of a higher grade, and addressed to a more advanced age than the common schools, have no connection with the former. In some parts, I fear, there is almost antagonism in their positions. When this is so, will not the good and patriotic seek to devise a remedy for so unhappy a state of things? As the rivers are fed by the streams from the mountain-side, or the hill-side, or the gently sloping plain, collecting the drainage of the whole land, so should these institutions be fed by pupils from all the common schools. Where this has been effectively realized, as in this city, in Philadelphia, and, in a great degree, in Boston, the result has been of the best character—best for the public schools, which are vivified by the free academy or the high school—and best for the youth of these cities. That a connection of other existing institutions, of the same grade, with this great public system, would be a benefit to them and to it, I feel entirely convinced; and one day this truth will be recognized. I had hoped its earlier recognition.

It is actually a conservative principle in society, organized like ours, to let men do, as far as possible, as they desire in a right career; waiting for the development of public opinion to change public action. Impatience produces volcanic outbursts which shake institutions and society, disturbing individual and aggregate relations. When society is organized upon the actual and avowed basis that any man may wield the degree of influence and power to which his qualities entitle him, it is conservative to afford to every one the easiest route to his position. Obstacles only irritate, and repression renders talent dangerous.

It seems, in looking over these institutions of learning, adapted to the young, that even in their present condition, and especially with the means of improvement which they contain within themselves, and with the pressure of public opinion upon them, they really furnish the greatest part of the facilities required for the education of youth. Their shortcomings, if any, are not lightly to be blamed. Their improvement has been very great within the last thirty years, measured by the standard of each institution, by their condition with respect to each other, by the general condition of education. This is true, I know, in regard to scientific culture, the only portion in reference to which I undertake to judge; to mathematics and physics, as far as they have place in a college course. The influences which have produced this, it is not my design to attempt to trace; but I must be allowed to say, in passing, that our National School at West Point has, by thorough training of its graduates in a course of exact science, caused a reaction upon the colleges quite as useful in its results as the direct influence of the institution in its more limited sphere.

It has, also, by its action on the popular will, raised up for itself a competitor in the Naval Academy, which will, in time, vie with the elder institution in its good work.

The youth of our country, in their impatience for entering life, have, no doubt, diminished too much the period of preparation for it by study, and their parents have, in a degree, conspired with them in their demands for railroad speed in the college course, diminishing, especially in certain portions of the country, the age of matriculation and graduation, and therefore necessarily lowering the grade of collegiate instruction. But, after all, there has been great improvement in these institutions. Minds of high grade, thoroughly trained, are connected with them, and earnest zeal and exalted talent are devoted to their improvement. Our colleges have done well in the past, they will do better in the future.

In this country our ambition led us at an early day to endeavor to imitate or even rival the Old World institutions, and before the way was fairly open by education, we proceeded to the establishment of colleges and universities. We thus followed the examples of the philosophers of Laputa, who, according to Dean Swift, began the erection of their houses *at the roof*. The colleges, however, it must be admitted, helped to invigorate the schools below them.

The organization of universities in the early colonial days was like the construction of those enormous hotels in the west, rivaling the St. Nicholas and Metropolitan of Broadway, while the land was scarcely cleared. But Chicago has grown up to its hotel, and others are required upon even a larger scale. And the country has grown up to its early organization and has passed it. Good Bishop White, of Pennsylvania, used to relate with great pleasure the meetings of the trustees of the college of Philadelphia by the bedside of the venerable Franklin, and the quaint ways which he took to convince them that they wanted an academy where the English branches should be foremost, and not a college for classical instruction. He traced in turn the theory of different parts of wearing apparel, how the rim of the hat, now in its narrowness, a useless appendage, had once been the visor of the helmet;—the cuff of the coat, the band of the gauntlet. Now we have, in a great degree, ceased to discuss such matters. We want all sorts of knowledge which can train the intellect, the more the better, and the craving grows with what it feeds on instead of becoming sated. We have classes of persons who are desirous of entering life fully armed by all the learning for the struggle, and large classes who, having entered life, are anxious to grow in mind as they advance in age, and who seek the outlets of knowledge with persevering spirit. How many institutions owe their origin to this spirit? Does it not pervade the one in connection with which we are now assembled? Witness its lectures, its publications, its exhibitions.

Universities.

Coming, then, from the period of youthful training, we enter the university, that great finishing institution for life. Where is our American university? We find schools of law, of medicine, of theology, scattered over the United States,—do not these constitute in fact, if not in name, a great university? Because scattered, do they lose their character? Would they acquire it merely by their union? Would not attaching, as in the German organization, to combined schools of law, medicine and theology, a faculty of philosophy, thus constitute each and every one a university? All these questions are worth discussing. But this is not the time nor the place to do so, nor is it necessary to my present purpose. If I intended to throw stones (which I do not) it would not be at this, the close of an exhibition held in a *glass house*, that I would do it. These schools express the several wants of the time and country for special professional education, and fulfil, in a greater or less degree, their mission. The professions will see that they advance.

Mechanics' Institutes.

In Philadelphia, some thirty-five years ago, a few mechanics met to consult upon an institution for mutual improvement. A similar movement had been commenced by other parties, and from their united efforts sprang the Franklin Institute of Pennsylvania for the promotion of the mechanic arts, of which James

Ronaldson, the Philadelphia type founder, was the first president.

In 1791 a few patriotic men, such as R. R. Livingston, Mitchill, Kent, Dewitt, Jay, and others, founded in New-York a society for the advancement of agriculture, arts, and manufactures. This was in operation for but ten years, and at the close of its incorporation expired.

The American Institute originated twenty-eight years ago, in the far-sighted efforts of a few individuals, among the most active of whom were the late secretary, Thaddeus B. Wakeman, and the present secretary, Hon. Henry Meigs, and many of the founders have lived to see their bantling grown to manhood. The officers, committees, and clubs of the institution are ever active in the affairs of agriculture, commerce, manufactures, and the arts, to promote which they were incorporated. The annual volume of transactions, published with commendable liberality by the State of New-York, contains, besides the report of the progress of the institution itself, those of the judges of the fair, of the committees of arts and sciences, addresses, and useful papers on subjects within the wide scope of the Institute.

The members are, to use nearly the language of the venerable Secretary, the kind of men by which republics can be made and maintained—making and maintaining themselves, they always have surplus power to maintain the State.

The wants here represented were intellectual improvements of the cultivators of the mechanic arts, and improvement of the arts themselves.

The Franklin Institute was, in part, for the education of youths and adults, in part for the advancement of the arts. Regular courses of lectures on natural philosophy and chemistry, and their application to the arts, mining and metallurgy, geology, and occasional courses in various branches of science and art; schools for mathematics, for architectural, mechanical and miscellaneous drawing fulfilled the first object. The second was reached by means of exhibitions. The first exhibition of the Franklin Institute was held in the Carpenters' Hall, in 1827, the last overflowed the largest building which the city of Philadelphia could furnish to it.

Crystal Palace.

The first New-York exhibition under the auspices of the American Institute was held in 1828, in the contracted space of the Masonic Hall; that of 1856 occupies the building of the World's Fair of 1853.

The idea of filling the Crystal Palace with articles of domestic manufacture, would two years ago have seemed, perhaps it did seem when first suggested, almost preposterous. When we recollect that fears were entertained, whether the products of the industry of all nations would be sent in sufficient quantity to fill up those vast floors, we can appreciate the boldness of the idea which would seek such an area for the display of American fabrics. And yet this space is by no means a void. Where else could the ample proportions of those steam engines find their appropriate place? or those products of the boatbuilder's skill, or those exquisite fabrics from Lawrence, or those useful ones from Manchester? Where else could those planing machines and turning lathes, those atmospheric hammers, those machines for pumping and draining, for transmitting power, for splitting wood, for dressing stone, for warming, ventilating, cooking; in short, for all the varied purposes of the arts and of life—be exhibited and in action, with room and verge enough to pass around and between, to admire and to examine? Then, where else could the marriage of the mechanic arts and the fine arts (that happy thought) have found space for its celebration, but here?

Modern machines seem not only instinct with life, but to have *thought*—so perfectly do they supply those movements which, directed by law, are usually the results of thought and will. In the old printing press, ink was applied to the types by hand by huge stuffed leather balls; the paper was cut to its size and placed upon the press by hand, and by hand folded down upon the types—other hands passed the whole under a screw or toggle-joint, which, by an independent exercise of will, was brought down upon the types; the paper was then released, removed and folded—several hands directed by thought were thus at work. Now, the paper is cut from the roll, and in some cases is actually manufactured from the rags, and presents itself to be cut, the types are inked, the impressions made, all by mechanical power, one man controlling the whole; and in the machine, fingers remove the printed paper from the press and fold it—they seem absolutely to be thought-directed. I saw a small specimen of "Young America" watching, puzzled, this most ingenious operation. It must think, his face seemed to say. At last, the roll of paper giving out, the fingers came forth to seize nothing, and the lad laughed aloud at their stupid clutching at vacancy. He had, at last, caught the idea of this thinking machine.

Modern civilization rendered such a structure as the Crystal Palace practicable. It was, as has been justly remarked of the great London prototype, as much a piece of mechanism as any machine within it—its parts separately wrought out from model and drawing, and put together with system, plan and order. The chief material, glass, was but little known to the ancients, and less used; and the idea of constructing a palace of such a fragile material comes only in a time of peace, of law and order, and of civilization. The moral effect of such a structure is not to be lost sight of.

Noticing the progress of public opinion in regard to the preservation of public objects of art and nature, Mr. Babbage, speaking of the introduction of water-fowl into the parks of London, says:

"In former days if there had been water-fowl in our parks, some such notice as this would have been placarded:—'Whoever throws stones at or frightens these birds, shall be prosecuted with the utmost severity of the law.' In the present day we read the much more effective address—'These birds are recommended to the protection of the public.' The advantage of action upon this principle is not confined merely to its direct efficacy for purpose. A still more important benefit remains latent—one which never ought to be lost sight of in the administration of laws. It enlists public opinion in favor of law and order."

Prior to 1837, the British Museum was open to admission only by tickets; and it was contended, that to open it to indiscriminate entry, would expose the collections to injury and loss. The experiment was tried of throwing it completely open during the Easter holidays; when it was thronged to inconvenience; and yet nothing was taken, and only a pane of glass accidentally broken by the crush in the narrow part of a passage.

Not the least wondrous of the sights of this American Crystal Palace, are the moving groups which throng its long-drawn aisles. Not, as in the Wall-street part of Broadway, where carking care shows on every face, and the fixed look, the wrinkled brow, the impatient gesture, indicate that care goads the passenger as he drives along; but where the faces are lit up with inquisitiveness, with the genial flow of gratified curiosity, or the grave but satisfied air of examination and investigation. See that school, headed by the sympathizing teachers, asking, hearing, moving, here and there in files, in knots, in little groups, in large fronted columns! See how the girls and boys display the different temperaments and trainings of the sexes! See the different objects which attract their gaze and elicit interest! What a beautiful effect, those graceful forms and brilliant dresses sprinkling the floor and mixing with the sober gloom of the iron machinery, and how those graver costumes contrast with the bright hues of the dahlias and brilliant exotics!

A few in lightness, easily forgiven; a few in talk of things not of the exhibition, perhaps of mechanics, not of machines. These are the exceptions to the groups, and are balanced by those solemn faces which discuss apart to the very minutest detail that new invention, and by those busy men who are dilating on the merits of the machines which have cost them nights of sleeplessness and days of toil. May the world appreciate their labors, and reward them with better things than that "hope deferred, which maketh the heart sick."

What if these breasts were made of glass? not roughened like that of our palace to keep the outsider from looking in, but good transparent crystal. Then, our illusion would vanish, and the inside show come back to the Broadway type. Let us rather use the scene as not abusing it; admit the light of day, but give no transparency. Let us enjoy our Crystal Palace illusion while it lasts. Let us believe that, in this house at least, there is no skeleton.

I have often wondered that more care was not taken amongst us to preserve the statistics of different enterprises, with a view to know their actual results, and trace them to their causes; and, further, with a view to their practical utility. If a railroad is organised in a city, for example, the statistics of the number of passengers at different times of the day, on different days, on different occasions, should be carefully collected and mapped in curves so as to show the results to the eye. It would then be seen how the wants of the public could be best supplied; how many cars were wanted each hour of the day, each day in the week, when the Crystal Palace was open; and, generally, on what occasions when open. A study of this enterprise would lead to rational results as to the need of others, and the study of them in connection, would show their mutual influences. What is now left to the "rule of thumb" would then be arranged by the judgment, and the evils which are now left to accumulate until they grow so far as to require abatement as nuisances, would be guarded against, and life would flow more smoothly. Then we would not see so many groups on the corners of the Sixth Avenue waiting for cars only to see them pass filled to overflowing, and forced to walk two miles or lose the sight of the exhibition.

Industrial Exhibitions of Europe.

When visiting the exhibitions of industry in Europe, some twenty years ago, I was much struck with the great difference between the products exhibited and those which our fairs presented. The articles turned upon the luxuries of life chiefly, which, to be sure were displayed in forms and qualities realizing the highest ideas of the beautiful. Since then, what a breaking out of the workshops and manufactories has taken place! The very catalogues of the London and Paris exhibitions startle one. The spaces covered seemed almost fabulous, and the demand for more—an absurd craving. The condition of opinion among manufacturers and mechanics now-a-days and twenty years ago, must be as different as that in regard to national communications. Then the traveller went to Liverpool and Manchester to pass between them on the only passenger railway in Great Britain. Now, the post-horse system is almost obsolete, and the steam horse carries the traveller over the whole kingdom. Then Edinburgh was fifty hours from London, now it is hardly eleven. On the continent the only railroads were in Belgium, except a few miles from Leipsic towards Meissen. Then Vienna was two weeks from Paris, and now it is hardly more than two days. Then the workshops were almost inaccessible as a rule, and the processes kept secret, but now they seek publicity both in their processes and products. While in some parts of the continent of Europe, things have been, in a great degree, stationary, within the last twenty years; in others, railroads and telegraphs have worked wonders. The establishment of the German Customs League (the Zoll Verein) has led to virtual free trade over a large portion of the Continent. The postcoach and diligence are now institutions of by-roads, or are decaying under stable sheds or antiquated carriage houses, and the spirit which has animated America and England, has spread to parts of the Continent. In the capital of France, wonders have been achieved. The Faubourg St. Antoine, that hot-bed of crime, misery and insurrection, and the terror of the peaceful quarters of Paris, has been rooted out. Houses lining a splendid street, brilliant with lights and beautiful with shops, take the place of those squalid dwellings of wretchedness and crime; the street stretching from the fountains and obelisk of the Place de la Concorde to the spot where the column of July marks the site of the old Bastile. Beautiful bridges of stone and iron span the Seine; huge airy markets of iron and glass take the place of the dingy structures of old times; factories spread everywhere in constantly increasing numbers, and everything betokens wealth and prosperity. True, the flowers grow on the crust of a volcano, but still they blossom, bloom and shed their seed, replant themselves and multiply, not heeding the coming eruption.

Babbage's Light-house system.

One of the most brilliant results of that World's Fair at London, was a book upon it by Charles Babbage, well known to Americans who have traveled, from his steady kindness, cordial hospitality, and hearty attention—well known to ALL, traveled or not, for his calculating engines and the wondrous resources of mechanical and mathematical genius which brought them forth. The finest principles of administration are there laid down which I have seen embodied in language. Such principles as the administrative labors of Alexander Hamilton and Albert Gallatin (and I might add names of men yet living) would have served to illustrate, or as might have been obtained by induction from them. The principles which should regulate such exhibitions as that of the World's Fair are elaborated in the most forcible manner.

Among the chapters of that work, is one devoted to light-houses and their improvement, and containing the general principles and many details of a most admirable system for distinguishing lights, by causing them to show their numbers by rapid eclipses and flashes of light. Any digit may be expressed by an equivalent number of occultations and restorations of the light: thus, one eclipse and one restoration would stand for the number one. The value of the digit, whether belonging to the units, tens, or hundreds' place, might be indicated by occultations preceded by shorter or longer intervals of light, as three occultations at intervals of a second would express three units, then a pause of several, say three seconds, then five occultations would express five in the tens' place, then a pause of three seconds, and two occultations would express the hundreds, then a longer pause of say ten seconds, would show that the number was complete. Thus, the number of a light-house might be repeated more than once in a minute, even where the figures are quite high, and each light-house would continue the repetition of its own number. Such lights can be seen at least as far as others which are not temporarily obscured; and by arranging the numbers of the light-houses along a coast, upon such a system that the adjacent lights shall have very different numbers, the figures representing units, tens, and hundreds of the number not recurring in the adjacent lights, the distinctions can practically be made very complete. For the world-wide purpose of its inventor, but three digits are required.

The mariner who approaches Sandy Hook, for example, would see constantly repeated number *one*, a flash for a second, darkness for three. Let his pulse beat ever so irregularly from toil and anxiety, he could discern by it infallibly, that the dark interval was three, the light *one*—and thus that this was the cynosure to lead him to the haven where he would be. Nor could he mistake Fire island light for Sandy Hook—for it would signal twenty-two, first two, next two—but never *one*.

Honor to the genius of this great inventor and philanthropist! How happy would we have been to welcome him amongst us, to put the seal of his fame upon the details of the light-house system. We envy not to Europe the possession of such ability, but rather would seek to give it world-wide usefulness. Nor is this mere vain-glorious boasting, for the executive board under which the light-house system is now placed, and at the head of which is the Secretary of the Treasury, invited Mr. Babbage here that he might mature and practically apply his great designs.

Here memory brings back upon me a bright but mournful recollection. Indulge me, that I cannot pass it by. Known to many in this community as a writer of pure and elevated mind, as a lecturer on themes of English poetry and history, as the devoted friend and admirer of Wordsworth, and perhaps his most successful delineator, he is not so generally known as having had full and glorious sympathies with science and with scientific men. Henry Reed had a mind and a head capable of embracing both, and if he loved literature more he did not appreciate science less. He it was, who, in conjunction with a young and zealous astronomer, (Dr. Gould,) almost shook the determination of Babbage to avoid or to defer visiting us. The melancholy loss of the accomplished envoy in the "Arctic," was a reason the more for the philosopher's decision not to cross the Atlantic.

Sydenham Palace.

The removal of the great London Crystal Palace to Sydenham, and its conversion into a receptacle for the permanent exhibition of the arts and sciences, constituted an epoch in our century. Here, upon an elevation overlooking the fertile plains of Kent, this palace of knowledge was permanently reared and dedicated to progress. Its grounds reckoned in acres, their slopes and terraces laid out with consummate skill in beautiful forms and in the contrasts of the gardens of Italy, France, and Britain, in the utilitarian representation of mines and of their working, and in the wonders of the earth and of the great deep, in epochs antecedent to the creation of man. Its interior, in ample development, shows the physical geography of the globe: America, with her mighty lakes and rivers, her varied vegetable and animal life. The plains of the African desert are found in place, and the boar, and tiger, and giraffe occupy their characteristic haunts. The Chinese and Persian marts are displayed to the admiring gaze. Europe, in its Alpine grandeur and its English beauty—Europe, in its arms and its arts. The visitor dwells for a moment in a hall of Egypt, surrounded by those sphynxes whose very expression excites such strange emotions in the soul—by those Caryatides, who bear so wearily the massive architecture of the solemn temple. The light Grecian fane, with its gilded magnificence within, and its wealth of beauty in marble within and without; the Roman temple and the Roman dwelling; the Pompeian house, recreated as by the touch of Bulwer's magic wand, its domestic life and its hospitality are there. The Alhambra is reproduced, with its Court of Lions; the gorgeous mediæval cathedral of the Continent is there, with its luxury of carving, and stained glass, and pictures, and relics. The English cathedral, with its tombs of warriors and ladies, statesmen and churchmen; the old English house, with its rush-strewed floor, and its dais and ample board above and below the salt, for gentle and for simple; the collections of modern comfort and luxury—of glass, china, carpets, tiling, carriages, of machinery, always in motion, and weaving the most delicate as well as the commonest of fabrics. One passes visibly in a day through all the progress of the world in its centuries, acquiring through sight, definite and all-enduring ideas of times past, and their order and succession. Enclosed under acres of glass roof, whose iron girders, colored by the hand of Owen James, seem like a fairy network against the sky, this building itself, one of the wonders of the world, gives the last, greatest idea of all—that, in this present time and place, such a wonder could be realized.

American Exhibiticns.

What if the Mechanics of America of 50 years ago could awake to visit the halls of our Crystal Palace! How would Rob't Fulton and John and Rob't L. Stevens glow with enthusiasm as they saw those steam engines moving so noiselessly in their power, any one of which would have ensured the success of their early experiments. Oliver Evans would see that his ideas of the locomotive have been more than realized; while a simplicity in mechanism, for which he ardently panted, had been fully attained. Rumsey and Fitch would see that the seed which they had planted was not wasted, but had yielded many hundred fold.

It is certain from the repeated results of the Fairs at Boston, New-York, Philadelphia, and Baltimore, that these exhibitions have been productive of good to the arts. Competition is developed in its most profitable forms. Secresy, the bane of mechanical improvement, becomes impossible. No great or marked advance in an art can escape recognition, though doubtful cases may be decided erroneously. In the award of distinction the liberal policy is the wise one, and this has generally been followed by all these institutions.

Franklin Institute.

The Franklin Institute has undertaken something for the progress of science, believing that the arts owe to science a debt over and above those which she has derived from them. This is a debtor and creditor account which it would be difficult to adjust, even by the aid of an accountant and a master in chancery. Physical science would not have reached its present position without the facts which the arts furnish to build upon. On the contrary, how many applications flow from one scientific principle? How complex the action and reaction of fact and principle, of art and science! The investigations by a committee of the Franklin Institute, of *water* as a moving power, have been pronounced by the highest living authority models of their kind. Those relating to the explosions of steam boilers actually so far exhausted the subject, that no considerable additions have been made to our knowledge in regard to it for the last twenty years, and public information is not even now up to the level of the results then deduced. The production within a boiler of hydrogen gas, and its subsequent mysterious explosion, still finds its way into print, while the dogma that a steady increase of steam pressure cannot produce violent explosions, has yet its advocates. But in general, these things are now better understood; and the searing iron has been so effectively applied by this Hercules to many of the heads of the hydra ignorance, that they have not again sprouted.

The hot and unsaturated steam within a boiler not properly supplied with water, is no longer believed to be the cause why, when water is injected suddenly, the boiler explodes; and on the contrary, the heated metal is now known to be the source of danger—danger from its own weakness—danger from the strength of steam which it suddenly supplies.

In taking up the subject of Weights and Measures, the Franklin Institute did a good service to the State. Happy if it had enforced further attention on the public to the great reform needed.

The promotion of the increase of knowledge is one of the highest functions of such an Institution. To it the Franklin Institute has added the publication of a Journal by which to diffuse knowledge, a publication sustained now so long, that we have a right to consider it as one of the established works of our time, a permanent mark of the usefulness of mechanic associations.

How eminently these things contributed to the mutual improvement of the members who earnestly engaged in this work—the work thus twice blessing, the giver and receiver! How it served to develop the power of those men of strong minds and willing heads and hearts!

Shadows gather around me as I speak—the mechanics of Philadelphia of thirty years ago, those then in their prime, now grey; the seniors gone to their rest. Worthy successors of Evans and Perkins, and Lyon and Ramage. Ronaldson and Lukens, Reeves and Tyler, and Patterson, worthy to be the scientific teachers of such men. Cautious but generous Ronaldson, always laboring in the cause of humanity and progress; skillful and ingenious Lukens; acute and laborious Reeves, equally able in devising experiments and mechanism, and in using them; philosophic Tyler hammering out iron heated by a fire of iron fuel to prove a principle, and puzzling the scholastics with the theory of the top.

I am not aware that other institutions have followed in the wake of the Franklin Institute, nor does that institution appear to have found it expedient or necessary to continue in this course. The men who at one period could devote much time to such researches, are now so greatly in demand that they cannot give their time to this good work. What if any one should have whispered, while thus employed for the public good *gratuitously*—they were laying up for themselves for the future a store of good things. Young men be not too careful to see an immediate return for your exertions. Be not too careful to pursue a selfish end by selfish means. Give way to the generous impulses of your heart and labor in love.

Do such institutions as these form any part of a university of the arts?

Government Works.

I have not time to notice here the doings of our government directly or indirectly, in aid of science, the coast survey, the patent office, the nautical almanac, the National observatory, the ordinance and engineer departments, the Surgeon General's department, the topographical bureau, the recent expeditions of Perry, Page, Ringgold, Rogers and Berryman, nor the institution founded by the munificence of Smithson, nor those Arctic expeditions, chiefly set afloat by a generous-hearted progress-loving merchant of New-York. All these bring in their place and degree, renown to the country. I have sometimes thought that if they could be directed by an academy of sciences, so as to prevent occasional misdirection and jostling, they would contribute better to the great end which all have in view; but perhaps independent action and rivalry are, after all, the best for them, since the tendency of government works is usually towards inactivity. Indirectly connected as they now are with the science of their country, a wholesome stimulus is found in scientific opinion. That this is exercised leniently, even to a fault, must be admitted; and our men of science are awaking to this conclusion and to a knowledge of the mischief which it has done to the progress of true science in the United States. Generosity is the right side to err upon, but it may be carried too far.

Free Passages from Europe.

At a recent meeting of the American association for the advancement of science, free passages from Europe, and return passages to Europe, were freely offered by the Collins, the Cunard, the Belgian, Glasgow and Bremen steamship lines, for such distinguished foreigners as might be invited by the association to attend their meeting; and the additional passages offered by the owners of the lines of sailing packets were so numerous, that it might be well said there was no limit to the hospitality which, through their intervention, might be extended to the *savans* of the old world. How admirably such deeds illustrate the character of our merchant princes, and how they speak to the old world of the warm-hearted liberality and regard for learning in the new. On the circular of the American Institute are the names of thirty railroads and steam navigation companies which have patronized this exhibition of the arts, by undertaking to pass goods intended for it over their roads at half freight. Nor is this liberality confined to the State of New-York, but extends through nearly all New-England. The liberal soul deviseth liberal things, and commerce and the arts tend to liberalize the mind.

Commercial Associations.

While the mechanics and manufacturers have found rallying points in the American and Mechanics' Institute, the merchants have made their organization felt for the advancement of the great and general interests of commerce, through the Chamber of Commerce.

The want which it represents is—united effort in movement upon objects affecting the interests of commerce and navigation. It is a peculiarity of these associations that they have no costly buildings appropriated to their action. This is emphatically true of the Chamber of Commerce, which assembles in various places, and at somewhat irregular times; truly utilitarian in this respect, that it comes together whenever there is something to be done, and depends upon the wisdom of its council rather than the sanctity of the place from whence it may emanate.

The union of views of practical usefulness, and an enlarged spirit of inquiry, characterized the proceedings of the Chamber of Commerce of the State of New-York from its earliest organization, in 1768.

Questions in regard to currency and the value of gold and silver coins claimed its attention as early as 1769, and in the minutes of proceedings for November of that year, is recorded the reply of the astronomer, Rittenhouse, and John Montresor, to the request of President Cruger for a determination of the latitude of the Battery.

This eminent body seems to have wielded almost legislative influence in moulding the commercial character of the past generation. In 1786, scarcely more than two years after the evacuation of this city by the British forces, the Chamber expressed its high idea of the proposal of one of its members for connecting the city with the great lakes by a line of water navigation—concluding with the statement, that as a single corporation, its funds, of course, were not adequate to the undertaking! Can we wonder that from such beginnings, and with such lineage as that traceable in its subsequent history, the enterprise of this metropolis should reach to such a Himalayan height?

Previous to 1806, action had been taken in the Chamber, on three several occasions, for regulating the system of pilotage, and measures were instituted to remedy the complaints to which the system then in use had given rise. Quarantine laws, which had some years before been discussed, in 1822 again became a subject of deliberation, with other matters not less vital to the public interests.

In 1828 the Chamber responded favorably to a request from the Philadelphia Chamber of Commerce, for its co-operation in inducing Congress to construct the Delaware breakwater.

After repeated action on the subject of pilotage, the Chamber, in 1837, represented the grievances arising therefrom, by a committee sent to Albany for that purpose.

Questions concerning wharfage claimed the attention of that body in 1840, and its committee then made the important suggestion that the piers and wharves of the city should be subjected, if practicable, to a uniform system of rules and regulations. What difficulties and dangers to the commercial interests of the city might have been avoided, had this suggestion been adopted at that day?

Astronomical Observatory.

Favorable consideration was given in 1845 to a proposal from Columbia College for the establishment of an observatory near this city, the chairman of the committee to whom the matter was referred, reporting it: "as an object well worthy of the consideration of the Chamber, alike for its utility to the commercial interests of the city, and for the maintenance of its character as an advocate for the cause of science."

It is interesting to observe how public opinion grows by action from one individual, or one locality upon another. The project of an Observatory has been dwelt upon, explained and enforced, until many minds are imbued with it; and the question is not—should there be an observatory—but rather *where*, and on what scale shall the most efficient one be established. From one small beginning at Philadelphia, this fire has spread to Cincinnati, Washington, Cambridge, and Tuscaloosa. Beams, more or less bright, seem to flow from the capital of your own State, aurora-like, high towards the empyrean. A devoted wife has given the name of her husband to immortality, while the sun and moon shall endure! The Dudley Observatory wants but moderate aid to place itself in the front rank of such establishments, to enable it to fulfil its duties to science and to society; the first by the study of the stars, the second by furnishing time to commerce and navigation—time to travel, time to society. Accurate time to the navigator is an essential, accurate time to the railroad traveler is his life, accurate time to the man of business is money. How pleasant to pass down Broadway and find ten minutes difference of longitude, equivalent to two degrees and a half, or some hundred and seventy miles between Union Square and Wall-street, with half of it between the City Hall and Trinity Church! Time signals, by telegraph and clocks, regulated by electrical currents controlled at the Observatory, will put a period to all these irregularities. They deserve encouragement as life-saving, time-saving, and money-saving inventions.

A memorial was adopted in 1851, for co-operating with the citizens of North Carolina, in efforts for opening a good inlet into Albemarle Sound; and the scope and spirit of the Chamber are well illustrated in its stating, as the ground of interposition on that occasion, "that the work proposed is one calculated to benefit the commerce and shipping interests of the whole country, and thus is a national object."

Harbor Encroachments.

In the very same year, well-conceived measures were taken by the body, to stay the encroachments on the channels of the East and North rivers, and in the following year the Chamber warmly seconded the recommendation for a permanent Light House Board.

The process by which in all our cities we go on increasing the land area, by diminishing that of the water, is worthy of more than a passing examination. To obtain deep water, we extend from the natural bank a pier or wharf, until it reaches the required depth. The current which once passed by the bank, now passes by the end of the pier, and gradually the space between the bank and the pier is filled up with silt and mud, there being no longer a current to keep the material suspended, or to carry it onward. Soon the line of shoal water is pushed out until it is nearly as far beyond the end of the wharf as it was formerly from the bank. The pier is again built out, the shoal goes on in advance, and thus there is a struggle between art, directed by injudicious means, and the powers of nature, which can have but one result. Two such piers inclose a space which, by becoming shoal, is no longer useful as water, but being filled up, become valuable as land. Meanwhile, the East river is diminished to two-thirds of its original width, and but for the timely interference of the State Legislature, prompted by public opinion, the commercial prosperity of the city might have been seriously affected. As it is, the danger of the removal of the great marts of commerce to neighboring localities in or out of the State does not seem to be sufficiently appreciated. Diminish the facilities for commerce here, and it will infallibly seek them elsewhere.

The great advantages of docks and warehouses have been frequently pointed out, and yet the recommendations of the State Commissioners on harbor encroachments, and their advisory scientific counsel, are thus far unheeded, and property owners are determined to interfere by filling up instead of by excavating, by piers and wharves instead of by docks and basins, by stores in streets, instead of warehouses on piers. This must drive the dock system to Brooklyn, to Gowanus bay, to Hoboken, and to Jersey City, if the same spirit does not also fill the water spaces there, and carry the docks down to the flats below Jersey City, making in the future new cities arise better adapted in their arrangements to the wants of the commerce of the times. The laws on this subject are as inflexible as any other natural laws. You may as soon expect, like the French politician, to withdraw your balloon from the action of gravitation as to evade those laws.

Manhattan Island was intended by nature as the site of a great commercial city. The channel of the Hudson, directed from the New-Jersey shore and towards that of New-York, makes the great city front. Turn it to the New Jersey shore, and commerce will be turned with it. Aid nature by multiplying facilities here, and commerce will take a long lease of your piers, and basins, and warehouses.

While these subjects interest the whole community, they have formed the special study of but a few. It is our characteristic to let an evil grow until it becomes intolerable, and then to act. The present Board of Commissioners on Harbor Encroachments have found difficulties at every step, growing out of the late day at which the movement resulting in their appointment was made. Thirty years ago it would have been easy to have fixed a proper pier line for New-York, but public opinion was not alive to its necessity. Let us at least be wise for the future, and insist that there shall be special persons to keep these things in view, and to enlighten the public mind; to suggest public action in regard to them, and to restrain individual cupidity when it would interfere with the general welfare. There is no other safety for the future of the metropolis. Private interest surely cannot prevail in shaking off the wholesome restraint of a commission whose only interest is the public good.

New-York Harbor.

What a scene of beauty New-York harbor presents on a sunny morning of the Indian summer, when the purple colored haze hangs over the water and land, lending to the landscape those beautiful tints for which the bay of Naples is so famous. There is hardly a breath of wind, and the sluggish sail scarce gives impulse to the vessel. What forms of beauty those innumerable floating objects present, the dark hulls and white sails contrasting strongly through the gorgeous air tint which covers both. They seem less the instruments of commerce than the creations of fairy land. In the midst covering the water with purple foam are those giants in strength, with the bodies of pigmies, the tow boats, moving with impatient snortings like Neptune's sea horses, and carrying by their power immense forms with masts, and spars, and rigging, looming in huge, uncertainly high through the misty glow of this quiet, breezeless, roseate air. It seems almost a pity to destroy so beautiful a scene by the utilitarian appliances of commerce; but the mariner frets as the sails flap, and invokes the aid of steam to take him from the enchanted port—the sea-breeze rises, the sunlight glows, the illusion vanishes, the ships move, and the beautiful passes into the useful.

Weights and Measures.

At a recent meeting the Chamber of Commerce has taken up the subject of weights and measures. As this important matter, striking deep into the interest of society, is now agitated both in the Chamber of Commerce and in the Geographical Society of this city, I would observe, that a great and simple reform would be to insist upon *one weight and one measure*—to adopt one unit of weight, one unit of length measure, and one unit of capacity measure, for both liquid and dry measures. There can be but little doubt that some day there will be a nearly universal system of weights, measures, and coins in use. The world will not bear the useless labor and waste of time caused by the present diversities, and as communication grows more easy, this burthen will become intolerable. Sinbad, the sailor, will not continue to carry this old man of the land upon his shoulders.

In view of this, if it is desirable to postpone any radical changes, the least that should be done is to reform our weights and measures, so that we shall use only one unit of weight, the troy or avoirdupois pound; one unit of length measure, the yard or foot; one unit of capacity measure, the gallon or bushel, and that these shall be decimally divided.

The United States government has, with a view to produce practical uniformity, distributed to all the States actual standards of weights and measures, and has multiplied them by sending also to the custom houses. These, by legislation in most of the States, (twenty-five out of the thirty-one,) are adopted as the only lawful standards of weights and measures.

An American University.

We have now looked into the little nook of our exhibition, throwing a more or less distinct light upon the products, trying to show the outlines of the schools, academies and colleges, and the faint shadows of the universities, using as many gas burners as our supply would permit, in considering the institutions for improvement of mechanics and the mechanic arts, and for progress in science, in commerce and in the arts. It is not an exhibition of "all institutions," so we will be pardoned that so few are represented, and that we have taken them rather as they came to us than as if we had sought them and asked them to send their products for exhibition. That we have taken those nearest home, rather than sought far and wide for more appropriate materials; that we have stuck upon the minor pegs our notice of Europe as it was and is, and a leaf from the volume of its industrial and mechanical development, and from the history of our own progress in the arts and sciences. In a side nook is a favorite collection of models and drawings, representing in fragments and in coarse outline, a much needed institution still unreared, to be based upon the schools, colleges and the mechanics' institutes, to be built by the exertions of mechanics, of the merchants and the scholars, an institution for the more effective promotion of knowledge among its members, for the advancement of the branches of knowledge themselves, in the most comprehensive sense of the words, a university of the arts and sciences.

If language was taught upon the natural philosophic principles so ably and plainly laid down by Professor Roemer, there would be no difficulty in recognizing it as a science, and no violence would be done in thus classing it. "We should proceed from facts to principles, and then from principles down to consequences; we should begin with analysis and end with synthesis." Is not this science? The sentence is from Professor Roemer's Essay on the Study of Languages.

Origin of Universities.

The universities of the old world, if they did not spring chiefly from the wants of the professions, at least in their systematic organization had direct reference to the technical preparation for one or more or all of them. Universities are traced by some historical writers back to the time of the Roman empire, and by others to the schools of the Arabians. The fact is, professional education in theology, jurisprudence and medicine, and sometimes astronomy or astrology, as it was in those days, was engrafted upon various stems constituting the institutions which, in the middle ages, most resembled the modern universities. Before the invention of printing, oral instruction was of course of greater relative consequence than after, and the university of Bologna numbered ten thousand pupils. After the invention of printing, says Libri, the professors had fewer attendants upon their lectures, but their instruction reached further. As extremes meet, events moving in a circle, so in those times as in those latter days, traveling was a great source of information, but the distances we should count as but travel about one's room. The same professors were employed in several institutions lecturing as itinerants, which we now deem a practicable feature for modern improvement, the scale of distance being however vastly enlarged. A professor's certificate of study occupied the position of the more modern degree, which dates only from the twelfth century. Instruction was, in the Italian universities, gratuitous from the 13th century. The democratic element (using the words in their largest acceptation) was strong in these institutions, for one of the luminaries in the Paris University was the son of a washerwoman. The privileges of professors and students, their exemption from arbitrary rule and from party changes, united in one brotherhood the friends of knowledge and liberty.

Leyden.

In Holland the Prince of Orange, as a reward to the citizens of Leyden for the bravery which they displayed during the siege of the town by the Spaniards in 1773–74, gave them the choice of exemption from certain taxes, or a University. To their credit they chose the latter, setting at that early day the example (if a penny saved is a penny earned) of encountering taxation for a public education. The reputation of this establishment was at one time so high, that it was called the "Athens of the West." The great physicist, Des Cartes, and the critic, Scaliger, the jurist, Grotius, and the physician, Boerhaave, were among the professors and scholars; and Goldsmith and Evelyn, and other distinguished Englishmen studied there. It is divided into four Departments: Law, Theology, Medicine, and Philosophy, and has twenty Professors. It is an example of a University without buildings except for Museums and Lecture Rooms, its Professors living in private houses, and its Students in lodgings. It has an observatory, an anatomical theatre, and a museum, a botanic garden, a chemical laboratory, and a natural history museum, founded on the basis of the products of Japan.

United States.

Many distinct movements have been made in various parts of the United States towards the establishment of an American University. I will not pretend to enumerate them. While there is, of course, considerable diversity of opinion as to what such an institution should be,—whether the National Government should be invoked, the State Government, or private munificence, or whether it should be self-supporting—and endless modifications of these; the want is admitted, of an institution, supplementary to our colleges, where young men can be carried onward beyond a college course in literature and science, where our young merchants, and mechanics, and teachers may find incentives and means of progress—a great University of the arts and sciences, in which the practical man may meet on equal terms with the scholar. Whether it shall give professional education like the institutions of the same name in the old world is a matter not organic; the great field must be, that unoccupied by our colleges, and it must be tilled to suit American soil and climate. The circumstances of society here are peculiar, and the organization must be adapted to them. The object is not to supersede existing institutions, but to establish one supplementary to them. The number of young men now sent abroad to attend courses of chemistry, mineralogy and geology, mining and metallurgy, to study civil engineering, to perfect their knowledge of ancient and modern languages, would of themselves make a respectable number of pupils for a University.

In the words of a distinguished man of science who has devoted much thought to this subject, "The best plan for founding a University is that which concentrates the interests of the largest community, and combines the greatest variety of intellect, with the smallest pecuniary outlay and the least provocation of opposition. The most feasible plan is that which is most elastic, and which may be the smallest in its germ, while it is most comprehensive in its full development. Its professors must be the ablest men in their respective departments; it must be connected with a fine library, a well equipped observatory, and complete collections and laboratories for the elucidation, illustration and investigation of every species of knowledge. But it is expedient that the library, the observatory, the cabinets, and the laboratories should be under the especial control and fostering care of their respective boards of administration, whose local residence and peculiar habits of mind should adapt them to these duties. The general board of overseers should unite all that is necessary to command the universal confidence of the country, and their principal duty should be to secure, by consultation with the professors, the ablest body of officers."

The development of this scheme contains as a cardinal principle the establishment of professorships or lectureships, the remuneration for each of which shall not exceed one thousand dollars a year, so that an income of forty thousand dollars would secure forty courses of lectures, several by the same professor, or all by different ones, as might be determined upon. These professorships to be vacated every five years, and to require no residence at the University, unless where the same professor is called upon for several courses, in which case he would constitute one of the governing heads of the University. Each professor to be required to deliver a course of at least twelve lectures during the year. The foundation of such professorships (to take the name of the founders,) would be within the reach of moderate means. The professors in the various colleges of the country would lecture in the University, deriving additional income by so doing, and improvement from association with their colleagues of the University. The institution can be organized step by step as professorships are established, and be developed in the direction found by experiment to be most advantageous.

It may be supposed that these professorships are analogous to the fellowships in the Universities of England; but this is hardly so. The professors will be lecturers to diffuse the sciences which they cultivate, bound to certain duties of instruction, and not enjoying the literary ease without much stimulus, which the fellowship procures. If they give several courses, their time may be too much engrossed by active duties, and the other horn of the dilemma be the one upon which they will be impaled. Both are easily avoided. They *must* have time to cultivate science, for the University should hold this to be one of its cardinal objects.

Referring to the union of the practical man and theoretical man in this university of the arts, I beg to be allowed a remark. Few terms have been more abused than this one of a *practical man.* It is often used to denote one who works by empirical processes instead of by scientific. Empiricism is the lowest form of knowledge. Science generalizes, and the scientific mechanic, instead of looking for separate solutions for every problem, solves many from one principle. The one gropes as in the dark, the other advances boldly as in the light. Superficial theory runs into quackery, and is deserving of all contempt, but the deeper the study the more practical it becomes. When theory is complete it is always practical; and when it seems not so to be, the absence of this turn may be traced to some defect in the theory. It is easier to work down than up; first to know what the generalizations of ages have done for us—then to improve upon them if we can. The application of such principles are far easier than their elaboration. The highest principles of science, such as were elaborated by Oersted and Ampere, and Henry and Gauss, were required for the application of galvanic electricity to the art of telegraphing. With these are associated the highest grades of mechanism, such as the inventions of House and Farmar. The calculating and printing machines of Babbage are at once an illustration of the union of the two highest theoretical and practical powers. The attempt to sever science and art is mischievous, and in this our time and country will prove abortive. Each is essential to the life and activity of the other.

In organising such a university, we must consider first the branches of knowledge which should be taught, secure the men available for them, and then make a classification of the whole scheme according to a scientific principle. We might first draw up a project in which all the branches desirable were interwoven, next consider what men we have to fill the chairs, and how the branches must be divided among them. These two considerations would act and react upon each other as far as a practical scheme was concerned, and the distribution of the subjects would, after they were determined upon, be an easy task. Consulting a number of scientific friends, I find that courses of literature, science, and arts, could easily be extended to sixty in number without assigning any unimportant subject. That these might occupy twenty to forty lectures, and that the least beginning of a respectable sort would be by twenty subjects and ten or fifteen instructors. All the details, however, would be much better left to the organization of the Chancellor and first faculty. After a careful examination of the schools of Europe, some twenty years ago, I saw abundant reason to conclude that an institution might have ever so good a plan upon paper and yet not be successful, and that a moderately good plan well administered might be better than an excellent one carried out by inferior ability. I would therefore counsel as high a flight as possible in looking for the professors, especially the first professors of the institution, and a liberal concession to their views in organizing and developing the new-born establishment.

With the facilities for travel in our country, the professors of our colleges could readily take part in University instruction without impairing their usefulness at home. Agassiz lectured in Harvard and in the medical college of Charleston. The most active minds in the faculties would thus be brought together in one institution, and they would return to their regular posts with all the glow which inter-communion of rich minds is sure to produce to react upon the college and themselves. Thus the requisite number of lecturers could readily be found, and thus the *elite* of our school men and men of science could be brought into regular communication with each other.

The first principle in the selection of the professors should be that they were capable of advancing the boundaries of their sciences, and not only capable but diligent in so doing up to the limits of their capacities.

It is no doubt true, that many profound thinkers are our good teachers, but where they are, there is a living spirit imparted by their teaching, which penetrates the mind of the neophyte and kindles the flame upon the altar of truth within. It is the highest kind of teaching. A chancellor of the university who knew how to use men and their gifts, would easily so arrange matters, that by supplementary professors or by assistants any defect in the teaching of the chief professor would be made good. In fact, so fairly do scientific men, as a rule, estimate each other, that volunteers would readily be found to serve under the leading spirits in research, to spare their time and exertion, and to occupy the rostrum in their behalf. This is not utopian.

Award of Scientific Reputation.

I have often of late years been brought into contact with two different classes of minds, the one which, seeing the brotherly affection of many scientific men for each other, feels and says that American scientists are members of a mutual admiration society; the other, seeing the occasional earnest differences of opinion rising sometimes into the regions of temper, sneeringly says, how quarrelsome philosophers are! The truth, I suppose, lies between that the philosophers are men, have the hearts of men to feel and love, and the tempers of men, showing themselves in occasional outbursts of volcanic trap, through the horizontal layers of the quietly deposited sand-stone. In regard to the award of reputation which such men make to each other, it should be considered as final and conclusive. It is founded on knowledge as on a rock. Notoriety among these men does not pass for reputation, for one may be personally known to all the cultivators of science in the country, and yet be rated low in mental power. Those of the same pursuits fathom first and most truly the minds of each other, then those of diverse pursuits, the circle of judgment wave-like decreasing in height and sharpness as it expands. The outer world of intelligence is hardly reached by these waves at all; and as well might the scientific man undertake to award reputation in law learning or acumen to the jurist, or in medical skill and power to the physician, or in mercantile knowledge and judgment to the merchant, as to have his place fixed by these instead of his scientific peers. "*Ne sutor ultra crepidam*"—"I love a quotation which is not hackneyed"

While upon this subject of the award of reputation, I wish to be permitted to say a few words about the carelessness with which American doings are too often treated abroad, chiefly to establish the proposition that in science and literature, as in other things, we should rather seek the judgment of our countrymen than that of foreigners, and that we should endeavor to establish a more wholesome public opinion upon this subject, struggling for an American reputation derived from our peers, as, in Europe, a European reputation is derived. The public, generally, would be more amused than edified if I went into a chapter of facts within my own knowledge, upon the mode sometimes adopted for attempting to secure a European reputation. The congratulations upon the receipt of a medal from a foreign potentate—which required an act of Congress to be permitted to accept, and which I know to be due to the amiable character of his representative, through social intercourse had with him—seemed to me like those ironical cheers of hear! hear! hear! by which the English opposition benches greet a minister's speech for the crown.

Few books for the times have been written which gave to their authors greater national reputation than Robert Walsh's Appeal of 1819. It was a warm and glowing appeal from the injustice of Great Britain in reference to America and American institutions. As far as the science of the two countries are concerned, I should say that a different feeling exists now; that if there are icy remains of a once bad understanding and selfish professional jealousies, they are fast disappearing before the warmth of personal acquaintance, rising even to the genial glow of friendship.

I wish I could so speak for the Continent, and especially for France. Since the wane of that great light of the French academy, Arago, American scientists have had much to complain of. Since its final earthly eclipse they have more. The official publications of the doings of our real men of science are either overlooked entirely, disregarded or named to be treated with disrespect. This, too, from those who once professed to be amongst the most devoted of the admirers of Arago, and, under his lead, to cultivate friendships which might almost be termed *sentimental* with our *savans.* "Write to me," said one of these distinguished men to one of our friends, "at the equinoxes, and I will answer at the solstices." "I wrote," said the American, "at the equinoxes, *but the solstices* have never come." True, there are cases of exception, which, according to the law maxim, prove the rule. Not to indulge in generalities, I state, after full examination, that the methods recently advanced by Le Verrier, a man who of many, has no need to slight the claims of others, for determining differences of longitude by the telegraph, are but the reproduction of those used in the coast survey of the United States for now these eight years, the fruits of the labors and studies of Walker and Loomis, Gould and others. Neither the method of coincidences which he lauds, nor that of signalizing the transits of stars, which he considers of the highest merit, *are new*, but have been practised for years, and have been published over and over in official reports and in the proceedings of recognized scientific bodies, and constitute in part what may properly be called the American method of telegraphic longitudes. The astronomer royal of Great Britain in a far different spirit has given to the automatic register of astronomical observations by the galvanic circuit, the title which generously recognizes our claims, and assigns the origin to the United States, in the title of American method of observation.

A lesser light, too, of the old world, Wichmann, of Königsberg, has just published an article on the difference of longitude by telegraph, stimulated by that of Le Verrier, and containing an outline of his mode of proceeding, which might almost serve as a history of the olden time method of the coast survey.

Better things than this were to be expected from a German physicist. They, of all Europeans, have, in former days, been sore under the infliction of the egotism or neglect of the French physicists; and I remember well the unction with which the story was told me by one of those men who read all languages, that when Becquerel was reproached with his neglect of German electricians in his work on electricity, he exclaimed, with a nonchalance considered typical of the Academy, "Must one know all languages to write a book?"

Museums.

Around the American University of Science, Literature, and the Arts, would cluster scientific, historical, and art collections of every sort: Museums, libraries, galleries of the mechanic arts, and of the fine arts. Our museums of Natural History, even though most prized for their scientific value, have grown up under the views which prevailed in past time, and are adapted to a past state of the science. They have been modified and enlarged, it is true, to endeavor to bring them up with the science of the day, but the plan or idea upon which they are based still shows itself. They are collections of specimens showing the diversities and not the analogies of nature. Separate museums of comparative anatomy took their rise from the researches of Cuvier and his followers. So the progress of geology gave rise to museums of fossils. So also the discoveries of Agassiz in embryology will produce museums devoted to this branch. But these are fragmentary establishments. A master of the subject has said: "What we now need is a museum in which the various relations that link together different groups of animals shall be exhibited at a glance, where the anatomical preparations illustrating their structure shall be placed side by side with perfect specimens showing their external forms; where the remains of extinct forms shall fill the gaps existing between the living, and where specimens of the embryos shall illustrate the succession of changes all these types undergo, and the correspondence between the development and the successive appearance of the representatives of past ages."

If the isolated efforts of those devoted to cultivation of science in our day could be brought into combination, such a museum could readily be produced, and the country in which such is first established will take the lead in the future progress of natural history. What an incentive to American exertion, to lead in such a race! Will not private munificence come forward to render such a thing possible?

Already a beginning has been made at Harvard of a great col lection, a fragment of this scheme;—but something much larger in the way of effort is necessary to realize the want of the time.

There exists in the country no extensive museum of materials and products of the arts, and manufactures, and of machines. In Vienna, imperial munificence has endowed such an establishment, and it has been growing from year to year, but is still deficient in the full development of the plan. The Conservatory of Arts and Trades of Paris was an admirable beginning of such a museum. You may pass through series of models of machines, from the merest beginnings to the perfection of the present day, from the rude pumping engine of Savery to the perfect marine steam engine,—from the egg watch of Nuremburgh to the modern chronometer. Our government is doing something towards such a record of daily improvements, by preserving the models of the Patent office, and the present enlightened Commissioner is using his efforts to give space for their display.

The Franklin Institute had a collection derived from the voluntary contributions of depositors at the annual exhibitions.

A great collection, such as the best minds connected with the arts of our country could organize, should be gathered by a University, and be the means of teaching the youth and improving the mature man in knowledge, of the national progress of the world, and the present condition of its workshops. Taking the exhibition of Sydenham Palace as a basis, we should rear upon it a superstructure adapted to the wants of the United States.

The Cooper Union.

The stranger visiting New-York, and admiring its structures raised by public and private munificence for public uses, sees inscribed in bold relief on one of them—*To Arts and Science—Union.* Yes, joined in the designs of the Founder of all art and science, they are not in this earthly temple divided. Without science the arts have flourished as handicrafts; *with* science, they have risen to control powers of the earth and beyond the earth. Tubal Cain, toiling as he fastened his copper spear-head in the smithy fire, and Henry Burden, as he lightly touched the spring which furnished steam to mould, and bend, and twist the iron horse-shoe, were types of those two conditions. The printing press of Franklin's time, toilfully bringing out its two hundred and fifty sheets per hour, and the great self-acting presses of 1856, inking and printing, cutting and folding their twenty thousand papers with railroad speed, represent these brought into closer compass of time.

How many facts was it not necessary to have established, compared, and reduced to principles, before the steps from one of these conditions to the other could be taken? And is not science the generalization of facts? Many men use science as Moliere's Bourgeois Gentilhomme used prose, without knowing it.

The mechanic of the present day is well idealized in the figure designed by Crawford, and selected by Captain Meigs to adorn the pediment of the National Capitol—not the mere handicraft workman, however skilful, with brawny arms and ready fingers, but the intellectual workman, with broad expanse of forehead, and face lighted with the fire of thought, the intellectual mechanic of the nineteenth century.

If, with the princely endowment of the Union of Peter Cooper, separate lectureships upon the plan proposed by Professor Pierce were founded, what a splendid branch of the great Art University would not this constitute! Reserving enough of the forty thousand dollars of income to meet contingent expenses and to provide for a Chancellor, and perhaps certain resident professors, there would remain enough to furnish thirty courses of lectures, upon as many different branches of science. By giving to one professor several of these, his whole time might be retained for the Union.

The highest grade of science would thus be brought into the class-rooms of this establishment, the name of which, and the well known views of its modern founder, point to this arrangement as the one adapted to its organization.

The Astor Library.

An earlier, yet still recent example of the spirit which satisfies itself with nothing less than views of public usefulness on the amplest scale, is seen in the establishment and endowment of the Astor library of this city. Perception in regard to public necessity may be said to be intuitive. Mr. Astor seems to have acted upon the promptings of his own mind, in founding the noble institution which so aptly bears his name. "It is," says a writer in the United States Magazine, "a first experiment of throwing open a library in a great city to any one and every one without any formality of admission or any restriction whatever, except as to age." When it is remembered that this is not a mere accumulation of eighty thousand volumes, but so many, most of which have been selected with special reference to the want which suggested the idea of collecting them, it seems difficult to assign limits to the benefits so conferred upon a practical people. "The first purchase for a library," says Dr. Cogswell, the present learned superintendent, "was made March 15th, 1839, and amongst the volumes bought were Brittain's Architectural Antiquities of Great Britain, Young's Recent Discoveries in Hieroglyphic literature, White's Gradations in Man, and Churchill's Voyages. These were the nucleus of the Astor library, and may fairly be considered as a type of the whole collection."

The donation in 1853, by William B. Astor, Esq., "for the establishment of a department to be called the Industrial Library," continues the magnificent design. What a splendid collection of books is here at hand for the use of the students and professors of the university!

Union of Institutions.

With such institutions as the Cooper Union, and the Astor Library, and the Dudley Observatory, a beginning of the great American university of arts and sciences seems already made. The museums of material products and machinery, of the arts and manufactures, and of agricultural products and machines, of natural history in all its branches, and the galleries of art, are yet to be founded and grouped in systematic order around it.

This university, like the genius in the Arabian Nights, released by the fisherman from his confinement in the vase, will, from a shadowy smoke, take substantial form, increasing as the country grows, and filling the measure of its greatness. Unlike the relieved genius, it will be the minister of good, instead of evil, and will have the seal of Solomon set, not upon the case containing its shriveled frame and shrunk members, but to its grand and noble figure and to its towering and magnificent proportions. Under its shade the arts and sciences will flourish. In its halls the practical and theoretical will meet in cordial union, while among its professors and alumni will be the light of progress in our country. It will be the intellectual temple over whose front will be inscribed, Dedicated to Science, Literature, and the Arts.

Here, men of progress, scholars, practical men, mechanics, merchants, artists, will meet to study the works of men, and, better still, the works of God—this temple itself but the vestibule of that more glorious structure dedicated to His Word.

Holy men of old studied the works of God, and their glowing references to them fill the pages of Holy Writ. The Psalmist invokes them by name to praise God. Praise him, all ye angels; praise him, all ye hosts; praise him, sun and moon; praise him, all ye stars and light; praise him, all ye heavens, and ye waters that are under the heavens; let them praise the name of the Lord,—for He spake the word and they were made, He commanded and they were created. He made them fast forever and ever; He hath given them a law which shall not be broken.

The spiritual world,—God's hosts, and the material world—including all space,—creation and law. Sublime conception!

What God hath joined together let no man put asunder. Let mutual love penetrate the hearts of those who study the works and the Word of God. By Him they were both given,—by Him we were made capable of their study. Both are, in fact, His Works.

LIST OF PREMIUMS

AWARDED BY THE MANAGERS OF THE TWENTY-EIGHTH ANNUAL FAIR OF THE AMERICAN INSTITUTE, OCTOBER, 1856.

AGRICULTURAL AND HORTICULTURAL DEPARTMENT.

Thorough Bred Horses.

Judges—J. De Graw, J. Drew, Nathan A. Cooper.

John Appleton, Orange county, N. Y., for the best stallion, (eight years old,) "Tom Crib." Silver cup, $25.

Henry Lloyd, Lloyd Manor, L. I., for the second best stallion, "Empire." Silver cup, $20.

Henry Booth, Morrisania, Westchester county, New-York, for the third best stallion. Silver cup, $15.

Henry Booth, Morrisania, Westchester county, N. Y., for the best three year old colt. Silver cup, $10.

Bathgate Brothers, Morrisania, Westchester county, N. Y., for the best brood mare and colt. Silver cup, $25.

Horses for all work.

Judges—F. Lotts Wyckoff, H. B. Bolster, Williamson Rapalje.

A. & J. Campbell, New-York, for the best stallion, "Young Andrew Jackson." Silver cup, $25.

James M. Cockcroft, 27 W. 41st street, for the second best stallion. Silver cup, $20.

Philip Ketcham, Richmond, S. I., for the third best stallion, "Morgan Jackson." Silver cup, $15.

Thomas Whitson, Flushing, L. I., for the best brood mare and colt. Silver cup, $20.

S. R. Bowne, Flushing, L. I., for the second best brood mare and colt. Silver cup, $8.

J. G. Lightbody, New-York, for the best three year old colt, "Laura Keene." Silver cup, $10.

James Jacks, 24th street and 3d avenue, for the second best three year old colt. Silver medal.

S. R. Bowne, Flushing, L. I., for the best two year old colt. Silver cup, $8.

Benjamin M. Whitlock, Westchester, N. Y., for the second best two year old colt. Silver medal.

Matched and Farm Horses.

Judges—Thomas Williams, Jr., Isaac Willets, Jackson Nichols.

Edward A. Lawrence, Flushing, L. I., for the best pair of matched horses. Silver cup, $20.

David L. Young, 646 Fourth street, N. Y., for the second best pair of matched horses. Silver cup, $15.

S. R. Bowne, Flushing, L. I., for the third best pair of matched horses. Silver cup, $10.

William Watson, Westchester, N. Y., for the best pair of farm horses. Silver cup, $15.

James Weeden, Newtown, L. I., for the second best pair of farm horses. Silver cup, $10.

Style and Action of Horses.

Judges—John Bathgate, R. E. Launitz, M. Young, Wm. Wilkins, John Perrin.

Lewis A. Sayre, New-York, for the best pair of matched horses (Roans). Silver cup, $50.

Joseph Churchill, N. Y., for the second best pair of matched horses (Greys). Silver cup, $30.

William Cummings, New-York, for the best single horse in harness. Silver cup, $25.

B. M. Whitlock, New-York, for the second best single horse in harness. Silver cup, $20.

David R. Disbrow, New-York, for the best saddle horse. Silver cup, $20.

William H. Disbrow, New-York, for the second best saddle horse. Silver cup, $15.

Discretionary.

Diana Vernon, New Utrecht, L. I., for fine horsemanship. Silver cup, $20.

Mules.

Judges—William Bigelow, Henry Drew, John S. Smay, F. W. Geissenhainer, Jr.

J. S. Bishop, Jersey City, N. J., for the best pair of mules. Silver cup, $15.

J. S. Bishop, Jersey City, N. J., for the second best pair of mules. Silver cup, $10.

Native Stock.

Judges—T. C. Munn, S. W. Mulford, Isaac Roberts.

Hugh Lunny, Westchester, N. Y., for the best two year old heifer. Silver cup, $15.

Grade Stock.

Judges—Isaac Skinner, John Wait, Robert Willets.

Henry C. Barretto, West Farms, for the best 3 year old bull, "Major." Silver cup, $25.

Robert Wilkinson, Westchester, N. Y., for the second best 3 year old bull. Silver cup, $15.

J. F. Seaman, Kingsbridge, N. Y., for the third best 3 year old bull. Silver cup, $10.

Edgar Sprague, Smithtown, L. I., for the best 1 year old bull. Silver cup, $10.

Thomas G. Aycrigg, Passaic, N. J., for the best bull calf. Silver cup, $8.

Hugh Lunny, Westchester, N. Y., for the best cow. Silver cup, $20.

Charles W. Bathgate, Fordham, Westchester county, N. Y., for the second best cow. Silver cup, $15.

Adam Thompson, 97th street and Broadway, for the third best cow. Silver cup, $10.

Thomas G. Aycrigg, Passaic, N. J., for the best 2 year old heifer. Silver cup, $15.

Robert Wilkinson, Westchester, N. Y., for the second best 2 year old heifer. Silver cup, $10.

Adam Thompson, 97th street and Broadway, for the third best 2 year old heifer. Trans. Am. Institute.

Thomas G. Aycrigg, Passaic, N. J., for the best 1 year old heifer. Silver cup, $10.

Thomas G. Aycrigg, Passaic, N. J., for the second best 1 year old heifer. Silver medal.

Short Horns.

Judges—L. G. Morris, T. H. Rutherford, H. W. Tibbetts.

Thomas Richardson, West-Farms, N. Y., for the best bull, (3 years old or upwards), "Duke of Cambridge." Silver cup, $25.

Charles W. Bathgate, Fordham, N. Y., for the second best bull, (3 years old or upwards), "Sachem." Silver cup, $15.

Thomas G. Aycrigg, Passaic, N. J., for the third best bull, (3 years old or upwards), "Marmion." Silver cup, $10.

S. T. Taber, Dutchess county, N. Y., for the best 2 year old bull, "Earl of Warwick." Silver cup, $15.

Barclay Haviland, Heartsville, Dutchess county, N. Y., for the second best 2 year old bull. Silver cup, $10.

Oliver Slate, Jr., N. Y., for the third best 2 year old bull. Trans. Am. Institute.

S. T. Taber & D. B. Haight, Dover Plains, Dutchess Co., N. Y., for the best one year old bull, "Highflyer." Silver cup, $10.

Edgar Sprague, Smithtown, L. I., for the second best 1 year old bull, "Murat." Silver medal.

Edgar Sprague, Smithtown, L. I., for the third best 3 year old bull, "Duroe." Trans. Am. Institute.

John Hunter, Westchester Co., N. Y., for the best bull calf, "Jacinthus Romeo." Silver cup, $8.

Charles W. Bathgate, Fordham, N. Y., for the second best bull calf, "Midas." Silver medal.

Thomas Richardson, West-Farms, N. Y., for the best cow, "Bijou." Silver cup, $20.

Thomas Richardson, West Farms, N. Y., for the second best cow, "Finella." Silver cup, $15.

Samuel T. Taber, Dutchess Co., N. Y., for the third best cow. Silver cup, $10.

S. T. Taber, Dutchess Co., N. Y., for the best 2 year old heifer, "Lauretta." Silver cup, $15.

Charles W. Bathgate, Fordham, N. Y., for the second best 2 year old heifer, "Elinor." Silver cup, $10.

Charles W. Bathgate, Fordham, N. Y., for the third best 2 year old heifer, "Style." Trans. Am. Institute.

Samuel Thorne, Thornsdale, (Washington,) Dutchess Co., N. Y., for the best 1 year old heifer, "Peerless." Silver cup, $10.

Samuel Thorne, Dutchess Co., N. Y., for the best heifer calf, "Azalia." Silver cup, $8.

Edgar Sprague, Smithtown, L. I., for the second best heifer calf. Silver medal.

Edgar Sprague, Smithtown, L. I., for the third best heifer calf. Trans. Am. Institute.

Devons.

Judges—T. C. Munn, Isaac Roberts, L. H. Cortelyou.

S. & L. Hurlbut, Winchester, Conn., for the best 3 year old bull. Silver cup, $25.

Edward G. Faile, Westchester, N. Y., for the second best 3 year old bull, "Exeter." Silver cup, $15.

Jacob N. Blakeslee, Watertown, Conn., for the third best 3 year old bull, "Norfolk." Silver cup, $10.

Edward G. Faile, Westchester, N. Y., for the best 2 year old bull, "Tecumseh." Silver cup, $15.

Jacob N. Blakeslee, Watertown, Conn., for the best 1 year old bull, "Young Prince." Silver cup, $10.

S. & L. Hurlbut, Winchester, Conn., for the best bull calf. Silver cup, $8.

Edward G. Faile, Westchester, N. Y., for the second best bull calf. Silver medal.

Edward G. Faile, Westchester, N. Y., for the third best bull calf. Trans. Am. Institute.

Edward G. Faile, Westchester, N. Y., for the best cow, "Titania." Silver cup, $20.

Edward G. Faile, Westchester, N. Y., for the second best cow, "Jenny." Silver cup, $15.

J. N. Blakeslee, Watertown, Conn., for the third best cow, "Jenny Lind." Silver cup, $10.

Edward G. Faile, Westchester, N. Y., for the best 2 year old heifer, "Cleopatra." Silver cup, $15.

S. & L. Hurlbut, Winchester, Conn., for the second best 2 year old heifer, "Hatty." Silver cup, $10.

Edward G. Faile, Westchester, N. Y., for the third best 2 year old heifer, "Flida." Trans. Am. Institute.

S. & L. Hurlbut, Winchester, Conn., for the best 1 year old heifer, "Darling." Silver cup, $10.

J. T. Andrew, West Cornwell, Conn., for the second best 1 year old heifer, "Jenny 2nd." Silver medal.

Edward G. Faile, Westchester, N. Y., for the third best 1 year old heifer, "Pinta." Trans. Am. Institute.

S. & L. Hurlbut, Winchester, Conn., for the best heifer calf. Silver cup, $8.

Edward G. Faile, Westchester, N. Y., for the second best heifer calf. Silver medal.

Jacob N. Blakeslee, Watertown, Conn., for the best herd of 20 head of Devon cattle. Cash, $40.

Ayrshires.

Judges—John A. Pool, Randolph Linsley, John Dick, D. A. Bulkley.

G. W. Coffin, Amenia, Dutchess county, N. Y., for the best three year old bull. Silver cup, $25.

William Watson, Westchester, N. Y., for the best one year old bull, "Bruce." Silver cup, $10.

William Watson, Westchester, N. Y., for the best bull calf, "Charlie." Silver cup, $8.

Alfred M. Tredwell, Madison, Morris county, N. J., for the best cow, "Jessy." Silver cup, $20.

Thomas Richardson, West Farms, N. Y., for the second best cow, "Lady Duffeen." Silver cup, $15.

Alfred M. Tredwell, Madison, Morris county, N. J., for the third best cow, "Jessie 2d." Silver cup, $10.

William Watson, Westchester, N. Y., for the best heifer, "Susan." Silver cup, $15.

William Watson, Westchester, N. Y., for the best one year old heifer "Flora." Silver cup, $10.

Thomas Richardson, West Farms, N. Y., for the second best one year old heifer, "Lady Duffeen, 2d." Silver Medal.

Milkin Cows.

Judges—Isaac Skinner, John Tait, Robert Willets.

Charles W. Bathgate, Fordham N. Y., for a cow, in milk. Silver cup, $15.

Hugh Lunny, Westchester, N. Y., for a cow, in milk. Silver cup, $10.

Working Oxen.

Judges—Asa Hubbard, E. A. Lawrence, Asa B. Munn.

S. & L. Hurlbut, Winchester, Conn., for the best pair of working oxen. Silver cup, $20.

John T. Andrew, West Cornwell, Conn., for the second best pair of working oxen. Silver cup, $15.

Ellathan Gazley Clinton, Dutchess county, N. Y., for the third best pair of working oxen. Silver Medal.

Fat Cattle and Sheep.

Judges.—Thos. F. DeVoe, Cornelius DuBois, Thos. Whitson

Fat Cattle.

Ellathan Gazley, Clinton, Dutchess county, for the best pair of fat oxen. Silver cup, $30.

Elihu Griffin, Clinton, Dutchess county, N. Y., for the best fat ox, (red.) Silver cup, $15.

Elihu Griffin, Clinton, Dutchess county, N. Y., for the second best fat ox, (spotted.) Silver cup, $10.

Ellathan Gazley, Clinton, Dutchess county, N. Y., for the best fat cow. Silver cup, $10.

Daniel Barnes, 75 E. Twenty-ninth street, for the second best fat cow. Silver medal.

Fat Sheep.

Ellathan Gazley, for the best fat wether. Silver cup, $10.

Ellathan Gazley, for the second best fat wether. Cash $5.

Ellathan Gazley, for the third best fat wether. Cash, $3.

Long Wool Sheep.

Judges.—W. Wickham Mills, Chas. Wright, Chas. Harrison.

Ellathan Gazley, Clinton, Dutchess county, N. Y., for the best buck. Silver cup, $10.

James Sherman, Milton, Ulster county, N. Y., for the second best buck. Silver medal.

Val. Hallock, Poughkeepsie, N. Y., for the third best buck. Trans. Am. Institute.

Isaac S. Hallock, Milton, Ulster county, N. Y., for the best pen of ewes. Silver cup, $10.

Ellathan Gazley, for the second best pen of ewes. Silver medal.

Ellathan Gazley, for the third best pen of ewes. Trans. Am. Inst.

Ellathan Gazley, for the best pen of buck lambs. Silver medal.

Ellathan Gazley, for the best pen of ewe lambs. Silver medal.

Nathaniel Hallock, Milton, Ulster county, N. Y., for the second best pen of ewe lambs. Trans. Am. Institute.

Middle Wool Sheep.

Judges.—W. Wickham Mills, Chas. Wright, Chas. Harrison.

D. B. Haight, Dover Plains, Dutchess county, N. Y., for the best buck. Silver cup, $10.

Thomas Betts, New-York city, for the second best buck. Silver medal.

Thomas Betts, for the third best buck. Trans. Am. Institute.

D. B. Haight, for the best pen of ewes. Silver cup, $10.

Thomas Bell, Jr., Eatontown, N. J., for the second best pen of ewes. Silver Medal.

Thomas Betts, for the third best pen of ewes. Trans. Am. Institute.

D. B. Haight, for the best pen of buck lambs. Silver medal.

D. B. Haight, for the best pen of ewe lambs. Silver medal.

Merino Sheep.

Judges—W. Wickham Mills, Charles Wright, Chas. Harrison.

William Chamberlain, Red Hook, N. Y., for the best buck. Silver cup, $10.

George Campbell, Westminster, Vt., for the second best buck. Silver medal.

William Chamberlain, Red Hook, N. Y., for the third best buck. Trans. Am. Institute.

William Chamberlain, Red Hook, N. Y., for the best pen of ewes. Silver cup, $10.

George Campbell, Westminster, Vt., for the second best pen of ewes. Silver medal.

George Campbell, Westminster, Vt., for the third best pen of ewes. Trans. Am. Institute.

Silesian.

Judges—W. Wickham Mills, Chas, Wright, Chas. Harrison.

William Chamberlain, Red Hook, N. Y., for the best buck. Silver cup, $10.

George Campbell, Westminster, Vt., for the second best buck. Silver medal.

George Campbell, Westminster, Vt., for the third best buck. Trans. Am. Institute.

George Campbell, Westminster, Vt., for the best pen of ewes. Silver cup, $10,

William Chamberlain, Red Hook, N. Y., for the second best pen of ewes. Silver medal.

William Chamberlain, Red Hook, N. Y., for the third best pen of ewes. Trans. Am. Institute.

Swine.

Judges—Samuel G. Stryker, P. H. Brink, J. H. Baldwin.

Thomas Richardson, West Farms, N. Y., for the best boar, two years old. Silver cup, $10.

William Love, New-York, for the second best boar, two years old. Silver medal.

William Love, New-York, for the best boar, one year old. Silver cup, $8.

Samuel Love, New-York, for the second best boar, one year old. Silver medal.

William Love, New-York, for the best sow, two years old. Silver cup, $10.

William Love, New-York, for the second best sow, two years old. Silver medal.

Samuel Love, New-York, for the third best sow, two years old. Trans. Am. Institute.

William Love, New-York, for the best sow one year old. Silver cup, $8.

Samuel Love, New-York, for the second best sow, one year old. Silver medal.

Samuel Love, New-York, for the third best sow, one year old. Trans. Am. Institute.

Samuel Love, New-York, for the best litter of pigs. Silver cup, $10.

Edward Wait, Orange county, N. Y., for the second best litter of pigs. Silver medal.

Thomas Richardson, West Farms, N. Y., for the third best litter of pigs. Trans. Am. Institute.

Poultry.

Judges—Wm. L. Laing, J. M. Moffat, B. K. Richardson.

Henry Johnson, Paterson, N. J., for the best and greatest variety of poultry, $8.

Henry Johnson, for the best pair Bremen geese. Two vols. Trans. N. Y. State Ag. Society.

William Love, New-York, for the best Muscovy ducks. Two vols. Trans. N. Y. State Ag. Society.

William Watson, Westchester, N. Y., for the best pair of Aylesbury ducks. Two vols. Trans. Am. Institute.

William Love, New-York, for the best pair of topknot Aylesbury ducks. Two vols. Trans. Am. Institute.

Robert Webber, Woodstock, Westchester county, N. Y. for the best Dorking fowls. Am. Poultry Yard.

Robert W. Pearsall, West Farms, N. Y., for the best black Spanish fowls. Bennett's Poultry Book.

Robert W. Pearsall, West Farms, N. Y., for the best black Poland fowls. Bennett's Poultry Book.

Henry Johnson, Paterson, N. J., for the best silver Poland fowls. Am. Poultry Yard.

Robert W. Pearsall, West Farms, N. Y., for the best golden Polands. Dixon & Kerr's Dom. Poultry.

Henry Johnson, Paterson, N. J., for the best Bolton grey fowls. Bennett's Poultry Book.

Robert W. Pearsall, West Farms, N. Y., for the best white Asiatic fowls. Am. Poultry Yard.

Alfred Alexander, Weavertown, N. J., for the best grey Asiatic fowls. Bennett's Poultry Book.

Henry Johnson, Paterson, N. J., for the best Shanghae fowls. Am. Poultry Book.

Henry Johnson, Paterson, N. J., for the best golden Hamburgh fowls. Am. Poultry Yard.

Henry Johnson, Paterson, N. J., for the best silver Hamburgh fowls. Dixon & Kerr's Dom. Poultry.

James Amm, Elizabeth, N. J., for the best gold lace bantam fowls. Bennett's Poultry Yard.

Henry Johnson, Paterson, N. J., for the best silver lace bantam fowls. Dixon & Kerr's Dom. Poultry.

Alfred Alexander, Weavertown, N. J., for the best native and dunghill fowls. Am. Poulterer's Companion.

Charles Votey, Brooklyn, L. I., for the best exhibition of pigeons. Am. Poultry Book.

Agricultural Productions.

Judges—John G. Bergen, Nicholas Wyckoff.

Isaac Hutchinson, Millstone, N. J., for the best 20 ears of white corn. Silver medal.

James Vradenburgh, Ulster county, N. Y., for the second best 20 ears of white corn. Bronze medal.

Jacob Salter, (gardener to C. M. Saxton, Orange, N. J.,) for the best 20 ears of yellow corn. Silver medal.

Thompson C. Munn, Orange, N. J., for the second best 20 ears of yellow corn. Bronze medal.

E. Sherman, Searsville, N. Y., for the best bushel of wheat. Silver cup, $8.

J. C. Thompson, Tompkinsville, S. I., for the best 12 ears of sweet corn. Bronze medal.

Paul Buchanan, Newark, N. J., for the best bushel of rye. Bronze medal.

Solomon D. Crispell, Hurley, Ulster county, N. Y., for the second best bushel of rye. Working Farmer.

E. Sherman, Searsville, N. Y., for the best bushel of oats. Silver medal.

Paul Buchanan, Newark, N. J., for the best bushel of barley. Bronze medal.

E. Sherman, Searsville, N. Y., for the best bushel of buckwheat. Colman's European Agriculture.

Hops.

A. A. Brown, Otsego Lake, Otsego county, N. Y., for the best hops. Silver medal.

Jas. H. Dunbar, Hamilton, Madison county, N. Y., for the second best specimen of hops. 2 vols. Working Farmer.

Flour.

Judges—Stephen Valentine, A. B. Davis.

Bagby, Burns & Wood, Quincy, Ill., for the best barrel of flour. Silver cup, $8.

A. W. Fagin, Woodruff & Co., agents, Pearl street, New-York, for the second best barrel of flour. Silver medal.

A. W. Fagin, Nason & Collins, agents, 23 Water street, for the third best barrel of flour. Bronze medal.

Productions of the Dairy.

Judges—W. J. Young, W. F. Badeau, Chas. M. Carpenter.

Mrs. V. P. Walling, Goshen, Orange county, N. Y., for the best butter. Silver cup, $8.

S. Pelton, Chester, N. Y., for the second best butter. Silver medal.

Nelson Crist, Goshen, Orange county, N. Y., for the third best butter. Bronze medal.

Fruit—Apples.

Judges—Thomas Hogg, Robert Reid, William Cranston.

Lewis C. Lighthipe, Orange, N. J., for the best collection of apples. Silver cup, $10.

Isaac V. Brower, Riverside, Millstone, N. J., for the best twelve table apples. Downing's Fruits.

Pears.

Hovey & Co., Boston, Mass., for the best collection of named varieties of pears. Silver cup, $10.

Thomas W. Field, Brooklyn, L. I., for the second best collection of named varieties of pears. Silver medal.

J. J. Mapes, Newark, N. J., for the third best collection of named varieties of pears. Bronze medal.

John Brill, Newark, N. J., for the best six named varieties of pears. Silver medal.

John Milhau, Locust Grove, Bloomingdale, N. Y., for the best twelve table pears. Barry's Fruit Garden.

Peaches.

Job Angell, Fishkill, N. Y., for the best twelve freestone peaches. Downing's Fruits.

Native Grapes.

William A. Underhill, Croton Point, N. Y., for the best twelve bunches of Isabella grapes. Bronze medal.

R. T. Underhill, Croton Point, N. Y., for the second best twelve bunches of Isabella grapes. Horticulturist.

John Couzens, Dobbs' Ferry, N. Y., for the third best twelve bunches of Isabella grapes. Chorlton's Cold Grapery.

William A. Underhill, Croton Point, N. Y., for the best twelve bunches of Catawba grapes. Bronze medal.

Daniel Hughes, for the second best twelve bunches of Catawba grapes. Hovey's Magazine.

R. T. Underhill, Croton Point, N. Y., for the third best twelve bunches of Catawba grapes. Pardee's Strawberry Manual.

Foreign Grapes.

Mrs. F. B. Durfee, Fall River, Mass., for the best four named varieties of foreign grapes. Silver cup, $10.

Christopher Schmieg, (gardener to E. H. Rogers, Ravenswood, L. I.,) for the second best four named varieties of foreign grapes. Silver cup, $8.

Benjamin Moore, (Amateur), Sing Sing, N. Y., for the best bunch of Black Hamburgh grapes. Downing's Fruits.

John Jamison, (gardener to Wm. Wright, Newark, N. J.,) for the best bunch of Xeres grapes. Barry's Fruit Garden.

Quinces.

R. A. Robertson, Astoria, L. I., for the best twelve quinces. Bronze medal.

Job Angell, Fishkill, N. Y., for the second best twelve quinces. Hovey's Magazine.

Discretionary.

A. T. Van Amringe, Rye Neck, N. Y., for extra large apples. Horticulturist.

Lewis Wheeler, Cambridgeport, Mass., for three varieties of pears. Bronze medal.

Thomas Bowden, 105 W. 29th street, N. Y., for seedling peaches. Downing's Fruits.

Thomas Cavanach, Brooklyn, for a basket of mixed fruit. Horticulturist.

Thomas Arrowsmith, Middletown, N. J., for fine water melons. Horticulturist.

Daniel Roberts, Middletown, N. J., for fine water melons. Trans. Am. Institute.

John H. Brinkerhoff, English Neighborhood, N. J., for fine orange water melons. Trans. Am. Institute.

John H. Brinkerhoff, English Neighborhood, N. J., for extra fine citrons. Horticulturist.

Flowers—Special Exhibition—Roses and Dahlias.

Judges—W. Grant, G. Gabrielson, Peter B. Mead.

Mateo Donadi, Astoria, L. I., for the best twelve multicolored dahlias. Bronze medal.

Adolphus G. Burgess, Glen Cove, L. I., for the second best multicolored dahlias. Breck's Book of Flowers.

Adolphus G. Burgess, Glen Cove, L. I., for the best twelve unicolored dahlias. Bronze medal.

George C. Thorburn, Newark, N. J., for the second best twelve unicolored dahlias. Buist's Rose Manual.

Andrew Richardson (Amateur), Fordham, N. Y., for the best six multicolored dahlias. Bronze medal.

Andrew Richardson, (Amateur), Fordham, N. Y., for the best six unicolored dahlias. Bronze medal.

William A. Burgess, Glen Cove, L. I., for the best American seedlings. Silver medal.

Bouquets and Baskets.

Judges—Geo. Hamlyn, William Fitzpatrick.

Charles More, 98th st. and 3d avenue, for the best pair of hand bouquets. Silver medal.

Gunerius Gabrielson, 374 Broadway, for the best floral basket. Silver medal.

Flowers, Bouquets, and Baskets—General Display.

Judges—John S. Burgess, Alfred Bridgeman, William Davidson.

Mateo Donadi, Astoria, L. I., for the best display of dahlias. Silver cup, $15.

Charles S. Pell, N. Y., Orphan Asylum, for the second best display of dahlias. Silver cup, $10.

Adolphus G. Burgess, Glen Cove, L. I., for the third best display of dahlias. Silver medal.

John Jamison, (gardener to Wm. Wright, Newark, N. J.,) for the fourth best display of dahlias. Bronze medal.

Andrew Bridgeman, Broadway, cor. 18th street, for the fifth best display of dahlias. Beck's Botany.

George Ceiss, 45th street and 6th avenue, for the sixth best display of dahlias. Hovey's Magazine.

Gabriel Marc, Astoria, L. I., for the seventh best display of dahlias. Horticulturist.

William A. Burgess, Glenwood, L. I., for the eighth best display of dahlias. Luchar on Hot Houses.

Andrew Bridgeman, Broadway, cor. 18th street, for the best display of cut flowers. Silver cup, $10.

Mateo Donadi, Astoria, L. I., for the second best display of cut flowers. Silver medal.

Charles More, 90th street and 3d avenue, for the third best display of cut flowers. Bronze medal.

Gabriel Marc, Astoria, L. I., for the fourth best display of cut flowers. Luchar on Hot Houses.

G. Gabrielson, corner Broadway and Eighteenth street, for the best display of flower baskets. Silver cup, $10.

William Fitzpatrick, corner Broadway and Twenty-ninth st., for the second best display of flower baskets. Silver medal.

William Fitzpatrick, corner Broadway and Twenty-ninth st., for the best display of bouquets. Silver cup, $10.

Thomas Cavanach, Brooklyn, for the second best display of bouquets. Silver medal.

Discretionary.

Charles S. Pell, N. Y. Orphan Asylum, for a fine display of dahlias and cut flowers, for eight days. Silver medal.

Vegetables.

Judges.—William M. White, Jonas Briggs, John S. Burgess.

Samuel Ruth, (gardener to Jno. C. Beeckman, Sixty-first street and Second avenue,) for the best culinary vegetables. Silver cup, $8.

Thompson C. Munn, Orange, N. J., for the second best culinary vegetables. Bronze medal.

Samuel Ruth, Sixty-first street and Second avenue, for the best cattle vegetables. Silver medal.

Samuel Ruth, Sixty-first street and Second avenue, for the best sugar beets. Two vols. Cultivator.

Samuel Ruth, Sixty-first street and Second avenue, for the best blood beets. Two vols. Am. Agriculturist.

Samuel Ruth, Sixty-first street and Second avenue, for the best mangold wurtzel beets. Two vols. Working Farmer.

Charles S. Pell, N. Y. Orphan Asylum, Seventy-fourth street, for the best drumhead cabbage. Farmer's Dictionary.

Charles S. Pell, N. Y. Asylum, for the best other varieties of cabbage. Buist's Kitchen Garden.

Samuel Ruth, Sixty-first street and Second avenue, for the best brocoli. Four vols. Working Farmer.

Samuel Love, Fifty-third street, between Sixth and Seventh avenues, for the best table carrots. Two vols. Am. Agriculturist.

Samuel Ruth, Sixty-first street and Second avenue, for the best table parsnips. Two vols. Am Agriculturist.

Edward H. Kervan, (amateur,) Broadway, corner Seventy-ninth street, for table potatoes. Bridgeman's Gardener's Assistant.

Samuel Ruth, Sixty-first street and Second avenue, for the best celery. Bronze medal.

John Brill, Newark, N. J., for the best egg plants. Bronze medal.

E. Sherman, Searsville, Orange county, N. Y., for the best white onions. Bridgeman's Gardener's Assistant.

Samuel White, Port Richmond, S. I., for the best yellow onions. Farmer's Dictionary.

J. L. Palmer, G. H. Kerr, (agent,) 433 Third avenue, for the best red onions. Allen's Farm Book.

E. Sherman, Searsville, Orange county, N. Y., for the best half peck of seedling potatoes. Bronze medal.

K. Townsend, Putnam county, N. Y., for the best table potatoes. Bronze medal.

John Brill, Newark, N. J., for the best table pumpkins. Two vols. Working Farmer.

Byron Stratton, Staten Island, for the best and largest pumpkin. Two vols. Cultivator.

Patrick Cavanah, (amateur,) Sixty-first street and First avenue, for the best cattle pumpkin. Two vols. Working Farmer.

J. L. Palmer, 433 Third avenue, for the best marrow squashes. Two vols. Am. Agriculturist.

Samuel Ruth, Sixty-first street and Second avenue, for the best yellow crooked-necked squashes. Two vols. Working Farmer.

Samuel Ruth, Sixty-first street and Second avenue, for the best striped crooked-necked squashes. Two vols. Cultivator.

Samuel Ruth, Sixty-first street and Second avenue, for the best other varieties of squashes. Farmer's Dictionary.

Samuel Ruth, Sixty-first street and Second avenue, for the best tomatoes. Two vols. Working Farmer.

Samuel Ruth, Sixty-first street and Second avenue, for the best salsify. Bridgeman's Gardener's Assistant.

John Brill, Newark, N. J., for the best turnips. Two vols. Working Farmer.

Discretionary.

James M. Cooper, Ellis' Island, N. Y., for fine mangold wurtzel beets. Trans. Am. Institute.

Paul Buchanan, Newark, N. J., for fine yellow onions. Trans. Am. Institute.

Thompson C. Munn, Orange, N. J., for four varieties of seedling potatoes. Trans. N. Y. State Ag. Society.

Wine, &c.

Judges.—Thos. M. Field, Thos. Hogg, Robert Reid, William Cranston.

Mrs. Mary M. Parker, West Rupert, Vt., for the best currant wine. Trans. Am. Institute.

T. C. Munn, Orange, N. Y., for the second best currant wine. Trans. Am. Institute.

Mrs. Elizabeth Everett, Cranberry, N. H., for the third best currant wine. Diploma.

Mrs. Elizabeth Frost, Port Richmond, S. I., for the best blackberry wine. Trans. Am. Institute.

Mrs. Elizabeth Everett, Cranberry, N. H., for cherry wine. Trans. Am. Institute.

J. V. Provost, Green Point, L. I., for Catawba, Isabella, and black native grape wine. 2 vols. Trans. Am. Institute.

Gabriel Sleath, Cincinnati, Ohio, for Catawba brandy. Dip.

T. C. Munn, Orange, N. J., for the best cider. Diploma.

Preserves, Honey, Pickles, &c.

Judges—Mrs. M. T. Constant, Mrs. E. M. Cornwell, Mrs. S. S. Jellison.

Reckhow & Larne, 157 Cedar street, for the best preserves. Bronze medal.

James Broadmeadow, 59 Robinson street, for the second best preserves. Diploma.

H. W. Crittenden, East Chester, N. Y., for the best honey. Webster's Encyclopœdia.

N. J. Goetschius, 341 Bleecker street, for the second best honey. Diploma.

James Broadmeadow, 59 Robinson street, for the best pickles. Webster's Encyclopœdia.

Wadsworth & Burtnett, 50 Front street, for the second best pickles. Diploma.

Discretionary.

Wadsworth & Burtnett, 50 Front street, for a fine display of preserves. Diploma.

Miscellaneous Articles.

Judges—Peter B. Mead, Alfred Bridgeman, Henry Steele.

Robert Burnett, for a collection of wire-work for horticultural purposes. Bronze medal.

Palmer & Longking, for an improved cast-iron flower-stand. Bronze medal.

Louis Marle, New-York, for samples of fresh meats preserved. Diploma.

Augustus Hepp, New-York, for plans and drawings of conservatories, pleasure grounds, &c. Diploma.

J. C. Thompson, Staten Island, for samples of Wyandot corn. Diploma.

Joseph Wakeling, for colored drawings of plants, flowers, &c. Beck's Botany.

W. R. Prince, Flushing, L. I., for fine specimens of Dioscorea Japonica. Diploma.

Wells & Provost, 215 Front street, for the best self-sealing cans, (Pratt's.) Bronze medal.

Edward P. Torrey, 6 Platt street, for Arthur's self-sealing cans. Diploma.

Lewis, Miss Elizabeth S., Coventry, N. Y., for a fine collection of mosses and grasses. Florist's Guide.

Graef & Son, Brooklyn, L. I., for a miniature landscape garden, &c., and for a handsome and ornamental design. Silver medal.

Agricultural and Horticultural Implements.

Judges—Edward B. Finch, Nicholas Wyckoff.

John Jones, 251 Pearl street, for the best display of agricultural and horticultural implements. Silver medal.

R. L. Allen, 191 Water street, for the second best display of agricultural and horticultural implements. Bronze medal.

Griffing, Brothers & Co., 60 Cortlandt street, for the third best display of agricultural and horticultural implements. Diploma.

G. D. Harris, Fitchburg, Mass., for the best machine for extracting stumps, pressing hay, cotton, hops, &c. Bronze medal.

Sampson & Stevens, Boston, Mass. O. B. Gray, (agent,) 18 Beekman street, for the best seed sower. Bronze medal.

Enos Woodruff, Elizabeth City, New-Jersey. Fowler & Wells (agents), 308 Broadway, for the best self-acting carriage gate. Dip.

D. Phillips, Shaftsbury, Vermont. H. Whipple, (agent,) Port Richmond, S. I., for the best farm gate. Diploma.

John Jones, 251 Pearl street, for the best corn planter. Dip.

J. A. Wagner & Co., 229 Broadway, for the best grain and seed harvester. Diploma.

Mayher & Co., 197 Water street, for the best double horse power. Diploma.

J. A. Ayres, East Hartford, Conn. A. M. White, Greenpoint, L. I., for the best self-acting farm well. Diploma.

H. B. Barber, Scott, Cortlandt county, N. Y. W. H. Babcock, (agent), N. Y., for a water drawing machine. Diploma.

C. B. Carter, Ware, Mass., for the best apple parer. Diploma.

Testing of Mowing Machines.

Judges—John D. Ward, Nicholas Wyckoff, John A. Bunting.

R. L. Allen, 191 Water street, N. Y., for the best mowing machine. Silver medal.

M. G. Hubbard, Penn Yan, N. Y., the second best mowing machine. Bronze medal.

Plowing Match.

Judges—R. L. Waterbury, Nicholas Wyckoff, John A. Bunting.

Ira Peck, Orange, N. J., for the best plowing. Silver cup, $15.

Asa B. Munn, Orange, N. J., for the second best plowing. Silver cup, $8.

Andrew Fitzpatrick, Harlem, N. Y., for the third best plowing. Silver medal.

Spading Match.

Judges—Adrian Bergen, Alfred Bridgeman.

William Beaty, Mott Haven, N. Y., for the best spading. Silver cup, $10.

James Vance, 6th avenue, cor. 125th street, for the second best spading. Silver cup, $8.

Roger O'Connor, 7th avenue and 127th street, for the third best spading. Silver medal.

MANUFACTURING AND MECHANICAL DEPARTMENT,

Architectural Drawing.

Judges—Martin E. Thompson, Jno. B. Snook.

Donald McKenzie, Brooklyn, L. I., for the best architectural drawings. Diploma.

Duggin & Holly, 335 Broadway, for five frames of architectural drawings. Diploma.

Building Materials.

Judges—Walter Roome, Charles B. Hamlin.

Hydeville Marble Works, 42d street, between 5th and 6th avenues, for the best slate stone mantels, marbleized. (A gold medal having been before awarded.) Diploma.

William S. Ford, 182 West 25th street, for the best sliding and swinging window sash and frame. (A silver medal having been before awarded.) Diploma.

J. K. Brick & Co., South Brooklyn, L. I., for the best fire brick, fire tile and retort. (A silver medal having been before awarded.) Diploma.

G. R. Jackson & Co., 201 Centre street, for the best vault light. Silver medal.

F. G. Lucky, 75 Nassau street, for the best building blocks. (A silver medal having been before awarded.) Diploma.

James L. Jackson, 315 Stanton street, for the best cast iron capitals and bases. (A silver medal having been before awarded.) Diploma.

Washington Smith, 261 West 18th street, for the best drain pipe. (A silver medal having been before awarded.) Diploma.

E. W. Bullard, Barry Plain, Mass., for the best window hanger and fastener. Bronze medal.

Sawyer & Carr, 3 Bedford street, for the best self-acting water closet. Bronze medal.

John Kennedy, for a very superior statuary marble mantle. (A gold medal having been before awarded) Diploma.

L. Young, 641 Hudson street, for the best marble mantle. Bronze medal.

Frederick Evers, 15 East 27th street, for the best rosewood door. Bronze medal.

B. Kreischer & Nephew, 58 Goerck street, for the second best fire brick. Bronze medal.

R. L. & C. H. Lundy, 192 and 194 West 40th street, for the second best drain pipe. Diploma.

E. Bookhout, 81 Nassau street, for the second best water closet. Diploma.

Ambrose Tellier, 82 West 36th street, for the best architectural ornaments. Diploma.

Andrew Stoeckle, 129 Worth street, for the best mahogany and black walnut newel posts. Diploma.

P. Weiler, 176 Centre street, for the best hard wood mouldings. Diploma.

Hope Mills, 71 Fulton street, for the best sand paper. Diploma.

G. J. Farley, 13 East 19th street, for the best cement marble pedestals. Diploma.

L. T. Holman, 80 Cortland street, for the best model of a truss bridge. Diploma.

John H. Mead, 41 Hester street, for the best fence and gate-post ornaments. Diploma.

J. H. Doughty, 11 Canal street, for the best carved and sawed ornamental work. Diploma.

J. H. Banta, 44 York street, Jersey City, for a patent weather strip. Diploma.

Benjamin F. Miller, 26 West Broadway, for a patent ventilator. Diploma.

John Casey, 85 23d street, for a window sash detachment. Dip.

Alfred Speer, New-Jersey, for a French window fastener. (A silver medal having been before awarded.) Diploma.

D. Fitzgerald, 120 Orchard street, for three portable houses. Diploma.

Bells.

Judge—Rich. M. Hoe, Wm. B. Leonard.

Meneely & Sons, West Troy, N. Y., for a church bell. (A gold medal having been before awarded.) Diploma.

Jones & Hitchcock, Troy, N. Y., Geo. H. Swords, Walton & Co., agents, 40 Dey street, for a church bell. (A silver medal having been before awarded.) Diploma.

R. Livingston, Hoboken, N. J., for alarm bells. Diploma.

Blank Books and Stationery.

Judges—Geo. C. Mann, Geo. McKibbin, Geo. C. Morgan.

Carson & Hard, 44 Beekman street, for binders boards and bank-note paper. (A silver medal having been before awarded.) Diploma.

Berlin & Jones, 131 William street, for the best envelopes. Bronze medal.

Lyon & Raynor, 25 Beekman street, for the second best envelopes. Diploma.

Philip S. Justice & Co., 54 Cliff street, for a patent solid oval framed, secret fastened slate. Diploma.

Latimer, Bros., & Seymour, 15 Nassau street, for the best blank books. (A gold medal having been before awarded.) Diploma.

Munson & Brunley, Chicago, Ill.; James Cook & Co., (agents,) 56 Gold street, for the second best blank books. Silver medal.

Hosford & Co., 59 William street, for the third best blank books. Bronze medal.

Bowne & Hasbrouck, 174 and 176 Pearl st., for blank books. Diploma.

Slote & Janes, 93 Fulton street, for blank books. Diploma.

Francis & Loutrel, 99 Maiden Lane, for blank books. Dip.

H. Smith & Co., 90 Fulton street, for wedding and staple envelopes. Diploma.

E. B. Clayton's Sons, 161 Pearl street, for diaries. Bronze medal.

Gray, Cook & Merritt, 18 Beekman street, for paper and envelopes. (A gold medal having been before awarded.) Diploma.

J. K. Parks, Marlboro, N. Y., W. E. & J. Sibell, agents, cor. Nassau and Wall streets, for tracing cloth. (A silver medal having been before awarded.) Diploma.

Book Binding.

Judges—William Ebbitt, J. N. Wells, Jr.

James Forster, 50 Division street, for the best specimens of book binding. Bronze medal.

Mathews & Clasback, 645 Broadway, for the second best specimens of book binding. Diploma.

Boats and Oars.

Judges—J. E. Davidson, R. Fish, Q. C. Degrove, E. Dela Montagnie.

W. H. & J. S. Darling, 368 South street, for the best race-boat. Silver medal.

Joseph Colton, 335 Broadway, for the best life-boat. Silver med.

Ezekiel Page, Erie county, Penn., E. W. Page, agent, 20 West street, for the best oars, sweeps and sculls. (A silver medal having been before awarded.) Diploma.

C. L. Ingersoll & Son, 250 South street, for the best barge. Bronze medal.

Henry T. Rigby, South Brooklyn, L. I., for the second best race boat. Diploma.

C. L Ingersoll & Son, 250 South street, for the second best working boat. Diploma.

Henry Mitchell, 256 South street, for the second best spruce oars. Diploma.

Henry Mitchell, 256 South street, for the second best club boat oars. Diploma.

William P. Glading, 85 Cannon street, for a patent rowlock. Diploma.

Gentlemen's Boots and Shoes.

Judges—N. A. Rogers, D. S. Fowler, H. Martin.

S. Cahill, 377 Broadway, for the best riding boots. Silver medal.

E. A. Brooks, 575 Broadway, for the best patent leather boots. (A silver medal having been before awarded.) Diploma.

John Ready, 127 Nassau street, for the best quilted bottom boots. (A silver medal having been before awarded.) Diploma.

Ladies' Boots and Shoes.

Judges—S. Cantrell, O. S. Watkins.

Benj. Shaw, Canal street, for the best ladies boots. (A gold medal having been before awarded.) Diploma.

J. B. Miller & Co., 134 Canal street, for the best children's boots and shoes. Bronze medal.

Wade & Ware, 197 Sixth Avenue, for the second best children's shoes. Diploma.

John N. Genin, 513 Broadway, for the third best ladies' and children's shoes. Diploma.

Britannia and Tin Ware.

Judges—Joseph P. Simpson, J. B. Hathaway.

Isaac Van Hagen, New-York; Taulman & Low, 157 Broadway, for patent locomotive oil cans. Diploma.

Chappel & Co., 62 Fulton street, for non-evaporating cans, lanterns, lamps, &c. Diploma.

Taylor & Hodgetts, 60 Beekman street, for self-sealing cans. Diploma.

Farr, Briggs & Co., 134 Cherry street, for candle moulds. (A Silver medal having been before awarded.) Diploma.

William Webb, 307 Broadway, for specimens of improved candle moulds. Bronze medal.

T. Smith, 258 Pearl street, for water coolers. Diploma.

Brushes.

Judges—B. B. Fosdick, J. Muckel, H. M. Fairchild.

James T. Steer & Co., 46 Fulton street, for the best paint brushes. (A silver medal having been before awarded.) Dip.

James Martin, Newburgh, N. Y., Pinckney & Clark, (agents,) 118 Fulton street, for the second best brushes. Bronze medal.

John Dixon, 152 E. 40th street, for two bundles of brush hair. Diploma.

Billiard Tables.

Judges—F. W. Geissenhainer, Jr., J. N. Wells, Jr.

J. B. Sigonneau, 88 Walker street, for a billiard table. Dip.

Cabinet Ware.

Judges—William Ebbitt, J. N. Wells, Jr.

H. R. & J. L. Plimpton, 62 White street, for the best secretary bedsteads. (A silver medal having been before awarded.) Dip.

C. L. Taillant, 403 Fourth avenue, for the best invalid chairs. Diploma.

Glass & Co., 13 Crosby street, for the best inlaid furniture. Bronze medal.

Robert Paton, 24 Grove street, for the best school furniture. Diploma.

J. H. Doughty, 11 Canal street, for a general assortment of piano stools, tables, and music stands. Diploma.

W. Clark, 98 East 26th street, for the best piano-forte leg fastener. Diploma.

Briggs & Vickere, 6 Sullivan street, for the best enamelled furniture. Diploma.

Chickering & Sons, Boston, Mass., H. Warren, (agent), 508 Broadway, for the best composing desk. Diploma.

Carpeting and Oil Cloths.

Judges—John W. Hoyt, John T. Bailey, J. B. Stewart.

Smith & Co., West Farms, for carpeting. Bronze medal.

Carriages, Sleighs, and Axles.

William Wright, Thos. Sparling, Jas. H. Green.

D. M. Grant, 239 Broadway, for the best patent suspension spring gearing. Silver medal.

J. Sheriff, Mechanic street, Newark, N. J., for the best silver coach handles and ornaments. Bronze medal.

William Wright & Co., Newark, N. J., for the best carriage spring. Bronze medal.

New Haven wheel company, New Haven, Conn., for buggy wheels. Bronze medal.

Thomas Breese, Newark, N. J., for a set of patent and half patent carriage axles. Bronze medal.

James M. Post, Newark, N. J., for six sets of carriage axles. Bronze medal.

J. R. & G. Proch, Newark, N. J., for three sets carriage axles. Bronze medal.

H. W. Studley, 37 Canal street, for express wagons. Diploma.

J. H. Mulford & Co., Orange, N. J., for an express wagon. Diploma.

Henry M. Miller, Rahway, N. J., for a shell buggy. Diploma.

W. & A. S. Flandrau, 250 Ninth avenue, for a trotting buggy. Diploma.

J. L. Smith, 28 East 29th street, for a light top wagon. Dip.

King & Wilcoxson, 394 Broadway, for a light pleasure wagon. Diploma.

C. A. Beatty, cor. Third avenue and 12th street, for the best omnibus. Diploma.

Arnold Stivers, Newark, N. J., for the best silver carriage mountings. Diploma.

Crane & Kilburn, Newark, N. J., for the best carriage shafts, carriage bows, and bent felloes.

Castings.

Judges—Noah Worrall, L. Colwell.

Janes, Beebe & Co., 356 Broadway, for the best ornamental and other castings. Silver medal.

James Ritchie, Eighth street, near Grand, Williamsburgh, for the second best castings, (grate frames, summer pieces, &c.) Bronze medal.

D. B. & G. H. Bruen, Newark, N. J., for the best specimens of malleable iron castings. Bronze medal.

Newark Malleable Iron Manufacturing Company, 11 Nesbit-street, Newark, N. J., for the second best specimens of malleable iron castings. Diploma.

Cloaks and Mantillas.

Judges.—H. McCune, H. Hubbell.

M. Bell, 58 Canal street, for the best ladies' mantles, (a gold medal having been before awarded.) Diploma.

Coopers' Work.

Judges.—W. P. Bensel, Jesse West.

Richard Bacon, 69 Rutger's slip, for the best barrels and firkins. Diploma.

Cotton Goods.

Judges.—Haynes Lord, W. B. Shepard.

Wamsutta Mills, New Bedford, Mass, Willard, Wood & Co., (agents,) 57 Broadway, for 59 pieces of bleached muslins, plain and twilled. Silver medal.

William A. Howard, (Arkwright Mills,) Providence, R. I., Shepard, Howe & Co. (agents), 18 Broad street, for 9 pieces of cotton goods. Bronze medal.

Suffolk Steam Mills, Suffolk Co., N. Y., Hutchinson, Tiffany & Co. (agents), 66 Broadway, for two pieces of Canton flannel. Diploma.

Thomas Munroe & Co., 59 Liberty street, for 24 pieces of cotton cloaking and printed cotton flannels. Diploma.

M. B. Lockwood, Providence, R. I., Lawrence, Clapp & Co., 35 Broad street, for 9 pieces of (linen fold) bleached and brown shirting. Diploma.

Pacific Mills, Lawrence, Mass., Little, Alden & Co., (agents,) 39 Nassau street, for 35 pieces of lawns, and 34 pieces of printed calicoes. Gold medal.

Dunnell Manufacturing Co., Providence, R. I., for 102 pieces of calico prints; and 91 pieces of printed lawns. Gold medal.

Manchester Print Works, Manchester, N. H., J. C. Howe & Co., (agents,) 59 Broadway, for 28 pieces of printed cottons. Silver medal.

Bay State Printing Works, Fall River, Mass., McCurdy, Aldrich & Spencer, 65 Broadway, for 69 pieces of printed calicoes. Silver medal.

American Linen Company, Fall River, Mass, McCurdy, Aldrich & Spencer, (agents,) 65 Broadway, for 33 pieces of assorted linen goods, sheetings, &c. Gold medal.

Demarest & Jerolamon, 100 Barclay street, for cotton twine and cotton cord. Diploma.

Lancaster Mills, Clinton, Mass., Schouler, Newton & Co., 153 Broadway, for 10 pieces of gingham. Diploma.

Lord, Warren, Evans & Co., 61 Broadway, for 15 pieces of cotton goods. Bronze medal.

Confectionery.

Judges.—Lucas Thompson, F. W. Geissenhainer, Jr., J. F. Conrey.

W. H. Gibson, 41 Atlantic street, Brooklyn, L. I., for the best confectionery. Diploma.

Clocks, Watches, &c.

Judges.—John Cottier, Egbert Scudder.

Calvin Kline, 92 Wall street, for the best marine chronometers. Gold medal.

A Stuart, 91 Wyckoff street, Brooklyn, L. I., for the second best marine chronometers. Silver medal.

Boston Watch Company, Mass., J. S. McCurdy, (agent) 411 Broadway, for the best watches and movements. Silver medal.

John Sherry, Sag Harbor, N. Y., W. H. Wilcox, (agent,) 135 Fulton-street, for the best church clock, (a silver medal having been before awarded.) Diploma.

Reeve & Co., corner Centre and Canal streets, for an improvement in raising the hammer of a church clock. Silver medal.

H. Sperry & Co., 238 Broadway, for a clock and movements. Diploma.

Isaac Lauder,. 172 W. Twenty-second street, for the best marble clock case. Diploma.

J. Tuerlingx, 421 Greenwich street, for a mantel clock. Dip.

John Tagliabue, 23 Elm street, for glass hydrometers. Dip.

Clothing.

Judges.—Samuel Lounsbury, Abraham J. Post, P. C. Barnum.

A. D. Reeves, 327 Broadway, for the best measuring instrument for tailors' use. (A silver medal having been before awarded.) Diploma.

Steele & Johnson, Waterbury, Conn., W. R. Hitchcock & Co., agents, 12 Vesey street, for the best metal buttons. Bronze medal.

Taylor & Peck, 9 Chambers street, for the best fire coat. Dip.

Millward Brothers, 408 Eighth Avenue, for the best silk and cotton cord. Diploma.

Cutlery.

Judges—A. W. Spies, Francis Many.

Metropolitan Knife and Plate Works, 563 Broadway, for the best steel and plated cutlery. Gold medal.

Ames' Manufacturing Company, Chicopee, Mass., for the best specimen of swords. Silver medal.

Herman Wendt, Elizabethtown, N. J., Corning & Co., (agents,) 81 John street, for the best shears for tailors' use. A gold medal having been before awarded. Diploma.

John Rowe, 269 Pearl street, for the second best shears and scissors. A silver medal having been before awarded. Dip.

Daguerreotypes, Photographs and Ambrotypes.

Judges—R. R. Brown, J. Johnson, John G. Wellstood.

J. Gurney, 349 Broadway, for the best photographic portraits, (untouched.) Gold medal.

J. E. McClees, Philadelphia, Penn, Howard Peal, (agent,) 363 Broadway, for the best photographic views. Bronze medal.

Hufnagel & Co., 346 Broadway, for the second best photographic views. Bronze medal.

Victor Prevost, 70 Madison Avenue, for the third best photographic views. Diploma.

Meade Brothers, 233 Broadway, for the fourth best photographic views. Diploma.

A. Hesler, Chicago, Ill., for the best photographic water colors and daguerreotypes. Silver medal.

Charles D. Fredericks, 585 Broadway, for the second best photographic water colors. Bronze medal.

J. Gurney, 349 Broadway, for the third best photographic water colors. Diploma.

J. Gurney, 349 Broadway, for the best photographic oil colors, (life size.) A gold medal having been before awarded.) Dip.

Charles D. Fredericks, 585 Broadway, for the second best photographic oil colors. Silver medal.

J. Gurney, 349 Broadway, for the best photographic pastel colors. Diploma.

Charles D. Fredericks, 585 Broadway, for the second best photographic pastel colors. Diploma.

Wm. A. Tomlinson, 447 Broadway, for the best ambrotypes. (A silver medal having been before awarded.) Diploma.

Meade Brothers, 233 Broadway, for photographs on stained glass and silk. Silver medal.

Charles Ketchum, Penn Yan, N. Y., for the best daguerreotype cleaning machine Diploma.

Peter Neff, Jr. Cincinnati, Ohio, E. Anthony, (agent,) 308 Broadway, for the best melainotypes. Bronze medal.

C. C. Harrison, corner Elm and White streets, for daguerreotype instruments. (A silver medal having been before awarded.) Diploma.

Enslin, Schrieber & Co., 3 Maiden Lane, for daguerreotype plates. Diploma.

John Griesler, 75 Mott street, cameras. Bronze medal.

Wm. Lloyd, 522 Broadway, for two stereoscopic cosmoramas. Diploma.

Wm. Lloyd, 522 Broadway, for patent improved stereoscopes. Diploma.

Dentistry.

Judges—J. Groshon Herriot, S. A. Main.

Jones, White & McCurdy, 273 Broadway, for the best porcelain teeth. (A gold medal having been before awarded.) Dip.

Drugs, Chemicals and Perfumery.

Judges—George D. Coggeshall, John Meakim, Eug. Dupuy, J. Bryant Smith, L. Feuchtwanger.

John Vandeventer, 87 Barclay street, for blacking. Diploma.

Clough & Hallenbeck, 195 West street, for colored paints ground in oil. Bronze medal.

Battelle & Renwick, 163 Front street, for a beautiful specimen of saltpetre. Silver medal.

C. H. Phillips, 159 Front street, for bleached beeswax. Dip.

William Colgate & Co., 6 Dutch street, for fancy soap. Bronze medal.

Smith & Stratton, 141 Maiden Lane, for samples of varnish. Diploma.

Glenn Putnam, 83 Liberty street, for safety fuse for blasting and mining purposes. Diploma.

Bellevue White Lead Company, 188 Avenue C, for kegs of zinc and white lead. Silver medal.

James Pyle, 114 Warren street, for chemical olive soap. Bronze medal.

T. Kingsford & Son, Oswego, N. Y., E. N. Kellogg, (agent,) 196 Fulton street, for specimens of starch. (A silver medal having been before awarded.) Diploma.

A. H. Everett, 5 Canal street, for a case of chemicals. S. medal.

Arthur Nix, McComb's Dam, N. Y., for the second best sun bleached and manufactured wax. Diploma.

Bryan & Wilcox, 140 Fulton street, for writing fluids. Dip.

D. Appleton & Co., 348 Broadway, for a chemical chart. Dip.

Henry Thayer & Co., Cambridge, Mass., George H. Bates, agent, 133 Water street, for medicinal fluid extracts in vacuo. (A silver medal having been before awarded.) Diploma.

C. B. DeBurg, Williamsburgh, L. I., for super-phosphate lime and sulphate ammonia (A silver medal having been before awarded.) Diploma.

Alden & Co., 334 Broadway, for prepared cream, coffee, milk, cocoa, &c. Diploma.

Feather Dusters.

Judges—J. C. Skaden, R. Tweed.

Hansen & Co., 176 Front street, for the best feather dusters. Bronze medal.

Edge Tools and Hardware.

Judges—George H. Swords, William H. Carpenter.

Benedict & Burnham Manufacturing Co., Waterbury, Conn., George W. Valentine, (agent,) 62 Beekman street, for brass tubing, sheet of brass, roll of brass, copper wire, hose pipes, whistle, bells, &c. Silver medal.

Alexander Anderson, 52 Beekman street, for the second best brass rolls, brass rods, &c. Bronze medal.

Michael Devoy, 73 Avenue D, for the best edge tools. Bronze medal.

Bigelow & Camp, New-Haven, Conn., for improved eye bolts. Bronze medal.

Harrington & Heald, Millbury, Mass., John Q. Kellogg & Bros., (agents,) 30 Platt street, for the second best builders' tools. Dip.

Charles Parker, Meriden, Conn., O. L. Hatch, agent, 15 Gold street, a best sample of hardware. Bronze medal.

Russell & Erwin, Manufacturing Co., New-Britain Conn., and corner of Cliff and Beekman streets, N. Y., for the best assortment of hardware. Bronze medal.

Hotchkiss & Son, Sharon Valley, Conn., for the second best assortment of hardware. Diploma.

Henry Nelson, 103 East 32d street, for the best blacksmith and contractors' tools. Diploma.

Plymouth Mills, 13 Platt street, for the best rivets. Diploma.

J. Farris & Co., Plymouth, Mass., Locke, Ketchum & Co., 193 Water street, for the second best rivets. Diploma.

J. Wesserchcid, 73 Bowery, for the best rasps and files. Dip.

New-York File Works, Poughkeepsie, N. Y., John Rowe, (agent,) 269 Pearl street, for the second best files. Diploma.

Hotchkiss & Son, Sharon Valley, Conn., for a self-adjusting screw wrench. Diploma.

Samuel E. Tompkins & Co., 362 Broadway, for patent saddle trees. Diploma.

H. Aiken, Franklin, N. H., for saw setts. Diploma.

New-England Screw Co., Providence, R I., for a case and card of screws (A gold medal having been before awarded.) Dip.

John Gandu, 102 Walker street, for turning tools, chisels and gauges. Bronze medal.

Multiform Moulding Plane Co., Boston, Mass., G. T. Shipley, agent, for the best specimens of moulding and bench planes. Diploma.

F. K. Sibley, Auberdale, Mass., C H. Haswell, (agent,) 6 Bowling Green, for the best emery sticks and cloth. Diploma.

Logan & Lidgerwood, 9 Gold street, for the best axes, hatchets, &c. Diploma.

Waterbury Brass Co., Waterbury, Conn., L. Wetmore, agent, 52 Beekman street, for specimens of brass and copper kettles. Bronze medal.

W. H. & D. Davis, Yellow Springs, Ohio, William H. Scofield, agent, 39 William street, for specimens of wood and iron vices. (A silver medal having been before awarded.) Diploma.

John Most, corner Centre and White streets, for a case of piano forte tools. Diploma.

Bay State Screw Co., Taunton, Mass., Bussing, Crocker & Dodge, agents, 32 Cliff (street,) for an assortment of bolts. (A silver medal having been before awarded.) Diploma.

Enameled Iron and Iron Furniture.

Judges—J. Dixon, J. B. Cornell, Thos. Goadby.

Robert Marshall, 407 Cherry street, for the best enameled iron ware. Bronze medal.

Engravings.

Judges—F. C. Strype, H. W. Herrick, W. Howland.

Thomas Phillibrown, 378 Bowery, for the best specimen of engraving. Silver medal.

J. C. Buttre, 48 Franklin street, for the second best engraving. Bronze medal.

Endicott & Co., 59 Beekman street, for the best specimens of lithography. (A silver medal having been before awarded.) Diploma.

Arthur W. Francis, 33 Wooster street, for a frame of impression seals. Bronze medal.

Robert S. Jones, 378 Broadway, for the best specimen of card engraving. Diploma.

Fred. K. Kimmel, 84 Nassau street, for the second best specimens of card engraving. Diploma.

Hatch & Co., 29 William street, for the second best specimens of lithography. Diploma.

J. W. Orr, 75 Nassau street, for specimens of wood engraving. Diploma.

Apprentices' Work.

J. M. Walker, 229 Broadway, for the best wood engraving. Diploma.

Fine Arts.

Judges—J. Whitehorne, J. H. Shegogue, J. K. Fisher, S. N. Dodge.

Frederick Chubb, 477 Ninth avenue, for the best oil painting. Silver medal.

Charles L. Cornish, 207 West 34th street, for the second best oil painting. Bronze medal.

W. Schaus, 629 Broadway, for the best colored and plain engravings. Bronze medal.

Louis Verhaegen, 310 Fourth avenue, for the best marble bust. Bronze medal.

John Gott, Albany, N. Y., for the best plaster bust. Diploma.

Thomas Coffee, 645½ Broadway, for the second best plaster bust. Diploma.

Charles Innes, 1232 Broadway, for the third best plaster bust. Diploma.

John Harding, Clifton, Staten Island, for scissortypes. Diploma.

Mrs. Walter D. Burnett, Newark, N. J., for a pastil drawing. Diploma.

Mrs. J. Davenport, 231 Sixth avenue, for a monochromatic picture. Diploma.

Charles Muller, 437 First avenue, for bronze and marble sculpture. Bronze medal.

John Citarota, New-York, for wax models of Tarquin and Lucretia. Bronze medal.

Minors' Work.

Mary Gunn, for a Grecian painting. Diploma.

William C. Frazee, 42 Charles street, for a water-colored painting. Diploma.

James W. Loveridge, 271 Spring street, for an ink drawing. Diploma.

Steam Fire Engines.

Judges—Orison Blunt, Peter Hogg.

Lee & Larned, 18 Greenwich street, for best steam fire engine. Gold medal.

Silsby, Mynderse & Co., Seneca Falls, N. Y., for the second best steam fire engine. Silver medal.

Fire Engines, Hose Carriages, &c.

Judges—Wm. Adams, H. J. Poinier, John Coger, Jr., Daniel Van Voorhies.

No. 12, of Brooklyn, best of the first class. Gold medal.

No. 1, of New-York, best of the second class. Silver cup, $15.

No. 36, of New-York, best of the third class. Silver cup, $10.

No. 1, of Brooklyn, best hook and ladder truck. Silver cup, $15.

No. 36, of New-York, best hose carriage. Silver cup, $10.

Fire Arms.

Judges—Jno. P. Moore, Joseph Rose, Thos. F. Peers, Joseph Hall.

Allen & Wheelock, Worcester, Mass., Onion & Wheelock, (agents,) 99 Maiden Lane, for the best breech loading rifle, etc. Gold medal.

W. Hicks, 55 Cliff street, for percussion caps. Silver medal.

F. D. Newbury, Albany, N. Y., for a carbine and pistol. Bronze medal.

F. D Newbury, Albany, N. Y., Low, Haskell & Co., agents, 304 Broadway, for a repeating tubular magazine pistol. Dip.

J. E. Halsey, 38 Warren street, for patent rifles, and rifle pistols. Diploma.

Apprentices' Work.

Albert B. Campbell, 88 Sands street, Brooklyn, L. I., for a brass cannon. Diploma.

Fishing Tackle.

Judges—H. H. Sill, Frost Horton.

J. & J. C. Conroy, 65 Fulton street, for the best rods and reels. (A gold medal having been before awarded.) Diploma.

John Warrin, 48 Maiden Lane, for the best patent reel, lines, and flies. Silver medal.

J. B. Crook, 50 Fulton street, for fishing tackle. Diploma.

Grates.

Judges—Thos. Goadby, Richard Moore, J. B. Cornell.

W. Jackson & Son, 246 Front street, for the best parlor grates. (A gold medal having been before awarded.) Diploma.

Glass, China, and Earthenware.

Judges—James Neeves, H. W. Haydock, Wm. Woram, Eben Collamore.

Schmidt & Vogeley, 64 Nassau street, for the best glass shades. Diploma.

American Glass Silvering Co., 46 Duane street, for crystal silver ware. Diploma.

Sidney J. Newsham, 483 Broadway, for mended china ware. Dip.

Obed Daw, 683 Broadway, for pieces of glass and china riveted. Diploma.

Stained Glass.

Judges—Griffith Thomas, Henry Sharp.

H. M. Falconer, 95 4th avenue, for the best specimens of stained glass. Silver medal.

W. J. Hanington, 418 Broadway, for the second best specimens of stained glass. Bronze medal.

Graining.

Judges—A. Gaw, P. T. Wilson.

Constant Cottiaux, 97 Wooster street, for specimens of marbling on walls. Diploma.

Stewart S. Bannon, 94 East 21st street, for specimens of graining. (A silver medal having been before awarded.) Diploma.

C. H. Tyler, 74 Irving Place, for specimens of panel graining. (A silver medal having been before awarded.) Diploma.

John A. Davis, 62 White street, for the best specimens of graining. Bronze medal.

Robert Garthwaite, 134 West 19th street, for specimens of marbleing. Diploma.

Hats, Caps, and Furs.

Judges—M. Bird, L. Mealio, E. T. Ryder.

John N. Genin, 513 Broadway, for the best hats. (A silver medal having been before awarded.) Diploma.

James Smal & Co., 118 Maiden Lane, for the best caps. (A silver medal having been before awarded.) Diploma.

Straw Hats.

Judges—W. J. Lewis, S. Chapin, A. C. Hodges.

John Fearn, 153 West 35th street, for the best specimen of bleaching of straw hats. Diploma.

House Furnishing Articles.

Judges—B. W. Segee, W. H. Post, F. W. Geissenhainer, Jr.

J. & C. Berrian, 601 Broadway, for the best assortment of house furnishing articles. Bronze medal.

Augustus Wetmore, Jr., 833 Broadway, for the second best assortment of house furnishing articles. Diploma.

Stephen W. Smith, 534 Broadway, for the third best assortment of house furnishing articles. Diploma.

G. C. Wilkinson, 312 Monroe street, for the best fancy bellows. (A silver medal having been before awarded.) Diploma.

Nathaniel Fenn, 517 Sixth Avenue, for the second best fancy bellows. Diploma.

Brown & Eggleston, 72 Fulton street, for the best rocking horses. Diploma.

McAllister & Greville, 11 West 27th street, for the best refrigerators. Bronze medal.

Stephen W. Smith, 534 Broadway, for the second best refrigerators. Diploma.

Institution of the blind, 451 Eighth Avenue, for willow cabs, mats, boxes, baskets, &c. Diploma.

Daniel Bedford, 219 West 35th street, for an apparatus for discharging water closets. Bronze medal.

D. Walker & Co., Newark, N. J., James D. Cook, agent, 654 Broadway, for self-rocking cradles. Diploma.

J. & C. Berrian, 601 Broadway, for a patent perambulator. Diploma.

S. Harrison & Son, 350 West 24th street, for the best Devonshire chairs, voiders, &c. Diploma.

C. D. Barnitz, Baltimore, for a portable folding table. Dip.

Manufactured Hemp and Flax.

Judges—J. T. B. Maxwell, Henry Dougherty.

Willard Harvey & Co, 84 Maiden Lane, for the best lines and ropes. Diploma.

A. L. Bassett & Co. 48 Vesey street, for the best linen twine. Diploma.

Excelsior Patent Cordage Co., Brooklyn, L. I., for the second best rope. Diploma.

A. H. Hart, 1153 Broadway, for the second best linen twine. Diploma.

A. Wortendyke, Godinville, N. J., for cotton cords, &c. Dip.

Horse Shoes.

Judges—Peter Fullmer, J. Rennet, H. McGoldrich, Thomas Davis.

Oliver E. Hunter, Sixth Avenue Railroad Co., for the best specimens of horse and mule shoes. Silver medal.

John H. Cooper, 109 East 28th street, for the second best horse shoes. Bronze medal.

John A. Donahue, Newark, N. J., for the third best horse shoes. Diploma.

India Rubber and Gutta Percha.

Judges—Alex. H. Everett, Isaiah Deck, William Rider.

North American Gutta Percha Co., 102 Broadway, E. R. Hubby, agent, for vulcanized gutta percha goods. (A gold medal having been before awarded.) Diploma.

E. Pratt & Co., 57 Fulton street, for gutta percha patent nipple cups and breast pump. Diploma.

Trenton Gutta Percha Co., Trenton, N. J., E. R. Hubby, agent, 182 Broadway, for vulcanized gutta percha car and wagon springs. Bronze medal.

Union India Rubber Co., 41 John street, for India rubber cloths, hose, clothing, druggists' articles, &c. (A silver medal having been before awarded.) Diploma.

Beverly Co., Beverly, Mass, W. D. Russel, agent, 201 Broadway, for India Rubber goods. (A silver medal having been before awarded.) Diploma.

New-Brunswick Rubber Co., 100 Liberty street, for rubber boots and shoes. Diploma.

Novelty Rubber Co., 39 Maiden Lane, for rubber canes, buttons and boxes. Diploma.

Beacon Dam Co., Naugatuck, Conn., New Brunswick Rubber Co., agent, 100 Liberty street, for hard rubber goods. Diploma.

Prince's Fountain and Pen Pencil Co., 290 Broadway, for fountain pen pencils, and Prince's protean fountain pens. Diploma.

A. G. Day, Caoutchouc Co., 39 Maiden Lane, for India rubber pens, pencil cases and pen holders. Diploma.

Henry Davenport, 337 Broadway, for elastic rubber goods. Diploma.

New-York Belting and Packing Co., 6 Dey street, for rubber belting, packing, and hose. Diploma.

Jewelry.

Judges.—A. G. Peckham, Dennis M. Fitch.

L. & J. Jacobs, 407 Broadway, for a case of California diamonds. (A silver medal having been before awarded.) Diploma.

William Jameson, 402 Thirteenth street, for a tobacco box. Diploma.

Leather.

Judges.—A. H. Kimmel, J. H. Bowie, Geo. Evans, W. Sherwood.

Halsey & Taylor, Newark, N. J., for the best specimens of fancy leather. Silver medal.

George A. Dockstader, 59 Frankfort street, for the second best specimens of leather. Bronze medal.

New-York State Tanning Co., Harlem, N. Y., H. B. Bolster, (agent,) 10 Spruce street, for the third best specimens of leather. Diploma.

Harlow Roys, 27 Courtlandt street, for the best japaned skivers. Diploma.

Lamps and Chandeliers.

Judges.—J. Johnson, Jas. J. Moffat, J. Donaldson.

Cary Young, Mechanic street, Newark, N. J., for the best coach lamps. Bronze medal.

Joseph Hollely, 2 Pitt street, for patent blow pipes. Diploma.

Gould and Lamb, Worcester, Mass., for the best submarine lantern. Silver medal.

W. Y. Adams, 328 Cherry street, for a pier lamp, reflectors, and ship lamps. Diploma.

C. Moeller & Co., Newark, N. J., for a passenger car side lamp. Diploma.

William H. Osborn, 219 Tenth avenue, for a set of girandoles. Diploma.

Charles N. Lockwood, Newark, N. J., for carriage lamps. (A silver medal having been before awarded.) Diploma.

Mitchell, Bailey & Co., 526 Broadway, for superior gas fixtures. Silver medal.

J. & T. Donaldson, 85 Leonard street, for a bronze figure, pedestal, and chandeliers. Diploma.

William Burnett, 166 Broadway, for a lamp and feeder. Diploma.

Door Locks, Springs, &c.

Judges.—Wm. Bellamy, John De La Mater.

Many, Baldwin & Many, 49 John street, for porcelain door knobs, (a silver medal having been before awarded.) Diploma.

Charles Parker, Meriden, Conn., N. H. Camp, (agent,) 15 Gold street, for blind hinges and fasteners, (a silver medal having been before awarded.) Diploma.

Dennis & Burras, 1061 Broadway, for combination sash fasteners. Diploma.

T. F. Engelbrecht, 293 Broadway, D. D. Badger & Co., agents, 42 Duane street, for patent double action springs. Diploma.

J. H. Butterworth, Dover, N. J., for a tin chest lock. Diploma.

Apprentices' Work.

Henry Bosch, 204 Bleecker street, for door locks and door latches. Diploma.

John Dolan, 16½ Downing street, for door locks. Diploma.

Bank and Safe Locks.

Judges.—Geo. D. Lyman, Joseph C. Dilks, Wm. Bellamy.

World Safe Co., Troy, N. Y., J. C. Morris, (agent,) 205 Pearl street, for the best bank lock, (Lillie's empire combination bank lock,) (a gold medal having been before awarded.) Diploma.

J. H. Butterworth, Dover, N. J., R. M. Tuttle, (agent,) corner Pine and Nassau streets, for the second best bank lock, (a silver medal having been before awarded.) Diploma.

S. C. Herring 135 Water street, for the best safe lock. Silver medal.

W. H. Akins, Berkshire, Tioga county, N. Y., for the second best safe lock. Bronze medal.

Mathematical and Philosophical Instruments.

Judges.—Isaiah Deck, Alex. Mc Kenzie, Alex. H. Everett.

T. & E. Steglitz, 2 Cliff street, for a theodolite and lever. Bronze medal.

H. W. Hunter, 1 Chambers street, for the best railroad and surveying instruments. Bronze medal.

Benjamin Pike and Son, 518 Broadway, for the second best case of mathematical instruments. Diploma.

Edward S. Richie, Boston, Mass., for the best philosophical instruments. Silver medal.

B. F. McCreer, 333 Stanton street, for an electrical machine. Diploma.

James Prentice, 1 Chambers street, for the best drawing instruments. Diploma.

Fehrens & Albrecht, 82 Fulton street, for the second best drawing instruments. Diploma.

L. L. Smith, 5 Canal street, for the best galvanic battery, and specimens of electrotyping, (a gold medal having been before awarded.) Diploma.

James Frost, 487 Houston street, for the second best specimens of electrotyping. Silver medal.

J. P. Humaston, New-Haven, Conn., for the best compositors' transmitters. Silver medal.

Andrew Coleman, Perth Amboy, for the best self-adjusting magnet. Bronze medal.

G. Tagliabue, 298 Pearl street, for three thermometers. Dip.

David Munson, Indianapolis, Ind., B. H. Taggart, agent, 263 33d street, for the best lightning rods. Bronze medal.

W. Kamena & Co., 13 South William street, for the second best lightning rods. Diploma.

S. B. Smith, 77 Canal street, for the best magnetic machine, (a silver medal having been before awarded.) Diploma.

S. P. Lewis, 110 Broadway, for the second best magnetic machine. Bronze medal.

Alfred E. Beach, 128 Fulton street, for a printing telegraph, (raised letters.) Gold medal.

A. H. Ogden, New-York, for an apparatus for spinning and blowing glass. Diploma.

Sutter & Wyberd, 68 Maiden Lane, for a daylight reflector. Bronze medal.

Calvin Kline, 92 Wall street, for the best ships' binnacles and compasses. Silver medal.

A. Schrader, 208 William street, for an air pump. Diploma.

Clark & Adams, Antioch, California, for a topographical grade machine. Bronze medal.

H. Whipple, Port Richmond, S. I., for a patent brace rule and decimal squares. Bronze medal.

A. W. Raymond, Lynn, Mass., for a patent universal square. Diploma.

Lewis White, Hartford, Conn., for a model of a telegraph apparatus. Diploma.

W. W. Albro, Binghamton, N. Y., E. D. Seely, agent, 69 Wall street, for an apparatus for cooking without fire or cost of fuel. Bronze medal.

Kellogg & Dodge, Charleston, S. C., for specimens of water filters. Diploma.

B. F. Smith, 53 Bond street, for samples of coal oil. Bronze medal.

E.C.Shepard, 304 Wesley place, for a magneto-electric machine. Bronze medal.

Hobart & Robbins, Boston, Mass., for electrotypes. Silver medal.

Minerals.

Judges—William Ebbitt, J. N. Wells, Jr.

St. Peter's Mining Co., Chester county, Pa., and 2 Pine street, New-York, for copper ore from St. Peter's mining company's mine. Bronze medal.

Morocco Goods and Pocket Books.

Judges—Wm. Ely Chilson, C. S. Westcott, G. R. Cholwell.

Gavey & Bernard, 12 Gold street, for the best reticules and pocket books. Diploma.

Musical Instruments.

Judges—Warren Hill, T. P. Monzani.

A. G. Badger, 181 Broadway, for the best flutes. Silver medal.

J. F. Browne, 295 Broadway, for the best double action harp. (A gold medal having been before awarded.) Diploma.

W. H. Ross, 52d street, near 9th avenue, for the best banjo. Diploma.

Charles Kell, 200 Seventh street, for the second best banjo. Diploma.

MACHINERY.

Mortar Mixing Machine.

Judges—Geo. H. Starbuck, Joseph Hyde.

Hunt & Sands, Peekskill, N. Y., for the best mortar mixing machine. Diploma.

Grist Mills, &c.

Judges—W. Montgomery, A. Knox.

John M. Earls, Troy, N. Y., for a smut mill. Bronze medal.

Troy Portable Grain Mill company, Troy, N. Y., for Fulton's portable grain mill. (A silver medal having been before awarded.) Diploma.

J. S. Savage, Boston, Mass., for a corn mill. Diploma.

Printing Presses.

Judges—Wm. Montgomery, Alex. Knox, C. A. Alvord.

C. Potter, Jr., 85 Nassau street, for Davis's patent oscillating printing press. (A gold medal having been before awarded.) Diploma.

S. P. Ruggles Power Press Manufacturing Co., 152 Washington street, Boston, John Thursman (agent), 12 Spruce street, for a combination printing press. (A silver medal having been before awarded.) Diploma.

A. M. & G. H. Babcock, Westerly, R. I., for a polychromatic printing press. (A silver medal having been before awarded.) Diploma.

James F. Starrett, 352 W. 27th street, for a power-press for printing music. Silver medal.

Carding, Weaving, and Rope Machines.

Judges—W. Montgomery, Alexander Knox.

Troy Patent Cordage Co., Troy, N. Y., for the best rope machine for making large rope. (A silver medal having been before awarded.) Diploma.

Thomas G. Boone, Brooklyn, L. I., for the best rope machine for making small rope. Bronze medal.

Daniels & Reynolds, Woodstock, Vt., for the best cotton picking machine. Silver medal.

Richard Kitson, Lowell, Mass., Jos. Armitage, (agent,) 51st st., near 11th avenue, for the second best cotton picking machine. Bronze medal.

W. Benjamin & Co., 7 Whitehall street, for the best power looms. Silver medal.

John Vickery, Rochester, N. Y., for the second best power looms. Bronze medal.

W. H. Walton, 50 Sands street, Brooklyn, L.I., for a machine for combing wool, flax, &c. Bronze medal.

L. W. Boynton, New-York, for hatters' lathes. Bronze medal.

W. H. Walton, 50 Sands street, for a cotton carding machine. Bronze medal.

J. S. Kelly, Brighton, Mass., for a patent steam kiln dryer. Diploma.

Steam Land Carriage.

Judges—E. P. Gould, A. L. Holley, A. F. Smith.

J. K. Fisher, 234 East Broadway, for a steam land carriage. Bronze medal.

Gas Generators, Gas Regulators, and Soda Water Apparatus.

Judges—John Johnson, Thos. Marsh.

John Matthews, 439 First avenue, for portable soda water fountains, soda water tubes, non-condensing draught tube and cooler, patent safety machine for bottling soda water, and a self-acting machine for manufacturing soda water. Silver medal.

A. J. Morse, Boston, Mass., F. B. Nichols, agent, 71 Pine street, for Nichols' patent improved soda water apparatus. Bronze medal.

William Gee, 58 Fulton street, for the second best soda water apparatus. Bronze medal.

N. Aubin, 358 Broadway, for a gas generator and heater, dry gas holder, metallic, and diaphragm. (A gold medal having been before awarded.) Diploma.

S. Coates & Co., 376 Broadway, for portable gas works. Silver medal.

C. R. Woodworth, 74 Wall street, for a portable gas apparatus. Bronze medal.

J. Carpenter, 335 Broadway, for Benzole portable gas works. Diploma.

J. Dixon & Co., Jersey City, N. J., for black lead crucibles. (A gold medal having been before awarded.) Diploma.

Samuel Down, 336 West 22nd street, for a dry gas meter. (A silver medal having been before awarded.) Diploma.

Samuel Down, 336 West 22nd street, for a wet gas meter. Dip.

J. W. Hoard, Providence, R. I., for a patent gas regulator. Silver medal.

W. F. Shaw, 406 Broadway, for gas heating parlor, and cooking stoves, and gas flat iron heater. Bronze medal.

W. J. Demorest, 375 Broadway, for a miniature gas cooking stove. Bronze medal.

J. L. Douglas, 262 Broadway, for Kidder's gas regulator. (A silver medal having been before awarded.) Diploma.

L. W. Boynton, New-York, for a universal smoothing iron, with gas heating apparatus. Bronze medal.

Machinery, No. 1—Railroad Machinery and Fixtures.

Judges—Philo Hurd, A. F. Smith, M. L. Sykes, Jr.

Radley & Hunter, 48 and 50 Duane street, for the best locomotive lantern and patent spark-arrester. Diploma.

J. A. Williams, Utica, Taulman & Snow, (agents,) 157 Broadway, for the second best locomotive lamp. Diploma.

D. D. Miller, 190 Water street, for the third best locomotive lamp. Diploma.

John R. Sees, 10 Suffolk street, for the best locomotive feed and water heater for locomotives. Silver medal.

James R. Hilliard, Paterson, N. J., for joint locks for railroad bars. Diploma.

William B. Arnet, Cincinnati, Ohio, S. B. Bowles, (agent,) 118 William street, for a railroad car pedestal. Diploma.

William G. Creamer, 98 Fourth Avenue, for Creamer's brake operator. (A gold medal having been before awarded.) Dip.

Ward & Sinclair, 102 Broadway, for reclining and self-adjusting railroad car seats. Bronze medal.

Albany Iron Works, Troy, N. Y., William Jackson, agent, 28 Cliff street, for the best wrought iron railroad chairs, spikes, and rivets. Diploma.

Bridges & Brother, 64 Courtlandt street, for railroad car materials and jack screw. Diploma.

Andrew Boyd, Mott Havan, N. Y., for the best car bumper. Diploma.

Wm. Wright, Newark, N. J., for wrought iron solid head car bumper. Diploma.

P. Dorsch, Schenectady, N. Y., W. P. Dorsch, (agent,) 75 Beekman street, for patent railroad car wheels. (A silver medal having been before awarded.) Diploma.

Tyng, Moore & Adams, Jersey City, N. J., for double and triple plate car wheels. Diploma.

Snow & Sweetser, Fishkill Landing, N. Y., for cast iron car wheels. Diploma.

F. M. Ray, 102 Broadway, for patent volute car springs and railroad fixtures. Diploma.

Joseph Wood, Jersey City, for an improvement for preventing dust in cars. Diploma.

John R. Sees, 10 Suffolk street, for a patent adjustable force pump for locomotives. Diploma.

Machinery, No. 2—Lathes, Planers, Boring and Slotting Machines, Bolt Cutters, Dividing and Cutting Engines for Iron, and Models and Drawings of Machines for the same.

Judges—W. K. Thomas, James Stewart, Peter Hogg, Geo. B. Hartson.

E. Gould & Co., Newark, N. J., for the best gear cutting engine. Bronze medal.

G. W. Bigelow, New Haven, Conn., for the second best gear-cutting engine. Diploma.

H. F. Reed, 149 South street, for a model of side-lathe head. Diploma.

L. Wright, Newark, N. J., for a scroll saw. Diploma.

Bernard Hughes, Rochester, N. Y., for the best atmospheric trip-hammer. Gold med.

Leonard & Clark, Moodna, Orange Co., N. Y., for the best engine lathe. (A gold medal having been before awarded). Diploma.

Springfield Tool Co., Springfield, Mass., Foster & Leach, (agents,) 26 Broadway, for the second best engine-lathe. Silver medal.

Putnam Machine Co., Fitchburg, Mass., L. Wright, Newark, N. J., for the third best engine lathe. Bronze medal.

Ames' Manufacturing Co., Chicopee, Mass., Foster & Leach, (agents.) 26 Broadway, for the fourth best engine lathe. Diploma.

Nathan Monroe, Daysville, Conn., Foster and Leach, agents, 26 Broadway, for the fourth best engine lathe. Diploma.

Joseph Hyde, Troy, N. Y., for a self-adjusting screw wrench. Bronze medal.

Machinery, No. 3—Machines for Working Wood and Models, and Drawings for the same.

1st Class.

Judges—B. Aycrigg, C. L. Goddard.

Pinney, Youngs & Co., Milwaukie, Wis., J. B. Smith, agent, 35 William street, for the best sawing machine. Gold medal.

C. H. Denison, Green River, Vt., for the best double planing machine with rotary bed for wood. Gold medal.

A. H. Crozier, Oswego, N. Y., for the best barrel machine. Gold medal.

N. W. Robinson, Keeseville, N. Y., for the best machine for planing and turning barrel heads. Silver medal.

Lane & Bodley, Cincinnati, Ohio, for the best morticing and boring machine. (A silver medal having been before awarded.) Diploma.

2d Class.

L. Wright, Newark, N. J., for a scroll saw. Bronze medal.

H. B. Smith, Lowell, Mass., for a power morticing and blind stile morticing machine. Bronze medal.

Thomas R. Bailey, Lockport, N. Y., for a machine for morticing wood. Bronze medal.

J. C. Marble, Paris, Me., Foster & Leach, (agents), 26 Broadway, for a hoop sawing machine. Bronze medal.

Asa Landphere, Erie, Penn., for a spoke machine. Silver medal.

Ball & Ballard, Worcester, Mass., for a tenoning and moulding machine. (A silver medal having been before awarded.) Dip.

John Sitton, Williamston, S. C., for a model machine for making wheel felloes and carriage wheel machine. Bronze medal.

American Hoop Machine Co., Fitchburg, Mass., for a hoop planing and hoop pole splitting machine. Silver medal.

J. Milnor, Peck & Co., Flushing, N. Y., for a patent wood turning lathe. Bronze medal.

F. W. Parmenter, Troy, N. Y., for a morticing machine. Bronze medal.

H B. Smith, Lowell, Mass., for a moulding machine. Bronze medal.

W. Steele & Co., Wheeling, Va., J. A. Knight & Co., (agents,) 334 Broadway, for a tenon machine. Bronze medal.

W. L. & D. L. Ormsby, 255 West 16th street, for the automaton wood sawyer and splitter. Silver medal.

William Jones, 734 Eighth avenue, for a wood planing machine. Bronze medal.

S. Warner, Enfield, Mass., for a patent curvilinear sawing machine. Bronze medal.

Morse & Adams, cor. Eleventh avenue and 29th street, for a double acting sash machine. Bronze medal.

C. B. Morse, Rhinebeck, N. Y., for a rotary planing machine. Bronze medal.

C. B. Hutchinson, Auburn, N. Y., for patent muley saw-mill hangers. Diploma.

3d Class.

J. A. Conover, 130 Horatio street, for a wood splitting machine. Diploma.

Joseph Cotton, 335 Broadway, for a miter machine, (wood). Diploma.

Farmers' and Mechanics' Manufacturing Co., Greenpoint, L. I., for Ingersoll's tree-felling machine. Diploma.

G. Hutton, Tremont, Westchester Co., N. Y., for an adjustable circular saw arbor. Diploma.

John G. Sutter, 86 West 35th street, for a drunken saw. Dip.

Thomas R. Bailey, Lockport, N. Y., for a bed rail machine. Diploma.

Daniels & Raymond, Woodstock, Vermont, George C. Webster, (agent,) foot East 25th street, for a granular fuel cutter. Diploma.

Machinery, No. 4.—Steam Engines, and all other Machines, and parts of Machinery not otherwise apportioned.

Judges—Chas. H. Haswell, Denison E. Seymour, Isaac Stanton.

Hinckley & Egery, and Geo. H. Reynolds, Bangor, Maine, for the best non-condensing steam engine. Gold medal.

William Burdon, 102 Front street, Brooklyn, L. I., for the second best non-condensing steam engine. Bronze medal.

Novelty Iron Works, foot of 12th street, East river, for the best design of an oscillating and non-condensing steam engine. Silver medal.

Booth & Canfield, 13 Twelfth street, for the second best oscillating and non-condensing steam engine. Diploma.

Silas H. Brown, Troy, N. Y., for the best model of a non-condensing steam engine. Diploma.

Clark's Steam Fire Regulator Co., 208 Broadway, for the best steam fire regulator. (A silver medal having been before awarded.) Diploma.

William S. Gale, 90 Elizabeth street, for a fire regulator. Silver medal.

Patrick White, 61 Poplar street, Brooklyn, for a steam fire regulator. Bronze medal.

A. Howard, Boston, Mass., J. S. McCurdy, 411 Broadway, for the best sewing and eyelet machine. (A gold medal having been before awarded.) Diploma.

Nichols, Leavitt & Co., Boston, Mass.; J. S. McCurdy, 411 Broadway, for the second best sewing machine. Bronze medal.

Wheeler & Wilson, Manufacturing Co., 343 Broadway, for the third best sewing machine. Diploma.

Cary & Brainard, Brockport, N. Y., J. C. Cary, agent, New-York, for the best rotary force pump. (A gold medal having been before awarded.) Diploma.

Stephen D. Carpenter, Madison, Wis., for the second best rotary force pump. Bronze medal.

R. F. Washburn & Co., 267 Broadway, for the best ship's pump. Silver medal.

L. P. & W. F. Dodge, Newburgh, N. Y., for the second best ship's pump. Bronze medal.

Butcher & Reed, 252 Water street, for the third best ship's pump. Diploma.

Butcher & Reed, 252 Water street, for the best exhausting and forcing ship's pump. Bronze medal.

C. A. Schultz, Chicago, Ill., for the best taper sawing machine for marble or stone. Silver medal.

G. W. Hubbard, Middletown, Conn., George Walker, agent, 77 White street, for the second best taper sawing machine. Bronze medal.

Neill & Behrens, 36 Platt street, for the third best taper sawing machine. Diploma.

Wallace & George Bull, Towanda, Bradford county, Pa., for the best sawing machine, for stone or marble. Silver medal.

Starbuck Bro's, Troy, N. Y., for the best stone dressing machine. Silver medal.

J. B. Bromley, New Haven, Conn., for the second best stone dressing machine. Bronze medal.

L. W. Boynton, New-York, for the best sweeping machine. Bronze medal.

John North, Middletown, Conn., S. T. Bacon, (agent,) Boston, Mass., for the best book-folding machine. Gold medal.

M. H. Ford, Massachusetts, William W. Settle, agent, 13 Ferry street, for the best model of a machine for making screw-neck bottles. Bronze medal.

John Parshley, Fair Haven, Conn., for the best machine for pressing brick. Silver medal.

John Boynton, East Hartford, Conn., for the second best machine for pressing brick. Bronze medal.

Edgar Conklin, Cincinnati, Ohio, B. Homans, agent, 162 Pearl street, for the third best machine for pressing brick. Diploma.

H. Whipple, Port Richmond, S. I., for the best clay pulveriser. Diploma.

Boiler Felting Works, 64 Cortland street, for the best specimen of felting, for steam boilers, pipes, etc. Bronze medal.

B. J. Burnett, Mount Vernon, N. Y., Smith & Boyd, (agents,) 346 Broadway, for the best model of a crane. Silver medal.

Gilson Sandford, Poughkeepsie, N. Y., J. S. Cutter, agent, 128 East 12th street, for the second best model of a hoisting machine. Bronze medal.

Seyfert, McManus & Co., Reading, Pa., A. B. Wood, agent, 253 Pearl street, for the best specimen of boiler flues. (A silver medal having been before awarded.) Diploma.

A. B. Wood, 253 Pearl street, for the second best specimens of boiler tubes. Bronze medal.

Theodore Krausch, 164 William street, for the best specimen of mechanical drawing. Bronze medal.

Samuel Stanton, Newburgh, N. Y., for the second best specimen of mechanical drawing. Diploma

Bech & Kunhardt, Poughkeepsie, New-York, and 62 Beaver street, New-York, for the best samples of pig iron. Diploma.

James Horner & Co., 28 Cliff street, for the best samples of cast steel. Silver medal.

Boston Steam Gauge Co., Boston, Mass., for the best steam gauge. Silver medal.

John Hearson, 13 South William street, for the second best steam gauge. Bronze medal.

William C. Grimes, 80 Duane street, for the best water and steam gauges combined. Bronze medal.

Novelty Iron Works, foot 12th street, East river, for the second best water and steam gauges combined. Diploma.

Novelty Iron Works, foot 12th street, East river, for the best syphon gauge. (A silver medal having been before awarded.) Diploma.

William Gee, 58 Fulton street, for the best mercurial steam gauge. Bronze medal.

C. C. Greenough, New-York, for the second best mercurial steam gauge. Diploma.

Novelty Iron Works, foot 12th street, East river, for the best vacuum gauges. Bronze medal.

C. C. Greenough, New-York, for the second best vacuum gauges. Diploma.

F. A. Hoyt & Co., Boston, Mass., for the best water float gauge. Bronze medal.

E. S. Hoyt, Boston, Mass., for the second best water float gauge. Diploma.

Novelty Iron Works, foot 12th street, East river, for the best indicator and steam engine register. (A silver medal having been before awarded.) Diploma.

James Rodgers, 421 Broadway, for the second best steam engine register. Diploma.

F. O. Degener, 207 Broadway, for the third best steam engine register. Diploma.

John Matthews, 439 First Avenue, for the best mineral water gauge. Bronze medal.

Taylor, Campbell & Co., Adams street, Brooklyn, for the best feed pump and fire engine. Silver medal.

Fletcher & Durkee, Williamsburgh, L. I., for the second best steam feed pump. Bronze medal.

G. & G. M. Woodward, Beekman street, for the third best steam feed pump. Diploma.

Blake, Wheelock, & Co., 71 Gold street, for a steam pump. Diploma.

W. C. & J. S. Burnham, 85th street, New-York, for the best force pump. (A silver medal having been before awarded). Diploma.

E. G. Day & Co., 113 John street, for the second best force pump. Bronze medal.

F. O. Degener, cor. Broadway and Fulton street, for the best paging machine. Bronze medal.

H. Law, 66 Fulton street, for the second best paging machine. Diploma.

C. A. Durgin, 335 Broadway, for the third best paging machine. Diploma.

Novelty Iron Works, foot 12th street, East River, for the best steam whistle and oil cup. Diploma.

Charles M. Day, 83 Avenue D, for the best saw mill feed. Diploma.

E. A. Swan, Gowanus, L. I., for the best marble carving machine. Silver medal.

Cochran Non-Wasting Hydrant Co., cor. Pine and William streets, for the best Hydrant. (A silver medal having been before awarded.) Diploma.

J. Tuomey, 47 King street, for the second best hydrant. Bronze medal.

John D. Haines, Yorkville, N. Y., for the third best hydrant. Diploma.

John Sutton, 114 and 116 Cannon street, for the best oil cups. Bronze medal.

William Gee, 58 Fulton street, for the second best oil cups. Diploma.

John Sutton, 114 and 116 Cannon street, for the best lubricators. (A silver medal having been before awarded.) Diploma.

Breaer & Nimmo, Flushing, L. I., Charles Jimmerson, (agent,) Thirtieth street and Fourth avenue, for the second best lubricators. Bronze medal.

McNab, Carr & Co., 133 Mercer street, for the second best gauge cocks. Diploma.

McNab, Carr & Co., 133 Mercer street, for the best stop valves. Diploma.

Abner Van Horn & Co., 327 Fifth street, for the second best stop valves. Diploma.

McNab, Carr & Co., 133 Mercer street, for the best panel of brass ware. Diploma.

William Gee, 58 Fulton street, for the best self-acting faucets. Diploma.

H. R. Howlett, 9 Spruce street, for the best hose and water coupling. Diploma.

J. A. Knight, 334 Broadway, for the best sole-cutting machine. Diploma.

Fetter & Co., Philadelphia, George A. Bullard, (agent,) 23 Ann street, for the best boot-crimping machine. Diploma.

J. A. Knight, 334 Broadway, for the best pile driver. Dip.

Roger, Fils & Co , 33 Pearl street, for the best mill stones and burr stones. Bronze medal.

Samuel Taggart, Indianapolis, Ind., B. H. Taggart, (agent,) 263 Thirty-third street, for the best flour-packing machine. Diploma.

G. R. Lillibridge, 166 West 37th street, for the best ice cutter. Diploma.

J. A. Knight, 334 Broadway, for the best model of a trussed bridge. Bronze medal.

Speed & Bailey, Jersey City, N. J., for the best specimens of copper tubes. Silver medal.

Charles R. Otis, Yonkers, N. Y., for the best locomotive boiler. Diploma.

Salamander Grate Bar Co., 30 Pearl street, for the best grate bars. Diploma.

S. Whitemarsh, Northampton, Mass., for the best steam condensing furnace. Diploma.

William Thompson, Worcester, Mass., for the best smiths' shears. Bronze medal.

Taylor, Campbell & Co., 15 Adams street, Brooklyn, L. I., for the best cutting presses. Diploma.

S. Stow Manufacturing Co., Plantsville, Conn., for the best foot-lever shears, tinman's machines, sheet-iron folder, and patent tube former. Bronze medal.

Frederick P. Flagler, 210 Water street, for the best smiths' forges and jewellers' furnaces. Diploma.

James A. Tremere & Co., 211 Water street, for the second best smiths' forges and jewellers' furnaces. Diploma.

John Tyler, West Lebanon, N. H., for the best water-wheel. Bronze medal.

Richard Vose, 15 Nassau street, for the best quartz crushing machine. Bronze medal.

Thomas J. Chubb, Williamsburgh, L. I., for the best metal separator. Bronze medal.

Edward N. Kent, U. S. Assay Office, N. Y., for the best gold separator and amalgamator. Silver medal.

Farmers' and Mechanics' Manufacturing Co., Green Point, L. I., for hay and cotton press. Diploma.

T. Reeves & Co., 162 Schermerhorn street, Brooklyn, for the best screw press. Diploma.

W. J. Buck, 57 Pine street, for the best embossing press. (A gold medal having been before awarded.) Diploma.

Richard Dudgeon, 8 Columbia street, for the best hydraulic press. (A silver medal having been before awarded.) Diploma.

Milo Peck, New Haven, Conn., for the best drop press. Dip.

John S. Barden, New Haven, Conn., for the best patent water meter. Bronze medal.

Darlington & Co., cor. Centre and Franklin streets, for the second best water meter. Diploma.

James Cochrane, 8 Tenth street, for a water meter. Diploma.

B. F. Lawton, Troy, N. Y., for the best anti-frictions metals. (A gold medal having been before awarded.) Diploma.

Thomas J. Cox, 331 Fifth street, for the best composition roller brushes. Diploma.

Blake & Johnson, Waterbury, Conn., J. V. D. Wyckoff, 152 Broadway, for the best cast steel rollers. Diploma.

J. F. Starrett, 352 West 27th street, for the best puppet valve cut-off. Diploma.

William Gee, 58 Fulton street, for the best governor cut-off. Diploma.

Putnam Machine Co., Fitchburgh, Mass., L. Wright, agent, Newark, N. J., for the best extension gear. Diploma.

Boughton & Fraser, Chicago, Ill., John Fraser, 192 Fulton street, for the best cross-cut sawing machine. Diploma.

Charles R. Otis, Yonkers, N. Y., for the best power elevator. Diploma.

William Platt, Waterford, N. Y., Thomas Douglass, agent, 83 Beekman street, for the best set of stocks and dies. Bronze medal.

Kingston Goddard, Philadelphia, Pa., for the best jamb nuts. Bronze medal.

John P. Jourda, 290 Broome street, for the best machine for raising sunken vessels. Bronze medal.

James T. King, 418 Broadway, for the best steam washing machine. Bronze medal.

F. Seibert, 1 Ferry street, for the best morocco finishing, rolling, and paper glazing machine. Diploma.

Edward Weissenborn, 106 Centre street, for the best machine for making chain. Diploma.

James T. King, 418 Broadway, for the best machine for making spiral springs. Diploma.

E. Horton & Sons, Windsor Locks, Conn., John W. Sloughton, agent, Lovejoy's Hotel, for the best patent geared screw chucks. Diploma.

Magoon & Co., St. Johnsbury, Vermont, for the best feed water heater for a boiler. Bronze medal.

B. Wassersheid, 73 Bowery, for the best jack-screw. Diploma.

William Ballard, 7 Eldridge street, for the second best jack-screw. Diploma.

James St. John, 97 Forsyth street, for the third best jack-screw. Diploma.

Thomas Main, 2 Milligan Place, Sixth Avenue, for the best design of a condensing propeller engine. Diploma.

J. S. McCurdy, 411 Broadway, for the best binding machine. Diploma.

Brayton Wrought Nut Manufacturing Co., 78 Broad street, for patent finished nuts. Diploma.

Otto Ahlstrom, 395 First Avenue, for expanding screw-fastening. Diploma.

W. J. Buck, 57 Pine street, for Dick's saw gummer. Dip.

William Fowler, 593 Hudson street, for improved mode of bending lead pipe. Diploma.

George Fetter, Holmesburg, Penn., for patent joint pipe connection. Diploma.

Ames Manufacturing Co., Chicopee, Mass., for Ball's patent safety pump, (steam power) Gold medal.

Thomas Hanson, 137 Third Avenue, for the best hydraulic rams. (A silver medal having been before awarded.) Dip.

Josephus Echols, Columbus, Ga., A Scott, agent, corner Reade and Elm streets, for the second best hydraulic rams. Bronze medal.

J. C. Cheney & Co., Rochester, N. Y., Picot & Shotwell, 63 Maiden Lane, for Kedzie's rain-water filter. Diploma.

James H. Wright, 835 Broadway, for water filters. Bronze medal.

C. Warner, 7 Beekman street, for water filters. Diploma.

Joseph S. Payne & Co., 204 Greene street, for the best brass goods. Diploma.

L. W. Boynton, New-York, for a fan blower. Diploma.

Wendall Wright, 1180 Broadway, for a patent friction clutch pulley. (A silver medal having been before awarded.) Dip.

Kellogg and Dodge, Charleston, S. C., for Smith's patent clasp for machine belting. Diploma.

E. G. Allen, Boston, Mass., for Huddleston's mercury test pressure gauge. Diploma.

Samuel Harris, Springfield, Mass., for sifting machines. Dip.

H. G. V. Buckley, for a grain drying machine. Diploma.

Naval Architecture.

Judges—Chas. H. Haswell, Eckford Webb.

J. B. Van Deusen, 246 7th street, for the best model of a pilot boat. Diploma.

Henry Steers, 274 7th street, for the second best model of a yacht. Diploma.

Charles T. Jung, 178 2d Avenue, for the third best model of a yacht. Diploma.

J. B. Van Deusen, 246 7th street, for a model of a clipper ship. Diploma.

John W. Griffiths, 4 Bowling Green, for the best iron kelson for vessels. Diploma.

Charles H. Platt, 46 West street, for the best patent ship's blocks. Diploma.

Nathan Thompson, Jr., 87 Wall street, for the best life seat. (A gold medal having been before awarded. Diploma.

Harry Whittaker, Buffalo, N. Y., D. D. Deming, 72 E. 30th street, for the best model of a side propeller. Bronze medal.

Yelland Forman, 74 Franklin street, for the best model of a tubular life boat. Diploma.

Isaac Boss, 43 South street, for a model topsail for ships. Dip.

John Cuttrell, Keyport, N. J., for model schooner. Diploma.

Needlework, Embroidery and Fancy Articles.

Judges—Miss Victoria Hadley, Miss Sarah J. Dunbar, Miss Louisa H. Reinagle.

Miss Jane Loucks, 112 West 36th street, for the best worsted embroidery. Bronze medal.

Mrs. John Wilcox, Albany, N. Y., for the second best worsted embroidery. Diploma.

Miss Harriet M. Denning, 18 Commerce street, for the best hearth rug. Diploma.

Mrs. Nott, 705 Greenwich street, for the best wax fruit. Bronze medal.

Miss E. C. Havens, 13 Beach street, for the second best wax fruit. Diploma.

Miss Catharine Sharp, 240 West 23rd street, for the best wax flowers. Bronze medal.

Mrs. A. E. Piper, 14 Pacific street, Brooklyn, for the second best wax flowers. Diploma.

Douglass & Sherwood, 343 Broadway, for the best ladies' skirts. Diploma.

Forman & Co., 705, Broadway, for the second best ladies' skirts. Diploma.

Lewis & Seacord, 655 Broadway, for the best gentlemen's furnishing goods. (A silver medal having been before awarded.) Diploma.

Mrs. Van Houten, 82 Nassau street, for the second best genemen's furnishing goods. Diploma.

John Flaherty, New-York, for shirts. Diploma.

E. H. Valentine, 408 Broadway, for enamelled collars. Dip.

Madame Gerard, 34 Amity street, for the best ladies' corsets. Diploma.

William T. Ross, 47 West 13th street, for the best specimens of glove cleaning. Diploma.

Miss E. Duston, 635 Sixth avenue, for the second best crochet work. Diploma.

Robert Link & Bro., 181 and 539 Broadway, for the best hair work. Diploma.

Mrs. Elizabeth Gautier, (aged 82 years), Jersey City, N. J., for the best potichomane vases. Bronze medal.

Content, Neary & Co., 502 Broadway, for the second best potichomane vases. Diploma.

Mrs. Sophia Cooley, 112 Eighth avenue, for the best ladies' bonnets. Bronze medal.

G. Schlegel, 15½ Division street, for the second best ladies' bonnets. Diploma.

Madame Demarest, 375 Broadway, for the best system of dress cutting. (A silver medal having been before awarded.) Dip.

James Bailey, 325 Fulton street, Brooklyn, for the best embroidery on muslin and linen. Bronze medal.

Mrs. Wild, 47 West 41st street, for the second best embroidery on muslin and linen. Diploma.

S. H. Doughty, 28 John street, for the best leather, silk, and elastic belts. Diploma.

John N. Genin, 513 Broadway, for the best ladies' and children's underlinen and fancy goods. (A silver medal having been before awarded.) Diploma.

Mrs. V. A. Smith, 158 East 32d street, for a patchwork bed quilt. Diploma.

Minors.

Miss Gertrude L. Eling, 6 Poplar street, Brooklyn, for worsted embroidery. Dipoma.

Miss Mary C. McFarland, (aged 7 years), 164 West 13th st., for the best crochet work. Diploma.

Preparations of Natural History.

Judges—E. Guillaudeu, T. F. King.

J. G. Bell, 289 Broadway, for the best specimens of prepared birds. (A gold medal having been before awarded.) Diploma.

John L. Bode, 16 North William street, for the second best specimens of prepared birds. (A silver medal having been before awarded.) Diploma.

Penmanship and Gold Pens.

Judges—Hiram Dixon, W. H. Dikeman, Wm. J. Roome.

Henry A. Brown, 121 Nassau street, for the best gold pens. Diploma.

T. S. Marlor, 22 Maiden Lane, for the second best gold pens. Diploma.

John Foley, 163 Broadway, for the best gold pen and pencil cases and gold pens. Bronze medal.

Herman Geiling, 42 Warren street, for the best specimens of penmanship. Diploma.

George B. Wheeler, 13 Bleecker street, for the second best specimens of penmanship. Diploma.

E. L. Viele, 13 Broadway, for topographical maps. Diploma.

John S. Sharp, 133 Nassau street, for show cards, etc. Dip.

Piano Fortes.

Judges—H. A. Wollenhaupt, W. H. Sage, Jas. Harrison, M. Gottschalk.

Chickering & Sons, Boston, Mass., H. Warren, agent, 508 Broadway, for the best grand action piano forte. Gold medal.

Steinway & Sons, 84 Walker street, for the second best grand action piano forte. Silver medal.

T. Gilbert & Co., Boston, Mass., H. E. Matthews, agent, 421 Broadway, for the third best grand action piano forte. Bronze medal.

Steinway & Sons, 84 Walker street, for the best square piano forte. Silver medal.

Schuetze & Ludolff, 452 Broome street, for the second best square piano forte. Bronze medal.

Henry Hanson, 100 Centre street, for the third best square piano forte. Diploma.

William Miller, 156 East 21st street, for a square piano forte, with æolian. Diploma.

Saddlery, Harness and Whips.

Judges—John B. Bull, Robert D. Sterling.

Daniel O'Leary, 9 Fulton Avenue, Brooklyn, L. I., for the best set of single harness. Diploma.

R. S. Jennings, Waterbury, Conn., for continental whip sockets. Diploma.

W. H. Lyman, Newark, N. J., for patent whip sockets. Diploma.

Newark Machine Co., Newark, N. J., Lyman Reynolds, corner Lexington Avenue and 56th street, for a horse collar stuffing machine. Diploma.

Stoves for Cooking and Warming, and Hot-air Furnaces and Ranges.

Judges—Thomas Southard, W. S. Whitney, A. W. Fraser.

John Liddle, 370 Broadway, for patent gas tight furnaces. Silver medal.

Treadwell & Perry, Albany, N. Y., Teets & Cummings, agents, 420 Fourth Avenue, for the best parlor cooking stove. Bronze medal.

Whitney, Seabury & Co., Peekskill, N. Y., William Corey, 61 Carmine street, for Mammoth heaters. Bronze medal.

Griswold & Blanchard, 5 Clinton Hall, Astor Place, for kitchen ranges. Bronze medal.

Blodgett & Sweet, Burlington, Vermont, S. F. White, agent, 406 Broadway, for portable ovens. Bronze medal.

Fall River Foundry Co., Fall River, Mass., Robert Diven, agent, 248 Water street, for the second best parlor cooking stove. Diploma.

James L. Seabury, Peekskill, N. Y., W. Corey, agent, 61 Carmine street, for hollow stove ware. Diploma.

William F. Shaw, 406 Broadway, for a gas heating parlor stove. Diploma.

D. G. Littlefield, Albany, N. Y., for railway coal burners. Diploma.

Charles Williams, 21 Court street, Brooklyn, L. I., for a fireplace heater. Diploma.

F. L. Hedenberg & Son, 58 Walker street, for a tubular spiral furnace and portable furnace. Diploma.

George Pierce, 806 Broadway, for a revolving roaster and baker. Diploma.

M. C. Hull, 288 Third Avenue, for Bay State cooking ranges. Diploma.

Surgical Instruments.

Judges—Henry F. Quackenbos, D. M. Reese.

Palmer & Co., 378 Broadway, for specimens of artificial legs. (A gold medal having been before awarded.) Diploma.

Marsh & Co., 2½ Maiden Lane, for trusses and surgical appliances. (A silver medal having been before awarded.) Diploma.

O. H. Needham, 303 Broadway, for medical apparatus. (A silver medal having been before awarded.) Diploma.

Mattson & Co., Boston, Mass., George H. Bates, (agent,) 133 Water street, for syringes. Diploma.

Silver Ware.

Judges—T. D. Lander, J. W. Hughes, J. G. Ferris,

Charters & Brothers, 12 Maiden lane, for a case of silver ware. Silver medal.

Silver Plating.

Judges—R. L. Anderton, Wm. Miller, Jr , Benjamin Newkirk.

George Moore, 142 Grand street, for the best hand plating. Silver medal.

William J. Miller, & Co., 15 Maiden Lane, for the best electro-plating. Silver Medal.

Richard H. Trested, 38 White street, for the second best electro-plating. Bronze medal.

Ames Manufacturing Co., Chicopee, Mass., for the third best electro-plating. Diploma.

J. R. Benjamin, 1 Barclay street, for a superior quality of sheet silver. Diploma.

Shawls and Delaines.

Judges—J. M. Constable, John M. Nixon, E. A. Leadbeater,

Bay State Mills, Lawrence, Mass., Lawrence, Stone & Co., (agents,) 41 Broadway, for the best long and embroidered shawls. Silver medal.

J. Roy & Co., Watervliet, West Troy, N. Y., Hoyt, Tillinghast & Co., (agents,) 63 Broadway, for the second best shawls. Bronze medal.

James Millward, Sen., 3 Millward place, (West 31st street), for silk lace shawls. Silver medal.

Manchester Print Works, Manchester, N. H., J. C. Howe & Co., (agents,) 59 Broadway, for thirty pieces of delaines. Silver medal.

Pacific Mills, Lawrence, Mass., Little, Alden & Co., (agents,) 39 Nassau street, for forty-one pieces of delaines. Silver medal.

Sign Painting.

Judges—R. B. Fosdick, H. Mason Dikeman, J. H. Breidenbah, Jun.

Alfred H. Lorton, 311 Spring street, for the best specimen of sign painting. Bronze medal.

A. P. Moriarty, 575 Hudson street, for the best specimen of fancy painting. Silver medal.

Apprentices' Work.

John G. Quirk, 363 Broadway, for the second best sign painting. Diploma.

Charles L. Zellinsky, 363 Broadway, for a specimen of sign painting. Diploma.

Wm. Stonehouse, 77 West Broadway, for a specimen of sign painting. Diploma.

Seraphines and Melodeons.

Judges—John Sloman, Daniel Rowland, Gustavus K. Eckard.

Mason & Hamlin, Boston, Mass., for the best organ harmonium and melodeon. Silver medal.

Taylor & Farley, Worcester, Mass., H. E. Matthews, agent, 421 Broadway, for the second best melodeon. Bronze medal.

Theodore Roz, 227 Elm street, for the third best melodeon. Diploma.

Scales.

Judges—James Horner, J. A. Bailey.

Fairbanks & Co., 189 Broadway, for the best iron frame railroad scales. Gold medal.

Vergennes Scales Co , Edward A. Johnson, (agent,) 36 Broadway, for the second best railroad and the best hay, 1 ton, and 1400 lbs. scales. Silver medal.

Fairbanks & Co., 189 Broadway, for the second best hay scales. Bronze medal.

Strong & Ross, Vergennes, Vt., for the third best hay scales. Diploma.

Strong & Ross, Vergennes, Vt., for the best 3000 lbs. warehouse, and second best 1400 lbs. scales. Bronze medal.

Fairbanks & Co., 189 Broadway, for a 3000 lbs. rolling mill scale, (patent India rubber spring platform.) Diploma.

Silk, Raw and Manufactured.

Judges—G. M. Haywood, A. Edwards, P. W. Williams.

M. Heminway & Son, Watertown, Conn., S. J. Dennis, agent, 40 Dey street, for the best sewing silk. (A silver medal having been before awarded.) Diploma.

Cleveland & Co., 26 and 28 Broad street, for the second best sewing silk. Bronze medal.

Tobacco and Snuff.

Judges—John Gray, Benedict Lewis Jr., John W. Chambers.

B. M. & E. A. Whitlock, 13 Beekman street, for specimens of Virginia manufactured tobacco. Diploma.

Schimper & Grill, 108 Leonard street, for specimens of assorted snuff. Diploma.

Trunks and Carpet Bags.

Judges—P. Trainor, J. Johnson, J. Black.

Peter & Co., 419 Broadway, for the best sole leather trunks. (A silver medal having been before awarded.) Diploma.

Henry Guest, 509 Broadway, for a leather valise and trunk. Bronze medal.

Lazar Cantel, 15 West Broadway, for the best water-proof trunk. Diploma.

Umbrellas.

Judges—James Davis, Jno. J. Smith, Mark Banks.

Clyde & Black, 401 Broadway, for the best silk umbrella. Bronze medal.

Norman Cook, 54 Bowery, for India rubber coated gingham umbrellas. Diploma.

J. V. Tibbets, 1 Barclay street for a cane umbrella. Diploma.

Upholstery and Paper Hangings.

Judges—Samuel S. Constant, Abm. Voorhis.

Wheeler, Bellows & Co., 1 Barclay street, for the best curled hair and hair mattresses. Diploma.

George Gatty, 1087 Broadway, for a patent spring roller for window shades. Diploma.

E. W. Hutchings, 475 Broadway, for a spring bed. Diploma.

Muscan Hair Manufacturing Co., Harlem, N. Y., A. S. Jones, agent, 17 New street, for muscan hair. Diploma.

Woolen Goods.

Judges—F. J. Conant, D. H. Arnold, William Richardson, J. W. Pinckney, Charles W. Dayton.

William Smedley, Philadelphia, Pa., Burham, Plumb & Co., (agents,) 175 Broadway, for fancy knit woolen goods. Silver medal.

Parker, Wilder & Co , Boston, Mass., J. Snelling, agent, 3 Pine street, for Cocheco extra blankets, and Cumberland blankets. Bronze medal.

Newark Patent Hosiery, Co., Newark, N. J., for knit shirts and drawers. Bronze medal.

Abraham Flint & Son, 139 First Avenue, for five pieces poplin. Silver medal.

Salisbury Manufacturing Co., Boston, Mass., for 5 pieces cassimeres. Bronze medal.

Middlesex Co., Lowell, Mass., Lawrence, Stone & Co., (agents,) 41 Broadway, for doeskin and cassimeres. Bronze medal.

Ballard Vale Company, Ballard, Mass., John Slade & Co., (agents,) 13 and 15 Broad street, for silk warp flannel, etc. Bronze medal.

Manchester Company, Manchester, Conn., Willard, Wood & Co., agents, 57 Broadway, for black satinet. Bronze medal.

Hilliard & Spencer, Manchester, Conn., Willard, Wood & Co., (agents,) 57 Broadway, for blue satinet. Diploma.

Alpheus Morse, Eaton, Madison Co., N. Y., John Slade & Co., (agents,) 15 Broad street, for four pieces doeskin. Diploma.

American Mills, Rockville, Conn., Richards & Van Wagener (agents,) 56 Exchange place, for fancy cassimeres. Diploma.

Bay State Mills, Lawrence, Mass., Lawrence Stone & Co., (agents,) 41 Broadway, for seven pieces flannel. Diploma.

Solomon Woodward, Woodstock, Vt., Hutchinson, Tiffany & Co., (agents,) 66 Broadway, for 21 pieces of assorted doeskin. Diploma.

Wales Co., Wales, Mass., Willard, Wood & Co., (agents,) 57 Broadway, for brown and green satinet. Diploma.

Wool.

Judges—W. K. Strong, J. Ripley, Christy Davis.

Joseph Parker, West Rupert, Vt., for 10 fleeces of Saxony wool. Silver medal.

George Parker, Rupert, Vt., for 1 Saxony buck fleece. Dip.

Wigs.

Judges—John Rose, William Ellegott.

C. Bourgard, 5 Frankfort street, for the best specimens of wigs. Bronze medal.

Medhurst & Co., 27 Maiden Lane, for the second best specimens of wigs. Diploma.

Weavers' Reeds.

Judges—Alex. Knox, J. N. Wells, Jr.,

Charles A. Ruff, 77 Duane street, for specimens of weavers' reeds. Diploma.

Miscellaneous.

Judges—W. B. Leonard, Wm. Ebbitt.

Edward M. Bullock, 138 Deane street, Brooklyn, L. I., for a model of New-York city. Silver medal.

A. L. Osborn, 414 Canal street, for the best specimen of cement for roofing. Diploma.

D. P. Burdon & Co., Brooklyn, for a steam engine. Diploma.

William Cobb, 23 West Broadway, for a hotel range for stews. Bronze medal.

John Baughen, Newark, N. J., for the best grained and marble muslins for table covers, &c. Diploma.

F. S. Pease, 61 Main street, Buffalo, N. Y., for specimens of oil. Bronze medal.

Magnolia Cotton Gin Co., Bridgewater, Mass., for the magnolia cotton gin. Silver medal.

R. Bergeron, 690 Broadway, for three wax figures. Bronze medal.

J M. Bottum, 169 Broadway, for watch makers' lathes. (A gold medal having been before awarded.) Diploma.

Silsby, Mynderse & Co., Seneca Falls, N. Y., for specimens of pumps, &c. Silver medal.

Clinton, Stiles & Co., Hartford, Conn., A. M. Treadwell, agent, 22 Fulton street, for thermometer churns. Diploma.

Nooney & Ramsey, 1080 Broadway, for patent files. Diploma.

Philip Schwickhardt, 59 Montrose avenue, Brooklyn, for bronze castings. (A gold medal having been before awarded.) Diploma.

Troy Hosiery Co., Troy, N. Y., for merino wrappers and drawers. Diploma.

James E. Serrell, 43 West 26th street, for breech loading rifle and cannon. Bronze medal.

Henry F. Dibblee, 100 Murray street, for an exhibition of agricultural implements. Diploma.

Mayher & Co., 197 Water street, for an exhibition of agricultural implements. Diploma.

A. M. Treadwell, 23 Fulton street, for an exhibition of agricultural implements. Diploma.

Faris & Hawkins, Cincinnati, Ohio, for heliographics on glass. Bronze medal.

Pawtucket Cordage Co., 38 Dey street, for bleached and unbleached cordage. Diploma.

C. L. Goddard, 185 East 23d street, for a wool burring machine. (A gold medal having been before awarded.) Diploma.

Jonathan White, Antrim, N. H., N. H. S. Colman, (agent,) 6 Wall street, for cast steel shovels. Diploma.

John R. Pratt, Attorney street, for iron capstans. Diploma.

A. Field & Co., Taunton, Mass., S. C. Hills, 12 Platt street, for specimens of brads, nails, &c. (A gold medal having been before awarded.) Diploma.

George L. Cannon, 406 Broadway, for furnaces, ranges and ventilators. Diploma.

T. Merrifield, 230 Water street, for specimens of stoves, &c. Diploma.

E. Strange, Taunton, Mass., Foster & Leach, agents, 26 Broadway, for concave saws. Bronze medal.

Harris & Bros., Elizabeth city, N. J., J. H. Schenk, 163 Greenwich street, for a smut and scouring machine. A gold medal having been before awarded. Diploma.

Lippincott & Co., 1180 Broadway, for patent section springs for ships' berths. Bronze medal.

J. Gunner, Jr., 86 Elizabeth street, for swing bolts for shutters and venetian blinds. Bronze medal.

Josephus Echols, Columbus, Ga., for a hydraulic rock drilling machine. (A gold medal having been before awarded.) Dip.

L. P. & W. F. Dodge, Newburgh, N. Y., for suction and force pumps. (A silver medal having been before awarded.) Diploma.

O. Ames & Son, North Easton, Mass., for shovels and spades. (A gold medal having been before awarded.) Diploma.

Valentine & Butler, 92 Maiden Lane, for rotary door lock and padlock. (A silver medal having been before awarded.) Dip.

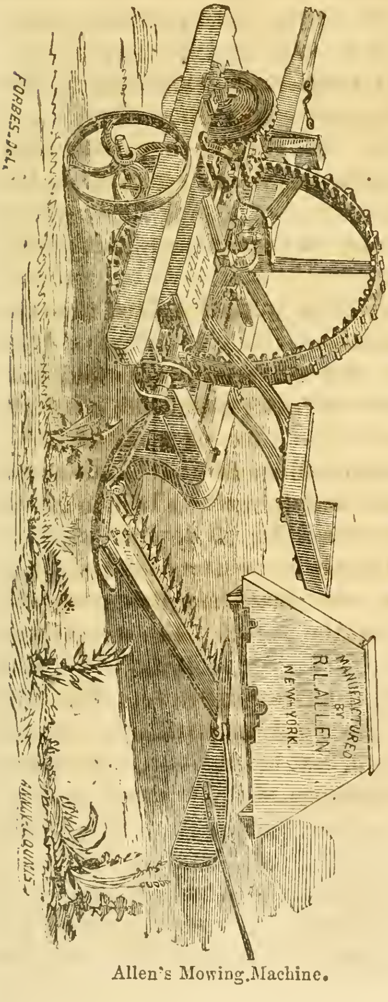
N. M. Phillips, 51 Cortlandt street, for an electro-magnetic grain scale. Bronze medal.

American Mill Co., Troy, N. Y., for the great western corn and cob mill. A silver medal having been before awarded. Dip.

Crockett International Cloth Co., Newark, N. J., for beautiful specimens of enameled cloth. Silver medal.

ILLUSTRATIONS AND DESCRIPTIONS OF MACHINERY ON EXHIBITION AT THE 28th ANNUAL FAIR, OCT. 1856.

REPORT OF THE JUDGES ON REAPING AND MOWING MACHINES AT NEWARK, N. J., OCT. 28, 1856.



Allen's Mowing Machine.

The premium committee of the American Institute having requested the undersigned to act as judges of the machines and the work performed at an exhibition of reaping and mowing machines at Newark, on the 28th inst., beg leave to report: That in compliance with the invitation of the committee we attended at the time and place designated for the exhibition, upon the grounds of Mr. Israel Crane, where we examined the machines presented by the exhibiters, heard their explanations of the peculiar features of each, and observed their performance while mowing the very light crop of grass which was found upon the field. As no grain crops remain uncut at this season of the year, of course no trial could be made of their fitness for the work of reaping.

Four machines were presented and were designated by numbers 1, 2, 3 and 4.

No. 1 was brought by Mr. R. L. Allen. The swath cut by this machine, when at full work, was about four feet six inches in width; the number of cutters sixteen; the diameter of the driving wheel thirty-three inches, and in each revolution it gives the cutters twenty-two strokes. The fingers, or guard teeth and cutters, appear to be substantially made, and little liable to injury by the ordinary operations of the machine. Its weight was reported to be 528 lbs., and the price $120, including duplicates of some parts most exposed to injury by wear or accident.

No. 2 was called "*Hubbard's American Mower and Reaper*," and was exhibited by the inventor, who stated that it was the first of that form yet constructed, and still incomplete in some of the minor parts. This machine is intended to cut a swath five feet in width; its driving wheel is three feet in diameter, and the weight of the whole is 710 lbs. It is fitted with two sets of cutting apparatus, one of the ordinary form and character, with stationary guards, or fingers and triangular mowing cutters. The other is so constructed that both guards and cutters vibrate; and as they move in opposite directions the cutting edges pass over each other with twice the rapidity in this that they do in the other where one half remain stationary—an arrangement which may, perhaps, for some work be found advantageous. But of this and the general merits of the machine we had little opportunity to form a definite opinion, as after being worked a short time the failure of a small but indispensable part rendered a further trial impracticable. Its work, while in good order, was well and rapidly done, though apparently at a greater expenditure of power than was required by the others.

No. 3 was exhibited by Messrs. Griffing, Brother & Co., and called the "*Little American Mower and Reaper*." It is intended to cut a swath four feet eight inches wide; its driving wheel is thirty inches in diameter; the number of cutters fourteen, and these differed from those in the other machines by having the bevil on the under side instead of the upper. The weight was reported to be 450 lbs. The price, fitted for mowing, $100, and with the additions required to fit it for reaping $120. The trial with this was not satisfactory; the machine itself was incomplete, (some small parts having been lost before it came upon the field,) and the team and driver attached to it appeared to be so entirely unacquainted with its proper management that it was worked but a short time.

No. 4 was exhibited by the inventor, and called "*Watson's Sulkey Mower*." It is intended to cut four feet six inches in width. The cutting apparatus is much in the usual form, and the cutters make eighteen vibrations to each revolution of the driving wheels, or one cut to each one and a-half inch traveled over by the machine. The outer end of the cutter bar is supported by a wheel of eight or ten inches in diameter, which prevents it from dragging or resting upon the ground—an arrangement which may be found beneficial, but its advantages remain to be determined by experience. One peculiarity of this machine is that it has two driving wheels, and these permit such a disposition of the working parts as relieves the team from any lateral pressure by the tongue or pole—a disadvantage which appears unavoidable in some others. The weight of this was reported to be 500 lbs.; its price, fitted as a mowing machine, $100, and with such additions as are required to fit it for reaping $115.

The foregoing comprises the information obtained in relation to the machines submitted for our examination, and from which the premium committee will of course form its own conclusions: the undersigned, however, in concluding their report, have to state that in their opinion the *performance* of No. 1, considering the power required to work it, and the amount and quality of the work done, should be classed as best, and the *performance* of No. 4 as second best.

Of the performance of No's 2 and 3, in the condition in which we saw them, it would be improper to express an opinion.

To form a correct estimate of their value they should be seen at work when completely finished and perfect, and in the hands of those familiar with their use.

Respectfully submitted.

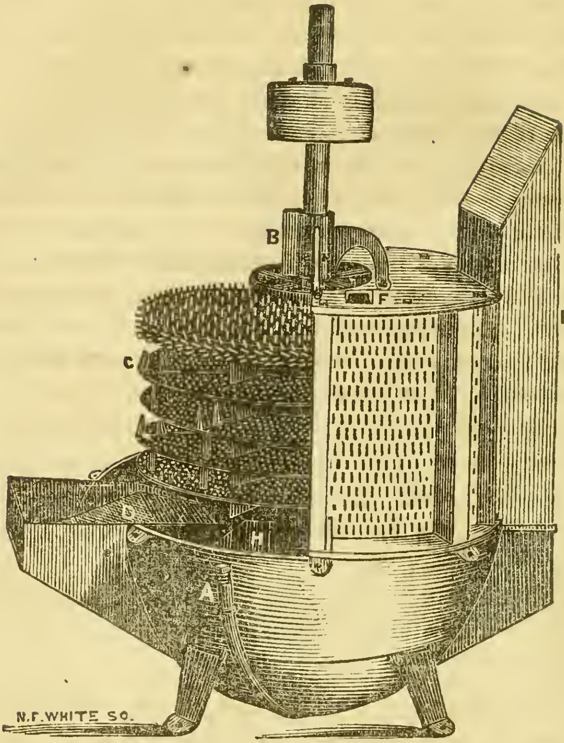
JOHN D. WARD,
NICHOLAS WYCKOFF,
JOHN A. BUNTING.

Repository of the Am. Institute, New-York, 30*th Oct.*, 1856.

[*A silver medal* awarded to R. L. Allen for the best mowing machine.

Improved Smut Machine.

John M. Earls, Troy, N. Y. This machine has been in use about four years, and the exhibiter says it has given satisfaction to every one who has tried them. Not liable to get out of order, and requires but little power to run them. [*A bronze medal awarded.*



Earl's Improved Smut Machine.

Felton's Portable Grain Mill.

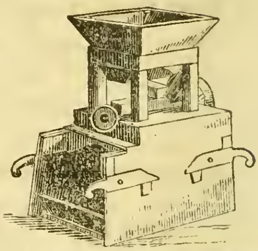
Troy Portable Grain Mill Co., Troy, N. Y. This is a very superior mill. A silver medal having been before awarded.

[*A diploma.*

Grain and Seed Harvester.

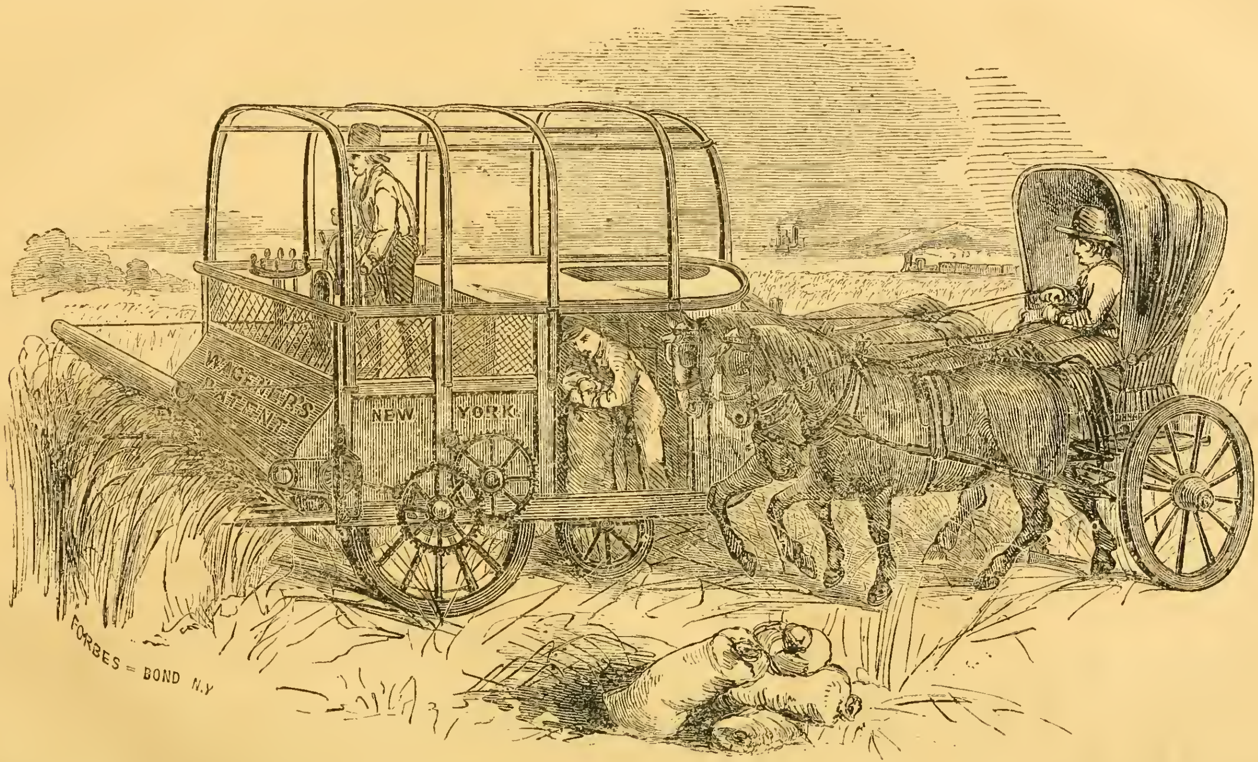
J. A. Wagener & Co., Beekman street, New-York. This is a good machine for the purpose intended.

[*A diploma awarded.*

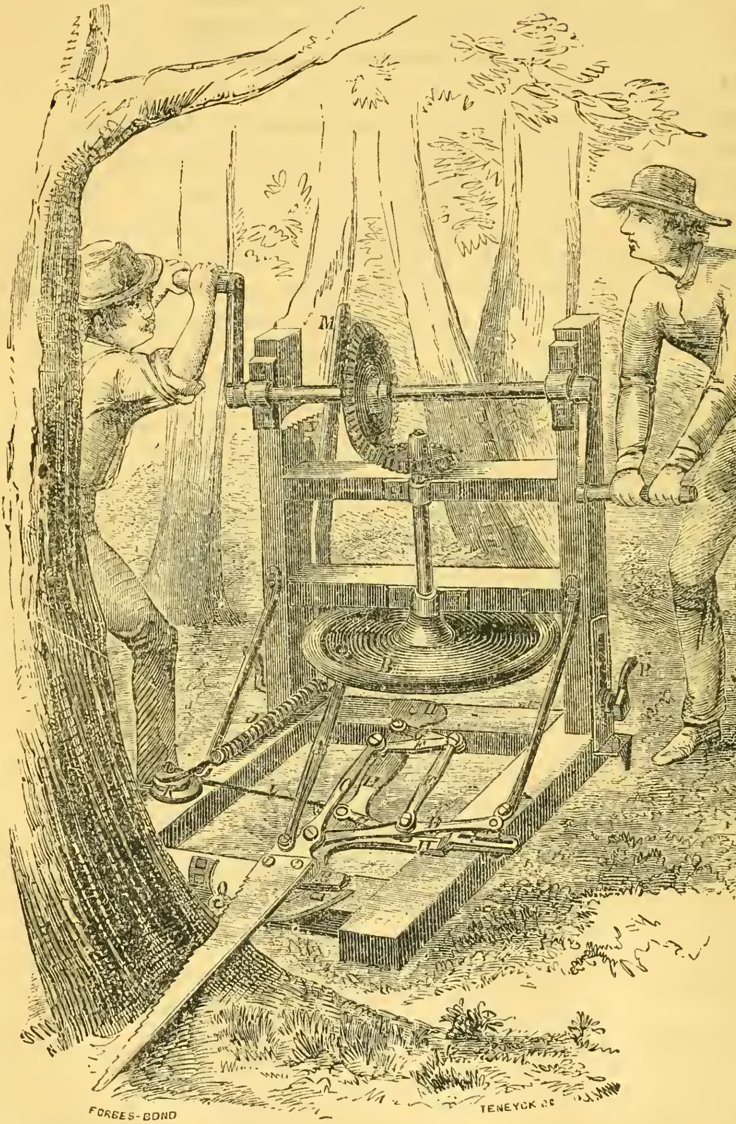


FELTON'S
PATENT
PORTABLE GRAIN MILL.
TROY, N. Y.

As will be seen by an inspection of the engraving, the machine consists of a platform placed upon bearing wheels, at the forward end of which is placed the cutting apparatus, which cuts the heads of the grain—leaving the stalks standing, either to rot upon the ground for manure, or to be cut for straw by a subsequent operation, as may be desired—and passes them to a thresh-



WAGENER'S HARVESTER.



INGERSOLL'S PORTABLE HAND POWER MACHINE, for Felling Trees, &c

ing apparatus located in the rear of the cutters, from whence the products are carried to a cleaner, which separates the grain from the chaff, the latter being scattered on the ground, while the former is delivered into bags, which are tied up ready to send to market. It will be apparent from this description of its operation, that this machine effects—and that in a most perfect manner—the operations that are now performed by three distinct machines, at a great saving in the cost of the apparatus, the labor of attendance, and the time required for the purpose—the latter being generally the most important item of the three, as a crop of grain may be lost, or at least materially injured, by being exposed to stormy and unpleasant weather, through the delay incident to its being gathered by the process at present in use.

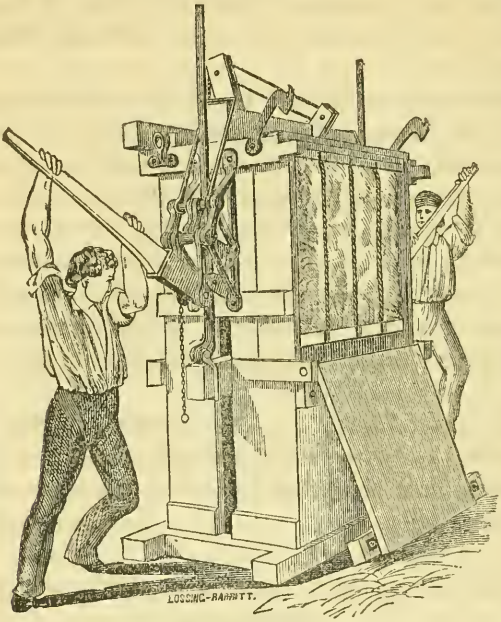
The machine is propelled by a team attached to a shaft jointed to the hinder part of its platform, and it is guided by an attendant operating a steering wheel connected to the hind truck wheels, so that it is readily controlled and guided, and it effects its operations with less power, and by the attendance of a less number of hands than would be required to effect the same operations separately, as four horses and three men will operate a machine cutting nine feet in width, and traveling over an area of twenty-five acres per day—delivering the grain grown upon that quantity of land in a state ready for market.

The question, whether it is more profitable to the farmer to harvest his grain in a green or a perfectly ripe state, is yet a mooted one; but it is claimed by the inventor of this machine, that the grain when fully ripe, not only weighs heavier—to the benefit of the producer—but possesses a greater amount of nutritious matter—to the advantage of the user: that it is less liable to waste in gathering, and leaves the straw of greater value, whether it is gathered for use or left in the field to rot for manure. The correctness of these assumptions can be best tested by experience; but we believe they are in the main correct, and will be proved to be so by extended experiment.

Portable Hand Power Machines, for felling timber, sawing logs, &c.

Farmer's and Mechanic's Manufacturing Co., Green Poi't, L.I. The company claim for this improvement, that by its extreme portability, simplicity and strength, is is fitted to render important aid in cutting down trees. It cuts close to the ground, thus saving wood, may be adjusted so as to cut at almost any angel, leaves the butt ready for the mill, does its work with great rapidity, runs easy, cannot well get out of order. By using *Spur Gear Wheels*, instead of beveled, the motion is reversed, and the machine adapted to sawing off logs. Both of which machines are now being made in the most substantial manner.

Throughout the region where wood is plentiful and required for fuel, the application of a movable *one horse power* to this machine, to saw the trees or logs into lengths suitable for the stove or locomotive, will greatly cheapen the process of preparation, leaving it in better condition, besides saving a large percentage of wood now wasted by the axe. [*A diploma awarded.*



Ingersoll's Hay and Cotton Press.

Portable Hay and Cotton Press.

Farmer's and Mechanic's Manufacturing Co., Green Point, L. I. [*A diploma awarded.*

Steam Engine.

Hinckley & Egery, and Geo. H. Reynolds, Bangor, Maine. This engine called the Endeavor, exhibited at the 28th Annual Fair of the American Institute, held at the Crystal Palace, was designed by Geo. H. Reynolds, Medford, Mass., a practical engineer and machinist, and was built at the well known works of Hinckley & Egery, Bangor, Maine.

Who claim the following improvements in the cut-off valves, pillow blocks and slides.

The improvements in the cut-off consist in the employment of a pair of perfectly balanced valves, secured to the back of the main slide valve, through which the steam passes in its way to the cylinder. These balanced valves are moved by the motion of the slide valve, and travel therewith. The device by which they are opened and closed is the most simple and effective of any known method of working the cut-off of steam engines. As the slide valve approaches the point to admit steam to the cylinder the cut-off valve is opened by its motion by coming in contact with fixed stops at the bottom of the steam-chest, and remains open until it comes in contact with movable stops, which are operated by the governor, when it is instantly closed and the steam cut off.

The improvement in the pillow block consists in clasping the bushings of the boxes, which part vertically in an iron frame which bolts firmly to the bed plate. The advantages of this over the ordinary style of pillow block are, that the side wear may be all taken up by screws taped through the side of the clasp, and that the entire box may be removed from the engine without raising or in any manner disturbing the shaft or any other part of the engine; while in the ordinary pillow block the shaft, with its fly wheel and all connections of the crank shaft, have to be removed.

The slides are constructed so as to come even with the top of the cross-head, thereby giving double the amount of surface sidewise, and enabling us to make the oil cup to lubricate the same, stationary upon them. [*A gold medal awarded.*

REPORT OF THE JUDGES ON FISHER'S STEAM CARRIAGE.

We, the undersigned, judges on the steam carriage of J. K. Fisher, appointed by the Managers of the Twenty-eighth Annual Fair of the American Institute, held in New York, October, 1856, beg leave to report:

That we have carefully examined the plans and devices submitted to our inspection, and decide—

1st. That the said plans and devices embody a novelty of arrangement of parts possessing great advantages over any former plans and devices for the same purpose.

2d. That the said plans and devices embody various new and essential advantages which overcome many of the old difficulties in the use of the steam carriage, and give hope of its success on smooth, hard and level roads.

First—In the method of outside connection, which (1) allows the boiler and load to run close to the ground; (2) avoids the expense and insecurity of the cranked axle; and (3) enables the oscillations arising from the respective positions of the crank pins (90° apart) to be more thoroughly counteracted than with the use of the inside connection.

Second—In the connection of the steering axle by projecting springs which combines (1) large wheels, (2) a long wheel base, and (3) a low centre of gravity. All former steam carriages have been, in these respects, much like common omnibuses.

This spring connection weighs only as much as springs of any carriage, while it dispenses with the cost and weight of the usual reach connection.

Third—On the steering lever, which enables the steersman to secure a thorough control of the direction of the carriage. The English carriages were steered by a pinion and rack, which, by being jerked out of the steersman's hand caused accidents in several cases.

Fourth—In the parallel connection, which is the only connection known, that is compatible with easy springs. The gearing, chain, slotted cross head, &c., adopted by Hancock, Stephenson, and others, to secure a parallel motion, were found on trial to be inadequate.

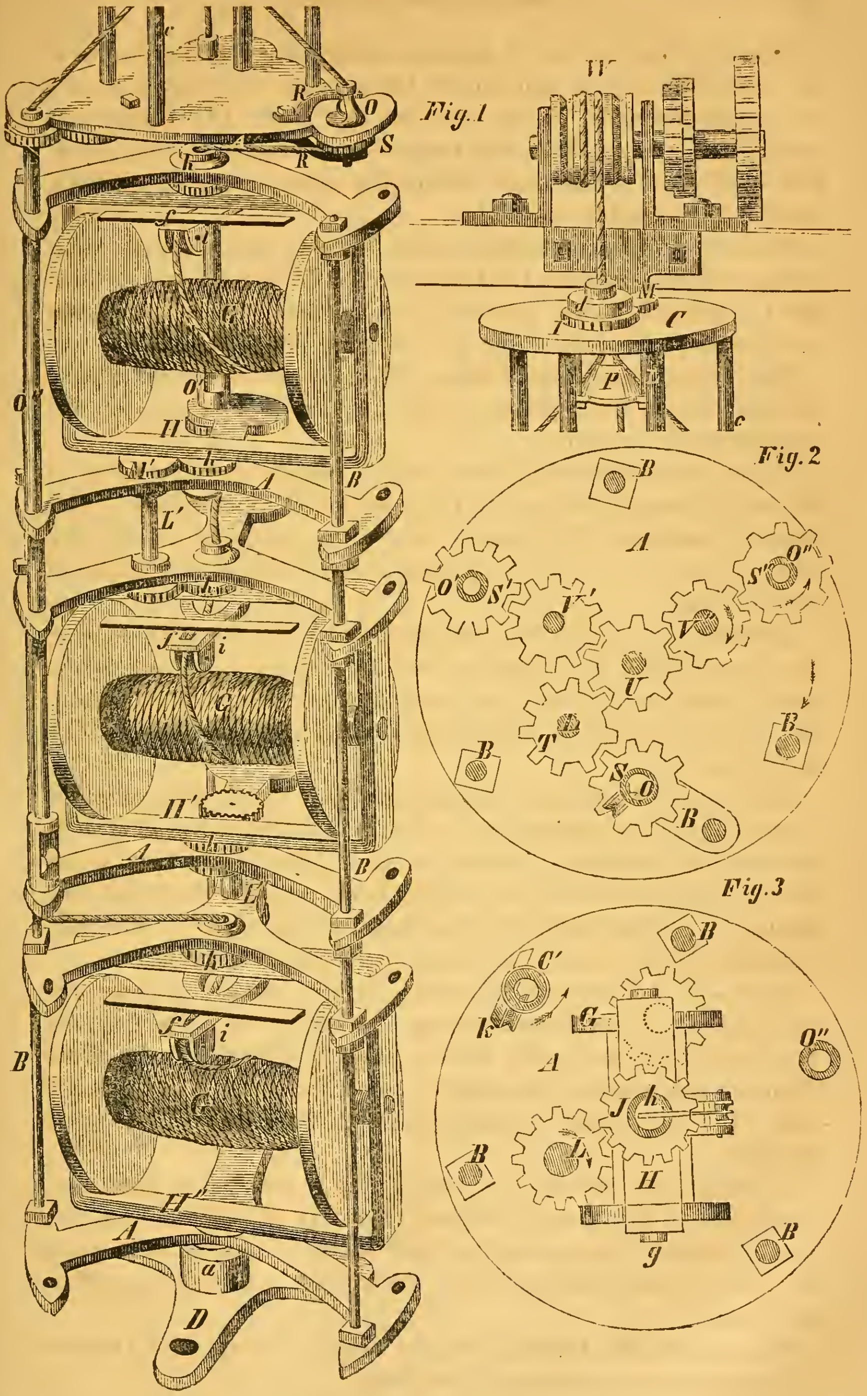
Fifth—On the general arrangement, by which the boiler is placed close to the steersman, so that he may take care of it; (2) close to the cylinders, to ensure a good blast, and (3) so far in advance as to distribute the weight nearly equally over the four wheels. (4) This enables the carriage to be managed by one man, instead of three, which the former carriages have required.

Sixth—In one variety of boiler, which being fed from the top (1) enabled one man to supply fuel, (2) which securing the downward draft burns the smoke, and (3) which having a flame chamber below allows the ashes to separate and fall into the ash pan. (4) The whole arrangement renders the burning of wood feasible.

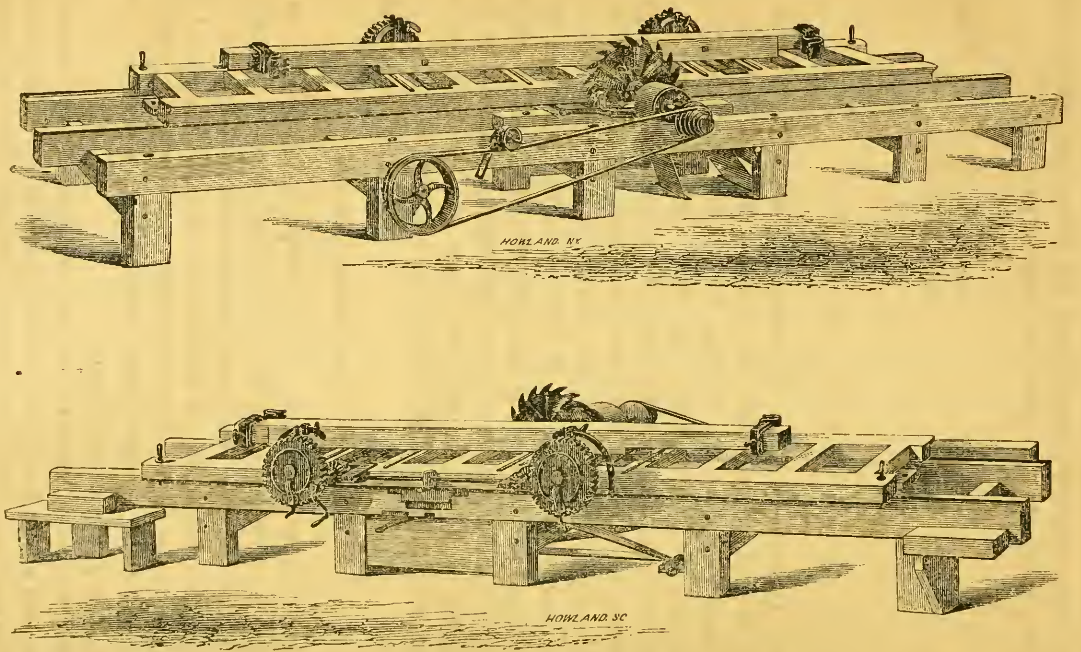
Seventh—On the valve motion, which is adapted to light construction and low speed, because (1) it cuts off quicker than the "link motion," during the first half of the stroke, and (2) gives a quick release near the end of the stroke, while cutting off at any point.

We believe Mr. Fisher to be the original inventor of the following devices hereinbefore described:

1st. The connection of the steering axle.



BOONE'S ROPE MAKING MACHINE.



PINNEY YOUNGS & CO'S SAWING MACHINES.

2d. The steering lever.

3d. The parallel connection which Mr. Fisher invented in 1848, before the use of similar devices by St. Clair & Stephenson.

4th. The valve gear.

Therefore we hereby recommend the plans and devices submitted to our inspection, to merit the highest premium.

E. P. GOULD,
A. L. HOLLEY, } *Judges.*
A. F. SMITH.

Sawing Machines.

Pinney Youngs & Co., Milwaukee, Wisconsin. These machines are of three sizes, one with a 28 inch saw for cutting siding, flooring and fencing, from kants prepared by an upright saw, as represented; one size with 36 inch saw, constructed in same manner, and used for same kind of sawing; also, for sawing boards from logs, sided up with an upright saw; and one size with 58 inch saw, for sawing direct from round logs. These machines are capable of sawing two thousand feet of lumber per hour with ease, if properly attended. They cut whilst the log or timber moves in either direction, and thus lose no time in gigging back. It is said that large numbers of them are in operation in Michigan, Wisconsin and Minnesota.

[*A gold medal awarded.*

Empire Rope Making Machine.

Thos. G. Boone, Brooklyn, L. I. Rope is formed by twisting together a number of strands. The strands receive an extra twist before laying them into rope, to compensate for the twist that is unavoidably taken out of them in the act of laying or twisting them together in a contrary direction to their own twist. This additional twist put into each strand is termed the *fore-hard*, because it is put in before laying.

Mr. Boone claims that in this machine there are certain novel devices, and a peculiar arrangement of parts for twisting the strands and laying them into rope, whereby the axes of the strand spindles are brought to positions in line with the axis of the laying spindle, and when an even fore-hard is desired, no rotary motion of the strand spindles is required, by which the machine may be driven at a much greater velocity than is practicable for other rope machines now in use, requiring less power to operate it, and besides, the peculiar arrangement of the parts reduces the machinery to a most compact form, occupying but a very small space.

Figure 1 is a perspective view; figure 2 is a horizontal section, taken under the lower plate of the laying-block, and figure 3 is a horizontal section taken under the top plate of the upper strand spindle. Similar letters indicate like parts on all the figures.

The strand spindles, the laying block, and all the appertaining parts of the machine but the winding capstan, are carried by a rotating frame composed of a series of plates, A A A arranged one above the other, concentric to a common axis, and connected by uprights, B B B; the lowest plate has a journal inserted in a step, *a*. The upper plate, A, is rigidly attached by pillars, *c c*, to a drum, C, which has a hollow journal working in a guide bearing, *d*, which is placed in the same vertical line with the supporting journal in the lower bearing step, *a*. These bearings may be secured in the frame, E F, or otherwise in a factory, the bed plate, D, being bolted to the lower floor. The main rotating frame constitutes the laying spindle, twisting the strand, into rope, and motion is given thereto by a horizontal belt passing around drum C.

H H′ H″ are the strand spindles, each one having a square frame, with journals, *h h*, at top and bottom, and a spool, G, containing the strand, secured (as usual) by a transverse pin, *g*, passing through the frame. The journals, *h*, of the several strand spindles are fitted to bearings in the centres of certain of the plates, A A, figure 3. The journals, *h h*, of the strand spindles, the lower journal of the frame in step, *a*, and the upper journal in bearing, *d*, of the main frame are in line with one another, so that all have a common axis. The upper journal of each spool spindle is hollow, and the strands pass from the spools up through them, as shown in figure 1,—each strand passing up over a guide roller, *i*, or arm, *f*, and thence through the hollow journals.

I is a stationary spur gear around the exterior of the upper bearing, *d*; the upper strand spindle, H, has similar spur gear of the same size as I, one on its upper, and the other on its lower end—J, figure 3, is its upper one; the middle strand spindle, H′, has similar spur gear, and the lowest strand journal has similar gearing attached to its upper journal. L is an upright shaft working in bearings. In the head of drum, C, is a spur wheel, M, of the size of I, and gearing into the latter. It is secured on the upper end of shaft L, figure 2; another spur wheel, of the same size, is secured at the bottom, gearing into the spur wheel on the top of the uppermost strand spindle. By means of these four gear wheels, arranged as described, the upper strand spindle, H, is kept stationary, while the main frame, A B, rotates—the shaft L, being caused to rotate on its axis once during every rotation of the main frame by the motion it receives round the stationary gear, I,—and the strand spindle, H, is also kept stationary. The shaft, L, is similar to the upper one, L, and has a like spur gear on its top and bottom, the latter gearing into like spur wheels on a shaft, L″, and the strand spindles, H H′ H″, are compelled to be stationary while the main frame revolves.

O O′ (C. by mistake, fig. 3,) O″, are three upright tubes; the strands from the hollow journals of the spools, G, pass up through these to the laying block, P. The tube, O, works in bearings in two plates, R R, bolted to the top and bottom of the top plate, A; the other two strand tubes are fitted to rotate in bearings in the same plate; their lower bearings rotate respectively in plate A, above strand spindle H′, and the plate above strand spindle H″. The strands coming from the spools through the hollow journals of the strand spindles are conducted by these tubes, as shown, up to the laying block, P, and are then twisted into rope.

Each of the conducting tubes has an opening near its bottom, in which is a roller, K, round which the strand passes. These conducting strand tubes have secured to their upper ends spur gear, S S′ S″, (fig. 2,) corresponding in size with the other gears described. The gear, S, meshes with wheel T, of similar size, on shaft L. The gear T meshes with gear U, of similar size, fitted loosely on a stud secured in the centre of the top plate, A; and between this gear and those S′ and S″ are interposed the gears V′ and V″, which are fitted to studs, by which means *all* the conducting tubes, O O′ O″, are rotated in a corresponding manner in the opposite direction to the main frame.

W is one of two capstans in stationary framing. The several strands from the spools, G G G, are conducted up through their tubes to the laying block, P, of the main rotating frame to the capstan, and a suitable motion is given to the latter to take up the laid rope. The laying or twisting of the rope is accomplished by the revolution of the strands around the axis of the laying spindle, and when a fore-hard in the strands equal in turns to that of the lay is desired, it is performed as described, without any revolution of the laid portion of the strands in the finished rope, or of the unlaid ends of the strands, or of the spindles which carry them. In this particular, this machine differs from other rope machines, and embraces much originality. The revolution of the strands to produce the lay of the rope being effected between the unlaid ends and the laid portions while those parts are stationary, involves the necessity of the strands receiving such a separate rotary motion in a direction contrary to the lay as is imparted by the tubes, O O′ O″, on their own axis; the additional twist which the strand first receives is carried forward through the tubes for a *fore-hard.* A greater or less fore-hard in the strand may be produced by simply varying the relative sizes of the gears, I and M. Any amount of tension on the strands may be obtained by increasing the friction on the strand spools by springs attached to the strand spindles. The horizontal section, fig. 2, conveys a clear representation of the action of the strand tubes, and fig. 3 that of the strand spindles, with their hollow journals, *h*, and pin, *g*, that secures a spool in the frame.

[*A bronze medal awarded.*

REPORT ON STEAM FIRE ENGINES.

We, the undersigned, judges appointed by the Managers of the Twenty-eighth Annual Fair of the American Institute, held at the Crystal Palace in the city of New-York, October, 1856, beg leave to report:

That we have carefully examined the steam fire engines, and have witnessed two experiments made by them, which was as follows:

The one presented by Messrs. Lee & Larned was eleven and one-half minutes raising steam to the pressure of forty pounds to the square inch, and worked for one hour, throwing one stream through a one and one-quarter inch nozzle to the distance of one hundred and seventy-eight feet and seven inches.

This engine also threw one stream through a one and one-half inch nozzle to a distance of one hundred and twenty five feet.

The next experiment was by the one presented by Messrs. Silsby, Mynderse & Co., as follows: Twenty-four minutes raising steam to the pressure of thirty-five pounds to the square inch, and worked for one hour, throwing one stream through a one and one quarter inch nozzle to the distance of one hundred and eighty-three feet and six inches.

This engine also threw one stream through a one and one-half inch nozzle to the distance of one hundred and seventy-nine feet.

The two engines were both inside of the building at the time of being worked, and it was claimed by both proprietors that they did not have a fair test of their engines. Your judges gave them another opportunity to work their engines, and to move them out of the building, to work them in such a manner as was agreed by all parties, which was as follows:

First.—The engine presented by Messrs. Silsby, Mynderse & Co., to work twenty-two and one-half minutes, and throw water through an inch and a quarter nozzle, and the same length of time through an inch and a half nozzle, to continue working without stopping for forty-five minutes, resulting as follows, viz: Eighteen and a half minutes raising steam to the pressure of twenty-six pounds to the square inch, throwing one stream of water through a one and one-quarter inch nozzle to the distance of one hundred and sixty-seven feet, and in consequence of some part of the engine getting out of order, was compelled to stop, after working eighteen minutes.

The engine presented by Messrs. Lee & Larned, to work the same time and same manner as the above, resulted as follows, viz: Working twenty-two and one-half minutes, throwing a stream of water through a one and one-quarter inch nozzle a distance of one hundred and seventy-one feet, and the same length of time through a one and one-half inch nozzle a distance of one hundred and seventy-two feet and four inches, thus working the full time, forty-five minutes, without stopping. Raising steam to the pressure of forty pounds to the square inch in ten and one-half minutes.

Your judges give all these gentlemen great credit for producing their steam fire engines, and they are both entitled to much praise for inventing so good a practical machine.

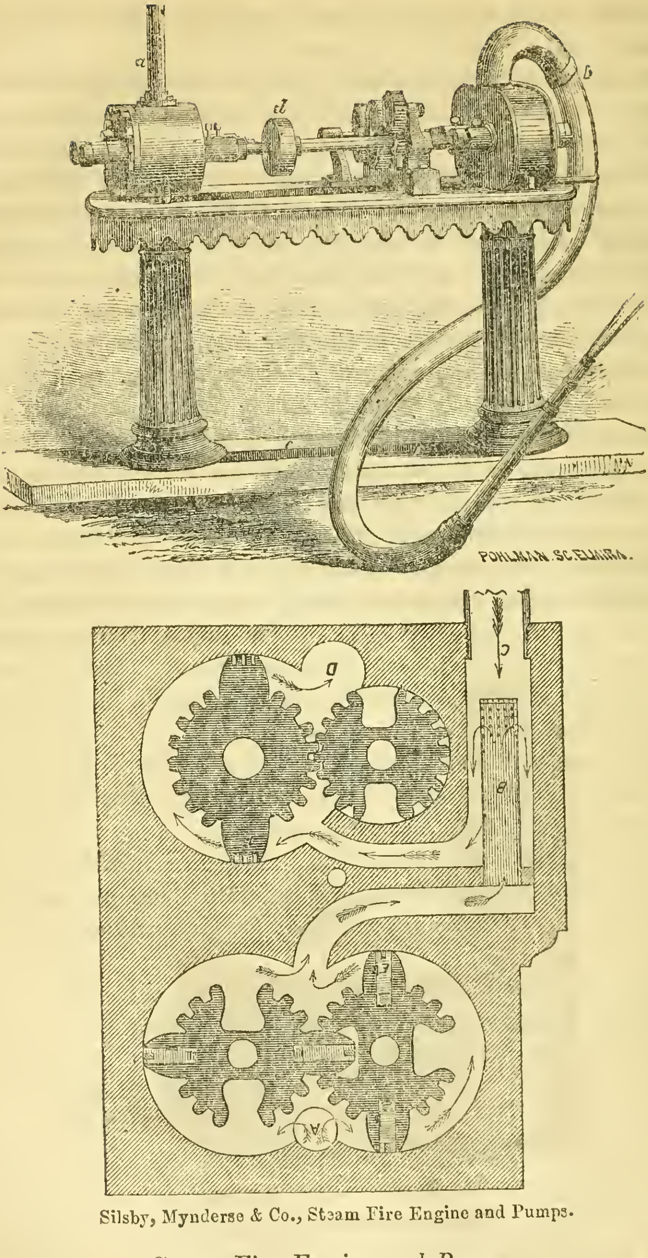
We would, therefore, recommend Messrs. Lee & Larned as entitled to the premium for the best steam fire engine, and Messrs. Silsby, Mynderse & Co. as entitled to the premium for the second best steam fire engine.

We would further recommend that they both receive a gold medal and honorable mention made of the two.

All of which is respectfully submitted.

ORISON BLUNT,
PETER HOGG,
Judges.

New-York, October 21st, 1856.



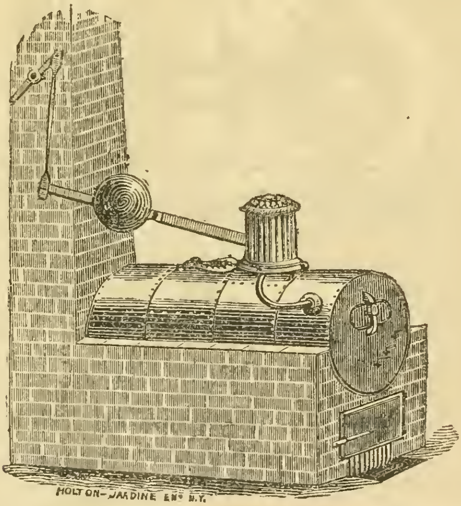
Silsby, Mynderse & Co., Steam Fire Engine and Pumps.

Steam Fire Engine and Pumps.

Silsby, Mynderse & Co., Seneca Falls, N. Y. This machine has a horizontal boiler, seven feet long and forty inches square, with 225 upright flues one and a half inches in diameter, and with two inch water space around the case, making about 350 feet fire surface.

This engine is rotary, after B. Holly's patent, as also the two pumps. The area of the piston to the engine is twenty-five inches, and runs from 1 to 600 revolutions per minute, and can be run either high or low pressure, as desired. The pressure of steam used is from twenty to seventy lbs. In connection with the engine and pump we use Mr. Holly's improved condenser, which is simply leading the exhausted steam directly into the suction of the pump, thereby increasing the power of the engine and preventing the hose from freezing in cold weather.

The boiler is supplied with water from an iron tank in front by a small donkey engine made after the same patent. The engine and pump both being enclosed in one case and not occupying over eight by ten inches space. The machine is also furnished with a fan, which is set in motion as soon as the engine is started from the house, it being run by a pulley attached to one of the back wheels. The whole arrangement is very simple, and not liable to get out of order, and can be run by an ordinary engineer. [*A silver medal awarded.*



Gale's Patent Steam Fire Regulator.

Steam and Fire Regulator.

Wm. S. Gale, 11 Elizabeth-street, and Wm. Noyes, 335 Broadway. [*A silver medal awarded.*

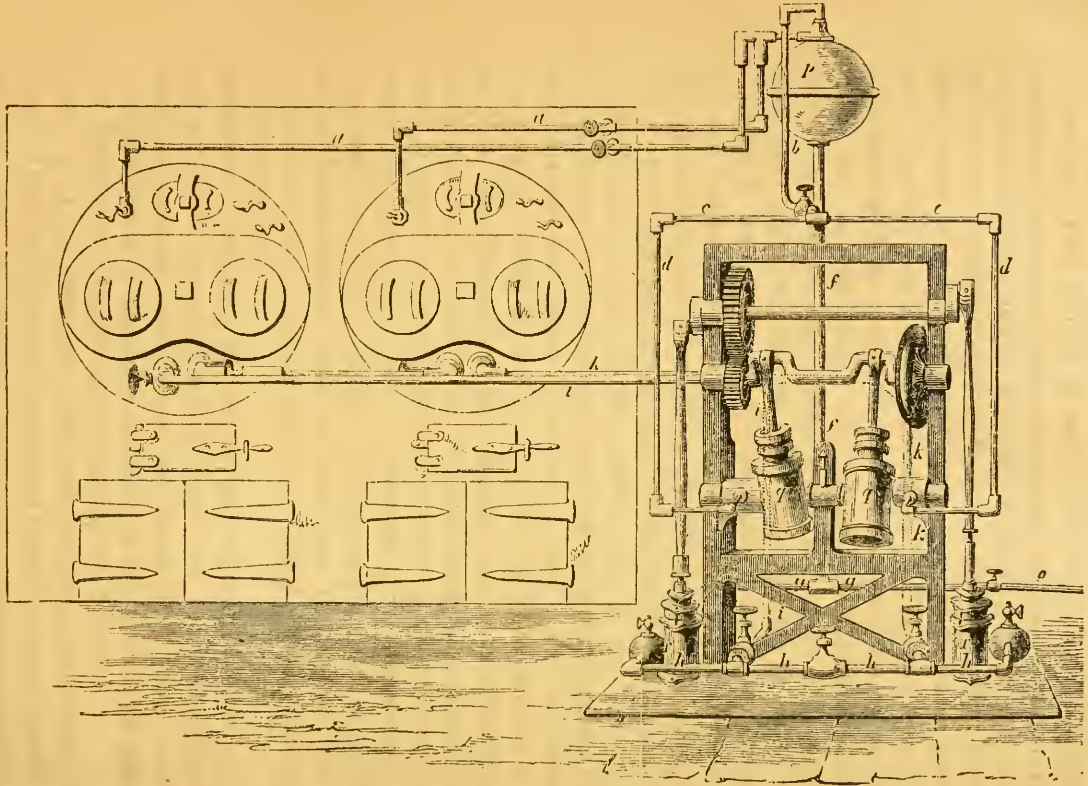
Ball's Safety Pump for supplying Steam Boilers with water. Ames' Manufacturing Co., Chicopee, Mass. Steam is taken through the pipes a a to the separator P; thence through the pipes b c c d d to the oscillating steam cylinders q q. The water carried along with the steam to the separator is carried through the pipes f g g to the pumps r r, and from these is forced through the pipes h h i i k k back into the boilers, in addition to that taken from the supply tank, or well, through the pipe o.

An inspection of the engraving, with a reference to its description, will show its construction and mode of operation, being at once self-acting, or rather acting as required by the condition and exigencies of the steam boiler, and not requiring the supervision of an attendant.

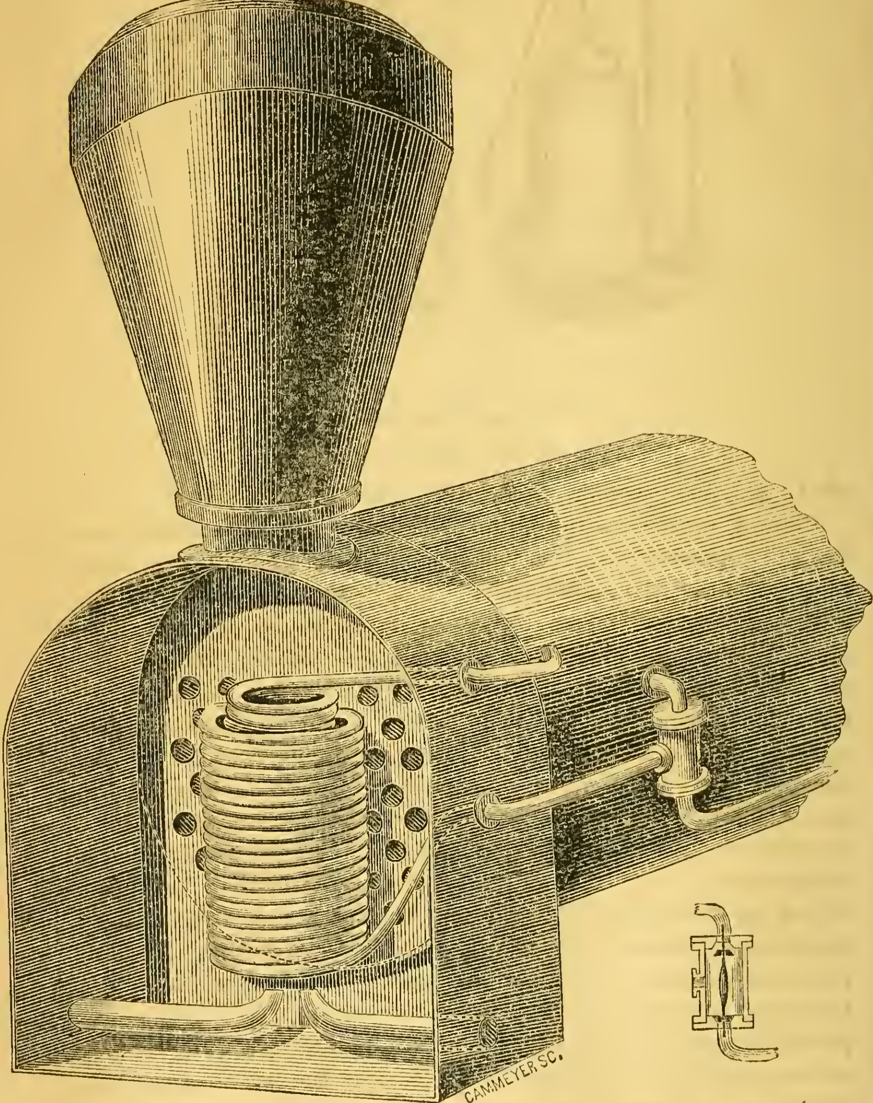
The steam pipes a a start from the boilers at the usual water line, and consequently when the water is at this height they are filled with surcharged steam, which is carried along to the separator p, in which the steam is separated from the water. The steam is then conveyed through the pipes b c c d d, and introduced through the journals of the oscillating cylinders q q into the same, giving motion to their pistons and working the cranks on which the small pinion is fixed, which gives motion to the shaft carrying the cranks to the rods of the pump r r, the water in the separator in the meantime having been carried down to the pumps through its appropriate pipes, b c c d d.

It will be seen that, in the above operation, when the water in the boilers stands at the proper height, giving the requisite supply, the amount of steam carried through the pipes a a to the separator P, and thence to the cylinders q q, is comparatively small after its separation, as it must in this case be largely surcharged with water, and consequently the steam cylinders and pumps are worked slowly and in proportion to the supply of water already in the boilers; if, however, the water in the boilers be lowered below the proper water line, the amount of unmixed steam is increased, and a greater volume is forced through the pipes, &c., to the cylinders, giving them more rapid motion, as well as the feed pumps, r r, and speedily restores the proper condition of the boilers; thus in all cases regulating its own speed to meet the exact supply of water required; and a mere glance is sufficient to assure the engineer that the water in the boilers is at its proper height. Its connection with the supply tank, or well, by means of the pipe o, requires no further description.

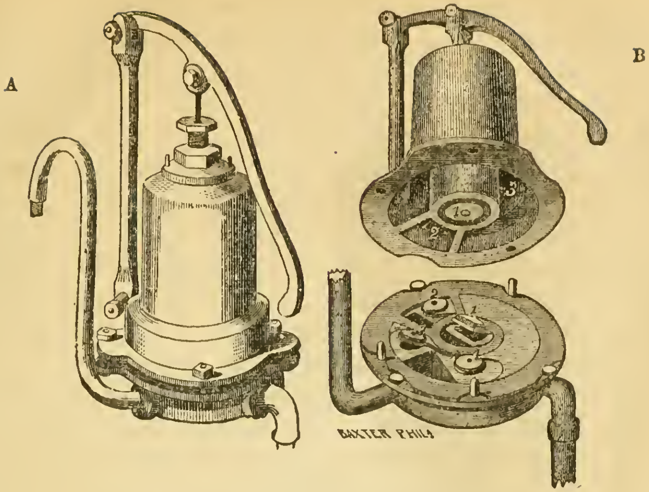
[*A gold medal awarded.*



BALL'S SAFETY PUMP, FOR SUPPLYING STEAM BOILERS WITH WATER.



SEES' LOCOMOTIVE FEED WATER AND SURFACE HEATER.



Burnham's Force Pump.

Burnham's Force Pump.

W. C. & J. S. Burnham, Eighty-fifth street, New-York.

Plate A represents the pump as it stands complete for service. Plate B represents the two sections or upper and lower castings divided at the valve joint, with valve leather remaining on the lower casting, and valves open as if in operation. No. 1 valve, open, is admitting water from receiving chamber into the cylinder on the up-stroke of piston. No. 2 valve is closed, and the water from the upper end of cylinder passes down through adjacent opening and up through valve No. 3 (represented open) into air chamber, and out at main discharge, opening into outlet pipe. On reverse motion, valve No. 2 supplies the upper end of cylinder through the side water passage, and the water from lower end of cylinder is forced down through opening adjacent to valve No. 1, and up through valve No. 4 into air chamber, and out at main discharge as before. The lower or bed-casting, therefore, forms a receiving chamber, two water passages, and the main outlet. In the upper casting, No. 1 represents the cylinder, in which a simple, double-cup plunger operates. No. 2 is the side water passage or continuation of cylinder; and No. 3 is the air-chamber into which valves 3 and 4 both open.

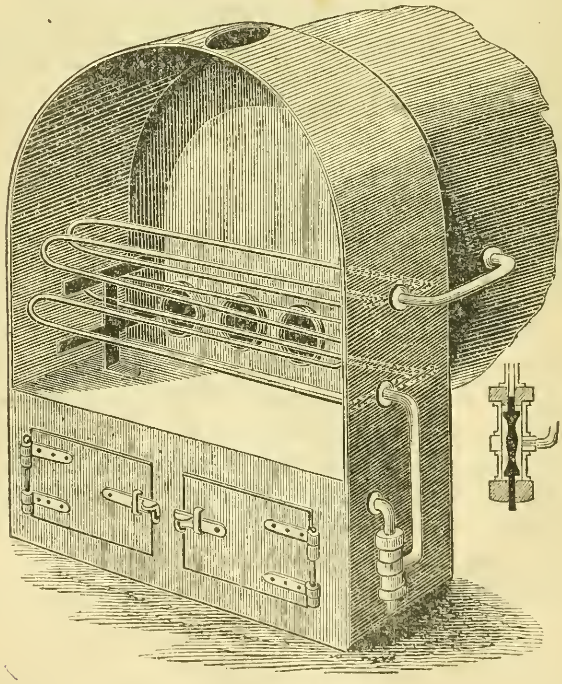
[*A silver medal having been before awarded—diploma.*

Locomotive Feed Water and Surface Heater.

John R. Sees, 10 Suffolk street, New-York. The cut represents one of Sees' locomotive feed water and surface heaters, attached in the breeching, or smoke box of a locomotive boiler.

It is composed of two coils of the best wrought iron pipe of $1\frac{3}{4}$ inch in diameter, to equal the area of an ordinary 2 inch feed pipe; the inside coil about 9 inches in diameter, and an annular space of 4 inches is left between it and the outside coil. The coils are placed about half an inch apart to allow the products of combustion to be drawn through them by the vacuum, caused by the exhaust, the position of the coils being directly over the exhaust nozzles, which enables the heater to create a great and equal draught through each tier of tubes. There are but two joints exposed to the action of the heat; it is easily removed if the boiler should at any time want repairing. It heats the feed water to or beyond the boiling point by the escape heat from the boiler, and has a perfect circulation of water through it when the pump is not in operation. It reduces the time taken to get up steam one-third; which, together with the water being put in the boiler at the boiling point, makes a saving of fuel. It is not liable to get out of order, is simple in its construction, and, from being self-acting, requires no attention from, nor does it add to the duties of, the engineer or firemen.

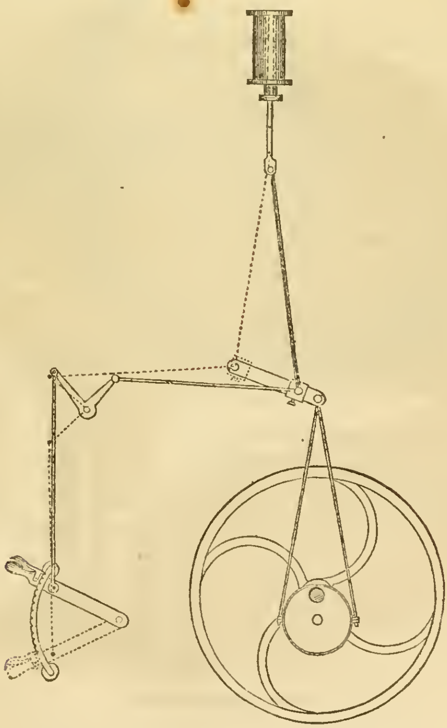
[*A silver medal awarded.*



Sees' Marine Heater.

Marine Heater.

John R. Sees, 10 Suffolk street, New-York. The cut shows one of Sees' marine heaters attached in the front connection of an ordinary return flue boiler, the whole being placed below the water line of the boiler, to insure a perfect circulation of water from the boiler throughout the heaters when the pump is not in operation, thereby increasing the steaming capacities of the boiler full 25 per cent. by using the heat which is at present lost by escaping out of the smoke pipe. The pipes on the outside of the boiler represent an ordinary $2\frac{1}{2}$ inch feed pipe; the dotted lines are the two branch trees with four $1\frac{1}{4}$ inch flanged outlets connecting with the four $1\frac{1}{4}$ inch pipes inside the connection, each joint being flanged and faced. By dividing the $2\frac{1}{2}$ inch pipe into four $1\frac{1}{4}$ inch pipes after it enters the connection, the same area of water space is maintained, the inventor claims an increase of four times more heating surface than can be obtained in any other form. They offer no obstruction to the draft, and do not interfere in cleaning the connections or flues. The materials used being the best quality of brass and wrought iron, render the apparatus as durable as the boiler itself.



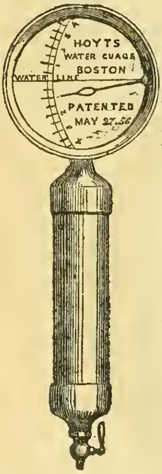
Sees' adjustable attachment for Force Pumps.

Adjustable Attachment for Force Pumps.

John R. Sees, No. 10 Suffolk street, New-York. For supplying the boilers of locomotives and other engines with water to equal the evaporation. The benefit of a uniform and constant supply of feed water, is unquestionable. The additional expense of attaching this to a locomotive, or other high-pressure engine of the same power, is only fifty dollars, including the right of use, or twenty dollars for the right alone, when the parties apply the improvement themselves.

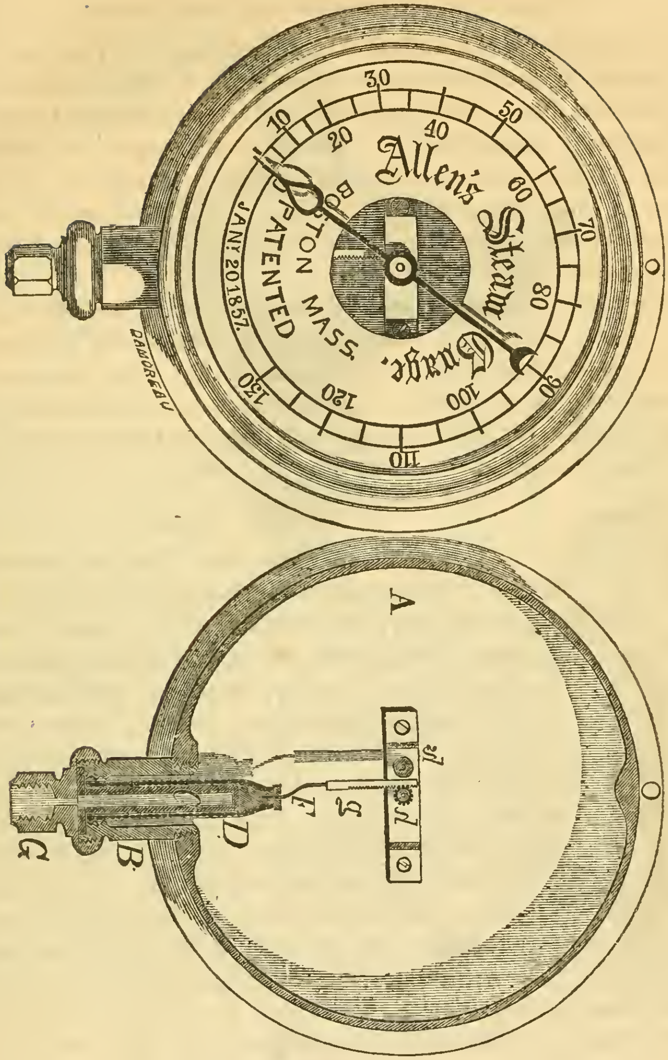
The cut represents one attached to the ordinary pump now in use; when on a locomotive in a snow storm, or when the road is blocked up from other causes, a pump with the above attachment can be worked by hand without disconnecting any part of the machinery, and all danger of burning the boiler for want of water is obviated.

Water Float Gauge.



Water Float Gauge

F. A. Hoyt & Co., Boston, Mass. The best water float guage. This is a simple mechanical invention for telling at *all times*, the position of the water in steam boilers. The advantages claimed over others now in use, are in its durability, simplicity, and its *constant* and *accurate* indication of the solid water within the boiler, the *foam* not being dense enough to move or affect the float, which being filled with compressed air, is in no danger of loading or collapsing by the pressure upon its surface. The float is also directly connected with the indicating hand, by means of a lever and shaft working in a steam-tight case elevated above the water, so that no sediment can collect about the shaft, to prevent its always working with perfect ease and accuracy. No packing is needed, as the shaft in passing through the case to connect with the indicator, forms of itself, a perfectly steam-tight joint—not creating friction enough to prevent its working perfectly free, at all times. It is easily applied to all kinds of steam boilers, locomotives, stationary and steamboat. [*A bronze medal awarded.*

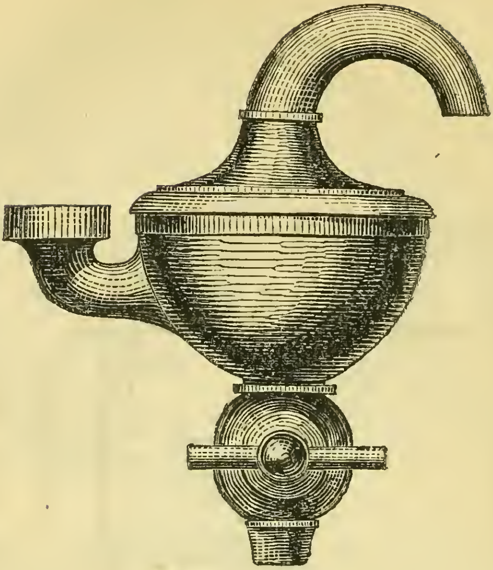


Allen's Dome Spring Steam Gauge.

Dome Spring Steam Gauge.

Boston Steam Gauge Co., E. G. Allen, agent, Boston, Mass. A, is the case. B, the cylinder, that holds the moving power. D, the dome, or closed top spring, consisting of closely wound steel wire, held at the bottom by being screwed into cylinder B, thus leaving the spring free from friction. C, is a tube or lining of vulcanized rubber inside of the spring D. F, connecting wire from spring to rack. g, the rack. h, the strap which holds the rack and pinion. G, the packing screw and coupling.

[*A silver medal awarded.*



Wright's Water Filter.

Water Filter.

Jas. H. Wright, 835 Broadway, N. Y. An excellent filter.

[*A bronze medal awarded.*

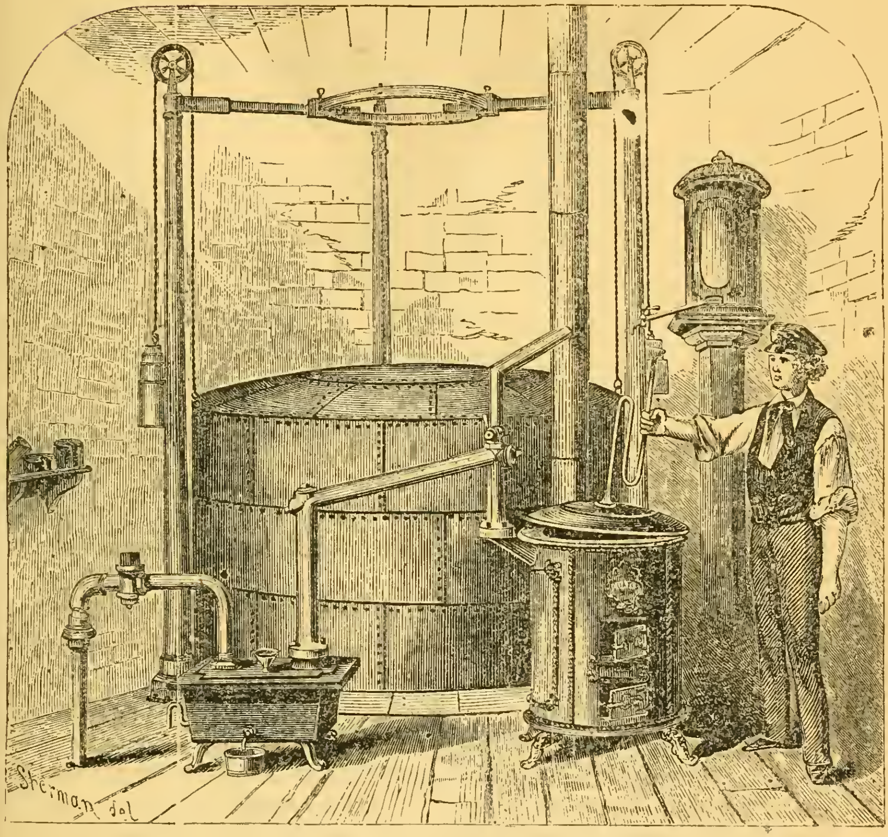
Portable Gas Works.

S. Coates, 376 Broadway, N. Y. The following is a statement from the exhibiter :

The machine is remarkable for its extreme simplicity, safety and economy; it consists of a retort, wash-box, or condenser, gas holder and tank, which are common to all gas works. We prefer the oil made from rosin, commonly called gas oil, because it will produce more gas, and is the cheapest known. It is an article of general commerce, and can be purchased in any of our eastern seaport towns at fifteen to eighteen cents per gallon, and the supplies from our southern states is inexhaustible. Each gallon of this oil will make about eighty cubic feet of gas; depending upon its quality, and care in its use, as well as the extent of operations carried on.

In our large works, where the heat on the retòrts is continuous for many successive hours, there is a very great economy in fuel, and a small amount of coal may be used to produce double the quantity of gas; for when the retort is once hot it requires comparatively little fuel to maintain the heat.

One of the greatest difficulties encountered by inexperienced persons, has been freeing the retorts from an incrustation of car-

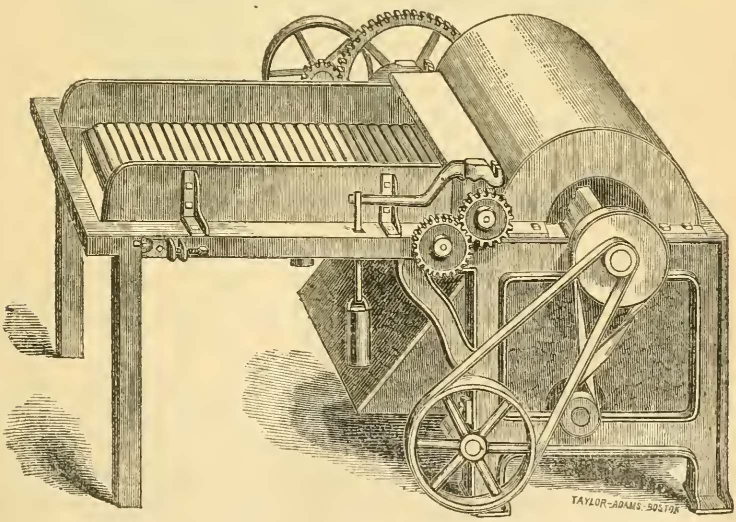


COATES' PORTABLE GAS WORKS.

bon which accumulates during the operation of making gas. By the old process this cleaning was done when the retorts were cold, and the scale adhered firmly to the bottom and sides, requiring the aid of a bar of iron to remove it. Our improvement obviates this difficulty; for by simply raising the cover of the retort, which is set in a groove of fusible alloy, and admitting a current of atmospheric air, the carbonaceous matter is consumed and passes off through a pipe connected with the flue, carrying with it all the smell and smoke; this is done when the retort is hot, and the whole cleaning process occupies but a few minutes, leaving the retort in a condition to continue the operation of making gas if required.

We find, since adopting this method, that our retorts are much more durable, and the works, room, and attendant are no longer begrimed with dirt as formerly.

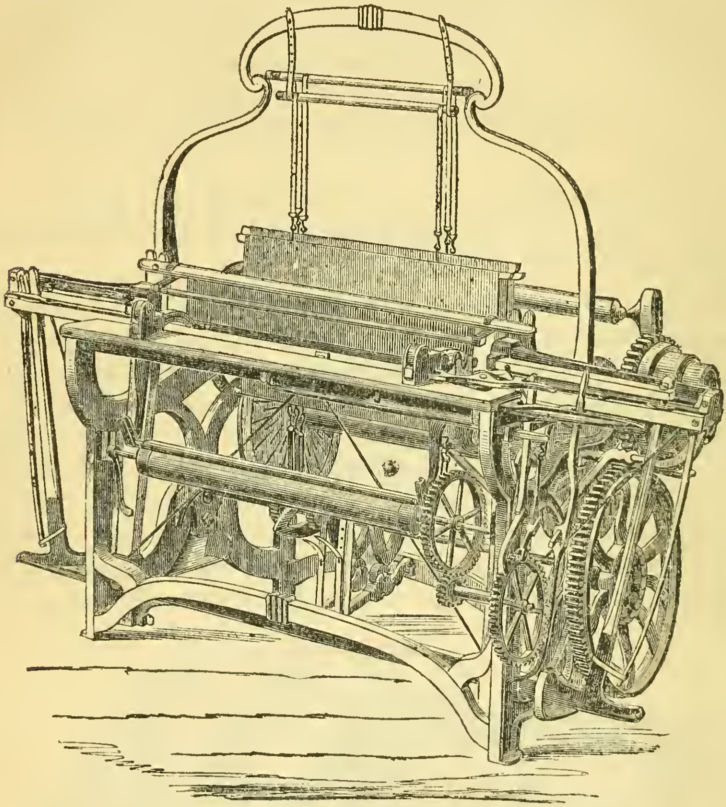
The deleterious vapors of sulphuretted hydrogen and ammonia escaping from coal are not emitted from oil, and of course are not component parts of the gas made from it; in oil gas the same portion of hydrogen is accompanied by a double portion of carbon; it also has a large portion of olefiant gas; so that a given quantity possesses double the illuminating power of gas made from coal, consequently the same number of cubic feet are worth twice as much to the consumer, and a burner consuming three cubic feet per hour will give as much light from oil gas as a burner of six feet from coal gas. [*A silver medal awarded.*



Kitson's Machine for Picking Cotton, &c.

Machine for Picking and Opening Cotton, and other Fibrous Materials.

Richard Kitson, Lowell, Mass. This machine thoroughly opens the fibre without injuring the staple, and can be kept in repair at a mere nominal expense. The main cylinder is both self-sharpening and self-cleaning. [*A bronze medal awarded.*

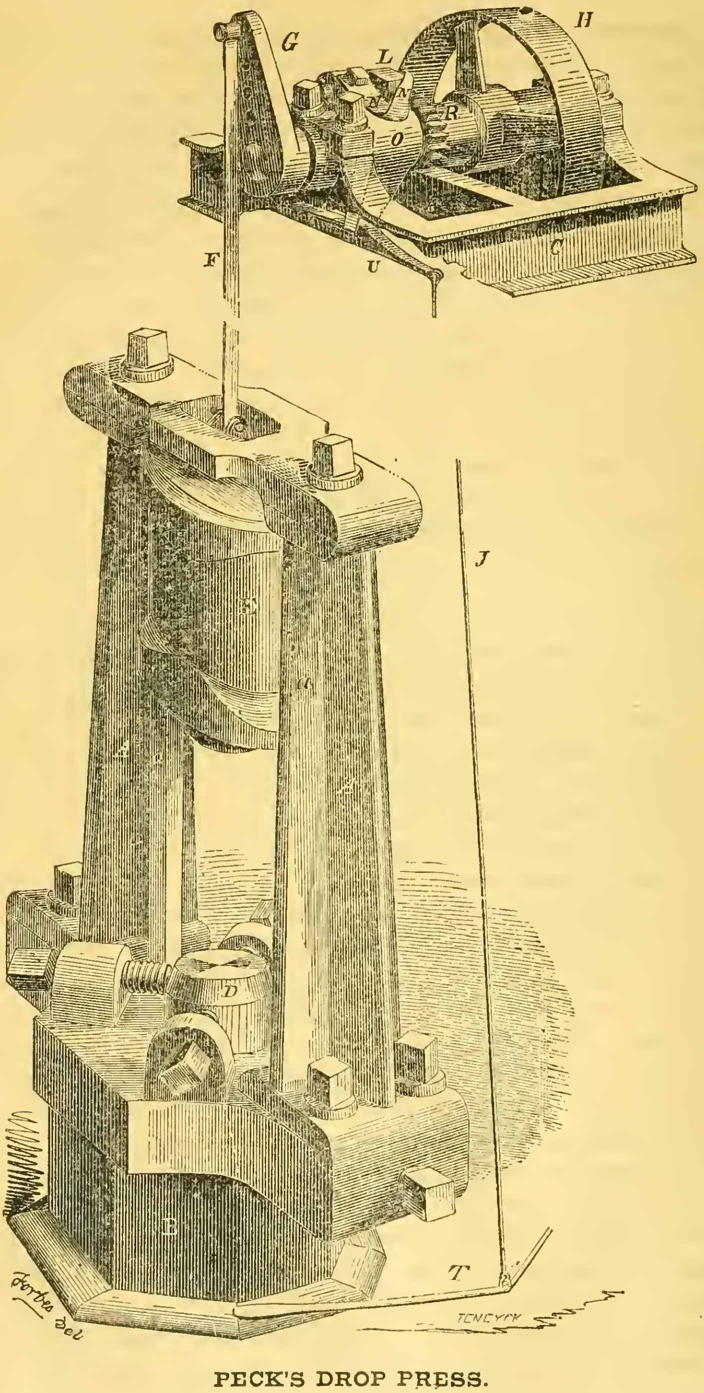


Empire Power Loom.

Empire Power Loom.

W. Benjamin & Co., 36 Broadway, N. Y. The combined advantages of this loom, constructed for running at a high rate of speed, is claimed by the exhibiter as follows:

A large saving in driving power; positive motion in all its parts; economy in operating; security and certainty of the shuttle; increased production of cloth; saving in oil and reduction in the quantity of cop waste; uniform quality of cloth and equality in the tension of the web; and may be changed to plain or twilled cloth in a few minutes.



PECK'S DROP PRESS.

It operates without re adjustment from 25 picks up to its highest speed. Those for thirty inch width run to the best advantage, at from 180 to 200 picks per minute, and have been run experimentally with perfect success at 350, producing from one to four yards per cut over what is usually obtained from same web.

The cloth may be taken from the looms without stopping them. The filling stop avoids atmospheric resistance ; there are no picker strings, pickers, or picker spindles, and no breakage to cops at the highest speed. There are no metallic connections in the picking motions, and no liability to wear. These looms are constructed to stand in line both ways on the factory floor.

The new centrifugal friction pulley combines the fast and loose pulley without shifting the belt, and is constructed to produce different speeds without altering the belt or the speed of counter pulley. There is no wear upon these friction pulleys, whether running free, or driving the loom beyond that of a common loose pulley. [*A silver medal awarded.*

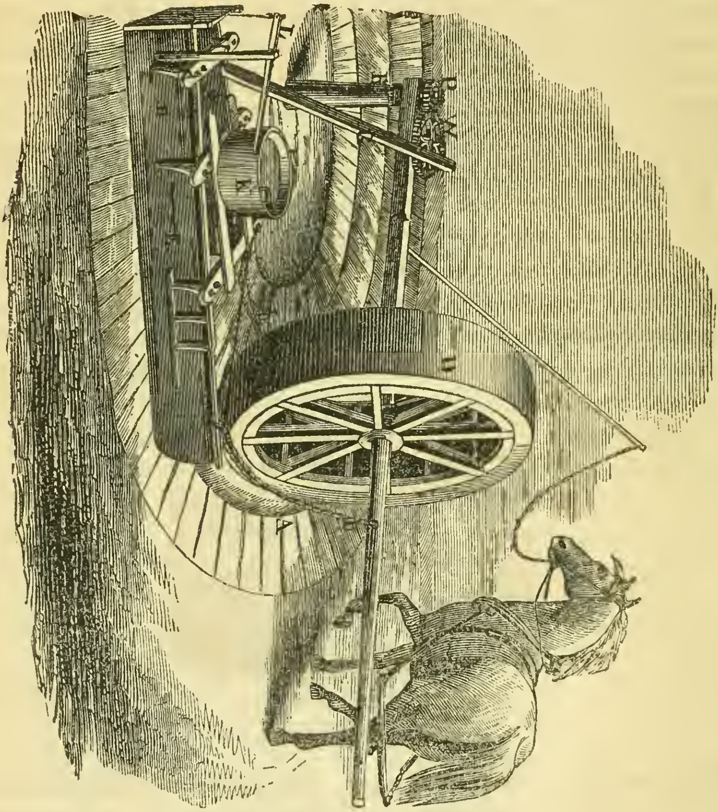
Drop Press.

Milo Peck, New Haven, Conn. *A A* are the standards or ways, between which the drop *E* with its die attached, moves; *B* is the bed or anvil, with the lower die secured in its place; *C* is the frame of the raising machinery, (with one corner removed to show the spring catch *U*;) *G* is the lift crank; *F* is a leather strap connecting the crank *G* by its pin with the drop *E*. The crank has holes in it to insert the pin at different points from the centre, to give a long or short stroke to the drop; *O* is a double crank, to one end of which is attached the dog *L*. There is an eccentric guard ring, (not seen,) which raises the dog from the teeth of the ratchet, when the drop is at its highest point, at the same time that the other end of the crank *O* strikes the catch *U*, (which is connected by the rod *J*, with the treadle *T*,) and is locked firmly in its place, as shown. While the ratchet with its hub *R*, upon which is keyed the pulley *H*, revolves loosely upon the crank shaft. When the workman presses upon the treadle *T*, the catch *U* is depressed, the lock crank is released and the drop falls, carrying around the shaft, with its crank, &c., until the drop is at its lowest point, when the dog *L* leaves the guard ring and is pressed into the teeth of the ratchet wheel by spring *N*, and is carried around, raising the drop to its highest point, when it is again raised from the ratchet, (which continues to revolve,) and the crank is locked in its place, suspending the drop *E* by the strap *F*, to be again tripped.

The machine is entirely self-acting, excepting when the drop is made to fall; when the operator places his foot on the treadle, and it strikes one blow or more, as he desires. Its construction is such that it is impossible for it to rebound and strike the second blow, thus spoiling the work. It is adapted to the heaviest as well as the finest ornamental work. When it is not convenient to place the machine over the drop, as in the cut, it may be placed to one side, when it is only necessary to alter the position of the crank *G*, and pass the strap *F* over a pulley.

[*A diploma awarded.*

Hunt & Sand's Mortar Mixing Machine.

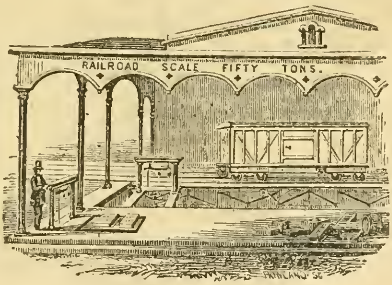


Mortar Mixing Machine.

Hunt & Sands, Peekskill, N. Y. This is a very simple machine. The lime and sand in proper proportions are spread upon path A, the faucet of the water tank, K, is opened, and the machine set in motion by the horse moving round the track. The door, F, of the drag is then kept open until the mortar is completely mixed. The runners, D, of the drag gather up the lime and sand into a ridge; the roller D spreads this ridge out, pressing the lime and sand particles together into intimate union, and at the same time the hind end of the drag has a wabbling motion given to it by the bar G, through wheel W, on which it is set eccentrically. It is thus that the lime and sand receive a mixing together of a more thorough character than by hand labor. Unless every particle of sand is enveloped with a coat of wet lime the mortar is not perfectly mixed. By hand labor this is seldom if ever effected. It is evident that such a result is easily obtained by working a sufficient length of time in this machine. After the materials are thoroughly mixed, and the mortar properly formed, the trap door, F, is shut down, the drag then gathers the mortar formed into a heap, if desired, or pushes it down into the receptacle described, through a trap door in path A. The lime employed is previously slacked before it is put on the way, A. A few revolutions of the roller and drag mixes the materials.

We are informed that with the labor of one man and a horse, thirty casks of lime can be made into plastering or building mortar by it in one day, and that the mortar is of a very superior quality. It works as smooth as fine cement under the trowel, and it sets and hardens much sooner than common mortar.

[*A diploma awarded.*



Fairbank's Rail Road Scales.

Rail Road Scales.

Fairbanks & Co., 189 Broadway. The platform scale, which was unknown a third of a century ago, has now become an *indispensable article* to every *mercantile* and *manufacturing establishment* where business is transacted by weight. It has entered into nearly every department of trade. It is used to ascertain the quantity of many articles of merchandise, as grain, coal, &c., which were formerly either measured in detail or imperfectly estimated in bulk; it has almost entirely superseded other and more clumsy contrivances for weighing, and recommends itself by its convenience and superior accuracy, as completely answering the wants of business men.

It is of the utmost importance, however, that the scale should be *correct and reliable at all times*, and under all circumstances; a *desideratum* which can be attained only by the skill and experience of the manufacturer, and by faithful care and attention in the adjustment of every part of the machine.

The plan of construction which has been adopted by the Messrs. Fairbanks appears to be correct and simple. The bearings are long knife-edges, placed on parallel lines; these rest on polished steel surfaces, so dressed and leveled that the knife-edge bearings rest equally through their whole length, and in every point; skill and fidelity have obviated all tendency to derangement or wear, thus securing the perfect and permanent accuracy of the instrument. [*A gold medal awarded.*

PROCEEDINGS OF THE FARMERS' CLUB.

[ORGANIZED JUNE 22. 1843.]

The Farmers' Club of the American Institute is under the direction and control of the committee of agriculture.

The meetings are held on the first and third Tuesdays of each month, at 12 o'clock M , except the months of March, April and May, when they are held weekly at the rooms of the Institute, No. 351 Broadway.

The meetings are free to the members of the Institute, and all other persons connected with the pursuit of agriculture, or who may desire through this medium to diffuse information on the subject of cultivation.

The Club will be happy to receive written communications at its meetings, on the subject of agriculture, horticulture, the raising and improvement of stock, and chemistry applied to agriculture.

May 6, 1856.

Present—Messrs. Watkins, Lowe, Atwood of Jersey, Stacey, John M. Bixby, Solon Robinson, Prof. Nash of Massachusetts, Brewster of Jersey, Edwards of London, England, President Pell, 36 in all.

R. S. Livingston, Esq., in the chair. Henry Meigs, sec'y.

Mr. Secretary Meigs read the following papers translated by him from the Parisian works imported by the last steamer:

[Bulletin Mensuel De La Societie Imperiale, Zoologique D'Acclimation, Paris, Napoleon 3d, Protecteur; No. 3, March 1856.]

THE ANGORA GOAT.

Hardy reports their condition since their introduction into Algeria:

I went to Cheragas to examine the flock of Angora goats confided to the care of Mr. Frutie, one of our oldest and ablest colonists. We found twelve females and one buck. The buck and ten of the she goats are of the perfectly pure race—their long silky fleeces undulating, entirely white, shone brilliantly in the sun shine. Two of them had their fleeces as white as the rest but much shorter and less silky. They seem to have come from a mixture of breeds.

The flock is in very satisfactory condition—they are lively, alert and in very flourishing health—they are rather too plump (d'embonpoint,) for the race of goat. However it is easy to see that in exterior, they, to a certain degree, resemble sheep. They graze all day—sometimes in the plains and sometimes among brush-wood—in company with a certain number of she goats from this country, and some from Malta. The bucks being carefully kept away from the flock. At night each Angora goat sleeps in a little separate stable by itself on abundance of well kept litter. Their fleeces are usually neat—but in their rambles they encounter hooks from some leguminous plants, such as luzernes—caterpillars, which get wound up so that portions of fleece are torn off in getting them out. These are injurious to the fleece. These Angora goats are certainly very rustic. They are less delicate and less susceptible in regard to their nourishment than goats of any sort, generally. They crop grass and browse on brushes of all sorts, eat leaves of the mastic, of climbing plants, filarias, olives, &c.

The reproduction of this little flock is not less satisfactory. The greater number of the goats are pregnant, many of them far advanced. Desiring to know the result of mixing breeds, I had two very fine Maltese goats led to the Angora buck. I think the favorable season for shearing is towards the end of April as with our sheep, pretty nearly. The fleeces ought to be kept distinct and baled up for trial.

HONEY BEES.

At the Crystal Palace we had a specimen of virgin wax, from Jamaica, with this note attached: "Bloached bees exhibited by Mr. Edward Chitty." We wish we knew more about it and the bees which made it.

EDUCATION OF PARTRIDGES.

Our Perdrix rouge Bartavelle, (Guernsey Partridge,) or Perdrix Saxatiles, appear to be the easiest to tame. We are busy with it. Naturalists have noted it—Gesner, Buffon, Tournefort. The latter, says he saw, in Greece, a man leading his flock of red partridges to the field—taking them up, caressing them, &c., and he saw it also done in Provence. Fifteen to twenty years ago Dr. Stevon saw in a wood opening, in the Flassans woods, an old woman who raised and took care of red Bartavelle partridges, who were at full liberty. They came around her as she called them, eat out of her apron and her hands. She passed somewhat for a witch in that quarter.

Mon. Ramon de la Sagra, presented a catalogue of twenty-nine vegetable substances, almost totally unknown in Europe, which have b en sent by the government of Paraguay to the exhibition.

Our confrere, M. Renard, a delegate to China, on behalf of Parisian industry, sends specimens of silk manufactured there from the silk worm of oak trees. Also other yellow and white silks.

From New Caledonia received seeds and tubers of some useful and some agreable new plants.

One member, Mon. Chazot, gives to the society a thousand francs for experiments on the domestication of the Ostrich in Algeria.

One member, M. Bossin, presents wick made of Georgia long staple cotton, and seeds of that cotton for distribution among our southern departments, and in Italy, Spain and Portugal, that its culture may be faithfully tried by our members resident in those countries.

Some extracts were read from notes of Professor Joly, an historical document relative to the powerful protection given by the Empress Josephine, to the efforts to introduce new vegetables into France. There is a remarkable letter written by her to the botanist, Raffeneau Delile, during his travels in North America. The Empress also extended her protection to the efforts to introduce useful animals. She endeavored to introduce herds of Alpacas and Lamas, could not succeed on account of the political situation of France then, but they were landed in Spain.

The Minister of Agriculture desires from this society a report on all things relative to the seven species of Bombyx, (silk worm,) procured by the society from China, India, Senegal, Brazil and the United States.

The Minister of War requests information relative to the possibility of introducing pisciculture into the rivers and streams of Algeria.

M. Bouvenot desires a committee to take charge of experiments on improvement of poultry by means of males of various races. Referred to the second section.

M. Manduyt remarked that three Senegal cranes had been kept near Poitiers, in good health, since 1847, but they had not reproduced.

One member, Mr. Sace, presented a pair of China pigs. A hardy race suited to rough mountainous districts where there are no means of feeding large hogs.

Mons. Gosse—As to the oil of Duzouz, (Halicone Indicus,) considered as a substitute for codfish oil, from which it differs by having no disagreeable tase, and also having no Iode in it. Mons. Chatin doubted its value without the Iode.

MORE IGNAMES OR YAMS.

Our honorary member, Mr. Piddington, at Calcutta, announces the sending of some tubers of a peculiar species of this *Batatas Dioscorea* to France and Algeria. They come originally from New Zealand.

ENDOGENS AND EXOGENS.

(Lindley's Vegetable Kingdom.)

Extract by Henry Meigs.

An endogen constantly developes new woody matter to the interior as palm trees do. This endogenous and exogenous growth was known to Theophrastus. The exogen developes wood from centre to circumference. This peculiar difference extends to a considerable part of the vegetable kingdom.

The endogens are Monocotyledons. The exogens are Dicotyledons. The endogens seldom live beyond 300 years, but exogens almost an indefinite age. The dragon tree of Cratava in Teneriffe, was an object of great antiquity in 1402.

POIS SANS PARCHEMIN, OR POIS MANGE TOUT.

Translated from Maison Rustique, by Henry Meigs.

Like our best bean pods without strings, the whole is eaten, and is an exquisite delicacy.

These peas are of several varieties. The white one with large pods does well in the open field.

The crowned or Turkish pea is very good.

Stable manure causes peas to give large leaves and few flowers, and those give but few peas.

These pea vines are the best thing to fertilize poor soil. The neighborhood of Paris knows and uses it, and thus is able to supply Paris with millions of quarts of green peas annually.

H. W. Brown exhibited a new patent model windmill, invented by Adolph Lempoke, of Pleasant Mount, Wayne county, Penn. One of 16 feet diameter of fan will cost about $100.

The following letter from Mr. J. D. West, in relation to his improved pump, was then presented and read:

New-York, May 6, 1857.

H. Meigs, Esq., *Sec'y of Farmers' Club:*

Dear Sir:—At your kind suggestion I avail myself of the privilege of telling the Club, through you, what I claim as the advantages of my improved pump, sold by my firm of A. W. Gay & Co., 118 Maiden Lane, as is also the Warner patent pump. 1st—The above pump is very simple, and is consequently cheap and durable. It has but two necessary valves, *a* and *g*, *h* being a duplicate foot valve and increasing the security of the pump. It has no stuffing box, which in other pumps is frequently a stumbling block. Instead thereof there is an upper piston *f f*, with a cup packing turned downward. It works with less friction, and wears longer. It is very easy to repair. By loosening the bolts on the upper flange the whole working part can be drawn out, and one nut secures it together. It is very strong, the pistons being well braced and formed in part by a cast sheath on the outside of the plunger rod; but its great glory is its combination of air chambers which cushion the stroke of the valves both ways, surround the working cylinders protecting them from frost, and furnishing a free supply of water to the pump with a diminished pipe.

I have not time now to give a minute description of my hydraulic ram, but will simply state that it is the only double acting one, and that it dispenses with weighted or spring valves. Having two waste valves the head of water must always be upon one while the current is rushing upon the other, and so long as the momentum of water gives power so long it must work notwithstanding any variation of head or delivery.

Were it not for the waste of water, I would propose them instead of the steam fire engines, confident that I could beat them. Respectfully, yours,

J. D. WEST,

Of A. W. Gay & Co., 118 Maiden Lane.

P. S.—By the way, I will mention that we are selling a two inch cast iron pipe at twenty-five cents per foot, thinking it will be useful information to many in connection with the subject of investigation. It is moulded by machinery, and is put together with screw couplings. It is a new and cheap article.

Yours, J. D. W.

The chairman, Judge Livingston, remarked that he had experienced such difficulties in wheat that he quit it for a while for rye.

Mr. Stacey had left an acre of carrots in the ground all winter under deep snow, and they were not injured. And under like circumstances potatoes have kept sound all winter.

Mr. Meigs did not think it proper to recommend the leaving potatoes or carrots in the ground all winter, as a rule. Adj.

H. MEIGS, *Secretary.*

May 20, 1856.

Present—Messrs. Adrian Bergen of Gowanus, Long Island, Philips of Easton, Penn., Messrs. Porter, Van Wyck, Bridgeman, Leonard, Chambers, Solon Robinson, Tanner, Chilson, F. W. Geissenhainer, Jr., Lowe, Demarest, Ewing, Lundy, President Pell, Hon. R. S. Livingston and others—between 30 and 40 in all.

President Pell in the chair; Henry Meigs, secretary.

The Secretary read the following translations and selections made by him from papers receivd from Europe by the last steamship, viz :

Extracts and Translations by H. Meigs.

[The Repertory of Patent Inventions, No. 160. London, April 1856.]

THUGAR'S METHOD OF PRESERVATION OF THE FLUID SUBSTANCE OF FRESH EGGS.

I deprive the fluid substance of eggs of all its water by evaporation—effected by currents of air.

Trays of slate or any suitable material, shallow, placed in frame work, separating the trays. Heat introduced so as not to coagulate the albumen. Air pumps or fans to produce currents of air. First, beat up together the yolks and whites so as to break up entirely the membraneous structure of the egg—fill the trays of one square foot surface with three or four hen's eggs. When dry, grind all to powder by a suitable mill. Put the egg powder into tin cases, bottles or others suitable for preservation.

[Societe Imperiale Zoologique, &c. Louis Napoleon, Protecteur.]

A memoir from our Confrere, Monsieur l'Abbe Allary, on raising (education) Pigeons, and the advantages thereof, was read.

Monsieur Bourgeois was against the Abbe, on account of the injury to cereal and leguminous crops caused by the pigeons. He reminded the members that pigeons were proscribed in districts where these crops were grown—so that the birds are shut up while the crops might suffer from their devastation.

Mons. Malezieux remarked that he had said in his work on the subject which he had presented to this society, that although raising pigeons might be very advantageous to their owners, they are nevertheless very injurious to the farmer.

June 3, 1856.

We have received by some of the late steamers, among other things, the April Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d, Protecteur.

This number contains a list of all the members thereof. We give so many names as may be useful to our people for correspondence, viz:

President—Le Compte DeMorny; Hon. President, or President d'honeur—Le duc de Cazes; Vice-Presidents—Morel, Payen, Chedeville, Bernard DeRennes; Secretaire General—Andry; Secretaries—Pepin, Chedeville, De Saint Projet, Bouchet and Rouillard; Librarian—Saillet; Treasurer—Corbay; Assistant Treasurer—Hund; Honorary Treasurer—Parguez, Jr.

The general and alphabetical list is given in full of all the members in 1856.

Their Imperial Highnesses, le Prince Jerome Napoleon, le Prince Napoleon, la Princesse Mathilde. Then follows a list of ladies of the highest classes—about 160 ladies—about 30 honorary members—90 corresponding members, some from the U. S., as for instance, Farmer Cavelier of Austin, in Texas, Dearborn of Massachusetts, Wilder of do. John Smith, Secretary of the Horticultural Society of Philadelphia, Zadock Thompson, President of the Agricultural Society of Burlington, Vermont.

The ordinary members are nearly 1,588 in number. About 100 French societies are in Copenhagen, and 19 foreign corresponding societies, of which the only one in the two Americas is, 1. Institut Americain De La Ville De New-York.

The Admiral, Minister Secretary of State of the Marine and the Colonies, Mons. Hamelin, addresses the Governors of Colonies, to cause societies of correspondence in conformity with the views of the Imperial Society, which will gather and transmit to it all valuable plants, animals, and information relative thereto, for the attainment of the great object of the society—Acclimation of the choicest of all sorts.

The Ignames (Chinese Yams,) of New Zeland, announced by Mr. Piddington, have arrived in good condition. The Council have taken all necessary measures to secure the best possible cultivation of these *generous vegetables!*

[By the Secretary of the Council. GUERIN-MENEVILLE.]

In order that all who wish it may know to whom to address communications for the Imperial Society, we add a list of the heads of its departments:

Mons. Is. Geoffroy Saint-Hilaire of the Institute, President; Le Compte D'Premesnil, Secretary General; Dumevil, (Auguste), Secretary of the Sessions; Dupin, (E.,) Secretary of the Interior; Guerin-Meneville, Secretary of the Council; Le Baron DeMontgaudry, Foreign Secretary; Jacquemart, (Frederic), Member of the Council, De Quatrefages, of the Institute, Richard, (du Cantal), Vice-President, Le Baron Seguier, of the Institute, Le Marquis De Selve, Le Compte De Sinety, Jacques Valserres, Members of the Council.

Strangers are entitled as well as Frenchmen, to premiums and encouragement. Judges only are deprived.

The premiums and encouragements annually, shall be

1st. If there be room for it, title of Honorary Member.

2d. One or more medals of gold, of large size, (Grand module,) worth intrinsically, 300 francs—$60.

3d. Silver medal of the first rank.

4th. Bronze medals of the second class.

5th. Medals of Honor.

Every medal should bear the name of the Laureate with the date and object of this premium.

Honorary notices may be given, also premiums in money.

Those persons who claim premiums, &c., must address, (postage free,) before Dec. 1, their claim, stating the results, &c.

These premiums, &c., will be distributed annually, at a general meeting of the society, in public, and the views of the society will be then stated and an address made by the President or Vice-President, and a general report will be read of the transactions for the past year, by the Secretary General or a Vice-Secretary.

This meeting shall take place on the 10th day of February annually—that being the day of the foundation of the society.

[From the California Chronicle, San Francisco, April 5th, 1856.]

TOBACCO.

A gentleman in Almeda county (says the Mining Journal,) has planted ten acres of tobacco the present year. The seed is of the best *Cuban varieties*, and the proprietor expects to realize a handsome profit from the operation. His calculations are based upon experiments made on the spot during the two or three past seasons.

Note.—Then we need not take Cuba for our cigars. Perhaps the *Alamedas* of our United States, may be even superior to the most costly *Havanas*. H. Meigs.

[Revue Horticole, Paris, May 1, 1856.]

THE CHINESE YAM AGAIN—(*Discorea Batatas.*)

Translated by H. Meigs.

It was generally supposed that this tuber would stand frost, so that it might be left in the ground all winter. I did not absolutely believe this, and therefore I deem it my duty to say what my experience has taught me. In April 1855, I planted four bulbilles, (little balls,) of this year. On the 6th of November last, I gathered four tubers about 18 or 20 inches long, I planted one in a pot of proper depth and buried pot and all in the earth just below the surface. I flattered myself that I should demonstrate its ability to resist frost. But, on the 9th of March last, I examined my Yam and found the top rotten; I turned it all out of the ground, and found it rotten *two thirds* down from its top; the lower *one third* sound. The ground had frozen to that depth. The thermometer (Centigrade,) marking 12° to 13° below zero, (*ie.*) by Fahrenheit + 8°. It therefore seems to me that this Dioscorea batatas will not survive frost of severity.

There is apparently a contradiction between my experiment and that of the Museum. But although their Yams sprouted and grew in the spring of 1855, it only proves that (like mine,) the roots did not all rot—neither did mine. So the common potato is safe in the ground where it grew, all winter, if not reached by frost.

TRANSPLANTING EVER-GREENS.

We take pleasure in extracting the following from the National Intelligencer of May 17th, 1856.

For although it is true that some understand how to do it, yet as in thousands of other things the many do not. For we see almost everywhere the transplanted evergreens turned even brown, they are dead:

"Strange as it may seem to most people, about the 4th of July is the proper time to transplant ever-greens, but it can be done in June, or any time in July. I have transplanted hundreds as late as the first of August, with perfect success.

At any other season of the year it is very difficult to make them live, and it is accounted for by the fact that the sap does not run at the same time with deciduous trees, (those that lose their leaves every year.) Most people imagine that they require a great deal of water, and often kill them by hydropathy. The roots of the evergreen in its natural state, are sheltered from the rain and sun by their foliage, which makes an umbrella over them, and they will flourish we all know on rocks where no other trees will live.

The earth should have a good soaking at the time of transplanting, but do not water the tree again (unless the weather should be very hot and dry) for ten or twelve days, then a good drenching is all they require."

Solon Robinson remarked that the difficulty in safe transplanting of evergreens was not only the mistake as to the time of the year, but in not cutting off the lower end of the tap-root early in the season by some implement which can be put into the ground some distance from the plant and cut off the lower end of the tap-root and not disturb the rest of the tree. Then you can remove it the following July with almost sure success.

Mr. Adrian Bergen, who is an experienced farmer of many years standing, and now busily engaged in farming, said that we are apt to attribute a single failure to bad unripe seed. But as to our Indian corn, it rarely happens to be gathered unripe.

Mr. Porter said that the injury to the manure in the tank spoken of, was occasioned by its being too tight to admit the air. It was the want of the phosphoric acid. Admit the air and the damage will not occur.

President Pell said that he had a tank on his farm which contained three hundred hogsheads, and that he had caused it to be constructed so as to be perfectly ventilated. He ordered two efficient ventilators to be attached to it.

Samuel Erwing of New-York, exhibited the Grafton mineral paint. It consists of tiles, very finely pulverised, and is used with oil as other pigments. Much is said in favor of it. Those who wish to try it can apply for information at No. 62 William street, New-York.

W. J. Demorest, of 375 Broadway, exhibited an improved portable magic summer stove for cooking. The fuel is gas of the cities, or a gas generated in itself from alcohol, by means of small wire in masses dispersive of the alcohol, like the Platinum sponge used for intense light.

Demorests' article is composed of tin or sheet iron, various vessels can be employed at the same time, for the heat is equally distributed—no smoke, and little heat radiated from its exterior—no smell, baking, broiling, boiling, sad iron heating, etc., all go on together. The whole *little kitchen* standing on a table or any where else handy to the operator. No danger from the alcohol, because that is contained in a hollow metal circle below the apparatus, where it cannot partake of the heat at all, and whence its upward supply to the *little kitchen* is perfectly under command by cook.

Secretary Meigs good humoredly said that this very effective little kitchen in which any batchelor of any age could make his coffee and sausages for breakfast, cook his bit of fish or flesh for dinner, and bake his custard and bread and make tea cakes, and all at the evening of day, might be tempted to abolish the women and *marry his kitchen !* Particularly as this kitchen costs but *twelve dollars*—hardly enough to pay for a poor cook's Sunday bonnet.

This magic is lighted up in a minute with a mere match, and when done a breath extinguishes it, saving the tedious process of building a common fire and the loss of fuel by its continued burning long after the cooking is over. One fact is that *one cent's* worth of alcohol *boils one gallon of water.*

Mr. Lundy exhibited a specimen of stone ware pipe with branches diverging. The strength of it is doubtless great enough for any natural pressure to which it will be exposed. It is in a measure glazed so as to be probably not very permeable to water. This specimen, whose calibre is over one inch, is sold for *six cents* a running foot, made at No's 192 and 194 West Fortieth street, New-York.

William Phillips, brother of John, the assignee of the patent self-protecting wind mill, from Easton, Pennsylvania, explained the model to the Club as being perfectly capable of avoiding all damages from heavy squalls by means of its entirely original and novel attachment, viz: a fan placed vertically, which on the instant that the wind strikes it, by leverage at its foot, instantly causes all the fans of the mill to present their edges to the wind and keep there as long as the wind blows hard enough, and then resuming their working angles as much as is desirable—that amount of force being under the command of the operator. It is probable that it may be rendered less complex, but the idea of this premonitory guard or sentry is new and excellent.

Mr. Lowe, on the calling up of Wheat, the subject assigned for this day, begged to make some preliminary remarks and would then ask for a continuance to the first Tuesday in June, the next regular meeting of this Club.

He had been for some long time past assiduously occupied with that most interesting matter—the insects which destroy such immense amounts of our wheat. Mr. Lowe adverted to the immense loss of wheat by the drought of 1854, and the chief cause thereof, viz: the wretched shallow ploughing and poor manuring and managing of the land. Europe knew her obligations to Liebig, for his well deserving lessons in agriculture, and Mr. Lowe said that we had a citizen busy among our soils whose ability was no less than Liebig's, and that was Professor James J. Mapes, of America, whose teachings in fertilization, deep and thorough tillage by his sole subsoil plow, and in many more invaluable lessons and practical doings, have impressed the country with respect for the name, which will last while thorough agriculture is known and honored.

Mr. Orange Judd, of the American Agriculturist, presented the following extract from his work:

A FARMER'S EXPERIENCE WITH SPRING WHEAT.

To the Editor of the American Agriculturist:

In response to the invitation in your April issue, I give you my practice and experience in growing spring wheat. I plow all the ground I can in the fall, ten inches deep, keeping for the purpose a team weighing from 1,300 to 1,600 pounds. My soil is undulating, consisting of clay on the eminences, and muck in the depressions.

I have used three varieties of wheat of late years, viz: Fife, China and Black Sea. I have about concluded to discontinue sowing the Black Sea, thinking that I can raise the other two varieties as cheaply and as safely against rust, while they will bring me from one to two shillings more per bushel in market. I have raised principally the Fife, the past season. I obtained $1.87½ per bushel for 613 bushels, which was as much as was paid for China at the time. The miller says that it does not make quite as white flour as the China, but that it makes enough more to enable him to pay as much for it as for the China.

The Fife variety has two advantages to the farmer over the China: first, it does not shell so easily in the field, and second, it is not so apt to crinkle down by wind and rainy weather.

The past season demonstrated this perfectly. My Fife stood up nicely, while the China was down almost as badly as the Black Sea. This was the case as far as my observation extended.

I have a heavy cultivator, drawn by my "big team," which mellows the ground almost as deep as it is plowed where it has not packed down during winter (as is sometimes the case with fall-plowed land, where it has been imperfectly drained.) Fall-plowed ground should be as effectually drained by dead-furrows or otherwise, as if sowed to a winter crop. Where the ground is not perfectly mellow, I cultivate twice in a place before sowing, and always follow twice in a place with the harrow after sowing.

Grass or clover seed is sown after harrowing and before rolling, which leaves the surface of my land in a beautiful condition—much better than it can be made by spring plowing.

I always aim to sow my wheat as soon after the first of May as possible, and do not care to sow it any earlier, lest it should not escape the wheat midge. By this late sowing my wheat has escaped this pest, while that of my neighbors, sown ten days to a fortnight earlier, has suffered severely. My wheat the past season yielded 755 bushels from 35 acres of breadth.

Mr. Adrian Bergen had been annoyed by the wheat weevil, and experience had learned him that when a barn has got weevils in it he knew no other way to get rid of them than not to put any more wheat there for a period long enough to starve them out. We know very well that these insects attack our wheat in our granaries where we used to suppose the grain was safe.

The subject of wheat was ordered to be continued at the next meeting, together with summer soiling of stock.

The Club then adjourned to Tuesday, June 3, at noon.

H. MEIGS, *Secretary.*

June 3, 1856.

Present—Messrs. Pell, Field, of Brooklyn, Darling, Dr. Waterbury, Dr. Wellington, Judge Scoville, Dr. Smith, Solon Robinson, Anderson, Antonides, Bergen, of Gowanus, Lowe, Judd, Alanson Nash, Pardee.

President Pell in the chair, Henry Meigs, Secretary.

The Secretary read the following translations made by him:

[The Moniteur of Societies and Cultivators, Paris, April 1, 1856. Six francs a year, pamphlet 45 pages.]

This sums up the transactions of a great number of agricultural societies and meetings relative to agriculture, and everything relative to it. It is sent to the Farmer's Club of the Institute.

Official Notice relative to the next great Universal Exhibition of Animals, Vegetables, and everything belonging to agriculture.

All animals will be fed free of charge to the exhibitors during the exhibition.

Government pays the expenses of transmission to Paris of all animals, implements, and premium agricultural products, from all societies.

And also of all animals which have not taken premiums, if the judges say that they should appear in the exhibition. The Belgian government orders transportation on her railways, gratuitous for all animals for the exhibition, and fifty per cent less for all products and implements.

Canal of Suez.—Referred to the committee on economy, statistics, and agricultural legislation.

Farmers of France.—Statistical report by Maurice Block, corresponding member.

Truffles.—Inquiry. Are they a product of oak trees? A farmer planted acorns and found they grew truffles! Mons. Guerin Meneville said that the inhabitants of the lower Alps knew by certain signs where the truffles would be found about the roots of the oak trees, and that generally such trees were sickly, feeble, &c., and growing where there was little vegetation.

How to prevent farmers from moving into the cities!

M. H. Grand Jean, clockmaker, at Lodi, reports that he imported original potatoes from the Cordilleras, of Peru, three years ago, with a view to a new generation of tubers, to be free from disease, He planted them, and so far, all were healthy. He offers some of them for trial by members.

M. Payen spoke of the great benefit arising from a certain amount of flesh being consumed by a people, and now that the supply of it in France is quite insufficient—of stock and of poultry—there being only about 700 millions of kilogrammes of cattle, sheep, and hogs, and about 380 millions of kilogrammes of poultry, game, fish, eggs, cheese, &c. This makes 980 millions, which gives to each inhabitant per annum but 28* kilogrammes. This amount is evidently insufficient.

The Secretary read the following paper from Capt. Smith of the United States Light horse service :

New-York, *June* 2, 1856.

Dear Sir—I had intended to avail myself of your kind invitation to be present at your next meeting of the Farmers' Club, but my duties will unavoidably prevent. In great haste I will give you an item, my own experience in sheep raising *in a small way*.

It is now about nineteen months since I came in possession of three Nankin sheep, (all ewes.) I took them from on board the clipper ship Jacob Bell, just then arrived from Canton, and sent them to my farm, Norwalk Island, Ct. These were all the sheep I had of any kind, and no buck with these, though they were all with lamb, and I relied on raising a buck as the sequel will show. They brought forth not long afterwards, each with three lambs, (the sheep were poor, having been on ship board 160 days,) but they soon fattened and the lambs grew finely. The next time, for they have lambs twice in a year, they had three, four and five lambs at a birth, and raised them. One of these sheep has had twelve lambs in fifteen months, and the increase from the three original sheep, up to eighteen months, has been *seventy-four !*

* Kilogramme is 2 lbs., 8 ounces. 3 pennyweights, and 2 grains. Troy weight.

I know this seems to be incredible, and Gen. Hall, who has known me since I was a boy, and would I think take my word on any other point, doubted this story entirely. Of course all I can say is, that the sheep may be seen on the Island, and abundantly satisfy any inquiring mind.

I should add that they are large and handsome, and the mutton of superior delicacy, wool rather coarse.

Very truly, &c., THEODORE SMITH,

HENRY MEIGS, Esq., 132 Monroe street, N. Y.

Sec'y of Amer. Inst., N. Y.

Mr. Pell states that these are not the small China sheep heretoforenoticed in *The Tribune*, but a variety of the broad-tails, with tolerably large carcases and coarse hairy wool. The flesh is alleged to be delicious.

DISTRIBUTION OF FISH AND PLANTS.

Dr. Waterbury offered a resolution, which was adopted, soliciting correspondence through the Secretary upon the subject of an interchange of seeds of rare plants and trees, and the eggs of fish between different sections of the country. He stated that the canals had served the purpose of filling waters with new varieties of fish to a considerable extent.

Connecticut wine, made from native grapes, was tasted by the Club, but not considered equal to wine from the Catawba grape.

INJURY OF FRUIT BY THE COLD AND WIND.

Mr. Field, an extensive grower of fine pears in Brooklyn, gave it as his opinion that the cold and high wind of the last week in May, had done immense damage to all the finest varieties of fruit. Apples, pears, and peaches, the blossoms of which were in just the right state of forwardness to receive impregnation, had the state of atmosphere been favorable, he thinks are all blasted, owing to the fact that the pollen was all blown away without performing its office. The idea is that all flowers must be in exactly the right condition to receive the pollen when it is wafted along on a gentle breeze, or the impregnation will not take place. None of the blossoms upon his old trees, except the top one of the coronal, have set fruit, and this was because they were the only ones ready before the storm; while trees imported this Spring from France, that bloomed so late as to be just in time since the others received their death, to start into new life. Peaches, except the very early and very late ones, Mr. Field thinks, have suffered the fate of the pears. Cherries and plums which bloomed early are loaded with fruit.

Mr. Pell—In my orchard I think the fruit is not injured, although it was so cold within four miles of my orchard on the Hudson that ice formed as thick as a silver dollar. In my experience I find that a northeast rain storm destroys the pollen, while a dry wind, if it is cold, rather assists the impregnation.

Samples of wine made by S. D. & L. B. Case, of North Canton, Hartford county, Conn: No. 1, common wine, 5 years old, $4; No. 2, pure juice of grape and sugar, 1 year old; No. 3, common wine, 2 years old.

The above are made from the common or native grape of the country, and the sugar used, Stuart's best refined.

The Messrs. Case would like the American Institute or Farmers' Club to give an opinion of its quality, also any suggestions of improvements. They have such wine for sale.

The members tasted the wine, and seem to be most pleased with No. 2. All efforts to render our indigenous grapes capable of giving good wines are much valued. It is well known that some of the best wine grapes are by no means esteemed on the dessert as much as those which yield inferior wine. So it is among the cider making apples of America. The best cider is made from a species of crab apple, not at all valued for eating.

Mr. Field, of Brooklyn, in reply to a question as to the effect of the late cold weather on his fruit, said that the fruit of nearly three thousand pear trees had been blasted by the late cold, dry winds. His cherry trees are in a thriving condition. The pollen seems to have been lost by the gales.

President Pell said that sometimes high winds aid the impregnation by the pollen.

Mr. Field—Our northwest winds blast fruit. The ancients used to say that the east winds blasted the fruit.

Mr. Pell—The late cold winds have not injured anything on my farm, nor generally any farms within some four miles of the Hudson river.

Adrien Bergen, of Long Island—I find our northeast winds most apt to blast fruit.

Dr. Waterbury remarked that our coldest winds come from our continent—mild winds from the sea.

Mr. Field—I noticed a remarkable fact this spring—that is, the numerous red cedar trees killed in whole or in part.

Mr. Meigs—Had observed it on Long Island with surprise, and had never seen it before.

President Pell called up the regular subjects of the day—wheat and summer soiling of stock. He requested Mr. Lowe to open the wheat question, as he had lately bestowed much time and practice on the wheats and their enemies.

Dr. Waterbury, of New-York, offered the following resolution:

Resolved, That the Farmers' Club of the American Institute invite correspondence from all parts of the country relative to the original distribution of our native forest trees and indigenous plants, and also relative to the orginal distribution of the different varieties of fresh water fishes.

This resolution, after some interesting remarks by the learned mover, was unanimously adopted.

Mr. Judd of the Agriculturist spoke of the value of millet as a crop little attended to, but he would try to bring it before our farmers, hoping that they would give it a fair trial.

MILLET—ONE MAN'S TRIAL AND WHAT HE THINKS ABOUT IT.

Having with many others suffered from the severe drouth of 1854, in my hay crop, I was induced last spring to procure half a bushel of millet seed. When preparing my grouud for oats, I reserved one acre and a quarter for the millet. After corn planting, say about the first of June, I plowed the said ground again, harrowed it down, sowed my millet seed, harrowed thoroughly again, and quietly waited the result. Well, after a while the young sprouts made their appearance, looking very much like what is generally called pigeon grass. But after securing my wheat and oat harvests, I had a heavy crop to cut on my millet ground. Leaving a small piece which I had sown thinner than the rest to ripen for seed, I mowed the field and cured it as clover should always be cured—in small cocks. When sufficiently dry, I carted *five heavy loads* to my barn, and my horses, cows and sheep have thanked me many times for my first experiment with millet. They have all eaten it readily and greedily, and I am so highly pleased with it that I shall sow much more this spring.

The time for sowing should be as indicated above, when the weather is warm enough to make corn readily—from the 1st to the 15th of June—and the time of harvesting comes after the rush of other harvests is over, thus accommodating the farmer, at both periods when it wants attention. It yields seed bountifully, which makes a flour very palatable for man, and is decidedly nutritious for every animal not forgetting the fowls—they are very fond of it. I say then to my brother farmers, try a piece of millet, and I am confident that if you try it once, you will again.—Ohio Cultivator.

ANOTHER MAN'S EXPERIENCE AND OPINION OF MILLET.

Mr. Thomas B. Lord says: I have raised millet for the last five years, chiefly for experiment. Having become convinced of its value, I last year sowed twelve acres; an acre or two was too wet, and produced nothing; the remainder was a good crop, and yielded twenty-two bushels of seed and three or four tons of straw to the acre. My experience has proved that it would yield from twenty to twenty-five bushels of seed and three to four tons of straw per acre. The seed is worth nearly as much as corn to feed. The straw is worth, after threshing, about two-thirds as much as timothy hay, is eaten by cattle or sheep more readily than hay, and if passed through a straw cutter I think it would be fully equal to it. I fed a flock of sheep last winter on millet straw after threshing, without grain—a part of which flock I sold in February, and a part recently, for the butcher. I have also fed it to milch cows with good success, the butter being nearly as yellow as when they run to grass.

The soil best adapted to millet is a moist muck, but it will do nearly if not equally as well, on sward or stubble. Time of sowing, last of May or first of June. Quantity of seed, if designed to ripen, twelve quarts per acre; if designed to be cut for fodder before ripening, I would sow half a bushel. It may be cut with a grass scythe, and cured like hay, or with a cradle (if the fingers are well secured,) and after laying a day or two, bound and set in stooks.

One of my neighbors raised last season thirty bushels per acre, and fed the straw to his cattle and some young horses. He informed me the other day that he never raised a crop which did him as much good as his millet. Another neighbor has raised it for two years and fed it to his horses, and he tells me that his horses would perform the same work with half the grain that they did when fed on hay. A year ago last August, not having pasture, I fed green millet to my working oxen during seeding time. They ate it more readily than green corn stalks, and less than half the ground would supply them. They worked hard and gained flesh.

CONVERSATION ON THE SUBJECT OF SOILING STOCK.

Adrian Bergen of Long Island, preferred that his cattle should roam, they were better for liberty, exercise, &c., but admitted that small farms and other relative circumstances would doubtless render soiling of stock most profitable.

President Pell—I believe in and practice soiling of stock, particularly in well populated districts. He keeps them in large yards and sheds, and feeds three times a day, when they will gain flesh or secrete milk faster than in pastures, except upon irrigated land, which he finds a good substitute for soiling. He recommends lucerne, orchard grass, millet, corn, rye and clover for soiling purposes. He has orchard grass now eighteen inches high. Cattle should always be fed when in stable on a variety of food. He recommends hay two days, straw two days, stalks two days, and mash one day every week. All coarse feed should be cut. The question of feeding cattle will be discussed at the next meeting.

J. Payne Lowe—In my travels in this country I find the farmers dread more than all others a cold east wind.

Mr. Pell—If such a wind comes cold and moist at the time of blooming, it is apt to blast.

Mr. Field—With me the north-west wind is the most fatal. It is, perhaps, because it is usually the coldest, and blossoms must have a certain amount of heat at a particular juncture. I am aware that the ancients dreaded "the east wind." I find that most of our evergreens, and those that were considered very hardy—such as deodar cedar, arbor vitæ, &c., were killed by the cold of last winter. None but the Norway spruce remains perfect.

Dr. Wellington—The leaves of the ivy upon many walls in this city, I notice, are also dead.

WHEAT—ITS CULTIVATION AND INSECT ENEMIES.

Upon this subject J. Payne Lowe gave the Club much valuable and interesting information, which we will publish in a condensed form as soon as we can find space.

THE SUBSOIL PLOW.

Solon Robinson related an anecdote illustrative of the ignorance that prevails about improvements that are made in agricultural implements. He said, a Pennsylvania farmer of mature age, and as much intelligence as the most of men, said to him, a few days ago, that he frequently read in the proceedings of the Farmers' Club about the subsoil plow and subsoil plowing, not a word of which did he understand, and he wanted to know what it meant; what such a plow looked like—never having seen one; and Mr. R. thought there might be 50,000 men in the country in the same condition of agricultural knowledge.

Dr. Waterbury gave tables of analysis to show how near alike are the constituents of blood and wheat, and statements showing how civilization and wheat cultivation have been diffused westward together from its starting point in Egypt. South of the equator, wheat is not much cultivated or consumed, and the country does not produce men of great intellects. Such are only found in wheat-growing and wheat-eating countries.

SOILING CATTLE.

This subject was indorsed by Orange Judd, who is a warm advocate of the measure. He read two articles upon growing millet for the purpose, as well as for hay. A farmer in Ohio sowed an acre and a quarter the first of June, and reserved a piece for seed, and made five large loads of good hay. A Mr. Lord, who writes in *The Rural New-Yorker*, sowed twelve quarts of seed per acre June 1, and made twenty-two bushels per acre of grain, and three to four tons of straw. A farmer at Hyde Park, Dutchess county, New-York, had lucerne twenty-nine inches long May 27. This crop should be sown at the time of sowing oats, 16 pounds seed per acre. It may be cut once a month for five months, each cutting 18 inches long. In countries scarce of fuel, the roots of lucerne are dug and dried, and afford a large amount per acre. The ashes are very rich in potash.

Mr. Field—In Germany the roots of quack grass are dug in times of scarcity of fodder for cattle feed.

President Pell adverted to modern science in feeding stock, and the actual success by appropriate keeping, feeding, and in figure, flesh, fat and bone of stock.

Mr. Solon Robinson moved continuance of the question of "summer feed of stock" to next meeting.

Alanson Nash, Esq.—And I move to add "feed of man too."

The Club adjourned. H. MEIGS, *Secretary.*

June 17*th*, 1855.

Present—Messrs. John W. Hanford, of Williamsburgh, Solon Robinson, T. W. Field, of Brooklyn; J. Payne Lowe, Darling, Wheelan, Evans, Van Wyck, Alanson Nash, and others, 23 in all.

Dr. Waterbury in the chair. Henry Meigs, Secretary.

The Secretary read the following translations and extracts made by him from works received by the Institute from Europe by the last steamer:

[London Farmers' Magazine, March, 1856.]

COVENT GARDEN MARKET.

FRUIT.—Pine apple, $2 to $3 per pound; grapes, $3 to $5 per pound; strawberries, 1*s* 6*d* to 3*s* per ounce; oranges, 2*s* per dozen.

Potatoes, 5*s* to 8*s* a bushel; lettuce (cabbage) 1*s* to 2*s* a dozen heads; cabbage, 1*s* to 2*s* a dozen heads; country potatoes, (York,) 3*s* a bushel.

It is now full 20 years since we had a supply of potatoes in rich abundance. Hundreds of tons will be consumed by cattle, pigs and horses. The average price is not over four shillings a bushel. The potato crop last year was enormous, and sound now.

All entomologists know that the larvæ of insects feed upon decaying vegetable matter in preference to that which is in a growing and healthy state, and the presumption is that such vegetables had been previously injured by frost or other cause. Grubs seem to be an effect rather than cause of injury. Decaying vegetables are attacked by myriads of grubs. The rooks are after them in our fields—in fact it is one of the modes nature has devised for freeing the earth from the decaying vegetable and animal matter upon its surface.

Reaping Machines tried on the farm of M. Dailly, at Trappes, near Paris, August 2d, 1855.

No.	Name.	Country.	Breadth of cutting.		Square metres.	Time.	No. of horses.	Price.
			ft.	in.		Min.		
1	Cournia, ...	France, ...	4	3	1,628	67	1	£26
2	Atkins, ...	America, ..	5	3	1,733	24	2	36
3	Laurent, ...	France, ...	5		1,825	66	2	....
4	Mazier, ...	France, ...	2	7	*	....	1	....
5	Manny, ...	America, ..	4	6	1,900	26	2	26
6	Brookhill & Bell	England, ..	5		*	....	2	45
7	McCormick, ...	America, ..	5	6	1,987	17	2	30
8	Dray, ...	England, ..	5		2,250	35	2	25
9	Canadian, ...	....	6	6	†	....	2	....

The grand Medal of Honor to Mr. McCormick, of Chicago, United States of America, for his reaping machine.

Professor Wilson considered the fish manure (*engrais poisson*) specially worthy of notice. The fish after having been steamed are pressed into cakes and dried. In this form it is said to contain from 10 to 12 per cent of nitrogen, and from 16 to 22 per cent of phosphate. Price about £8 per ton, $40.

* Broke down. † Retired.

COMPARATIVE PRODUCTS OF ENGLAND AND FRANCE IN MEAT.

France kills 4,000,000 head weighing 400,000,000 kilogrames, or an average of 10) kilogrames per head.

England kills 2,000,000 head, weighing 500,000,000 kilogrames of meat, or 250 kilogrames per head.

England, with only 8,000,000 head of cattle and 30,000,000 hectares of land, gives 500 millions of meat, while France, with 10,000,000 head of cattle, gives but 400 millions on 53 millions of hectares, (nearly double surface.)

The French Charolais race of cattle are very good in themselves, and offer a stock very suitable for crossing with Short horn bulls.

The draught horses called Percheron, are strong, muscular, hardy and of great power and activity, well worthy the attention of breeders. They are better suited for the quickened step of improved farming, than the heavier sort of English cart horses.

PLOWS.

Fifteen were tried by dynamometers, average depth about seven inches, and plows from Baden, England, Austria, Belgium, Saxony, and Canada, were tried. Breadth of slice about ten inches. Comparative resistance found to be : The Von Thaer plow of Saxony 16.2; Ball, of England, 3.4; The Toronto, Canada, 7.7. Difference in draught very remarkable.

[From the Bon Jardinier of 1856, just presented to the Institute by Vilmorin.]

The causes of the potato diseases are very obscure. It first showed itself in Belgium, then Holland, then France, then England, then Germany, and in succession in all countries where it was cultivated. All varieties of it have been attacked. The Early White is the only one which has been generally spared, and in general, newly imported varieties were most affected by the malady.

PINE APPLES.

Fifty-six varieties are known, but the choice ones are but few.

The Martinique is preferred by confectioners.

Count of Paris, large size and easy culture.

Providence, very large.

Cayenne, with smooth leaves, very large and very good, pyramidal figure. They call it there Maipouri—as they do the largest of every thing.

Montserrat, one of the largest.

Malabar, cylindrical figure and large.

Otaiti, large and round.

Queen of Barbadoes, hemispherical.

It was supposed that pine apples yielded no seed in our culture, but certain varieties produce more or less seed, which are planted to get new and perhaps better sorts. A plant from the seed does not commonly give fruit until the fourth or fifth year. A sort of cochineal insect injures them.

[Le Bon Jardinier, Paris, 1856. From Mons. Alexandre Vattemare.]

Extracts translated by H. Meigs.

Weather wisdom has not so many friends in modern times as it once had; even the late learned astronomer Herschel advised the notice of the moon's changes as affecting the weather.

The Good Gardener, (which, by the way, has now been published about one hundred and five years for the benefit of French cultivators and others,) says:

"Local circumstances exert such manifest influence over the mean temperature, over rains, storms, etc., very interesting indeed for farmers to know beforehand, and yet little can be relied upon in one district from a knowledge of the weather of another. Long local observation does gather some little power of prognostication.

Winds generally go around the compass in the same way. As for instance, after blowing from the south it moves to the west, then to the north, then to east then south and so on, blowing more or less from each point—very rarely moving half the other way. We therefore, can generally tell where the wind will be next. Our south west winds are generally hot, humid and rainy, our north west cold and dry, often having cloudy and covered sky, but rarely any rain. Very violent winds are obstacles to rain, the fall of which is ordinarily preceded by moderate winds.

Barometer. When the mercury is regular and slow in its rising, it indicates good weather. Contrary, when it falls slow and regularly, for we get bad weather. Rapid falling of the mercury indicates violent wind.

Sun-set. If it be calm and the lower edges of clouds be all of a beautiful reddish color, fine weather next day is almost certain."

By the last steamer from Europe, the Bon Jardinier of Paris, for 1856, from Mons. Alexandre Vattemare, Bulletin Mensuel de la Societe Imperiale, Zoologique D'Acclimatation, and Journal de la Societe Imperiale et Centrale D'Horticulture, Napoleon 3d Protecteur. Both for the month of April last.

Some articles in these works will be translated for the next meeting of the Club.

Mr. Meigs said that during his long life he had never noticed young dandelion plants, nor of their having been cultivated, yet this plant which follows man has been known for ages as a remedy for some of his diseases—such as affection of the kidneys and liver. Called by the Greeks *Leontodon*, (lion's tooth,) *Dents de Lion* by the French, *Dandelion* by us. This plant having recently come into a fresh reputation, Mr. M. desired to ascertain its habits of growth, and on the 27th of May last gathered some fresh seed, planted them as close to the surface of the soil as possible, and they all came up on the fifth day afterwards, with a fair healthy vigorous appearance. It may be well for some of our cultivators to plant a few acres of the dandelion, for their roots sell in our markets for about ten cents a pound, and the product of an acre suitably cultivated may be safely estimated at the lowest figure at *four ounces* on a square foot in the second year of their growth, which at ten cents per pound will exceed one thousand dollars

Dr. Waterbury said that the dandelion and the bee (morn'g fly) followed man—nowhere without him.

Mr. Meigs—The common house fly too.

Dr. Waterbury—And mouse too. The consumption of roots and herbs in domestic medical practice was far greater than was known or believed. And certain of them were in steady and extensive demand at the following rates :

Dandelion roots, 20 cents; Elecampane, or dulcamara, or bitter sweet root, 10 cents; Burdock, 12 cents; Penny Royal, 12 cents; Catnep, 12 cents; Motherwort, 12 cents.

Mr. Judd—I should like to know if anybody has practised soiling successfully?

Dr. Waterbury—Yes; there are large dairies in Herkimer co., where the cows are never turned out to pasture, simply because soiling is the most profitable.

Mr. Judd—Can any gentleman tell us anything about Douro corn?

Judge Meigs—Mr. Peabody of Columbus, Ga., speaks of it in the highest terms. He says it will yield 100 or more bushels of seed and several tons of fodder per acre.

J. Payne Lowe—I hope this subject will be continued and more fully discussed in a full meeting. I gave way last week to Mr. Judd's proposition to discuss soiling of cattle in preference to the important one of wheat, and yet he has had but very little to say upon the subject.

It will be called up again at the meeting of July 1.

MISCELLANEOUS SUBJECTS.

Judge Meigs, Secretary, read several interesting translations and condensations of articles from French and English papers. A paper called the Good Gardener has been published a century.

The London Farmers' Magazine says that potatoes have not been so plenty and cheap for twenty years as they are now. Country potatoes (York,) are quoted at prices equal to an average of 37½ cents per bushel. The following are the prices of some other vegetables in London:

Pine apple per lb., $2 to $3; grapes, $3 to $5; Strawberries per ounce, 18c. to 37c.; oranges per dozen, 25c.; potatoes per bushel, 62c. to $1; lettuce per dozen heads, 12c. to 25c.; cabbage per dozen heads, 12c. to 37c.

There has been a great mortality among grubs and insects.

REAPING MACHINES.

The Magazine says the machines tried at La Trappe last year showed that all of the American machines were superior to those of France or England, as well as that of McCormick, the prize machine.

It seems that no American plow was tried at the French exhibition. A plow from Canada showed the lightest draft.

France butchers 4,000,000 of animals, averaging about 250 lbs., England butchers 2,000,000, averaging 750 lbs. The proportion of sheep and swine is not stated.

The potato disease first showed itself in Belgium, and then in Holland, France, England, &c., through all the countries where the potato grows, affecting every variety.

The Otaheitean Pineapple is one of the best of fifty or more varieties of this fruit.

GUANO.

A paper, prepared by Mr. Nash upon the guano trade was read. There are at times 500 ships awaiting for loads of guano at the Chincha Islands. The writer thinks the supply will be exhausted in a few years. Twenty thousand tons are sometimes loaded in a single day. There is not a drop of rain and but little dew at the guano islands. The guano is now taken to every civilized country in the world. It is estimated that the guano is two hundred and fifty feet deep on a part of one of the islands, and is so hard that it has to be broken up with picks. It is dug by

Chinese coolies and State prisoners. The rock is of the new red sand-stone variety. The opinion of the writer is that the guano is not all composed of bird dung, but of a composition that was lifted up with the rock from the bottom of the ocean. The bird-dung guano is only the small part on the surface. The right to remove guano is held by Gibbs & Bright of London.

PLUM TREES.

Mr. Judd read a letter upon the subject of black wart on plum trees. It states that the warts are caused by a small ant.

Mr. Field—I doubt this theory. The warts are not black at first, but appear just like the bark. The ants are after the sugar like excrement of aphis or other insects. There is alway a larva found in the fresh warts. It is this probably that the ants are after.

POLL EVIL.

Mr. Judd stated that a correspondent says hydrochloric acid is a sure cure for poll evil.

Solon Robinson said he had cured poll evil by simply inserting lumps of saleratus in the pipe of the sore.

PROFITS OF STRAWBERRY BEDS.

Judge Meigs stated that Thomas Bell sold the fruit of five acres of strawberries, or rather the use of the land, as the purchaser did all the work, for $700. This is equal to an annual rent of $120 per acre, without any expense after the plants are once started.

BALLOON FRAMES.

Messrs. Olcott & Vail, from their farm, render the following useful account of their new balloon building. The club will remember that a full account of this new, strong, economical sort of a building was given some time ago to this club, that being the first we ever heard of such a method.

Mr. Solon Robinson—I published a full set of instructions on this novel architecture for hasty settlers of our boundless domain, some months ago, and am much pleased that our young ambitious citizens, such as Olcott & Vail, put the thing into full practice. Such an architecture precisely suits the land and age we live in. Time will make us go into the more sober, costly and age-enduring buildings of a riper age, but some centuries are yet to elapse before our vast fields will have been brought under the dominion of our plows and harrows.

ON BALLOON BUILDINGS.

Westchester Farm School,
Mount Vernon, N. Y., *June* 15, 1856.

Hon. H. Meigs, *Sec'y N. Y. Farmers' Club:*

Dear Sir—The great pressure of business on our hands, consequent upon the purchase of our farm and establishment of our school has prevented our regular attendance upon the meetings of the club, and at such times we feel the great benefit to us and farmers generally by the regular publication of the newspaper reports of the proceedings. The influence of the club is by this means transmitted throughout the length and breadth of the country, not only by the original reports themselves, but also because of their being copied into many agricultural papers, and from their passing into the columns of *their* secular exchanges. We are now erecting our house, which, you may remember, is built in the Western "Balloon" style. There is not an *upright* stick of timber in the frame larger than two by four inches, and yet it promises to be as lasting and strong as any ordinary framed building. As some of the club may never have seen one of the kind we think it will not be amiss to furnish a short description.

The sills are framed as usual in other styles of houses; then we take two by four stuff, which runs thirteen feet long, stand each piece up on end and *nail* it to the sill with tenpenny nails. Openings are left for doors and windows and strips inserted at proper heights for framing them. Having gone around the frame in this manner a notch is sawn out of the uprights at the place where you wish the second story floor beams to come, one inch deep and wide enough to admit a pine board, which being thus let in to the uprights is nailed fast. Continue this all around and your uprights are braced one way and you have a support for your floor-beams. When these are put in, your uprights are braced another way. Now saw off the uprights at a uniform height, nail a piece on the tops horizontally and proceed with your second story in like manner.

On the outside we nail common rough hemlock boards putting them on diagonally, letting them on each of the four sides run different ways, and over these come the clapboards, or upright siding as taste may dictate. By this means you perceive your frame is braced in every way, and it is so warm that it is unnecessary to fill in with brick. In three days four men framed our sills, nailed all the uprights, laid the floor beams in two stories, made some of the partitions, and put on most of the hemlock sheathing, We have found it quite difficult to get any one to understand that this style of frame would not fall soon after erection, but our carpenters are now pretty well assured of its stability. Of course it is no novelty to yourself, and it may not be to any of our members, but inasmuch as there are many thousands of farmers who never heard of a balloon-frame, and as it is the only style which should be employed, where economy, strength and rapidity of erection are desired, we believe you will willingly bring it before the club. We should be very glad to show the building and the Farm School premises to any friends who may choose to call upon us. Trains of the New-York and New Haven railroad for the Mt. Vernon station, leave Canal street at 7 and 9 a. m., at 12.30 p. m., and later, and return at 9.27 a. m., and 4.38 p. m. Distance 17 miles. Time required to go there, one hour.

Yours, very truly, OLCOTT & VAIL.

Mr. Hite, from his garden at Morrisania, brings very superb roses and some other flowers, and a bunch of strawberries from a Virginia stock, very large and fine—at least *one inch in diameter*.

John W. Hanford, gardener, of Williamsburgh, Long Island, No. 125 Ainslie street, brings a dish of strawberries from vines accidentally grown where no others grew; and he believes it to have been dropped there by a bird. The berry is a very oblong one, nearly an inch, quite dark colored when fully ripe. Mr. Hanford first saw it in the spring of 1853.

Mr. Hite had seen a similar strawberry, but had forgotten its name.

Mr. Field thought it was not a new one.

The Chairman called up the regular subject of the day, "Summer soiling," especially "Millet" for that purpose.

Orange Judd remarked, that at a late meeting he had rendered his opinion on the value of millet, for soiling, and would like to hear more on the subject of Indian corn for like uses.

Solon Robinson—In 1830 I first sowed Indian corn broad cast for fodder, in Indiana. When fit for it, I cured it by cutting it and setting it up against the fences on the outer part of my field, and against poles horizontally arranged in the body of the field on crotches. I cured it well that way and never had nor ever saw fodder so cheap as that.

J. Payne Lowe had been pleased with the Canada management and hoped we should have for next meeting "Summer feeding of cattle." Adopted.

Mr. Nash read the following paper:

PERUVIAN GUANO.

An account of the Guano trade at the Chincha Islands on the coast of Peru.

An intelligent gentleman, named F. Nash, of New-York, who has been employed in loading ships with guano at Chincha Islands, on the coast of Peru, has communicated to me much interesting information with regard to the trade. He has been at the Islands at three different times, and nearly six months in all.

The last time he was there was in the fall and summer of 1855. He says that he found at times, five hundred sail of vessels together at the Islands loading with guano, generally large ships; one ship was 4,500 tons burden. Not less than 500 sail of vessels are now at the Islands loading for the United States, Spain, Portugal, France, and to English and German ports, some cargoes are sent to Constantinople and some to Russian ports in the Black Sea. This was before the war in the Crimea. The Russian trade will now open again, both from the Black Sea and the Baltic. Freights are high, £6. 10s. are often paid per ton for Liverpool and Hampton Roads. Generally 10s. more a ton freight is paid to Europe. At the rate at which guano is now shipped from the Chincha Islands, it will be exhausted in eight years. Not a ton will be left. Twenty thousand tons are sometimes removed from the Islands in a single day.

These Islands are situated opposite to the city of Pisco, 130 miles south and southeast from Callao and Lima, on the west coast of Peru, within the tropics, in latitude about 13 deg. 46 min. south of the Equator, in a great bay or bight of the coast. It never freezes, snows or rains at these Islands; fogs are seldom seen; but in the winter months, which are June, July and August, dews come on occasionally at night. Water does not fall in sufficient quantities to furnish a drink at the Islands from one year's end to another, nor do the eaves of the houses drop water.

The Chincha Islands form a group about ten miles from the main land on the Peruvian coast. The rise and fall of the tide at the Islands are regular, and often equal six feet. The current of the gulf stream works up along the coast from the Straits of Magellan and Cape Horn out of the Atlantic Ocean towards Panama bay, by Valparaiso, Lima and Callao. This current is one branch of the Gulf-stream which divides on the coast of Brazil; one current runs north to the Gulf of Mexico, the other south towards Cape Horn, the coast south and east of Callao, and forms a bay or bight, into which the sea exuviæ, consisting of animal matter, the remnants of sea animals and floating and shell fish deposites itself and forms a vast bed of *sea mud* or guano, of a chalky substance containing *ammonia*, nitrogen and posphate of lime and soda. This mud is of a white *green color;* when the anchors of the ships are raised at the Islands they bring up large quantities of this *guano mud*, which when dried form a substance like the guano on the Islands, and when mixed with the guano cannot be distinguished from it.

It will be asked from whence has come this great deposit of guano? We answer, from the animal and vegetable matter of the sea. A writer in one of the late English reviews, says:

"That sea-weed grows from the bottom of the ocean to the surface in stalks 1000 to 1500 feet high, having stems scarce as big as a man's finger. A surface fifteen times greater than that of Great Britain covers the ocean with sea-weed, stretching west from the Canaries and Cape Verd Islands, and east of the gulf stream. This vast dominion is not only filled with vegetable but also with animal life. All over the ocean, in every clime and latitude, the water is filled with animal life until every wave is converted into a *crest of light* by animals of the minutest form up to sea monsters, which derive nutriment from the waters impregnated with animal matter. Reason and imagination are equally confounded by the effort to conceive those hosts of individual existence generated or annihilated at a passing instant of time. No scheme of numbers can reach them even by approximation. All the materials of organic life are in a state of unceasing change from the minutest animalculæ of the ocean to the Leviathan of the great deep."

The laws of life and death in the ocean are the same as on land as we have above hinted. The transformations are governed by the same *divine economy*. The bones left on the field of Waterloo were gathered up to be put on the corn and grass fields of England to make other bones for the fields of Sebastopol and Balaklava. Man in his natural state was the last and most finished work of creation; he is naturally the longest lived of the whole animal kingdom. We are told by the philosophers, that since the creation the remains of the human family alone would cover the land on the globe more than a foot deep of soil. What shall we say, then, of all the other animal and vegetable productions? When death takes place a large portion of all the animal and vegetable productions are carried by the streams and rivers into the ocean, and there deposited. The purest water from our springs contains much animal and vegetable, not to say mineral matter, which glide off into the ocean, and is there deposited and forms guano.

We find the ocean also instinct and alive everywhere with vegetables and animals in numbers and species great beyond conception. These come on the stage of life at periodical times, from a moment to 100 years, live and all die, and are changed and form other organizations. These decaying animals and vegetables form guano, and form the blue and green mud around our bays, harbors and creeks and mud flats, which is a fertile guano.

The gulf stream commences in the bay of Panama on the west coast of America, and is occasioned by the combined laws of attraction and motion, or by the centrifugal force of the fluids and air which lie on the surface of the globe. The earth turns on her axis east with a velocity of more than a thousand miles an hour; on the equator, it turns so rapid that it runs away from the power of attraction. The wind and water, are not carried forward as fast as the surface of the earth, hence both the wind and water of the ocean between the tropics form a current to the westward, or rather the earth runs away from both wind and water and leaves them behind; hence they both set to the west forming the trade winds and the gulf stream. This is forced west until it strikes the Asiatic continent; one branch turns off or is directed by the eastern shore of Siam, China and Japan and forms a gulf stream, which sets north and east to Kamschatka; another current sets south along the eastern coast of New Holland to New Zealand and the Polynesian Islands, but the main current continues on through the East Indias into the Indian ocean and through by the Cape of Good Hope; thence up to the bay of Guinea and across to the Gulf of Mexico; while another large current sets over from the Cape of Good Hope to South America, and there it parts. One stream runs north to the West Indies and the Carribean sea, and thence into the Gulf of Mexico. The south stream runs below Pernambuco, up along the South American coast, and inside the Falkland Islands through the Straits of Magellan; thence up by the coast of Chili and Peru, and then falls again into the bay of Panama to commence another circuit of the globe. The north current on the American coast passes along North America to the coast of Europe, to Norway, then east of Spitsbergen Islands; thence up the Artic ocean north of Russia, which greatly modifies the climate of the Arctic shores, and thence out to Behrings Straits, and down the coast of California to the bay of Panama. It is the law of motion and attraction which is the principal cause of ocean tides. The waves wash the American and Asiatic coasts, and are deflected back to the east to the opposite shores in unceasing motion like the pendulum of a clock, keeping one eternal round of time by tides like the motion of the earth on her orbit and on her axis; hence the high tides on the western shore of the ocean and on the eastern shores of the continents, and that so rapid that, on the occasion of the great earthquake at Japan in 1855, the surge or tidal wave reached from Japan to California in 5 hours after the shock of the earth.

Along these great currents in the ocean the vegetable and animal matter which fills the ocean finds its great deposits when life becomes extinct—they become the feeding grounds of the living races. Hence the great deposits of guano on the western coast of Peru. Hence the great feeding grounds of fish on the grand banks of Newfoundland, Scotland, Norway, California, Oregon, Behrings Straits and Brazil. Hence the sea eels or the black La Mer, on the coasts of New Zealand, new Holland, and at the Polynesian islands. Hence the great whaling grounds on the coast of America and Brazil, in the Okotsch sea, the Indian ocean and the coasts of Africa. Hencè the sperm whale only is found within the tropics where an abundance of food of a peculiar kind is supplied to produce the white flesh and bone of the sperm whale.

The largest of the Chincha group is two miles in length and a quarter of a mile wide. This contains only a small quantity of guano. The most northerly is the smallest, being about a mile in length by half a mile in breadth. Guano on this island is 250 feet deep. This island contains a Chinese settlement of Coolies, about one thousand in number, who are employed in digging guano and loading the vessels. A task is given them each day, and if the gang fail to get out the given number of wagon loads of two tons each a day their bondage is continued a longer period to make it up, so many months or days being added as wagon loads are wanting.

The Coolies are cheated into the belief that they are to be shipped from China to California and the gold diggings, and are further deceived by the offer of a free passage. The knowing Chinese or the Mandarins ship them. The ship master carries them to the Peruvian coast and sells the cargo of living Chinese to the Peruvian government for his freight money. All this time the Chinamen are kept in irons and confined below in the hold of the ship.

The Peruvian government purchase the cargo of living Coolies, paying the Yankee or English captain a round sum for his care, diligence and labor in stealing Chinamen from their homes to be sent into the guano mines of Peru for life, or for five or seven years, and to be held in bondage or peonage to pay their passage to the glorious land of the Incas. Once on the islands a Chinaman seldom gets off, but remains a slave to die there.

The guano is hard and firmly imbedded in strata on the islands, and can only be broken up with the pick axe and crow bars. It is then broken and shoveled into the wagons and rolled into the shutes of the vessels and then stowed in the hold of the ship as cargo in bulk, in which shape it is sent to market all round the world, but it loses much of its ammonia in the transportation and exposure to the atmosphere, and is often adulterated with earth. The guano when pressed into the hold of the ship is very offensive. The seamen of ships do not go below to trim the ship or to stow cargo. This is done by the native Peruvians, who strip themselves naked, fasten a sponge or a mop of hemp over their mouths and nose and cover their eyes with a thin gauze, and work below to stow cargo. Generally the men below cannot work longer than from ten to twenty minutes before they come on deck to catch a breathing spell, when another gang go immediately below to work and repeat the same operation every fifteen to twenty minutes. These stevedores are paid by the Peruvian government to stow the cargo of the ships at the rate of only one dollar for every 500 tons of cargo. This is again a charge on the ship, and amounts to about twenty cents for 100 tons of cargo stowed.

The smell of the Guano, when stowed in the hold of the ship, is strongly like quick lime and hartshorn combined, indeed it is mostly a carbonate of ammonia. The ammonia may have come from a chemical action of the atmosphere working on animal matter, lime and soda. The animal matter, nitrate of lime and saltpetre has much to do in the composition of guano at these islands; such is the opinion of our informant.

No person can go upon or come away from the islands, without a pass, as they are guarded by more than one hundred armed soldiers belonging to Peru.

The Peruvians send all their prisoners of state into the guano mines, say about two or three hundred, where they are let out to work by day, and at night are shut up in their cells, with only two meals per day.

The prisoners are given twenty-five cents per day by the government for their support, out of which they are to clothe and feed themselves, and when they can spare a little money, they keep a woman. They generally make out to provide themselves with wives or female companions who have been permitted to go to the islands and hire themselves out for work and prostitution. These are mostly Indian women, who are natives of the country.

There is no fresh water on the islands, and each vessel is compelled by law to carry a ton of fresh water there for every hundred tons burden of the ship. The oldest captain in the fleet from each nation, is appointed commodore *pro tempore*, hoists his flag as such on his ship, where all disputes are settled. Indeed, the municipal laws of the islands and of the fleet are decidedly of Yankee origin.

The islands are composed of new red sand stone. The guano is (much of it) not composed of bird dung, but is composed of the mud of the ocean. That brought from Peru is so.

Sea birds and seals come upon the islands when the people are not at work, but it does not appear that their dung or decayed bodies are more than a foot deep on any of the islands. Fish are taken in great quantities about these islands, as are slso seals, which come there in large schools. Sea lions also abound. The composition taken from the islands called guano is stratified, and lies in the same form it did before it was lifted up from the ocean. Our informant says that a geological examination of the islands will satisfy any man that what the guano ships are bringing away from these islands, is a very different thing from the dung of birds or decomposed land animals.

The whole Peruvian coast opposite these islands, is of the latest geological formation, and seems to be volcanic. The Chincha islands evidently have been thrown up from the bottom of the ocean, with their guano on them. The bottom of the ocean on the west coast of Peru, contains vast deposits of guano. An island, during an earthquake, rose up in the bay of Callao some years since from the sea, containing guano four feet deep, the formation the same as the Chincha islands.

The average depth of the ocean is said to be a thousand feet, while the average height of all the land above the ocean does not exceed one thousand. The proportion of land to water is only one-fourth of the surface of the globe, and perhaps less. Now, as the ocean is the great basin into which most of the animal and vegetable matter, from sand and sea, is ultimately deposited;

we must look for fertilizers in the deposits of the ocean, and from this source they come; also the mud of the river Nile, in Egypt, is very fertile; this is so because it is largely composed of animal matter; so is the mud of the Ganges, of the Amazon, of the Mississippi, and of all the great rivers; so is the mud deposited from our cities, and that found in our creeks, bays, and on our mud flats along shore; the nitrogen from vegetable and animal matter carried down the rivers afford great quantities of food for the fish of various kinds that visit the mouths of the streams, hence the great feeding grounds for fish at the mouths of Columbia river, the La Plata, the Amazon, the Chesapeake bay, the St. Lawrence, the Amoor in China, and other distinguished streams.

So are the deposits of animal matter in the ocean, which raised up have formed the Chincha Islands guano.

The composition of the guano at the Chincha Islands is evidently a marine animal exuviae mixed with lime and soda, which gives out carbonate of ammonia in large quantities when broken. Much of the fertility of the guano is lost by exposure to the atmosphere even before it reaches us. On the south side of the north Island the rock has much slag and *iron ore* and volcanic cinders in it; on this Island is the most of the guano which is found at the Islands.

Many deposits of nitrate of soda and lime are found along the western coast of South America. Any thing that contains animal matter makes a fertile manure, and the best guano is always found to be dead animals, buried and planted over for crops; fish put into the ground produce great crops of corn, so does sea weed; the white and blue mud found in our creeks, bays and harbors along the Atlantic coast is one of the most valuable fertilizers, while guano manufactured from fish and the bones of animals by dissolving in sulphuric acid yields the superphosphate of lime so celebrated as a fertilizer, indeed the more animal matter which can be worked into artificial manures renders them the more fertile for vegetable life; whatever produces ammonia produces fertility; a snow storm in April is always said to be as good as a coat of manure for the farmer, and where great storms of snows come down on the earth in the winter, we always find heavy crops of vegetation succeed the snows in the summer; the reason is when the snow particles crystalize in the heavens they absorb ammonia from the atmosphere and bring it down to the earth. The ammonia liquor is the great stimulant for both animal and vegetable life; the reproductive powers of animals contain a superabundance of ammonia, and without it nothing is fertile, but all is barren.

During drought we have witnessed an attempt to irrigate grass lands, but the growth by irrigation is small indeed compared with the growth during the same length under the operation of rain and showers. The great rains within the tropics produce an abundant growth of vegetation, but the water from the heavens brings down large amounts of ammonia which may have been supplied by evaporations of sea water from the ocean.

There are many small islands composing the Chincha group, where birds and seals resort, but very little guano comparatively is found on them, and this of an inferior quality. They are not covered with the real guano, but with a deposit of bird lime or dung and dead animals, small in quantity and thickness. The seals when they become sick come on to the islands to die; they are much inclined also to come on the shore when not disturbed to bring forth their young. So does the animal called the sea lion, which is an immense seal, strong and ferocious.

Whales and black fish are plenty around these islands, and come in shore to clean themselves of the barnacles which accumulate on them.

The sea elephant is a very large species of seal from which the sea elephant oil is taken, and occasionally it appears at these islands.

The fish around these islands are eels in great abundance, also a species of bass and rock cod herrings. The fly fish, the shad fish, or a fish very similar, a large shell fish like sea snails and cockel are found in great quantities around these islands; the whole ocean is alive with inhabitants. This resort of fish brings the seals and birds into these waters in great quantities, which make this sea their feeding grounds. The same causes on the western coast of Peru as those on the grand banks of New Foundland, produce the great schools of fish at the Chincha islands.

Messrs Gibbs and Bright of Liverpool, have a lease of the guano islands from the Peruvian government, for five years, which expires in 1857, but they expect a renewal. This house pays the Peruvian government about $4.50 a ton for the privilege of taking all the guano from the islands, the government furnishing the men to dig the guano.

The ships that load at the islands are mostly ships chartered to carry a cargo, or are sent there by the owners to take away a cargo bought of Gibbs & Bright, who have the entire monopoly of the trade.

The day will come when the guano at these islands will be drudged up with boats like mud from our rivers and harbors.

ALANSON NASH,
36 Beekman street, N. Y.

Subject for next meeting—"Canada millet and summer feeding of cattle."

Club adjourned. H. MEIGS, *Secretary.*

July 1, 1856.

Present—Messrs. Solon Robinson, J. Payne Lowe, Dr. Smith, Elijah T. Kimball, of Flatlands, L. I., and others.

Dr. Waterbury in the chair. Henry Meigs, Secretary.

Mr. J. Payne Lowe presented the following paper, which was read by him to the club:

"Yours of the 30th of July was received in due time, and would have been answered before this had I not delayed writing in order to forward you at the same time a sample of the Lawler wheat, according to your request. I have not been able yet to procure any of this wheat, but have ascertained that a gentleman of my acquaintance, living about 30 miles from me, saved some last fall, and have written to him to supply me with a small parcel by mail. It will be forwarded on to you as soon as received. My neighbor, Mr. Old, introduced this variety of wheat in our section in 1818, having procured it of Mr. Lawler of Virginia. It already had attained great celebrity, both on account of the beautiful character of the grain and its exemption from the attack of the Hessian fly. It is a beardless white wheat, heavy, and suited to the manufacture of the best and whitest flour. The stalk is strong and elastic. The yield makes it compare with the best of other varieties when it is not destroyed by *rust.* In some instances in our neighborhood, when it was first introduced, it yielded as much as from 80 to 100 bushels to one sowed. Its comparative exemption from fly was illustrated in one instance cited to me, in which another popular variety was cultivated along side of this on the same field; the first was almost entirely destroyed, while the latter was free from injury to the line of contact. The variety retained its character for many years, but it is *late* in coming to maturity, and, like all other late varieties, is liable to the greatest cause of fatality to the wheat crop with us—the rust. Occurring as this disease does, about the time of harvest, a few days sooner or later in the ripening of the crop, will decide between an abundant yield or an entire failure. On this account, more than any other, it has been discarded within the last few years. I perhaps cultivated the last which was sown in our immediate neighborhood about 8 years ago.

Extracts translated by H. Meigs.

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d, Protecteur. Paris, April 1856.]

SESSION OF 27th OF MARCH.

A letter from the Minister of Agriculture with a basket of *thistle potatoes* to be experimented with by the society, referred to the director of the experimental garden. Some of them will be given to members who wish to try the experiment.

Mon. Morel read a note on the use of *nux vomica* in the brewing of beer in England; that the quantity used thus, amounted to one hundred thousand kilogrammes—about 125 tons.

Mon. Bouis does not think that strychnine is used in the brewing, because it is extremely easy of detection, both by its peculiar symptoms and easy analysis.

Session, April 10, 1856.

Mons. Payen remarked upon the sophistications of vinegar and the serious evils growing out of them.

Mr. Lenormand desires a committee to examine his improved asparagus.

Mr. Dupuis presents his treatise on the mushroom—the eatable and the poisonous. Referred to Mons. Vilmorin to examine and report.

Report by Mons. Saillet, &c., on the disease of the apple tree, in Normandy.

LENORMAND'S PLAN FOR IMPROVING ASPARAGUS.

Since 1834 he has been engaged in its cultivation, and his farm has been often examined by committees. Your committee have on the 17th visited him. A square of 320 metres was planted by him, in the first days of April 1855, with 1440 roots grown from the seed one year previous. The product already equals the ordinary beds of three or four years' growth. There were out of ground now 2,550 stalks, half of them fit for the market.

He thoroughly cleans out all weeds and plants of every sort from the ground he intends for asparagus. He digs it nearly a foot and an half deep, when perfecly levelled, he marks off beds about four and a half feet wide, separated by paths of about two and a half feet wide. He digs trenches in these beds about 16 inches deep, which he fills with horse dung 8 inches deep, and stamps it down with his feet. If the dung is dry, he moistens moderately—this suits in good soil, but if the soil should be rather calcareous or clayey and wet and cold, he uses city manure and night soil mixed with dry leaves and horse dung; when the soil is dry and hot I use cow and ox dung. The manure being thus in the trenches I cover it as even as possible with good soil about six or seven inches deep. I make four rows in a bed and set my roots *Quincunx* about ten or twelve inches apart—thus, $\substack{\circ \\ \circ}\ \circ\ \substack{\circ \\ \circ}$. I leave margin on my beds of nearly ten inches, or else the roots would get into my paths. The roots placed in the outsides of the bed should have their largest eyes turned to the centre of the bed. I set pickets at each end of the rows, so as to know where the roots are; I then smooth the surfaces of the beds, stamp on them well and evenly; I then rake the surface smooth so that no trace of the planting remains; I then cover the paths all over with good mould or with good clean straw. My pickets mark the lines where the roots are. I set out cabbages, lettuce, cauliflowers on the margins of the beds; sometimes I sow early carrots, or white onions, or spinach, or other plants whose roots do not go deep. These plants which I generally water, help the asparagus as far as the end of August. It often happens that insects attack the asparagus shoots in the spring, and I take the pains to shake them off into pans and burn them with straw, for they are injurious to the whole plant. You must pick off the seeds as they form, because when *they ripen* they enfeeble the roots. In the course of the year the manure diminishes in the ground so that the beds must be heaped up. In February I spade between the rows. Every year the beds want raising a few inches by means of putting on good rich soil. I cut my asparagus very carefully, feeling with my hand the place to cut, which I do with a sharp pointed tool; when cut I cover the place with soil again. When the cutting is over for the year I cover the beds with good fresh *dung straw* for the rest of the summer; it keeps the ground fresh. (It is a good mulch! Meigs.) My beds will last ten years.

The committee congratulated Mr. Lenormand for his beautiful asparagus culture, and thanked him for the information he had given.

[Bulletin Mensuel de la Societe Imperiale Zoologique D'Acclimation.]

Session of February, 1856.

SILK.

The introduction of the Saturnia Mylitta and its naturalization are very important facts. This society desires to learn all the details relative to this precious insect.

I received from Mons. Guerin Meneville, in the name of the society, forty eggs of it laid partly on the 19th, 20th and 21st of August. These were kept at the natural temperature of 18° to 20° Centigrade, 65° to 67° Fahrenheit, hatched from the first to the fourth of September. Two of them perished and gave no worms. Care of those first hatched at same temperature, fed with shoots of trimmed oak; these kept in bottles of water. But it is well understood that this silkworm requires raising in open air and will not flourish under cover.

TOKAY WINE.

Some years of cultivation of the Tokay vines from Hungary, proves its successful introduction into France.

NEW SILK WORM.

Modern silk seems to have suffered injury by degeneracy of the worm fed on the *morus* mulberry.

We have received a Chinese silk worm, the *Saturnia Mylitta*, which lives on the oak.

Mons. Guerin Meneville has caused the experiment to be tried in-doors, by feeding the new worm on young oak leaves, placing small branches of young oak shoots in bottles of water for the worms to feed on in rooms as with the morus. But it seems that this new worm will do best in open air.

The *Saturnia Cynthia* can be raised under cover like the common mulberry silk worms. It may be raised on the leaves of castor oil nut plant.

Sitting of March 14, 1856.

THE NEW IGNAME OF NEW ZEALAND.

This Yam, or Dioscorea Batata, has been found to weigh from 10 to 40 pounds in growing from February to last of October. This tuber is egg shaped and singular in being at the smaller end smooth with thin skin, and coarse with thick skin at the top. In France it has attained the weight of five pounds.

THE SUGAR SORGHO.

Hardy says that most of the stalks grew from 13 to 17 feet high. Seed ripe in middle of September, gave about a thousand pounds weight of seed per acre. The weight of the sugary portion of the stalks was about forty tons weight per acre.

The stalks being chopped up and subjected to heavy pressure, gave 67 per cent of juice, which had the density of 8° $\frac{3}{4}$ Baume, which approximates to 13 per cent of sugar. Supposing that all the sugar in it is crystalizable, we should then obtain from an acre about one thousand pounds weight of sugar. All the juice is capable of making alcohol. The grain is valuable for feed to poultry and swine.

Doctor Sicard, of Marseilles, discovered last year that the grain contains in its *episperm* (seed cover,) a very beautiful red color, from which all the shades from red to violet can be obtained, and that the color has a remarkable fitness for dyeing silk.

There is no doubt of the stalks doing well as chopped feed for stock.—Meigs.

THE WEATHER AND ITS PROGNOSTICS.

We read a few lessons on this subject, translated from the standard Gardeners' Almanac of France, "Le Bon Jardinier."

We now extract some passages on this subject from the North British Review of May, 1856, No. 49.

BOOKS ON THE SUBJECT.

Climate of London, 3 volumes, octavo, 3d edition. By LUKE HOWARD, 1833.

A Cycle of eighteen years in the seasons of Britain. By the same, octavo, 1842.

A Barometographia. Twenty years variation of the Barometer in the climates of Britain, exhibited in autographic curves, with the attendant wind and weather.

Papers on Meteorology. By the same, 1854.

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Comtes Rendus, and weekly scientific reports of the Academy of Sciences of the National Institute, 24th and 31st Dec., 1855; vol. 41, pages 1127 to 1177. Paris.

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Report of the Council of the British Meteorological Society. By JAMRS GLAISHER, Esq., F. R. S., May 2d, 1855.

Agricultural Meteorology. By Sir JOHN STUART FORBES, of Pitsligo, Bart. In the Transactions of the Highland and Agricultural Society of Scotland, July, 1854.

Report of the Preliminary Meeting of the Scottish Meteorological Association, 1855.

On Meteorology. Lectures delivered before the Smithsonian Institute, Washington. By ROBERT RUSSELL of Scotland: page 43. Washington city.

The Log of a Merchant Officer. By ROBERT METHUEN. Account of the Blenheim Hurricane, &c. : 1 volume, imperial folio. London, 1854.

The weather, the most important, the most universally interesting of all sublunary themes, painfully interferes with our every day duties and enjoyments. It predominates with a despotic sway over all our most important physical wants, and famine and pestilence are among the scourges which it wields, &c. The fool and the philosopher are on a par in their weather wisdom ; and the accumulated knowledge of past ages does not yet enable us, as it did the Pharisees of old, to discern the face. This branch of natural science has been less studied than any other—certainly a strange fact.

One of the earliest attempts to establish registers of the weather, on an extensive scale, was made by the Royal Society of Edinburgh, in 1820.

The Commissioner of the Land Office of the United States, (Josiah Meigs,) had some years before that caused exact meteorological tables to be kept throughout the United States, and transmitted to him every month.

A very great impulse was given to this subject by the interest excited by the publication of Professor Hansteen, of Christiana's celebrated work on the Magnetism of the Earth, and his subsequent investigation of the intensity of magnetic force in different parts of the globe. First made known in England in 1820. The importance of these observations was first observed by the distinguished Danish philosopher Professer Oersted of Copenhagen, who visited Edinburgh in June 1823, and brought with him the very magnetic needle which Prosessor Hansteen had intrusted to different philosophers, who determined with it the time of three hundred oscillations in various parts of Norway, Sweden, Denmark, Prussia and France. Baron Humboldt attracted by his experiments went to see them, at St. Petersburg, in 1829, and urged the French Academy of Science to institute hourly observations on the variations in declination of the magnetical needle during two consecutive days.

In 1830, such observations were made at St. Petersburg, Kazan, Miolaieff and Sitka, and at Pekin. In 1834, three magnetic and meteorological observatories were constructed at Catherinebourg, Barnavoul and Nertschinck, and other three solely for meteorology were established at Bogoslowsk, Zlatvoost and Lougan.

Baron Humboldt's letter to the Duke of Sussex, in 1836, caused England to establish observatories at Kew, Greenwich, Dublin, Toronto, St. Helena, Cape of Goodhope, Hobart town, in Van Diemen's Land, at Smila, Singapore, Madras and Aden, changed to Bombay. England furnished instruments for observations at Breslau in Prussia, Hammerfort in Norway, Cairo of Egypt, and Algiers. Observations have been made at Berlin, Breda, Brussels, Copenhagen, Gottingen, Gotha, Hanover, Heidelberg, Leipsic, Marbourg, Milan, Munich, Philadelphia, Prague and Upsal.

After Humboldt's discovery of what he called magnetic storms, or disturbances of the magnetic needle, exhibited at *same instant*, at great distances on our globe, he proposed to establish "magnetic houses" in different places on the globe; and Arago, in 1823, erected a small building in the garden of the observatory at Paris, for the exclusive use of magnetics.

In 1853, these things induced the French Minister of War to address the Academy of Sciences, asking for such observatories to be established in Algeria. He said that Government desired to establish in various geographical portions observatories suitable for registering temperature of air, earth, springs, the pressure of the air, its hygrometrical state, falls of rain, force of winds, storms, the optical and electrical phenomena of the atmosphere; and proposed the following locations:

In the Province of Algier—Algiers, Milonati, Teniet-el-Haad, Orleansville.

Province of Oran—Oran, Tiaret, Tlemcen and Lebdou.

Province of Constantine—Bona, Constantine, Batna and Biskara.

A committee was appointed. Dissention arose.

The Abbe Moigno said "he would have given much not to have been present."

Mons. Leverrier said the committee had failed.

Mons. Biot abused the privilege of his old age and attacked both parties. He spoke of the gigantic labors of Russia in this cause, her large and very extensive quarto volume filled with *cyphers*, and that neither in Russia nor any where else, has any real fruit been obtained from these costly publications — they have produced nothing for the advancement of meteorological science—nothing of any practical use, either in theory or its application.

[Revue Horticole, Paris, 16 May, 1856.]

Extracts translated by Henry Meigs.

CHINESE FLOWER ISLANDS.

The Chinese, like all the Orientals, know how to love home enjoyments. They well understand the proverb "our home is our prison," for they ornament their habitations in the most delicious style of comfort and even luxurious refinement. Our ladies of Europe owe them for the parasol, that graceful gem, the most coquetting article of all their dress. We borrowed from the Chinese our garden kiosks which lend shade to our elegant ladies. Unhappily for us, the Chinese are jealous as to their furniture and the luxuries of their interior rooms. One must have the obstinacy of a Briton to get into the interior of the good houses of China. English travelers, who are more headstrong than the Chinese, are shy, are unwilling to go around the world without cribbing (*clipper*) some oriental invention to endow their rainy island with. See this new garden, one of the last importations naturalized in England. The Island of Flowers. A piece of water in a garden is one of its greatest joys—any one having a basin can do it. They make their flower islands in such pieces of water. If the basin is large enough they make a flower island in it with a kiosk in the middle of it. A boat is moored to the main—or there is a bridge of reeds or grotesque cacti—to pass to the flower island. Some of these are large enough to contain dining halls. A flower island is divided into as many parts as there are flowers to grow on it and to form agreable intermixed colors. 1. Luca rosa Geranium, rose color. 2. Princess Royal Vervaine, white. 3. Vervaine Heloise, deep lilac. 4. Vervaine Perfection, white. 5. Vervaine Duc d'Aumale, blue lilac. 6. Calceola Viscosissimam, yellow. 7. Vervaine Defiance of Robinson, scarlet. 8. Vervaine Montblanc, white. 9. Vervaine Emma, purple.

They then border the island with water plants, such as Menianthe or water clover, with white and rose flowers; Myosotis palustris, blue flowers; Water lilies; Aponogeton dystachion; Butomus umbellatus, the flowering reed, bunches of white and rose flowers; Le Nenuphar rouge, (red flower;) the thousand leafed Plumeau, rose flower; Populage or Water Case, yellow; White Nenuphar, and the common rushes and reeds of ponds.

The islands present a most charming aspect with their beautifully assorted flowers fr m May to November.

Mr. Kimball observed that in reference to insects injurious to plants, his experience was that they always prefer the best and richest for their share The rose bug squadrons never deign to touch the beautiful wreathed Michigan roses, because they are without perfume, and probably to them insipid, but they are voracious on our sweetest roses. So of all vegetable productions, the rich and delicious are wisely selected by the cunning insect and the larger creatures too, birds, etc. The finest cherry on the tree is selected by them all. Who selects the poorest?

Solon Robinson—And the fly attends to his grain of wheat precisely when, in the dough, the precious meal is ready for him.

Mr. Lowe—The wheat midge always does.

The Chairman called up the question for the day "Summer soiling of cattle."

Mr. Kimball was requested to state his views and practice on his hundred acre farm at Flatlands, Long Island, ten miles from Brooklyn. He said that he never pastured his cattle and had no doubt of the loss sustained in it for the stock would destroy as much as they could eat. That he soiled all his and found that one acre would do as much as two. As to the exercise needed by cows particularly, he could not find that they suffered for want of it. His farm had no interior division fences at all. The various crops grew side by side on the hundred acres. He had outside fences and a long lane which contained some grass, and he let his cows into this lane for pasture and exercise, if they pleased, but they moved but little and seemed best pleased while standing or lying down in the shade of trees chewing the cud. Where I grow crop for soiling I have to keep the ground rich. I top dress it suitably. I find that the crop of *one acre* soils *four cows* for summer. In winter, hay, grain, etc. I think that grazing gives some more milk than soiling.

The Chairman said he had made summer soiling experiments, thought it true economy, and was surprised at the smallness of the piece of ground required for soiling compared with the large extent of pastures. As to the effect of soiling on the health of cattle, he thought it nothing at all. They were as healthy soiled as pastured.

Mr. Lowe believed pasture best where land was plenty.

Solon Robinson—But sir, where the land is worth the trouble and expense of fencing, there soiling is best—otherwise grazing or pasturing, of course.

Mr. Kimball—Some say labor hurts the milk of the cow. I saw cows continually at work in Germany, and the women too out doors, while men (they were or had been soldiers chiefly,) were then playing old soldier in the taverns, drinking lager bier perhaps. The rye I saw there was taller in one field than an officer six feet four inches high with his hat on, and right excellent bread was made of the grain. The cows were as well lodged as the people. The barn on one side, house on the other, both equally neat and clean, made of stout timber, frame heavily filled in with bricks, and the timbers all whitewashed, showing in contrast with the red bricks, the posts, braces and girders of the buildings. Except a little ammonia in the barn, one was as well off there as in the extremely neat dwelling opposite. The young men employed at hard study in the schools during forenoon, were all hard at work in the afternoon, showing robust health.

The Club then adjourned.

H. MEIGS, *Secretary.*

July 16, 1856.

Present—Messrs. Solon Robinson, Dr. Waterbury, Adrian Bergen, of Gowanus, L. I., Charles F. Loosey, Consul General of Austria, James K. Fisher, Mons. Charles Louis Lezare Olivier Marle, of Paris, and his friend Mr. Mitchell, introduced by Mr. James Kentish, of New-York, Frederick W. Geissenhainer, Jr., Dr. Smith, J. Blakeney Auld, Esq., and others.

Mr. Adrian Bergen, of Gowanus, L. I., in the chair. Henry Meigs, Secretary.

Miscellaneous business first according to the standing rule of the club.

The Secretary read the following extracts made by him from the most recent works received by the Institute, by steamers from Europe, viz:

[London Farmers' Magazine, June 1856.]

DEEP CULTIVATION AT HOME AND ABROAD.

Mr. Hoskyns has described the practice of the vine growers in Madeira. The vine is not a native of that island, and after growing well for a few years, the fruit begins to degenerate, and make inferior wine. The expense of new stocks being very great, as they are usually brought from the Hock-vineyards of Germany, every expedient has been tried in order to postpone the evil as long as possible; but no manuring, or pruning, or attention is of any avail; and the *only remedy is found in deep cultivation!* "I once happened" he says "to see the process." Nearly a score of laborers, hard at work, were standing in a long trench *as deep as they were tall*, stocking the earth from one side and throwing it up on the other. On inquiry, they told me they were trenching *an old vineyard* for fresh planting—*trenching nearly six feet deep!* Some months afterwards a merchant in taking me over his wine-stores, pointed out in some casks that were being broken up, a mineral incrustation about as thick as half a crown and as brittle as glass, which he called *tartrate of lime*, adding that it was commonly deposited by the wine, especially when new. I afterwards ascertained that *potash and soda existed in the deposit.* Now these minerals are very deficient in the soil of the islands. Here then was good reason for deep trenching. The vine, to supply its mineral wants, robbed the soil so fast of what little alkali it contained, that nothing but the opening of a *great depth to the roots*, would keep-up the supply for many years; for the roots of delicate plants will not travel through earth that has *never seen day-light!*

The vegetable gardens which supply Covent Garden, and the other markets of the Metropolis, we all know are not only profusely manured, but are deeply tilled; and in many cases the subsoil has been dug up in the gradual course of time, no less than *four or five feet deep!* to supply *the waste of mineral matter to the soil above!*

In some parts of Flanders they gradually deepen the staple by spade trenching, gradually deeper by about two inches, until the land is brought to uniform quality to a depth of from eighteen to twenty inches.

Scripture says "the ploughman opens and breaks the clods of his ground." Dr. Clarke says "the frost is God's plough, which he drives through every inch of soil, pulverising and fructifying all."

WOOL TRADE OF ENGLAND.

In 1820, the import from abroad was only 16,000,000 lbs., while our woolen goods exported required 32,000,000 lbs. of wool. We commenced raising wool in Australia, and in

1816,	we received from there, ...	13,611 lbs.
1821,	do	175,433
1826,	do	1,106,302
1831,	do	2,541,205
1836,	do	4,996,645
1841,	do	12,899,062
1846,	do	21,789,346
1851,	do	41,810,117
1853,	do	47,075,812

The climate of Australia appears to be peculiarly adapted to the breeding and rearing of sheep, as well as *preserving* if not improving, the staple of the finer descriptions of wool. In the interior are vast plains with natural grass herbage, and lightly wooded. The best of pasturage for stock of all sorts; temperature genial; no necessity for any artificial protection for them; air pure, dry and bracing. The best breed of sheep have been introduced.

In 1828, the wool of the United Kingdom was 110 *million lbs.* In 1818, the value of woolen goods of England was 140 *millions of dollars.*

The attempt to establish the Spanish breed in England is a failure.

Mr. Southey estimates in 1846, the number of sheep in the United Kingdom, at forty millions, of which fifteen millions are slaughtered annually. That the fleeces of all amounted then

to, ...	275,000,000
Add our imports, ...	77,000,000
And we have annually brought to sale, ...	352,000,000 lbs.

By the census of 1850, the United States showed 22 millions of sheep (nearly,) and 52½ *millions of wool.*

[Journal of the Society of Arts. London, April 18th, 1856.]

Extracts by H. Meigs.

TRACTION STEAM ENGINE.

"Boydell's traction steam engine for agricultural purposes is a great success. It is a horizontal machine on wheels, with a man to steer in front, and an engineer behind. Two cylinders, 6½ by 10, are worked at 60 pounds pressure per inch, with a quick movement, and is estimated at 16 horse power. Twenty pounds of steam were required to keep the machine moving, the other 40 pounds for traction. The machine can turn as easily as a common wagon and not mind a deep furrow or a side hill. The success of this machine is owing to an endless and wide railway attached to the circumference of the wheels, which gives a fulcrum for the lever and a bearing sufficiently wide to carry a great weight on soft ground without imbedding in the soil. Boydell's engine although it weighed nine tons made scarcely a perceptible impression upon the soil, where a horse's foot left a deep indentation.

This engine *walked* from Camdentown to Acton, taking in tow its four wheel wagon with coals, and four heavy iron ploughs, and water enough for four hours' work. When on the soft turnip field (after a night's rain,) it drew after it ploughs, scarifier, etc., with perfect ease—it then *walked* home to Camdentown.

It can ascend any acclivity of one in three, which is nearly walking up stairs, our stairs being one in two. It can advance, back, or stop instantaneously, the pinion being shifted from the cogs of the driving wheel, and the power thus suddenly released is carried off by a separate fly wheel, which may be used for driving threshing machines, mill-stones, or other purposes. In fact, instead of a farmer sending for and sending back a six horse power engine and threshing machine, requiring in each trip four horses, this machine will move itself any where, draw the corn to market, bring home manure, and do the cultivation and work of the farm.

Mr. Boydell has expended nearly fifty thousand dollars in accomplishing this object.

P. S.—On the return of the machine from a trial at Acton, it was met by a wagon loaded with grain, drawn by six horses. The horses swerved at sight of the machine, and drew the wheels into a soft place, from which seven horses could not extricate it. The engine hooked on to the wagon and drew it out with ease."

RAIN.

The quantity increases from above and is greatest at the surface of the earth. Observations made on high places show a very marked increase near the earth. This is a matter of course on account of the greater quantity of air in a given space at the surface. I presume that the barometric pressure in degrees would show this.

Chairman—The subject for the day is now in order, viz: "The bread and the butter for this city." And on this interesting matter Dr. Waterbury said that important information can be obtained for the next meeting of this Club by our Secretary's addressing certain farmers, whose names I will give him. I wish therefore that the subject be postponed to the next regular meeting, the first Tuesday of August.

A member asked the chairman what knowledge he had of the present condition of our important crops?

Chairman—They are good. There is not as yet any sign of the potato disease. That the growth of the potatoes is good, that his young potatoes dug up here and there over the field, where they have got ahead of the rest, would average 100 bushels per acre, although not near of full size.

Dr. Waterbury desired Mr. Solon Robinson, whose knowledge of our markets is hardly equalled and not excelled by any one, to speak of the way articles are put up for our markets, and how it may be greatly improved, for profit to both seller and buyer.

Mr. Robinson replied that country fruits, etc., ought to be put up in such sorts of baskets and boxes as would answer to bring them neat into our markets, and of suitable sizes for buyers, and delivered as brought—baskets and boxes unbroken. That such baskets and boxes are made and can be multiplied indefinitely out of shavings obtained by machinery from blocks of our worthless timbers, such as cotton wood, bass wood, aspen and others, the cost of which would be, considering the benefit, *nothing at all, if not less!* These blocks when steamed give off shavings as flexible as paper nearly.

Dr. Smith was pleased with the project of the cheap baskets and boxes. Hats have been extensively made of like shavings and then covered with silk—they were light and clever. I like this plan of the boxes very much; conveyance by our roads and rivers of articles in such form will be easy and economical on account of this form.

Mons. Charles Louis Lezare Olivier Marle, of Paris, introduced to the Club by Mr. Mitchell, is patentee (in France,) of his new mode of preserving meat fresh. He has legs of mutton, of pork, and pieces of beef put up in Constantine, in Northern Africa, which were carried to England, and are now here.

Captain Lines of the U. S. mail steamer Arago, has given him a certificate that on the last passage from Europe he treated his passengers to a leg of Mons. Marle's fresh Constantine mutton, which they pronounced to be in excellent condition.

Mons. Marle says he puts them up in saw dust or tan in boxes. The nature of his preservative he does not state. He will place one before the next meeting of the Club on the first Tuesday of August, for trial. Mons. Marle's process includes fish, butter, eggs, all keeping their natural flavor.

Solon Robinson said that inventors were apt to be very sanguine, but this matter really did look as though there was something more than an inventor's mere assertion that it had been or would be successful; and if it accomplished one half only of what it promised, the result would be among the most important of any invention of this remarkable age. It would not only give the dwellers in cities cheaper and healthier food, but it would allow the animals to be slaughtered where they grew, and where all their offal is wanted to keep up the fertility of the soil. It would not only cheapen food, but enable us to preserve meat without salt, which is not food, nor of any benefit to those who consume it, particularly in salted meats.

Dr. Waterbury remarked that one of the great advantages that would result, would be enabling farmers to live upon fresh instead of salt meat, which, independently of the salt, is not as wholesome as fresh meat, because the act of curing with salt changes the character of the flesh, and renders it less fit to be taken into the human stomach.

A desultory discussion now followed upon diet.

Dr. Smith contending against eating so much meat as most people consume in this city, as being detrimental to health.

Solon Robinson thought variety of food more detrimental than meat, and that a man might eat hearty of fresh meat if he would eat nothing else.

Dr. Waterbury thought quantity had more to do with health than kind of food, and that the amount eaten must be regulated entirely by a man's employment.

Mr. Robinson remarked that the advantages of this Marle process would be felt every where on the borders of our thousands of roads; meat, game of all sorts, poultry, all meats could be thus made ready for the freight cars, go to every man's table ready for action, and the *offal all left in the country to nourish the land!* Let gentlemen think for a moment of the fleet loads of such stuff brought here from the country, a nuisance and discharged through our sewers into our rivers!

Dr. Waterbury said it would be an unquestionable blessing to us to have less salt meat; great masses of salt junk are consumed and with some injury to the consumer. I say, besides this method of Mons. Marle's to keep meat fresh we ought to build ice houses in abundance for the keeping of our meats fresh, instead of swallowing salt, salt, salt.

Dr. Smith—I found, when in India, that our notion of strength being dependent on meat is erroneous, that the rice eaters are lively and strong. Four of them carry a great fat heavy perspiring Englishman in a palanquin all day without fatigue. So much for rice vs. beef. I am a physician, and I confess my astonishment that there is not more disease among our swallowers of *lumps of meat* in large masses, and *ice water enough* to drown the whole.

Mr. Meigs said that he felt great pleasure in reading the account of Boydell's grand success in producing a mechanical ox, with the muscular power of sixteen horses! and he saw an American gentleman in the room, whose talents have been long devoted to steam land locomotion. He named Mr. James K. Fisher, whose beautiful painting of his steam carriage is before us, and who has genius and knowledge competent to add to it powers of traction, &c., like Boydell, and probably more effective; and the advantage of the farmer and his family riding under coach cover over the broad acres, overseeing its work; engineer and conductor also under cover; and also all the machinery attached to it to do all milling, threshing, cutting and sawing required at any spot on the farm or off of it if let to neighbors; so that it will take the place of all water falls and stationary engines.

Mr. James K. Fisher of New York—The Secretary gives me a kind reception. He is right in stating my devotion to the cause of constructing mechanical oxen, or elephants, or mammoths as substitutes for horses. I am ardent in the belief that it can be perfectly done, and I regret that my limited capital prevents me from going immediately into the adaptation of my steam carriage to all the agricultural and mechanical purposes indicated. I incline to think that Mr. Boydell's walking apparatus—what may be termed his endless *plank road*—may not be wanted; but may be supplied better, by great *breadth of tire.*

Dr. Smith again resumed the subject of light eating and drinking, and adverted to the Secretary as an example; he being active at nearly eighty years of age.

Mr. Meigs observed that Dr. Smith had given just views of the *great unknown* and unpracticed art denominated by wise Frenchmen, the "*savoir-vivre*"—the knowing how to live. For the last 70 years, I have got to bed as soon as possible; at curfew of old, 9 of p. m., and get up at day light in summer, and 1½ hours before in winter; one common dish of tea at supper, one of coffee at breakfast, a rule nearly unexceptionable; I partake of every thing, but take care as to the "*ne quid nimis*" the nothing too much; one peach, or pear, or apple, or orange per day, &c., &c. I was born a subject of George 3d.; I was a member of the procession celebrating the adoption of the Constitution of the United States in '89, with my Erasmus under my arm and his witty Diluculum and Naufragium in my head; and the lesson of the Diluculum was fixed there. That is "get up early in the morning, for then the Divine Spirit of the air breathes," or as he has it, (and I have not read it for sixty years,) "*in matutinis horis dum Divina Spiritus Auræ Spirat.*"

John T. Addams of Plattsburgh, New-York, writes to the Club that he succeeds in ridding his currant bushes of a destructive worm three-quarters of an inch long and thickness of a knitting needle, by holding a broad tin pan under the bushes and then beating them with a small stick which shakes the worms off into the pan; he then burns the worms.

He believes in the value of soap-suds for apple tree worms; he fills a mop with it and with a long pole applies it to the worm nests, &c.

Mr. Hite of Morrisania--This gentleman is an artist of distinguished merit and success, who wisely lives in a garden of flowers and fruits of his own making—presented cherry currants, very fine and very large. Some members supposed them to be our common red currant improved by culture; but Mr. Hite states that it is a distinct variety. They were admired by the members, especially in reference to their value for making one of the most valuable articles in any man's pantry, (viz :) currant jelly.

Dr. Waterbury—I do not like to leave the dieting conversation of this day without a qualifying remark. I know and so do you that in strong laboring men, the small eating and drinking process would be a failure. Why, Mr. Chairman we all know what strong eating is required by strong working men! When I have been under laborious exertion on my farm, my eating was proportionally strong and abundant. Editors and authors sitting on cushions in their quiet sanctorums, have no means of judging in this matter.

The subjects adopted for the next meeting, are "Bread for the city," "Butter for the city," and "The steam-plow."

The Club then adjourned.

H. MEIGS, *Secretary.*

August 5, 1856.

Present—Messrs Elliott, Frederick W. Geissenhainer, Jr., Dr. Smith, Solon Robinson, Dr. Waterbury, Professor James J. Mapes, Mons. Mitchell, Mr. Jennings, Issachar Cozzens, of Jersey, John W. Chambers, and others.

William B. Leonard, Corresponding Secretary and Agent of the Institute, in the chair. Henry Meigs, Secretary.

The Secretary read the following papers, extracts translated and prepared by him, viz :

DEWITT CLINTON ON AGRICULTURE.

We have justly adorned our diploma by giving Washington the centre, Franklin on the right, and Dewitt Clinton on his left.

At the time when Mr. Clinton was governor of New-York, he attended the first cattle show of the Jefferson County Agricultural Society, held at Watertown on the 28th and 29th of September, 1818. Gen. Stephen Van Rensselaer, and others were present.

An exhibition of domestic manufactures was also held there. An excellent address was delivered by the president of the society. In it we think the following passages are worth repeating, in reference to fruit trees.

" We do not let the roots of our fruit trees have a sufficient share of cold in winter. Sometimes, before the ground is sufficiently frozen to reach the most *nutritive* roots of our fruit trees, snow falls and communicates a genial warmth to the soil which accompanied with the moisture of the melting snow in spring starts its vegetation too early ! Late frosts then come and give fatal checks to their fruit production. The remedy is to *take away* early in winter *the snow* about the roots of the delicate fruit trees—peach for instance—that their roots may have their share of the cold. Then let snow cover up and it preserves them cold until the proper period for vegetation."

After the President had closed, Governor Clinton, by request, made the following remarks :

" When we recollect that scarcely twenty years have passed away since the first inhabitant erected his hut in this county, and when we see it now with flourishing villages characterized by intelligent views and well directed exertions, a soil eminently fertile and climate salubrious, and looking to those artificial facilities which the improvement of our internal navigation and the markets of the north and the south, connecting with our interior seas, we are persuaded of the great future prosperity of this region and State at large.

"You have, gentlemen, chosen wisely the true road to prosperity, for agriculture is the source of subsistence, subsistence is the basis of population, and population is the foundation of prosperity and power. It is the parent of individual and national opulence ! It comprises all the sources of wealth—land, capital, labor—and how favorable to health, to wisdom and contemplation, by exercise and activity friends of virtue, and (to adopt the emphatic language of a sublime Poet,)

" Sweet peace which goodness bosoms ever,"

we must all admit, that as it was the first, it is also the best pursuit of mankind."

Gov. Clinton then urged societies to promote it and also its invariable companion, domestic manufactures.

It is a subject of high felicitation to witness now a confederacy of scientific and practical men—to behold the experienced agriculturist and the enlightened professional man combining their powers in favor of agriculture and domestic manufactures to promote the public prosperity.

[London Farmers Magazine. July, 1856.

TULL'S HUSBANDRY.

William Cobbett, of England, rendered good service to the cause of agriculture. Among other things he appreciated the system of good old Jethro Tull.

In 1822, in his Weekly Register, he says: "I mean to publish Tull's book by subscription, as I can get enough to do it with. Even since the publication of my year's residence in America, I have been receiving applications to republish Tull. These applications are more pressing now than ever, seeing that there are at this moment, in several parts of England, to my knowledge, the finest crops of Swedish turnips—standing in rows, at *Tullian distances*—that ever, I believe, stood upon the face of the earth. I bought an old folio edition of Tull, in 1812, for seven shillings, and such copies now cannot be had for thirty shillings. I propose to re-publish the whole of Tull's book except what relates to *drills* and other implements, for in this we have far surpassed Tull, who being a *lawyer* too, (would to God that lawyers were always as usefully employed,) was the *first inventor of a drill*, which he made out of the *barrel of an organ*, which shows that even organs may be good for something." This was the *first drill* ever made. The agriculture of England had been, up to that time, very nearly what the Romans had introduced, and, as Tull clearly shows, all their erroneous notions had been most faithfully handed down to us from father to son.

Tull went abroad for health, and being in the south of France, he observed that the vineyards were tilled in spring and summer while the vines were producing their fruit, and that those vineyards had the best crops and finest fruit that were best and most deeply tilled. On his return to England, he applied this sort of cultivation to corn, (wheat, etc.,) turnips, San-foin and Lucerne.

Tull lays down causes why the thing is, not rules! He begins with the roots, then goes to the leaves and then to the food of the plants, and the manner it is conveyed into the body of the plants, he does this in a plain way, not that lofty and law jargon of the present day! His book ought to be read by every young man and by every young woman too.

When I went last to America, there never had been a field of Swedish turnips in that country. Now there are thousands upon thousands of such fields all cultivated in the Tullian manner.

After this statement made by me, The Farmer's Journal treated my book as a *romance* and me as a *liar*. One thing about it is *my own*, the rest belongs to Tull, (viz :) I transplant in *dry* weather—he in *wet*."

[Bulletin Mensuel De La Societe-Imperiale Zoologique D'Acclimatation. Paris, June 1856.]

Mons. le Vicomte de Valmer, gives the following notice of the aquaria (ponds,) of sea water and of fresh water, in the London Zoological garden. They are made of glass and so placed as to enable an observer to study the development of plants and animals in them. They are manufactured by Messrs. Sunders and Woolcot of London, and cost about 18 pounds sterling a piece. These are about six feet long by about two and a half feet wide, and two and three quarters deep. It was doubted whether the sea animals could be kept in them, on account of the necessity for changing the water often. Algæ flourish in them, fastening themselves to pebbles placed in the aquaria, the actinus, or anemones of the sea soon grow and fill the vase with their animal flowers of a thousand brilliant colors, among one difficult to be obtained the actinia mesembryanthemum, (*noon day flower;*) with some pains the Cross corner can be procured, whose flowers are larger and very brilliant and various, red, blue, rose brown and gray; you reach with your hand to take hold of them, these living dahlias instantly vanish and become a lump of sand! They re-flourish on the following day. The sea daisy or ox eye, called *bellis*, flourish. The *dianthus*, which is sometimes found attached to oysters, resembles olive colored, or rose, or white jelly. Dust is as injurious on the surface of the water in the aquarium as ice! It prevents the oxygen of the air from entering the water; you must cover it with glass or muslin; ends open for air; keep off the rays of the sun by means of transparent paper or some other clear stuff. If the sun's rays are allowed to heat the water of the aquarium, your tender plants are ruined; and there must always be a shady place in it; new water must be ready to supply the loss by evaporation ; it must be kept at the same level and same degree of saltness; globules of pure oxygen are formed on the plants, then rise to the surface, and are there seized with avidity by the fishes. When natural sea water cannot be had we make it; common kitchen salt will not answer.

The following rule for making sea water is given, viz :

Water, parts,		964.744
Chlorine of sodium, parts,		27.059
magnesia,	do	3.666
potash,	do	0.765
Bromine of magnesia,	do	0.029
Sulphate of magnesia,	do	2.295
of lime,	do	1.407
Carbonate of lime,	do	0.031
		999.998

This sea water is preferable to the natural, because it is more clear. Mons. Miable, druggist, in Favart street, sells concentrated sea water, which can be diluted at will. Mons. Gosse has an aquarium of sea water, and the water has not been renewed for 19 months; all the fish, &c., which die in it are of course removed immediately or the rest would perish infallibly. The fresh aquarium is more easy to manage. In point of utility these aquariums are far more valuable for the study of pisciculture than any other thing, for here the generative, &c. of the fish can be minutely examined and practical lessons gained.

A letter in Arabic, written by the Emir Abd-el-Kader, returning thanks for his nomination as an honorary member of the Zoological society, and expressing his strong desire to render services to it.

[Journal De La Societe Imperiale et Centrale D'Horticulture. Napoleon III., Protecteur. Paris, May 1856.]

Extracts translated by Henry Meigs.

Minutes of the meeting April 24th, 1856.

Mons. Lenormand presented fine asparagus grown by his method in two years from the seed.

Moreau, the Son—Very tender cauliflowers, called Big Solomon, from his kitchen garden.

Mons. Neumann—Three sugar canes from the aquarium of the museum. Referred to Mr. Payen to analyze and ascertain their value relative to common sugar cane.

Mons. Deguise—Tickets for plants, of zinc and of glass.

Mons. Tarin—Spinach which received the premium of the 3rd rank. It is the lettuce leaved spinach.

Mons. Rouillard asks for a committee to visit his tulip park, which contains 500 varieties.

Gen. Doumas, Director of Foreign affairs in Africa, says thirty samples of Algerian cotton have been sent to the Emperor, grown there in 1855.

[Bulletin Mensuel de la Societe Imperiale zoologique d'Acclimatation. June, 1856.]

Translation by H. Meigs.

The present state of Agriculture compared with the general Industry. By Mons. Geoffroy Saint Hilaire, President of the Society.

It is often said that our age is that of wonders, nothing is more true. All that our fathers dreamed of, or imagined, has been undertaken to be accomplished by science. All the Oriental fables have become in Europe beneficent realities. We might say of science and industry, our modern fairies, what Pliny said of nature, "de ea nil incredibile existimari," (nothing in it can be deemed incredible). Nothing is above its power, and there is no prodigy which may not be expected of it.

In 1760, Voltaire said "who could have foreseen that we should ever use the electricity of thunder? or analyze the rays of the sun?" Immortal discoveries! Light, heat and electricity subjected not only to the laws of science, but to the will of man! Light from gas—rendering darkness light—engraving, statuary. It is the most prompt of all painters, and exact as prompt. More marvellous still we see electricity by turns an engraver, statuary, gilder, a powerful motor and a splendid pharos, the docile agent of the most varied transformations, or the swift messenger which instead of conveying like "La Chappe's telegraph—thought from the centre of France to its most remote parts in one day," carries thought as quick as lightning through Europe, through seas and through continents. We cannot say it flies, for the flight of a bird, the glance of a bullet from a cannon, the course of the earth itself in its orbit, are all in comparison Repose! Immobility! Science can give the result in figures, but the tongue has no words to express it.

And after all these prodigies in mechanics, physics, and chemistry, and others no less admirable, what is best of all is their vast utility. In the present domain of science and arts, it seems that *years* are now worth what *ages* have been heretofore.

The novelty of twenty years ago is used up—it is old, hardly recollected by any one!

Now to our question—agriculture.

Are the people well fed yet? Are they clothed suitably to climates? No, a melancholy spectacle is seen in the suburbs of our great cities. The ragged cotton dress of winter! Blouses pieced and patched, a habitual evil of a part of the population of the first city of the world! How does this happen? We call the Chinese barbarians, but they repay that with usury!

Prof. Mapes spoke favorably of the new sugar plant introduced into this country—the *Sorghum* or sugar millet. It is growing finely at his place, and so is every other plant, unaffected by drouth, wherever the ground has been underdrained or deeply sub-soil plowed. His fence seems a line of demarkation between green fields and those parched and brown of his neighbors. He contends that the prevention of injury from drouth is in the hands of every farmer. Flat culture of all crops is his rule, and horse-hoeing his practice. His potatoes so worked are very fine this year, and his dwarf pears, specially manured, are unusually good, and have not suffered in the least from drouth. He also stated that he rarely used a hoe on his farm; everything is done by machines drawn by horses, or, what he greatly prefers, mules. He has one mule said to be about fifty years old, that will walk between two rows of carrots, twelve inches apart.

MAMMOTH PIE-PLANT.

Solon Robinson exhibited a stalk of Cahoon's mammoth seedling Rhubarb, grown at Kenosha, Wisconsin, that excited considerable curiosity. It was out of a box sent to the Tribune office for distribution, and some of it on trial was found as rich and tender as that of smaller growth. It is supposed to be the most productive variety grown for culinary purposes, and should be in every market garden, and then, possibly, it would be grown in such abundance that it could be purchased by people in ordinary circumstances.

NEW SEEDLING BLACKBERRY.

Mr. A. A. Bensel sent a basket of blackberries, from plants discovered nine years ago by Jonas Newman, of Marlborough, Ulster county, New-York, that are not as large as the Lawton blackberry, but of a very decidedly better flavor. The following paper was furnished by Mr. Newman:

"The blackberries now offered to the Farmers' Club are not exhibited on account of extraordinary size, but it is believed that they will compare favorably with other sorts on account of their great productiveness and good qualities as a market berry. The berries are usually above the medium size of the New Rochelle or Lawton blackberry. The specimen sent being from plants removed in the spring of 1855, are not so large as from roots older and better established. The writer first noticed these berries nine years ago, and so enormous was the yield from two shoots growing upon a stone wall that it was determined to try good cultivation upon them, and removed them next spring into prepared ground, where in the second year the fruit exhibited itself in perfection. It is supposed to be an accidental seedling. The roots settle far into the ground, beyond the reach of drouth or plow, and must thus become strong and vigorous before showing perfect luscious fruit. The shoots are smooth and round, of the ordinary size of shoots of the wild blackberry, with the fruit upon side and main stems in thick clusters. In cultivation, coarse manure is found best adapted to the growth of both berries and plants."

Plant the roots four and a half feet apart and cultivate the same as Antwerp raspberries, with stakes and tying. The canes are hardy and need no protection, but may be covered in winter, like raspberries. The small thorns of the young shoots disappear in winter and spring, so that they may be handled in transplanting without gloves. For this peculiarity we have called the variety the "Thornless Blackberry."

Members of the Club thought that a very good distinguishing name, and all concurred in the opinion that the variety is very well worthy of cultivation, particularly when such fruit sells for 18 to 25 cents a quart.

PRATT'S DITCHING MACHINE.

Prof. Mapes said he had lately seen this machine in operation. It is a wheel of spades, drawn by two horses and held by a man, by which he can dig a ditch three feet wide and seventy rods long in a day. It lays the earth on one side, or both sides, in going back and forth, and the ditch may thus be made any width desired. Stones do not injure the machine, and it works in hard clay almost as well as in sand. He thinks it a very useful tool for all farmers; and he saw fields upon which the machine had been used that are now worth double what they were while wet. He also spoke of a new tile machine, by Mr. Pratt, that he saw in use at Canandaigua, that will cost $200, and make 5,000 tiles a day, at a cost of $3 a thousand.

ANALYSIS OF CORN AND COBS.

As much has been said upon the value of corn-cobs for feeding stock, and ingenuity has been taxed to build machines to grind cobs into meal, the following analysis made by Dr. Charles T. Jackson, possesses peculiar value. It was made at the request of D. Jay Browne, and by him furnished to Roswell L. Colt, of Paterson, who communicates it to the Farmers' Club. The paper read by the Secretary, says:

"The corn subjected to analysis was grown in Rhode Island, and is a mixture of 'Red Cap' and 'Canada corn,' and generally produces four or five ears to a stalk of the eight-rowed variety. The number of kernels on the ear, 332, weighing 1,970 grains. The cob weighed 260 grains. A second specimen, 325 kernels, weighed 2,070 grains; the cob weighed 280 grains. The analysis--100 grains yielded to ether 475 grains of fat, fixed oil; and alcohol 411 grains of ziene and sugar. Ziene is the name of the peculiar gluten of Indian corn."

ANALYSIS OF CORN COBS.

One hundred grains finely ground corn cobs yielded to ether, hot alcohol, and boiling water 3,145 grains. These ingredients were a siccative yellow fixed oil, 0.323 grain. Grape sugar or glucose, 0.242 grain. Dextrine (gum), with some albumen and extractive bitter matter, 0.557 grain. Loss, 0.23 grain, showing the nutritive matter per cent, 3.145, as all the value of cobs for feeding purposes.

Dried at 212° Fahrenheit, 1,000 grains of cobs burned in a platina bowl, yielded the following mineral matters :

Potassa,	3.204
Soda,	0.492
Phosphate of lime,	1.000
Phosphate of magnesia,	0.260
Phosphoric acid from the alkalies,	0.300
Silica,	0.800
Chloride,	0.196
Peroxide of iron,	0.360
Unburned charcoal,	1.500
Carbonic acid and loss,	1.383
Total,	9.500

The great value of cobs as a fertilizer is the potash, or when charred, as an absorbent of ammonia.

Solon Robinson--I hope this will convince farmers that cut straw is far more valuable to mix with corn meal than cut cobs, and that straw can be made fine for half the cost. I doubt not that instead of grinding cobs, the farmer would find more nutriment in coarse bog hay.

Dr. Waterbury—Yes, in saw dust.

BEARDLESS BARLEY.

Solon Robinson--I hold in my hand a communication from a farmer who is an honor to the name. He has accidentally obtained the seed of what he conceives a new kind in this country, and valuable variety of grain, which instead of selling at a dime a seed, or $5 for a little tin pill-box full, like some Chinese Yam speculators, see what he offers to do with it. Here is his letter, dated

WEST MACEDON, N. Y., *Saturday, Aug.* 2, 1856.

EDS. TRIBUNE—With a view of giving this new variety of grain a simultaneous introduction into every town and district of the Union, I make my proposition through the columns of *The Tribune*, as the most likely means of effecting this object. This valuable grain is a native of China. The subscriber commenced with seven grains three years ago, and the quantity, though insufficient now to prove its merits by grinding or malting, is still sufficient to supply one head containing 30 to 60 grains, to all who will take an interest in having *a barley without beards.* Thousands of our barley-growers will at first doubt the existence of such a thing as "barley without beards." But, gentlemen, on their receipt of a post-paid envelope, bearing your own address, I will cheerfully send you *one head*, which will prove itself, and *all shall be supplied who ask*, though it should reduce my stock to a single head.

I offer this as a treat to the rural readers of *The Tribune*, being well aware of what may be the result of my offer to such a host of readers, viz: 200,000 calls; but I am prepared for it; nothing would please me better than to devote about three months' time, more or less, to the distribution of this grain. Therefore, if you will give the above card an insertion, I will perform my part of the contract with the greatest pleasure. Inclosed are a few heads, by which you will see it is a beautiful grain, aside from that very desirable quality, "beardless."

Very respectfully, yours, &c.,

J. W. BRIGGS.

These heads were much admired by the Club, as well as the spirit that animates the writer.

THE ITALIAN HONEY BEE.

Solon Robinson read a lengthy communication from Samuel Wagner of York, Pa., upon the Dzeirzon theory of bee culture, and the great improvements in progress in Germany, where the subject is fostered by several State Governments, and a journal published devoted to the Apiarian. We extract the following passage from his letter about the "Italian Bee:"

"It has been satisfactorily ascertained that this species (the Italian bee,) when of pure blood, is more industrious, hardier and more courageous than the common kind, and yet naturally of so mild and peaceable a disposition as rarely to use its sting. These facts have only of late years been brought into general notice through Capt. Badenstein, who remarked their superior industry when in Italy, during the Napoleonic wars, procured a colony thence, eight or ten years ago, and furnished some account of them for the *Bienen Zeitung*. It was not, however, till the controversy respecting the Dzierzon theory arose—in the course of which Dzierzon procured a colony from Italy, by the aid of the Austrian Agricultural society, for the purpose of demonstrating conclusively certain physiological facts on which his theory is mainly based: that the peculiar value and importance of this species of bee was clearly ascertained. Nor would it have been practicable till then to render this superiority available on a large scale in other countries. This is evident from the fact that Capt. Bardenstein, himself an experienced and enthusiastic bee-keeper, was unable under the old system to multiply his stock of the pure race, even in the course of seven years, having at the end of that period still only one genuine colony. But when Dzierzon subjected them to his system, he multiplied his colonies fifteen fold the first season, and has since proceeded increasing his stock with almost similar rapidity, preserving its purity the while, and diffusing the breed far and wide through the land. Last year Mr. Edward Jessop of this vicinity, and myself, made an effort to import two colonies from the apiaries of Mr. Dzierzon. But though we succeeded in getting them in Bremen they perished on the voyage to Baltimore, from sheer neglect on the part of those having them in charge. The circumstances attending this failure have satisfied me that there is little hope of success in such an effort, unless the colonies be placed in charge of some careful and competent person during the voyage."

Mr. Wagner asks that the Patent-Office should take charge of this importation of a valuable "seed," and thinks that if Government can import camels, that can only be used in one section, it can import bees, that would be of universal use all over the United States by every family.

Mr. Wagner seems to forget that bees are for the North, while camels are purely a Southern institution.

Mons. Marle addressed a note to the Secretary expressing his regret at not having yet, as was expected, received from Europe the promised specimens of fresh and cooked meats, by his process, put up in Constantine, Africa. He expects to exhibit to the Club at the next meeting, on the 19th of August inst.: a leg of mutton, *fresh and raw;* a leg of mutton, *cooked;* a piece of beef, *fresh;* a piece of beef, *raw;* a piece of pork, *fresh;* a piece of pork, *raw;* fish, *raw;* fish, *cooked*; a lump of butter, *fresh;* no salt or other condiment—like the meats and fish; one dozen eggs, *fresh.*

Proof authentic will be furnished.

Many new varieties of turnip and cabbage seeds sent from the United States Patent Office by Mr. D. Jay Browne of that department, have been distributed, and the receivers requested to return specimens and the success of cultivating them. Mr. John W. Chambers, the clerk of the Institute has attended carefully to their distribution.

Prof. Mapes invited the members to visit his farm on some Saturday, when he is at home, to exhibit his dwarf pears in fine bearing, and the triumph of his deep plowing, sub-soiling and under draining, in resisting the recent severe drought of many weeks continuance. Not a vegetable on his farm has suffered, and the farm exhibits a marked contrast with the adjacent farms, suffering with drought.

The Club ordered the "butter for the city" and the "bread for the city" and "steam plows," to be taken up at the next meeting, August 19th.

Mr. William R. Prince, of Flushing, Long Island, invites the Club to visit his gardens and see 40,000 Dioscorea batatas, the vines growing, some 13 feet high, trained on poles.

Paul Stillman cannot attend, having lost his right foot by amputation, recently. He found advantage in the certificate of membership of the American Institute, when wrongly arrested for a Mexican, at La Vera Cruz. Mr. S. desires to prepare a complete view of ice-houses.

Mr. Martin E. Thompson presented certificates proving the superior good quality of the guano lately received from the newly discovered United States guano islands.

The Club then adjourned.

H. MEIGS, *Secretary.*

August 19, 1856.

Present—Messrs Amos Gore, of Bloomfield, N. J., Solon Robinson, James K. Fisher, Martin E. Thompson, Adrian Bergen, of Gowanus, L. I , Judge Van Wyck, Mr. Pepper, Mr. Andrews, T. W. Field, of Brooklyn, Mr. Pardee, Wm. B. Leonard and others,—thirty-three members.

Martin E. Thompson in the chair. H. Meigs, Secretary.

The Secretary read the following translations made by him from the works received by the Institute from Europe, etc., since the last meeting, remarking that for the most part we receive the papers from Europe before they reach any other part of the Americas.

[London Farmers' Magazine. July, 1856.]

The Grasses at different stages of their growth. By CUTHBERT W. JOHNSON, Esq., F. R. S.

That grasses vary in their nutritious quality, at different seasons, is an old observation. The first spring crop of grass of irrigated land, as food for sheep and their lambs, is well known for its superior value. The second crop varies materially—they tell you "it rots the sheep."

Prof. Johnson has carefully analyzed these grasses at various periods. We extract as specimens:

	Water.	Ash.
April 30,	87.58	1.28
June 26,	74.53	2.24

WAY'S ANALYSES.

	First crop.	Second crop.
Flesh making,	25.91	10.92
Fat,	6.53	2.06
Heat—from starch, gum, sugar,	32.05	43.90
Woody fibre,	25.14	34.30
Ash or minerals,	10.37	8.82
Silica,	9.24	34.11
Phosphoric acid,	9.31	5.56
Sulphuric acid,	3.55	4.23
Carbonic acid,	11.62	1.15
Lime,	9.50	9.13
Magnesia,	2.47	2.49
Peroxide of iron,	1.31	0.62
Potash,	90.00	22.13
Soda,	0.09	0.0
Chloride of potassium,	0.00	17.40
Common salt,	2.91	3.14

These chemical examinations might not only be usefully extended, but that they lead to several other subjects of inquiry.

It is probable that certain fertilizers which are hardly remunerative when applied in the ordinary way, might be rendered far more useful by improvements in the usual mode of employing them—such as sowing guano, gypsum, etc., in moist weather rather than in dry, or a mixture of common salt and soot to certain crops.

Many generations of farmers and learned professors will probably exist and explore Nature's fields, and examine her manifold and to us mysterious movements, but there need be no apprehension of these useful researches being exhausted, for as one difficulty is removed—one *beautiful myth* rendered intelligible, others will arise in rapid succession to excite our curiosity and to reward the searcher after knowledge.

CATTLE SHOWS IN SPAIN.

Spain has come into the field and is turning her attention to improving her breeds of cattle and horses. A society has been formed for holding Triennial cattle shows. The first took place about a month ago.

Signor Geronimo Martinez Enrile, exhibited eight beautiful horses of the Andalusian breed, all precisely of the same age, size and color, (sorrel). They attracted universal admiration, and they obtained one of the first prizes. Their *English* Durham bull took another prize. This bull weighed 2,000 pounds. A cross with the Andalusian cattle is expected to be very excellent.

Clay Soils converted into Loams by the action of hot Lime. By JOHN DONALDSON.

"Well may agriculture be ranked as a science combining, as it does, every other science in its development. The leading men of knowledge are uniting to do it homage!"

"The reign of the present Emperor of the French will furnish the future historian with ample materials wherewith to erect an historical monument upon which posterity will gaze with gratitude and wonder, for he has given many proofs of his wisdom and depth of judgment in stirring up the latent energies of a great nation—as to agriculture, especially upon the art of agriculture, the alma mater of civilization."

Napoleon's late grand Cattle Show—Animals from all countries.

"The much vexed question of over fattening in breeding cattle, has again been agitated here, (Paris,) in such a manner as will fail, we are certain, to bring it to a satisfactory conclusion. One of the rules of the programme of this show was "That all animals *found too fat by the Judges, would be thereby disqualified for competing for prizes !*" So far, so good; but how are breeders to know the point of condition at which they are to stop? The judges should publicly state the rules by which they were guided!

In the poultry class they had 1,400 birds! Nine thousand animals were on exhibition.

[Revue Horticole. Paris, June 16, 1856.]

Translated by H. Meigs.

HYBRIDATION.

We believe we cannot too strongly call the attention of horticulturists to hybridation, or in plain speech, the artificial fecundation of plants. We published last year an interesting memoir on this subject by Mr. Klostzch of Berlin, (we have translated it lately, H. Meigs.) The importance of the results to be obtained in this way, merits the meditation of men of ability and leisure. Nature has given us species of plants, and as appears by experiment, she has not imposed any limit to the perfection and modifications of which these species are susceptible.

Hybridation is founded on precisely the same principle as the crossing of animal races. In the animal kingdom the cross of two animals in the same zoological circle, is a *metis* or *half-breed*, partaking of father and mother in respect to form and aptitude, and capable of reproduction. The product of two animals of a different circle is a mule, not capable of reproduction, and differing somewhat from the father and mother. The analogy to this in the vegetable kingdom is complete, for their seeds are also sterile.

Nothing is more simple than this process of hybridation. It is only putting in contact the pollen on the anthers of one flower upon the pistil of another flower. The two flowers must be in the same state of advancement—that is open their blossoms at the same time. The stamina are the male organs, and the pistils female. Pollen is a fine dust, generally of a pale yellow color.

The pistil commonly has a spongiole, a little sponge, which is lubricated by a serous liquid, which takes the pollen and absorbs it. By coloring this with the least drop of colored fluid—say of carmine —if the pistil is white, the absorption is very evident, for the pistil will be all clouded by it. The pollen possesses odor.

To cross hermaphrodites—that is where the flower has both male and female organs—take away the anthers, the male organs with delicate pincers, as soon as the flower blooms, especially in a morning, for then humidity prevents the opening of the little sack which contains the pollen. Take another stamen and lightly shake the pollen on the stigma of the castrated anthers—this operation succeeds best in the middle of the day, because the heat makes the pollen swell and disperse. It is an operation requiring delicacy and dexterity. A flower appears to have much more attraction for its own pollen than for that of a stranger. Kœlreuter and Gœrtner have observed that a particle of pollen, invisible to the naked eye, from a brother anther, had many more chances of success than a great quantity of pollen from a stranger. Decandolle attributed to this, the small number of crossings of natural plants, for he said he knew only forty examples of it in nature.

Double flowers—always sterile—crysanthemums for instance, can not be reproduced by hybridation. But Mr. Gallesio obtained double flowers by crossing half double with half double flowers, and obtained various colored flowers from crossing double and half double flowers of the Ranunculus.

The beautiful flowers of hybrid origin, last much longer than the originals. I. Sanrey.

[Journal de la Societe Imperiale et Centrale D'Horticulture. Napoleon 3d, Protecteur. Paris, June, 1856.]

Extracts translated by Henry Meigs.

Mons. Guillard, Jr., manufacturer of metallic cloth, 210 rue de Faubourg St. Denis, asks for an examination of his metallic cloths as shades to hot-houses.

Silver medals of the first class were given to meritorious gardeners—actual service with honor—for not less than twenty years.

Hedges of Fuchsias.

Mons. Bury says: "It is difficult to form an idea of the great beauty of hedges made of *Fuchsia virgata* or *gracilis*.

[From Chambers' Edinburgh Journal.]

African Fundi.

From Henry Cotheal, Esq., seeds, and plants grown to near six feet in height, and not yet showing their seed.

In November, 1855, the Linnæan society of London received this grain from R. Clarke, Esq., assistant surgeon to the Colony of Sierra Leone. It is cultivated near Kissy village and elsewhere—it is highly prized, it is called hungry rice—it is like millet in some respects. It is white, semi-transparent, cardiform; is inclosed in a delicate fawn colored husk or membrane, from which it is very easily separated. It is highly glutinous, has a delicate flavor between that of rice and kiln dried oats. It thrives in light soils and in rocky situations. It is pounded before cooking. Manure is said to injure its growth. Sown in May or June, it ripens in September. When gathered, if left in rain, the grain is apt to agglutinate to its coverings.

The Club is much pleased to acknowledge the receipt of a box of valuable seeds from China and East Indies, presented by an officer of the United States Navy, to whom we feel deeply indebted for their patriotic and intelligent course in reference to the great interests of our country.

This collection of seeds was made by Richard T. Allison, Esq., Purser of the United States frigate Macedonian, in her recent cruise in the Eastern seas.

Among these seeds is a black heavy bean which is extensively used in China to procure a valuable oil for culinary, illuminating, and probably lubricating purposes. Such a bean is very valuable, as the crop per acre is vastly greater than flax seed, or any other used by us.

U. S. SHIP MACEDONIAN, *Boston.*

SIR:—Feeling great interest in all that concerns agriculture, and having read with great pleasure several volumes of the "transactions" published by your admirable institution, I take the liberty of sending you, per Messrs Adams & Co., a few seeds which I thought worth collecting during the cruise of this ship in the East Indies, China, and Japan. By so doing I feel that I take the best course to ensure the discovery of any value they possess. They consist of

1. Wheat, barley, and three species of beans, from Japan.
2. Two species of beans from Shanghae, China.
3. Beans from Madagascar.
4. A few apricot pits, and one peach pit from Shanghae.
5. Beans from Singapore.

The seeds from Japan are perhaps more curious than valuable. Yet from them might be secured some new and valuable variety.

The beans from Madagascar may, I think, prove a valuable acquisition to the vegetable garden, and perhaps even for field culture to the farm. I first saw them on the table of a gentleman in the island of St. Helena.

But the beans from Shanghae appear to me peculiarly valuable. Being but a theoretical agriculturist myself, fond of reading upon the subject, but ignorant of the practice, I send them to you, hoping that you will bring them to the test of a practical experiment.

It is from these beans that the inhabitants of Northern China procure the oil which they universally use for purposes of cooking and burning. The beans are steamed and the oil expressed. The residuum resembles our oil-cake, and is applied to the feeding of horses, cattle, sheep, etc.

It has occurred to me that this bean might be advantageously introduced into our "rotation," as it is a renovating rather than an exhausting crop. The oil certainly could find a market, if not for cooking as amongst the Chinese, yet for burning and many other purposes. The "cake" is probably equal to the "linseed cake," if not superior to it.

The land about Shanghae, where this bean is cultivated in great abundance, is level, low, and wet, producing principally wheat, cotton, rice, and beans. The bean, planted in drills about one foot apart, flourishes here. But it is grown with equal success upon the higher grounds adjoining the mountain ranges.

I regret that I did not bring with me specimens of the oil and cake, and that I can give no data as to the number of bushels produced to the acre, or the quantity of oil yielded per bushel. All this, however, I can obtain from friends in China, and will do so, if deemed desirable. Very respectfully,

RICH'D T. ALLISON,
Purser, U. S. Navy.

To HENRY MEIGS, *Secretary*.

William Benjamin presented a tin case of fresh salmon which he has been possessed of about five years. On examination the salmon was found to be entirely unchanged, and as fresh as on the day it was encased. A valuable evidence of the destructive power of common air, which in warm weather in three days would have corrupted the fish, but shut out, the fish has kept its exact condition for more than eighteen hundred days. Mr. Benjamin has, in the pursuance of his mercantile business, crossed the Atlantic ocean *forty times*, and generally provided with a convenient conservative stock of eatables to go through accidents with!

MUSCAN HAIR.

A new article for mattrasses was exhibited by A. S. Jones of this city, which is manufactured from the long moss, or, as it is sometimes called, Spanish Moss, which has been used for the purpose, with but little preparation, ever since this country was settled. The moss grows in unmeasured abundance upon the lowland forests of several of the southern states. The objection to it is that it cannot be freed from its inner bark, which wears off by constant attrition, and forms a fine dust. Its advantage is that it never harbors vermin, is perfectly inodorous, and entirely free from any animal impurities, such as sometimes get in with hair. In the present process of manufacturing the moss, which has commenced upon a large scale in this city, under a patent process, the fine, black, hair-like fibre of the moss is freed from its covering by steeping in some mineral solution, and afterward in a solution charged with iron, that gives it a glossy black appearance, like iron threads, and being very curly when dried, it is one of the most elastic, cleanly, durable and bug-proof materials for beds, and withal very cheap, the present price being $18 a cwt. Mr. Jones stated that a sample was sent to a house in

England, and an order came back by the first post for fifteen bales.

Dr. Smith, one of the reporters, inquired what effect dampness had upon this new material—that is new to him.

Solon Robinson—I will answer that question, having seen millions of tons of the moss growing, and in all its stages of decay, manufacture and use. This wiry fibre is almost indestructible; it will remain a long time—longer than wood on the damp ground without decay, and in any state of moisture is but little affected; and it is said that a mattrass made of it will not carry epidemical diseases. It grows in such abundance that it can be furnished in any desired quantity, and increased demand will cheapen the price. If this process of preparing the crude material for use comes into general use, it will add another to our industrial products, furnish a new article of export, and give better and cheaper beds to the people.

T. W. Field—Yes, enable the poor to get more, and more wholesome sleep.

Dr. Waterbury—Any cheap, good substitute for feathers will be a national blessing. I am glad to see this new article, and to hear the remarks made upon it.

GEORGIA PEACHES.

C. M. Saxton sent in a basket of peaches from Augusta, Ga., a fine yellow freestone.

Mr. Field stated that Mr. Saxton was in the weekly receipt of this choice fruit, and for aught he could see we shall have to look to the South for a supply of peaches, since the tree seems destined to fail entirely in this climate. The original disease of all trees is propagated by our system of budding and grafting, by which we only continue to grow limbs of the original trees. If the natural life of an apple tree was fixed at a given period, say 150 years, the natural life of the grafts would be the same.

BUTTER.

The subject that has been for some time pending was called up to hear a report from Dr. Waterbury. He said:

The subject of production of butter is not sufficiently appreciated. Nor is the value of all our different crops. Taking all the Northern States, hay crop is the most valuable, but is not appreciated, because it is not sold in its crude state, and exported like cotton, and that is not anything like as valuable as Indian corn, which six years ago was worth $300,000,000, and wheat $100,000,000. Cotton was less than wheat, while dairy products were more. Yet what protection, or what legislation does Congres ever give directly or indirectly to anything but cotton.

Dr. Waterbury had prepared a valuable and interesting table, showing the number of cows and pounds of butter and cheese produced in each State. We have only room for the following, showing the average number of pounds of butter made per cow in each of the States.

Relative Proportion of pounds of Butter and Cheese produced by cows in the several States of the Union. Prepared by Dr. Waterbury *for the American Institute Farmers' Club.*

States.	Butter, lb.	Cheese, lb.
Vermont,	80	50
New-York,	80	50
New-Jersey,	80	3
Connecticut,	76	63
New Hampshire,	70	34
Massachusetts,	62	54
Ohio,	68	40
Pennsylvania,	80	5
Maine,	70	29
Michigan,	70	10
Rhode Island,	60	20
Wisconsin,	57	6
Delaware,	55	--
Indiana,	50	2
Illinois,	42	4
Kentucky,	40	9
Tennessee,	33	6
Mississippi,	34	1
Virginia,	33	2
Oregon,	23	4
Utah,	20	7

States.	Butter, lb.	Cheese, lb.
North Carolina,	20	5
District Columbia,	19	2
Missouri,	20	--
Arkansas,	18	--
Alabama,	18	--
South Carolina,	15	--
Texas,	10	--
Louisiana,	6	--
Florida,	5	--
Minnesota,	2	--
New Mexico,	--	½
California,	None.	

This calculation is based upon the census returns of 1850. Important changes have since occurred, particularly in California, where butter is made now to a considerable extent.

Mr. Peter Dowie, a butter dealer in New-York city, gives the following directions for manufacturing and putting up butter for this market:

The greatest care should be taken to free the butter entirely from milk, by working it and washing it after churning at a temperature so low as to prevent it from losing its granular character and becoming greasy. The character of the product depends in great measure on the temperature of churning and working, which should be between 60 and 70 deg. Fahrenheit. If free from milk, eight ounces of Ashton salt is sufficient for ten pounds. Western salt should never be used, as it injures the flavor. While packing, the contents of the firkin should be kept from the air by covering with saturated brine. No undissolved salt should be put in the bottom of the firkin.

Goshen butter is reputed best, though much is put up in imitation of it, and sold at the same price. Great care should be taken to have the firkins neat and clean. They should be of white oak, with hickory hoops, and should hold about 80 lbs. Wood excludes air better than stone, and consequently keeps butter better. Tubs are better than pots.

Western butter comes in coarse ugly packages; even flour and pork barrels are sometimes used. Much of it must be worked over and repacked here before it will sell. It generally contains a good deal of milk, and if not re-worked soon becomes rancid. Improper packing in kegs too large and soiled on the outside, make at least three cents a pound difference. Whatever the size of the firkin, it must be perfectly tight and quite full of butter, so that when opened the brine, though present, will not be found on the top.

Until the middle of May, dairymen should pack in quarter-firkins or tubs, with white-oak covers, and send directly to market as fresh butter. From this time until the fall frost, there is but little change in color and flavor with the same dairy, and it may be packed in whole firkins and kept in a cool place. The fall butter should also be packed separately in tubs.

Dr. Waterbury said it was surprising that farmers could not learn the benefits of soiling cattle. He thought the time would come when land would be sold so high that owners could not afford to devote it to pasture.

Solon Robinson—That time has come when land is worth \$25 or \$30 per acre.

Dr. Waterbury said few knew the use of butter or fat in the animal economy. Suppose we look at the fact that the most intellectual portion of mankind are the greatest butter eaters. Casein goes to support muscle, sugar to support respiration, butter to the support of animal heat and all the functions of the body that grows out of that.

MILK COWS IN TEXAS.

Mr. Field said—A brother of mine has travelled much in that State, and notwithstanding the immense herds of cattle, the people who use butter have to look to New-York for a supply. Many families who own large herds never have any milk.

Amos Gore of Bloomfield, New Jersey, presented a very valuable bean. It was grown by Mr. Jacob Freeman and his father before him for nearly fifty years. They were market gardeners and having become possessed of this very valuable variety of *stringless* in place of *string* bean, found very ready and profitable sale for it in the markets, and did not let others have any ripe beans. Jacob the son, now old, gave the Secretary (Meigs,) an old acquaintance, two years ago some of these beans as a valuable legacy. Mr. Gore has taken pains to grow them and gives for the benefit of his country, these beans for distribution.

The nuisance of the bean to kitchen maids is notorious. Lend me your pen knife to cut these *string* beans! I wish the d——l had them! And so she cuts at least half the bean away, and yet, tired of the job she leaves some strings to get in your teeth, and not half as many beans as are wanted. If Jacob Freeman's stringless bean will save all this trouble, his memory ought to be well preserved.

Professor James J. Mapes presented a stalk of sorgho sucre, grown by him on his scientific farm near Newark, New Jersey. This specimen has just put forth its hampe of young seeds. The entire plant is nine feet and a half high. Sugar is believed to be profitably obtained from it—but fodder of superior quality, of it, is certain.

Henry Cotheal, Esq., of New-York city, presented seeds of the millet, called dourah of Africa, and also one never seen here before—the *fundi* of Africa. This plant grows on light sandy lands and in rocky places; resembles rice in its stalk and leaf, yields an abundance of small heart shaped seeds, which, somewhat like rice readily agglutinate, are very wholesome, and the whole plant, grown here, is four to five feet high, stalk jointed like the millets, and would make a famous crop for hay, or more particularly for soiling purposes.

In connection with what farmers should do, Mr. Bergen of Long Island made some pertinent remarks upon the subject of lightning rods. He related a noted case of preservation of a barn provided with a conductor.

An interesting discussion followed upon the subject of weeds and how to exterminate them. Mr. Field thought that weeds could be easily exterminated and kept out of the soil, and said he had lately been all over Professor Mapes's farm, which is absolutely free of weeds.

Mr. Bergen wished Long Island farmers knew the secret of keeping clear of weeds, as they were the greatest pest in his neighborhood.

Solon Robinson thought Long Island farmers must delight in growing weeds, since they hauled the seed home by the wagon-load in the stable manure they buy in this city. His remarks excited a good deal of merriment.

Mr. Pardee said almost the entire cost of growing garden vegetables was in keeping the ground clear of weeds. For five years he put everything in compost, till he got rid of weed seed, and the cost of raising strawberries did not exceed thirty cents a bushel.

Dr. Waterbury made a statement to the same effect; by the use of compost he got rid of weeds.

Mr. Amos Gore corroborated these opinions.

Dr. Smith related a noted case of a farm in England that was manured many years with nothing but woolen rags, which produced great crops and no weeds; because, once exterminated, and no seed sown in the manure, weeds could not grow.

The next meeting of the Club will take place on the first Tuesday in September.

Judge Van Wyck remarked that the butter question was one of universally admitted importance. In his late excursion to Dutchess county, he had informed himself that a good cow properly treated, there yielded every year about eighty pounds of butter.

Mr. T. W. Field said that he had visited the scientific farm of Prof. Mapes, at Newark, New Jersey, repeatedly, and was rejoiced to see there proof positive that the terrible foe of farmer and gardener, the weeds had been wisely totally expelled by the able Professor. And he also admired the admirable culture of the smaller garden plants, without the hoe entirely; a small mule was trained so as to step carefully in spaces 12 or 15 ins. wide between the drills, and stirring the soil close to the plants. The deep culture of the Professor has, as usual, saved his crops from damage by the recent severe drought, so much so that his farm is conspicuous as a green one, among the neighboring dry ones. His nursery of finest pears excels in quantity and character any he ever saw; pear trees not higher than his head are loaded with pears—some bearing 150 fine pears!

Adrian Bergen said that he was glad to attend the meetings of the Club and hear sensible men talk freely all about the ways and means of amending agricultural faults, of laziness or ignorance, and pointing the way to future improvements and welfare.

Mr. Gore felt convinced that guano and its imitative artificial manures had very great advantages over ordinary barn yard manure, both on account of the total absence of weeds and vermin, and also the greatly reduced trouble of transportation and application to the land.

The Club adopted as subjects for the next meeting "bread and butter for the city" and "steamploughs."

Heavy rain almost all day.

The Club adjourned to the regular day—first Tuesday of September, 1856.

H. MEIGS, *Secretary.*

September 2, 1856.

Present—Hon. Robert Swift Livingston, Solon Robinson, Dr. Waterbury, John Couzens, of Dobb's Ferry, Adrian Bergen, of Gowanus, Martin E. Thompson, Judge Scoville, Dr. Smith, T. W. Field, of Brooklyn, a Lady, Mr. Darling, Lieut. Washington A. Bartlett, of the United States Navy, and others—thirty-seven in all.

Hon. R. S. Livingston, in the chair. H. Meigs, Secretary.

The Secretary read the following extracts made from the last works received by the Institute from London, Paris, etc., (viz:)

[Newton's London Journal, August, 1856.]

Steam Plows and other Implements for Tillage. By David Fiskin and Robert Hay Fiskin, of Stockton on Tees.

Fixed power—drawing the implements across the land.

[London Farmer's Magazine, August, 1856.]

Boydell's Traction Engine, of which we extracted some notices for the Club of May or June.

The government experiments with it are of very great interest.

"An important series of experiments were commenced on Tuesday last by the select committee of the board of ordinance, with the above engine, to test its traction force as a substitute for artillery horses; and the results, so far as gone, greatly exceed our expectations—sanguine as they have ever been. The experiments on the 24th instant, were two.

First the engine, with a sufficiency of water for a good long yoking, weighing nine tons, hauled a heavy siege gun, (5 tons 12 cwt.) carriage and tender (2 tons 7 cwt.) and sixteen men (say 1 ton 2 cwt), making a total of 18 tons, including the engine itself, from the arsenal up Barrage road to Plumstead common, and down the steep incline to Waterman's fields in return. The steepest part of the ascent is one in ten, and of the descent one in eight, both inclinations having to be re-measured. Of the two, the descending was considered by all present the master-part of this experiment, no brake or drag being upon any part of the wheels, those of the gun-carriage and tender, (9 tons,) being without endless rails, for in the very steepest part of the inclination, our modern megatherium (great wild beast,) war-horse had as much control over his ponderous load as is to be seen in the parallel case of the steam-hammer, standing rock-fast, like a statue, the instant the order "stop her" was given—a feat which even few of the admirers of this new-fangled innovation expected to see performed in so triumphant a manner. Moreover in going up Barrage road, the wheels of the gun carriage sunk from one to three inches in the shingle of which the road was made—a circumstance which greatly added to the draught; nevertheless the war-horse dauntlessly took the ascent with that dignity of bearing and self-confidence which characterises the genius of steam when master of its work, and would soon have enabled the men to have planted the huge gun on the top of Shooter's hill, had not Colonel Tullock ordered him down the steep descent to try his metal there.

The second experiment was in hauling a gun of the same size over a marshy bog, in the lower part of the arsenal grounds, a bog too soft to bear the feet of horses when pulling, or even when standing. The wheels of the gun-carriage, in this case, were furnished with rails, and the engine was yoked to the gun by means of a rope, capable (it was said) of sustaining a strain of ten tons. This rope was broken by fair pulling several times, owing to abrupt inequalities in the ground which the wheels were run against, and not the best of engineering; but these were eventually both overcome. Two thousand and forty pounds pressure of steam on both pistons, or sixty pounds to the square inch, dragging triumphantly *eighteen tons over the quagmire!* A result which all the artillery horses in Her Majesty's service could not have effected!"

[U. S. Gazette, Philadelphia, August 29, 1856.]

Hon. Bronson Murray proposes to be one of a hundred to raise $50,000 for a steam plow to do the work as cheap as it is now done!

INDUSTRIAL RESOURCES OF RUSSIA.

"The central table land of Russia, in Europe, forms what is called the Industrial Zone. It may be considered as a level plain running from east to west, from the Valdai mountains to the Oural, bounded on the north by the southern frontier of the second Industrial Zone.

Here the soil is tolerably favorable to agriculture, and ordinary cereals are cultivated. Rye is the chief product. Barley is not raised for the consumption of the inhabitants. In the western division of this zone flax and hemp are abundant. Cattle are reared, but are very inferior. Great care is taken of bees because so much wax is used in the Russian churches. In the eastern portion of this zone the gold and silver of the Oural mountains are found, as also marble, many precious stones and salt. Peat used as fuel in Moscow.

The Agricultural Zone is bounded by the Industrial on the north, and by the Steppes on the south. The richness of the soil gives its name; it is a thick bed of black loam which covers the whole district, imparting to it a wondrous fertility. It spreads over 17,400 square miles—population nearly twenty millions. Here are raised wheat, hemp, oil seeds, tobacco, hops, beets and bees wax. A part of it is well wooded, and gives pitch, tar, and pearl ashes, has factories of various kinds—makes soap, tallow, candles, tans hides, and has salt petre and manufactures tobacco.

The Pastoral Zone or Plain of the Steppes, is the southern one of the Empire. Soil various—denominated according to the facts—grassy, heathy, brushwood, sandy, chiefly devoted to breeding horses, cattle and sheep. It has this immense importance—it contains the mouths of all the great rivers flowing towards the south. Odessa its principal port.

SIBERIA.—The plains of southern Siberia are wonderfully fertile. Siberia contains 250 thousand square miles. Elephants' teeth abound in the north, as also beautiful furs, gold and precious stones.

OX GRAZING FIFTY YEARS AGO.

Fifty years ago I saw in Borough Fen, seven miles north of Peterborough, clean and good grazing of a first rate but quite a different system by Mr. John Patrick. I saw as clean, good, and as profitable grazing and the oxen gained weekly as much per head in the neighborhood of Market Harborough, Liecestershire, fifty years ago, upon first rate old grass land, as I have ever seen since in any county in England. Many of those fields were from fifty to one hundred acres each. Their pastures were kept short until the first of July, when I say short I mean of sufficient length for an ox to fill his belly. And to keep the said pastures level, sweet and fresh, the *ox dung was gathered up weekly* ! What said the grazier about it—partly borrowed from *Bakewell the Great*, in agriculture? Why, that all grass grown before midsummer should either be mowed or kept a proper length by cattle and sheep, as grass, said they wisely!

[London Farmers' Magazine, August 1856.]

GUANO.

We are forcibly struck by the late comparisons scientifically made between the natural guano and the artificial guano.

Prof. Cuthbert W. Johnson, stated at Cumberland lately, that all the codfish caught on the great banks of Newfoundland, would only yield about ten thousand tons of imitation guano; whereas last season we received from the Chincha islands only *two hundred thousand tons* of the natural guano.

Analysis by Prof. WAY *of the Royal Agricultural Society and by* Prof. ANDERSON.

SPRATS.

Water,	64.60
Oil,	19.50
Dry nitrogenous matter,	15.90

When burnt 100 parts yielded 2.12 per cent of ash, which contained in 100 parts,

Phosphoric acid,	43.52
Lime,	23.57
Magnesia,	3.01
Potash,	17.23
Soda,	1.19
Common salt,	11.19

The Peruvian guano contained in 100 parts,

Water,	10.54
Organic matter and ammoniacal salts,	21.68
Phosphates,	46.20
Alkaline salts,	18.31
Sand,	3.27

Prof. Way observed that wheat contains about two per cent of nitrogen, so do the sprats. One hundred lbs. of wheat require about 1¾ lbs. of ash, of which about one half is phosphoric acid, and one third potash. One hundred lbs. of sprats contain two pounds of ash, of which two-fifths is phosphoric acid, and one fifth potash. What manure (he asks) should be more fit to produce a bushel of wheat than a half hundred lbs. of sprats?

PROGRESS OF AGRICULTURAL CHEMISTRY.

We sometimes complain "how little has agricultural chemistry really done for agriculture."

We can better decide by looking back and then compare.—" What is the food of plants?" Going back eighty years and considering Arthur Young as the pioneer of his day—let us see! in comparison with the Rothamsted experiments what he knew.

In 1783, '4 and '5, Young grew plants in pots containing various soils—manured with various substances. One of his conclusions was that common salt is a valuable manure, though never proved before. His notes on this subject are interesting—" that salt acted as a very good manure on loam, but did no good whatever on sand, which is remarkable, and should make us conjecture that its operation is mechanical—salt rendering the loam much more fertile and taking a considerable effect, mixed with dung." The result of another set of experiments is very remarkable and highly in favor of salt when dissolved in water and added to the dung; though poultry dung alone has been unable to stand the late burning weather, yet the *addition of salt to it* has made it prove a fine manure to the present moment. This suggests a most important lesson for the *addition of salt* to dung-hills." Spirits of hartshorn and sal-ammonia, were tried in his experiments, and he says, "*the volatile alkali* continues in this as in every trial to triumph! The votatile alkali has never failed of being of great service. In every repetition we can make upon the volatile alkali, its superiority to all other additions, is more and more confirmed. Up to that time, however, *ammonia had been declared an enemy of vegetation!*" Young proved that *covering soil* from the sun benefits it, (Gurneyism,) "this seems to denote that covering is good to destroy weeds."

Do not our modern German chemists talk of the "destructive influence of the plow" in exposing humus and ammonia to the rapid evaporation of the sun's heat. And do not the teachings of our men of "science with practice" point to the value of overshadowing leaves in the hot summer, to protect the gaseous riches which have been stored in the soil, in the rainy months of winter and spring?

Arthur Young also lighted upon much the same truth which Mr. Lawes has arrived at, relative to the power of nitrogenous manure to give plants assistance to avail themselves of the "mineral manure."

He fed plants with Priestly's phlogiston, that is hydrogen gas from iron filings and oil of vitriol, causing daily a stream of the gas to be thrown up through the soil in the pot from the bottom.

In 1786, he said, "I scarcely know the the man of science who has treated the subject that has not been sensible of the connection between chemical inquiries and the principles of agriculture. To imagine that we are ever to see agriculture rest on a scientific basis, regulated by just and accurately drawn principles, without the chemical qualities of soils and manures being well understood is a childish and ignorant supposition. If you do not know what is in the soil, how is it possible you should know what you ought to spread upon it," &c.

STEAM CULTURE.

The real object of all this machine culture is to take the place of the horse, but the £500 premium offered by the Royal Agricultural Society of England, for *an economical substitute for the plow and spade*, is one of those impossibilities too gross to be seriously entertained.

Boydell's Traction Engine is capable of applying more than its steam force to the cultivation of comparatively level land. In other words its traction force is greater than its motor force.

The celebrated Mr. Mechi, whose attempted improvements in agriculture have made much noise among farmers and others, has become an altered and a wiser man, a great deal of the wild and visionary has disappeared, he is daily becoming more of a farmer and less of a mere experimentalist. He has become a regular attendant at the London Farmer's Club.

[The Practical Mechanic's Journal. London, August 1, 1856.]

The Royal Agricultural Society at Chelmsford, July 11, 1856, trial of plows, etc., Boydell's steam locomotive for the field was started in the light land field and it went gallantly over the undulations of the earth dragging a great compound plow of Mr. Coleman's. The engine did its duty well but the ploughing machine to which it was harnessed did irregular work. It is indeed a seven fold apparatus, seven plows being disposed in a V form. And the difficulty was in the tendency of the cutters to get out of fair work and the regulation of the depth according to the form of the ridge. But the great novelty of the show consisted in two rival plans of steam ploughiug with a stationary engine and windlass, wire ropes and anchored pullies.

Mr. Smith of Woolston Bucks, has an arrangement of machinery by which, with a seven horse power engine, he has ploughed one hundred acres of his own farm, at a cost of *seven shillings* an acre, doing four or five acres every day.

Grass is good grown in April or May, but is bad food for cattle in August, September, October and November. But all grass grown upon rich land, after midsummer, is good and nutritious food for cattle and sheep, all through the last named four months. A meadow laid for hay and not mown, and not stocked until September and October, is *bad* and unfeeding!

[London Farmers' Magazine, Aug. 1856.]

The Horticultural Society was founded in 1804, by Sir Joseph Banks and others. In 1809 it received a Royal charter. Since its establishment, it has expended about $1,250,000, of which $200,000 created the garden—$10,000 for drawings, models of fruits, &c., $65,000 for new plants and seeds, and $100,000 in medals and money prizes.

Before 1830 it got in debt over $100,000 ; it is still oppressed by a debt of $50,000, of which not more than $15,000 has been incurred within the last twenty years. This late increase of debt is owing to unpropitious seasons rendering the garden exhibitions unprofitable—of diminished income—caused by deaths and other causes. This, unless checked, will speedily destroy this society, and that would be a public calamity.

Voluntary subscriptions are now solicited, and the annual payments by members to be reduced from $21 to $10.50 ; new members obtained ; no admission fee to be hereafter taken but the annual subscription paid in advance.

[Bulletin Mensuel De La Societe Imperial Zoologique D'Acclimatation, Paris, July, 1856.]

Extracts translated by H. Meigs.

ON THE PRODUCTION AND THE MEANS OF PERFECTING THE HORSE OF ALGERIA.

A letter addressed to Mons. the President of this Society, by M. Bernis, principal veterinarian of the army of Africa.

The devotion of your society to the high interests of agriculture and domestic animals, authorise me to address you on the practical subject of the horse in Algeria. The means proposed are to put at the disposal of the Arabian and European breeders, (who often fail for want of a good type,) the stallions to which the name of *stallions of the tribe* is given.

Before this wise measure, due to Marshal Count Randon, was adopted, a great number of breeding mares were unused for want of suitable stallions; and what is worse, a great many were put to horses of very little value. The true stallions were never wanting among the tribes. Those stallions, however, never make more than *one* or *two leaps a year!* while others make from thirty to forty!

In 1851, there were but 2,000 leaps made in all our breeding (Hippiques) establishments. In 1855, there were, in round numbers, 15,500, which number is daily increasing. Under the measures taken, if the stallions are suitably stationed, as to localities, &c., we shall, in a little time, arrive at immense results.

And it is indispensable that our breeders should unite in good action; and I shall not cease to repeat the necessity of constantly getting as near as possible to the following rules formed by the Science of Belon, Buffon, Linnæus, Pallas, Daubenton, Cuvier, Geoffroy Saint Hilaire and others, viz:

1st. Good quality of the material composing the organism, that is to say—the muscle, bone, tendons, ligaments, the aponevrose, (fascia), &c.

2d. The nervous fluid in harmony with the force and resistance of these organs.

3d. The conformation indicated by the laws of mechanics applied to the physiology of the horse.

The absence of those transmissible blemishes which constitute a predisposition in the colts to be so attacked, and which always more or less act as restraints upon the play of the articulation of the horse.

Every horse proposed as a stallion which has not by his antecedents been perfectly and undeniably proved to have the energy, the resistance to fatigue, swiftness long continued under a suitable weight, are among the proofs wanted.

Even a proper conformation of the horse will not do without the above proofs.

We know that without these, the horse is not to be used as a breeder, however admirable his exterior form, &c.

The proofs of the energy of every stallion stationed for breeding must be published every year among the tribes where they stand.

The result of which will be, that the natives will all bring their best mares to him, for the Arab will never put his beautiful mare to a stallion whose vigor has not been perfectly demonstrated.

That is the reason why such numbers of the most distinguished mares come to the stallions of our stations. But we must increase all this by causing our stallions to go among the tribes and look for the most beautiful mares.

The stud-book of Africa will soon be of great utility, for it will not only teach the whole world the success of the race but the precious elements of these ameliorating principles in the horse. We can hardly give attention enough to the perfection of that noble creature.

The relative stature of the stallion and mare is worth a note. If the mares of a country are generally from four feet eight inches to four feet ten inches high, and the stallions from five feet to five feet two inches high, we find a product most commonly of a loose frame and not able to do good service. The principle of the Arabs is never to put their mares, however small they may be, except to stallions of great stature.

Countries which are low and humid, where the soil abounds in grass, tend to give to the animals great and rapid development, thicken their skins, increase the quantity and quality of hair, and of the mane and tail; but diminish the nervous fluid and make the muscle, bone, and the organs generally, less solid in their texture compared with size.

The crossing of breeds has another fault, that is we *castrate the males*, but never the females. So that the cattle produce a *melange* (a mixture), prejudicial to our horse-race, (*chevaline*). The study of nature only can enlighten us, (in my opinion,) as to the multiplication and perfection of all that she gives us.

All civilized countries have been re-generated by agriculture. And all experience teaches us that one of the most efficacious causes of all agricultural progress is, if not the very first, the amelioration of the farm races of animals.

The French plow and sword are raising in Africa glory for ages. Happy if my studies, researches, and any science I have may make me a good worker in this cause ! !

The Garonne race of cattle, whose cradle has been in the valleys of that river, is one of the finest known. Its reputation, a matter especially worth our noting, came first to us *from England*

When the English undertook seriously, with that admirable instinct which distinguishes them, the amelioration of their races of which the Durham is with them perfection, it was in the Gironde where they came to choose their types!

The special characters of the Garonne race of cattle are—four feet eight inches to five feet two high, skin clear red or wheat color, fine, supple, short nap, large head, square, expressive physiognomy, neck and shoulders short, muscular, shoulders deep, free, limbs strong but not large, movements easy, full of nobleness, body elegant, form unexceptionable, buttocks and thighs irreproachable, tail handsomely attached, long, ending in an enormous silky tuft, withers prominent, the creature *perfectly plump*, foot well made, the horns hard. This race in all its qualities, taken together, without contradiction, is one of the most perfect we are acquainted with.

England came among us and stole our golden fleece. The brothers Collings, who gained celebrity for their stock, had no other models than our Garonne! Yet it is far from being proved that we should envy England. We may force nature, as in the Durham, but not with impunity; they fatten early, but will never constitute the two ends aimed at by breeders, for they will never be as highly estimated by the butcher as our's.

FISH GUANO.

The Farmers' Magazine says that it has been estimated that all the codfish on the Banks of Newfoundland would make about 10,000 tons of fish guano annually, while they import 200,000 a year from the Chincha Islands. It is thought, from this calculation, that the effort to supply the demand for guano with an article manufactured from fish will prove an impossibility.

SALT FOR MANURE.

Upon the subject of agricultural chemistry, The Farmers' Magazine, London, states some very interesting facts. One is that salt renders loam more friable and fertile, while sandy soil was not benefited. Salt added to poultry-droppings prevented it from drying up and burning the plants.

WEEDS AS A MANURE.

A gentleman present said he had a statement to make connected with one that was discussed at the last meeting, about keeping land in cultivation clean, and the folly of seeding the soil with foul stuff in the manure. He said he would relate an anecdote of a Long Island farmer, upon the subject of weeds; the former giving it as his experience that weeds are an advantage to the growing crops, and if plowed in before they seed, serve as a good coat of manure. One advantage that he contends for the weeds is that they keep the land moist, as they gather and convey the dew down to the roots of the crop plants, besides keeping the ground shaded. And, as they will grow everywhere except in a crop of buckwheat, why he don't mind them much, and as a crop to turn in, thinks the weeds an actual advantage.

Solon Robinson preferred clover for that purpose.

Mr. Bergen, a Long Island farmer, thought the weeds did not injure any small grain crops, but they were troublesome in hoed crops. He had plowed in weeds and found the practice advantageous. He plows as deep as his horses can draw the plow—he don't care how deep his land is plowed. He does not try to get rid of weeds, because if he did he couldn't.

Another gentleman thought land that bears great crops of weeds will bear anything else. He had often heard it observed, where the land bore a great crop of weeds it would bear any other crop.

Dr. Waterbury thought that all weeds were a detriment, and in their growth exhausted fertility that should go to promote the growth of useful plants.

Mr. Bergen acknowledged that weeds were a damage when they go to seed.

Dr. Waterbury said old farmers used to crop orchards—now, how different. The practice of seeding with crops is an old practice; now a better plan is to sow grass after grain crops are harvested, or to prepare the land especially for a grass crop and nothing else. Sowing an orchard is a miserable practice.

AGRICULTURE IN RUSSIA.

The Secretary read a paper from the Farmers' Magazine upon the subject of the agricultural value of Russia. One of the products of that country is honey to a larger extent than any other country. There is an immense region of rich, black soil, 17,000 square miles in extent. The cattle of Russia are generally inferior.

PASTURES.

A writer in the Magazine advocates keeping all pastures short up to the 1st of July. Also, the advantage of gathering up all the droppings of the cattle and carrying them off the land, or breaking up and spreading the droppings as soon as dry.

DYING ORCHARDS.

Dr. Wellington stated that there is a general impression in the vicinity of Boston that the apple trees of that region are all on a decline. No reason can be given; but many very fine old orchards that were in their prime a few years ago, are now entirely dead. One in particular, of five acres, has not a single tree left; the average of the stumps measure a foot in diameter. Some of these trees were old seedlings, that had been grafted in the tops with Baldwin's scions, and others were nursery grafts, set out thirty or forty years ago. The trees seemed to be diseased with what is called black rot. Most of the trees affected are of the Baldwin variety. Dr. Wellington thought it was an important question now to ascertain whether the theory is correct, that all grafts begin to decline after the parent stock is dead.

The subject of orchards and fruit being important questions, the Club adopted a motion of Solon Robinson to discuss the question at the next meeting.

COMPOSITION OF MILK.

Dr. Waterbury gave an interesting statement of the composition of milk and the class of animals that produce milk. All milk is essentially the same, so much so that one animal may be supported upon the milk of another, though not always in a healthy condition. The attempt to substitute cow's milk for the milk of women for food of children, is the cause of so many deaths in this city. The following is an analysis of cow's milk. The average of cow's milk upon ordinary feed of the farm, will give the following result: One hundred pounds of milk will give

Butter,	3 lb.
Dissolved and undissolved casseine,	5 lb.
Milk sugar,	4 lb.
Water,	87 lb.
Chloride of sodium,	1-6 lb.
Chloride of potassium,	$\frac{1}{3}$ lb.
Bone earth,	$\frac{1}{3}$ lb.
Free soda,	$\frac{1}{4}$ lb.
Total,	100 lb.

This is milk in a healthy condition. Of course it may contain many deleterious substances. The best substitute for the natural food of a child is rich cow's milk diluted with water and sweetened with refined sugar. That chemist who shall succeed in inventing an equivalent for the natural food of the infant will confer a great favor upon the human race. If the digestive powers of the stomach be weak, the curd may sour before it is dissolved in the juices of the stomach, and will be ejected by vomiting. The curd of milk is devolved in the system of the nursing to the production and support of muscles. Ordinary cow's milk will make twice as much weight of veal as pork, because it contains the elements of bone and muscle, and is better calculated to form lean meat than fat. It is not proper food for a child, because its constituents vary so much from the milk of human beings. This fact should be better understood.

HOW TO CHOOSE A GOOD COW.

The Doctor gave it as his opinion that one of the most important and true marks of a good milch cow is a large body—a capacity to hold a large supply of food to convert in her chemical laboratory into milk.

Dr. Wellington observed that the best milk cow he ever knew was noted for her great capacity of abdomen.

Dr. Waterbury gave some very valuable hints to prove that a breed of cattle good for beef, or rather the best breed for beef, will never be good for milk. He thinks Durhams make excellent beef, but Devons always will produce the most good milkers.

The Club then adjourned.

H. MEIGS, *Secretary.*

Sept. 16, 1856.

Present—Messrs. Rev. Mr. White of Staten Island, Mr. Darling 75 years of age, Dr. Waterbury, Captain Francisco Borden late of the Mexican army, Dr. Wellington, John M. Bixby, Mr. Veeder, Prof. Nash of Vermont, Prof. Mapes and others.

Rev. Mr. White in the chair. Henry Meigs, secretary.

The Secretary read the following report of the committee on the Mapes Experimental Farm at Newark:

THE MAPES FARM.

The committee appointed by the Farmers' Club of the American Institute to visit the farm of Prof. James J. Mapes, near Newark, New Jersey, on the 6th of September last, beg leave respectfully to report,

That they have performed that duty, and take pleasure in reporting, as the result of their investigation, the following facts:

The farm has been occupied by Prof. Mapes for ten years, during which time it has been gradually increased in size, now embracing 93 acres of upland, and devoted to various crops. When this farm comprised but 30 acres, and was visited by some of the members of the present committee, it was devoted chiefly to garden crops, and under the old system of garden cultivation, by hand hoes, forks, spades, etc., required from 10 to 25 hands, since which time, by the introduction of new tools, the farm, now three times as large as it then was, is cultivated in the most thorough manner by only seven hands.

The Soil and its Preparation.

The soil of this farm varies in quality—many of the fields being distant from others—chiefly, it may be said, to consist of a redkellis hard pan sub-soil, with a thin clayey mould on top—the sub-soil of a very tenacious quality and difficult of manipulation; indeed, without the use of the peculiar tool used for its disturbance, it would seem to be impracticable. Large numbers of boulders occupied the surface-soil, which have been removed; the better portions of the land have been underdrained, and the whole thoroughly sub-soil plowed to a great depth. This free admission of atmosphere into the sub-soil, has caused a disintegration of the redkellis, and now the whole surface to a great depth is in the finest tilth. From the depth of the disintegration and the influence of the under-drains, securing circulation of atmosphere and deposit of moisture by condensation, no drouth is ever felt, all of which was fully set forth by the committee who visited this farm last year, and who reported that the "fences seemed to be a boundary to the drouth."

Manure Shed.

Near the stables is a shed under which the solid manures of the stables are placed each day, the fluid manures running from the stables to a cistern which receives the drainage from the manure heap. This cistern is supplied with a pump, by which its contents may each day be pumped on top the manure heap, returning by filtration to the cistern, and preventing all fire-fanging or loss of ammonia from the heap. This arrangement does away with the necessity for forking over the dung heap, as it is never dry, and the soluble portions of each part are sub-divided through every other part, without any disturbance other than that consequent upon the filtration of the water itself, while the frequent changes of air and water supply all the necessary chemical conditions to secure decomposition without loss of ammonia. We learn that occasionally a small quantity of sulphuric acid was added to this cistern, to change the carbonate into the sulphate of ammonia, and that occasionally a small quantity of nitrogenized phosphate of lime, in a soluble or semi-soluble state, was also added.

Beyond the manures of the farm, which are entirely insufficient in quantity to produce the vigorous growths named by your committee, there are used, in variable quantities of 100 to 600 lbs. per acre of either Mapes' nitrogenized super-phosphate of lime, or the cheaper potash phosphate, and in all cases divided with charcoal dust or decomposed salt marsh muck, of which there are 50 acres, before being applied to the soil, which is mainly done during the disturbance of crops, and but in part before seeding or planting. No other artificial manures are ever used than the phosphates above named, and in some parts of the farm no stable manures have ever been applied. The cost of manuring seems to be much less than if stable manures without cost, except for carting and spreading, were applied. Those made on the farm are cared for in the best manner, but none others are ever brought to the farm, although they can be had at Newark, two and a half miles, at $1 per cord.

Improved Tools.

Of these there is a great variety; some distinctly labor-saving, while others embrace this quality in a less degree, but perform the work more perfectly and in less time, than those formerly in use.

Professor Mapes has found practically, that a few dollars expended to produce a tool precisely adapted, even to the working of but one kind of crop, if labor-saving or capable of rapid use, was profitable in the end, as it enabled all the work which should be done in early spring, or any other season, to be then done, and not at an inappropriate time. The motto of the farm is, "*never use a dull knife.*"

Among these tools are various double mould-board plows for banking celery, and other uses. Some of these have cut or open mould-boards, permitting the disturbed soil to pass through for special uses, etc. Varieties of horse tools for weeding to different depths, with means for separating weeds from disturbed surface-soil instead of replanting them; seed sowers of various kinds; dibbles, spuds, etc.; earth borers for post holes; planting tubes; digging forks of superior strength and adapted to various special uses; draining tools; potato diggers, etc.; liquid manure carts, with sprinklers when required. The more important, however, of the improved tools, are the following:

Mapes' and Gibbs' Digging Machine.

This implement the committee saw in use, and had every reason to be satisfied with its performance, as it leaves the soil in better tilth and to a greater depth, than can possibly be brought about by plowing, harrowing and rolling. This machine may be worked by a pair of oxen or mules, and will disturb as much soil in two hours to a depth of sixteen inches, as can be disturbed in five hours by the same team with any plow to the depth of eight inches; or, differently stated, it will disturb five acres to the depth of sixteen inches, in the same time that the same team can plow two acres to a depth of eight inches. The soil is left in a finely divided state, and the machine may be so set that the surface will be turned to any required depth from one to twelve inches, while the lower portion is disturbed without being elevated or mixed with the surface-soil.

Mapes' Soil Lifter.

This tool is so configured as to be easily propelled through the soil like a mole, lifting the soil for a short distance, but the resolution of the line of force being upward and outward, even this short distance of gradual lift renders the soil above it fine without material displacement. When run to a depth of nineteen inches under an old sod, it lifts it without turning, and the cut made by its upright part closes behind it, thus leaving the sod perfect again, but loosened to the full depth of nineteen inches. When used as a sub-soil plow it follows the surface-plow by a separate team, and going far below the track of the surface-plow, loosening not only the sub-soil, but by the slight lifting of one inch causing the loosening of the previous furrow slice; at the same time it undercuts and lifts the standing side of the furrow, so that the next operation of the surface plow is more effective, besides requiring less power. A smaller size of this tool is used to run between corn and row crops when first above the ground, lifting the rows on each side of its track without abrading the roots, and leaving the whole in fine tilth; it does not, however, remove any weeds from the surface, but rather encourages their growth in common with that of the desired crop. After its use, say ten days or less, when the ground has settled, then the weeds are all removed by another horse tool known as the

Root Cleaner.

Of which Professor Mapes has a great variety. These skim the surface, between rows, to a depth varying from two to four inches or more, by forcing a V shaped piece of steel, point forward between the rows, with a comb behind placed at an angle. The soil and weeds in passing over this comb are separated, the soil falling through, and the weeds, however small, riding over the comb so as to be left in the sun with their roots freed from soil so as to decay readily. These are of various widths and kinds to do away with hand hoeing of row crops entirely. The driver does not follow this tool so as to walk over the disturbed soil, but walks in the next row before its disturbrnce. With a small mule this tool is made to do the work of forty men with hoes, and in a much more perfect manner.

Knox's Horse Hoe.

Is also an admirable tool, being a compound of the root cleaner and two small plow shares, so arranged that they can be made to throw the earth toward, or remove it from, corn or other crops. It has many useful applications, and is an admirable tool.

Pratt's Ditching Machine.

This machine, with the help of a pair of oxen or horses, will dig 75 rods per day of ditch 16 inches wide and three feet deep. Professor Mapes has drained a seven acre field with it the present season ; the drains, however, are made five feet deep, the lower two feet being dug by hand in the usual way.

Horticulture.

In this department Prof. Mapes has made great strides. He raises large quantities of the finer kinds of fruit for market, most of which are sold to the Broadway fruit dealers.

The Vineyard contains about 1,200 vines in full bearing, and we have never seen a finer display of fruit or better wood. No disease is to be seen among the grapes, the greater portion of which are Isabella and Catawba. The other kinds cultivated embrace the following: Norton's Seedling, Hiberman's Madeira, Bland's Virginia, Charter Oak, Rulander, Portuguese Blue, Concord, etc.

Pears.

Both standards and dwarfed on quince stocks are largely raised, and we have never seen a pear orchard in so fine a condition ; many of the small trees having 200 pears each of the largest size and in perfect condition. The farm has many hundred fruit trees of other kinds ; apples, plums, peaches, apricots, cherries, etc.

The Small Fruits.

Of these there is a great variety and in large quantities.

Strawberries in many varieties, including Hovey's Seedling, Black Prince, Myatt's Eliza, Victoria, British Queen, Prolific Hautboy, Scarlet Cone, etc.

Raspberries—Of these a fine display, and include the following kinds, viz: Fastolf, Franconia, True Red Antwerp, White Antwerp, and others.

Blackberries—Lawton's, White, Black cap, etc.

Gooseberries—100 varieties of the best kinds.

Currants—Large Red Dutch and White Crystal.

Hot-Beds and Cold Frames.

Of these there are about 300 lights, and a large number of cold frame shutters. Large sales are made of plants to market gardeners and others from these frames, and they include all the kinds of plants required.

Several acres are appropriated to market gardening, all of which are worked in the best manner.

Large Crops.

Your committee examined a corn crop, which they estimated at 110 bushels shelled corn per acre, which estimate has since been found not to exceed the fact, their visit having occurred late in September last. Many acres in carrots it was supposed would yield 1,000 bushels per acre, and parsnips a still larger amount. The potato crop was large, chiefly of the kind known as the Mammoth Nutmeg, introduced some years ago by Prof. Mapes, and since improved in size so as to render them now a most desirable potato, and as yet not subject to disease. The crop we understand was 250 bushels per acre. The cabbage crop, one acre with 10,000 standing, promised to be all merchantable, and most of them of very large size.

The beet crop was very large, as well as onions, caula rapas, cauliflowers, etc.

All of which is respectfully submitted.

H. MEIGS, *Chairman.*
JOHN A. BUNTING,
THOS. W. FIELD,
A. O. MOORE,
JOHN V. BROWER,
R. L. WATERBURY, M. D.,
C. F. TUTTLE,
A. S. WALCOTT;
WM. RAYNOLD,
S. BLACKWELL,
JOHN M. BIXBY,
Committee.

NEW-YORK, *January* 3*d*, 1857.

The committee consisted of thirteen originally.

Messrs. John A. Bunting, Adrian Bergen of Gowanus, Dr. Smith of the Times, Dr. Wellington, George Andrews, John V. Brown, John L. Tucker, S. Blackwell and lady, A. O. Moore, Dr. B. F. Hatch, Henry Steele, C. F. Tuttle, A. S. Walcott, Mr. Raynolds and Henry Meigs.

The committee was received by the Professor and his amiable lady and children, with that grace which grows from cultivated cultivators—the rich farm and the science with the arts. The Professor gave us a volunteer upon his musical glasses, in a style of touch which is seldom experienced—tones inimitable by other means.

The committee then surveyed the farm, the factory of fertilizers in full action by steam power, the operation of the Professor's patent digger, or rather we say *Forker*. His noble oxen drew it through the soil, pulverising it literally. The driver touched the cattle rather too much with his whip, and Mr. George Andrews of the committee had leave to command them. He spoke gently to them, touched them lightly with the end of the whip stock and not with the lash, and they acknowledged his skill by a steady even draught, pleasing to the committee. When Mr. Andrews was young he learned this art from those who like his father had long made of their noble red cattle the most docile of creatures.

Capt. Francisco Bordon being invited to speak of the agriculture of Mexico, where he has been extensively a traveller and observer for many years, an officer of the army of Mexico, of English birth. One arm lost in battle with Camanche Indians—men of very extraordinary bodily strength and great courage.

The descriptions given by the Captain of the wonderful richness in yet undescribed magnificent flowers in some mountainous regions were well received by the Club.

Mr. Meigs remarked that Mexico had been long considered capable of excellence in agriculture almost without a parallel. The general surface being elevated about six thousand feet above the ocean on either side of it, its climates had both temperatures, the temperate on the summits and tropical at the base. Like the mountain Potosi, all the plants of both zones flourished within a couple of hour's ride of each other. Cotton, cabbages, sugar, potatoes, dahlias, buckwheat, rice, cheremoya, fig, orange, clover and timothy, and southern crab grass, rye and wheat, fuchsias and a thousand flowers of both zones, can be found every morning in the same market fresh from the gardens above and below. And the animals also are here of far distant districts; the splendid shawl goat may live above, while our sheep lives in the valley below.

[Revue Horticole, Paris, September, 1856.]

INSECTS.

Of the whole animal kingdom, the knowledge of insects is most important to horticulture. Their vast numbers, their small dimensions, the great difficulty in making accurate observations of their characters and manners, the extent of the injury caused by certain species and the important services rendered to us by others, all these demonstrate abundantly the great utility of the study of entomology. The Insects directly useful to man are reduced pretty nearly to three—the *Cochineal*, the *Bee* and the *Silk-worm*.

Insects almost supply the place of the thermometer, so precisely are their appearance governed by temperature, and their coincidence with the plants necessary to them. With this idea, Prof. Boyle has established in the environs of Aix, in Provence, an entomological and botanical calendar, or table of the first appearance of principal insects with the first flowering of indigenous vegetables. See Mons. Quetelet's observations in vol. 21, of the Annals of the Belgian Academy.

Some false notions are entertained as to the effect of temperature on the insects. It is generally believed that very cold winters hinder their development, yet these little beings sustain very low temperature without inconvenience. Mons. Mathieu, Professor of the school of forests, has observed that the eggs of lepidopteræ exposed to a cold of about 40° centigrade, (or about 20 degrees below zero of Fahrenheit,) were not injured. Caterpillars and their chrysales were not killed at 50° when they were all ice and gave a sound when dropped, and all revived when the suitable temperature returned; and on the other hand they sustain very high heat, even that of very hot water. Gnats frozen in ice remain so a long time without loss of vitality.

It is generally believed that fruits are more wormy in rainy years. Mr. Mathieu has shown that dry years, cold winters and hot summers multiply insects greatly. Electricity plays a great part among them—after greater than usual activity in thunder storms, their bodies are often found in great numbers strewed over the ground.

Insects are of very high utility to horticulture, being the most powerful agents in the fecundation of plants, especially those whose sexes are separated in the different flowers. The best way to prevent any hybridation by the insects is to cover the blossoms with clear gauze. The wounds on fruit made by insects sometimes operate favorably by ripening them sooner than others.

Indigenous plants, says Mons. Enrile Blanchard, are almost the only sufferers from insects, and the plants of the same species from abroad also suffer. On the contrary, other plants are hardly touched by such insects. It would seem that insects are attached to some peculiar food, and do not try others until in necessity.

The Chairman called up the subject of the day, "Orchards and how to preserve them." Dr. Wellington was requested to take it up, as Mr. Robinson, who proposed it, was absent.

Dr. Wellington said that the subject was certainly very interesting, and his attention had been for many years drawn to the subject by the decay of many noble trees of our best fruit. The Russetts of New England have justly held rank. The Baldwin very high rank. The first Baldwin is dead, and it is melancholy to witness its descendants perishing at thirty and forty years of age. Almost every tree in some orchards have left bearing fruit of value, and have at last been cut down. Does the theory of the life of the offspring of a fruit, dying with the parent, find confirmation? Some of the trees lately dead were set in the orchard of my father by me when I was young, thirty years ago! We have an excellent apple called the *Granny apple* which also flourished long, but when that tree died its offspring began to follow its example. We have tried all the best methods for cultivating and preserving the trees, in vain. Our former splendid crops of Baldwins and others have gone, and profits with them, for they were a valuable staple article in market.

Rev. Mr. White—I think it proper to state the result of an accidental matter on fruit trees. I had on my place some old apple trees—useless and beset at their roots with suckers. I casually threw oyster and clam shells about their roots, not dreaming hardly of any result, but the old trees soon revived and went into profitable bearing again.

Professor Mapes—We are now in a very interesting field of inquiry. On my farm, ten years ago, I found old neglected apple trees which had not borne fruit of any worth for the fifteen preceding years. I gave some potash, lime, silicate of potash, wood earth and other fertilizers, cleaned their bodies and pruned. I have so far restored their health that they give two thousand bushels of cider apples. I have cultivated among the trees. I revived an old Virgalieu pear tree which had like thousands of others got to bearing boys *wooden tops*, instead of the old rich butter pear of fifty years ago, so that the pears are good once more. I applied to it soda and potash freely after cleaning its bark well. The tree is now good and its fruit too. Our late friend and member, Commodore DeKay, succeeded as well on a Virgalieu tree several years ago. I use soluble silicates, etc., at a cost of some two cents each tree of my pears, and they bear fully every year. I set them eight feet apart, in rows twenty feet apart, and cultivate the small low crops between. I make holes three feet wide and four feet deep, these I fill with the best surface soil. I plough among the trees eighteen inches deep and sometimes more.

Rev. Mr. White—My experience convinces me of the high value of deep plowing among trees, as well as for smaller plants.

Prof. Mapes—My friend Mr. Birkmann, who is among our first Pomologists, has proved the value of fertilizers, etc., for pear trees by treating alternate trees and watching the several results.

On motion the question of "Orchards, and how to preserve them" was ordered for the next meeting.

Prof. Mapes moved that Pratt's new ditching machine should be also considered.

Paul Stillman's improved bayonet hoes were before the Club, and their utility acknowledged. The late Jesse Buel gave his name to this implement. Acting on a side it is a common hoe, acting vertically it is a fork—being polished and sharp it works better among plants that are near together than any garden tool we ever had.

Prof. Mapes said that he had seen a similar one at the Patent office, marked "Collins, 1810." Thomas Collins was the inventor of it.

The "Orchard and how to preserve it," and "Pratt's Ditching Machine," were ordered for next meeting.

The Club then adjourned.

H. MEIGS, *Secretary.*

September 16, 1856.

The committee appointed by the Institute to visit the vineyard of Mr. John Couzens, at Dobbs' Ferry, report that they examined it on Wednesday, the 2d instant, and found it an extraordinary pleasant mission.

Mr. Couzens some 20 years ago in this city found growing in his yard a grape vine whose character he knew nothing of, but took care of it, learned the method of treating the vines. It flourished and its fruit rewarded his care. It resembled in general the Isabella, but the berries showed a marked difference in figure and in size. These were round and the largest an inch in diameter. The Isabellas are ovoid and of less size considerably.

Mr. Couzens being very deeply fond of the garden, purchased three acres at Dobbs' Ferry, and successfully transferred his favorite vine there.

The committee found this vine to be about 14 or 15 inches in circumference at three or four feet above the ground, and putting forth branches a hundred feet long, around and over Mr. Couzens' dwelling.

He has many years ago, from this vine, propagated others; so that his three acres are covered with them; some on several hundred feet of arbors and on strong wires between posts. Many of the vines are allowed to have their own way as to climbing. They are on willow, cherry, pear, apple and other trees, hanging their clusters every where. Mr. Couzens has forked up the ground of his vineyard deeply, three times since May last. He gave to the committee both wine and brandy made by himself from these grapes. He calls the grape the Greenburg, from the name of the place near him; but as it is a new variety and owes its present establishment among us to the great care and industry of Mr. Couzens, we prefer to name it (as all botanists do new plants discovered by them after themselves,) the Couzens grape.

This vineyard although small, is comparatively great among us, for notwithstanding all the efforts of our people from the vineyards of Vevay to this moment, fame is charged with few titles to the gratitude of the Republic for the large culture here of the second of the three greater gifts of God to man in the temporal way, viz: "Corn, wine and oil." Longworth of Ohio, Underhill of Croton Point, &c.

Mr. Couzens merits our thanks for setting so excellent an example to us; and may be one of those who set agoing system of national importance. We can easily imagine the vineyards like his on both banks of the Hudson for 150 miles.

By order of the committee.

JOHN A. BUNTING,
M. DARLING,
LIEUT. W. A. BARTLETT, U. S. Navy,
HENRY STEELE, of Jersey city,
JOHN V. BROWER, of Jersey city,
JUDGE SCOVILLE,
ADRIAN BERGEN, of Gowanus,
H. MEIGS.

The Club adjourned to 1st Tuesday of November next.

H. MEIGS, *Secretary.*

November 18, 1856.

Present—Messrs. Dr. Waterbury, Solon Robinson, George Andrews, Stacey, Wagner, John M. Bixby and others.

Dr. Waterbury in the chair. Henry Meigs, Secretary.

The Secretary read the following translations and extracts made by him, viz:

Atlantic Hurricanes from 1493 *to* 1855. By Senor ANDRES POEY, *of Havana, with reference to all the authorities, communicated to the British Association*—40 *pages.*

Here is a list of four hundred gales and hurricanes with descriptions of them, and also a catalogue of 450 authors, books and periodicals containing them.

Mr. Poey gives the monthly distribution of 355 of them in the Atlantic and West Indies.

January,	5
February,	7
March,	11
April,	6
May,	5
June,	10
July,	43
August,	96
September,	80
October,	69
November,	17
December,	7
Total,	355

[Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimation, Paris, September 1856.

In 1848, Mons. Geoffroy Saint Hilaire, in his general report made to the Minister, says: Out of one hundred and forty thousand species of animals known to us, how many does man possess in a domestic state? Forty-three. And of these 43 France lacks *ten*, and all Europe *eight*."

The field of acclimation is immense—we must cultivate it. The Lama, the Egyptian Goose, the Hemione of Hindostan—that energetic horse, swift in the race—these are now naturalized in the *Jardin des plantes*. They have all reproduced themselves as well here as in their native countries. The Hemione now forms with its descendants, *a stud* in the garden, born and brought up there. Their bodies are larger and more developed than those in their natural state. It is now hardly twenty years since their first importation from the East, by Mr. Dussumier de Bordeaux, an honorary member of this society. The descendants of the Giraffe flourish at the museum, notwithstanding the great difference of climate between Paris and the burning sands of Africa. These animals thrive here with no more care than we have bestowed upon the merino sheep this century past.

Philosophers and chemists are daily adding conquests in their fields of action, and great ones! Agriculture owes it to herself to carry out the grand ideas which some of our great men long ago suggested—Buffon, Daubenton and others.

In 1766, Daubenton first began his labors in the Museum of Natural History, by acclimating the Merino sheep—reports of which he made to the Academy of Science. The experimental Menagerie was not founded until 1793, five years after the death of Buffon. We have no trace of the acclimation of Mammiferæ except the animals we now possess, and whose conquest by man reaches back to the most remote ages, and we have not the slightest indication of the time of its beginning.

With abundance of cattle comes abundance of milk, cheese, meat, manure that brings abundance of wheat, oil and wine cheap to all men. We now want fewer splendid houses in our cities and more full barns in the country—less luxury and more general comfort—less velvet in parlors and more hay in the stacks—great attention to roads, especially the small ones which reach the farmers. Too much cannot be done in the system of internal communications—equalizing values and vastly increasing production.

The following statistics of England are deemed reliable:

Agriculture, (viz) cultivated lands, ...	
Agricultural implements, grain, &c., ...	$10,860,000,000
Horses, cattle, sheep, &c., &c., ...	
The whole property of every sort, ...	$22,235,000,000

The gold of California at fifty millions a year, would pay England for her agriculture in 200 years!

SUGAR SORGHUM.

The Sorgho sucre attracts much attention on account of its sugar and as a fodder. Lindley in his Vegetable Kingdom—Edition, London, 1846, says: "Among the Graminaceæ are ranked *Eleusine Coracana* or Natchnee of the coast of Coromandel; the *Nagla*

Ragee or Mand of India ; *Phalaris Canariensis*, which gives us the Canary seed ; *Tizania aquatica*, or Canada rice ; *Paspalum scroviculatum*, the Menya, or Kodro of India, a cheap grain regarded as not being wholesome ; *Setaria germania*, a millet ; *Panicum frumentaceum*, or *Shamoola* of the Deccan ; *Setaria Italica*, cultivated in India by the name of *Kala-kangnee*, or *Kora-kang; Panicum Miliaceum*, a grain called *Warree* in India; *Panicum-pilosum*, called *Bhadlee; Penicillaria-spicata*, or *Bajree; Andropogon Sorghum*, or Durra, Doora, Iowaree, or *Iondla*, and *Andropagon saccharatus*, or *Shaloo*, are grown in India for their grain ; *Fundi* or *Fundingi* of the west of Africa, (we have some from Mr. David Cotheal,) is a small grain valued there—it is the seed of *Paspalum exile;* the *Teff* and the *Tocusso* are of like species—they belong to Abyssinia. The *Teff* is *Poa Abyssinica*—the latter *Eleusine-Tocusso* of Linnæus; *Stipa-pennata* yields a flower like that of rice.

The *Doorah* appears to be the most common fodder of India.

[Journal of Agriculture of the Highland and Agricultural Society of Scotland, July 1856.]

We extract with pleasure from this intelligent journal the following rather remarkable ideas on agriculture—a science in which it seems doubtful yet whether we have half reached the great secrets of vegetable physiology.—[H. Meigs.]

AGRICULTURE, METEOROLOGY AND PHYSIOLOGY.

"Frequently," says M. Barral, "the vulgar laugh at seeing the ardor with which Savans discuss certain questions, nor can they comprehend the passion with which some try to find out how nitrogen enters into plants and is fixed in them." This has been a most fertile subject for discussion ever since chemists detected this substance in plants and became acquainted with some of its properties. Smith, of Lois Weedon, grows good crops without anything more than thorough tillage, and the Rothamstead plan by tillage and no manure, raises 16 or 17 bushels of wheat year after year on the same spot. When turnips are tried on this plan they almost fail, but with some superphosphate of lime they yield eight tons per acre, only a third of a crop, and which cannot be increased by adding more of the superphosphate of lime. But the superphosphate of lime does not make any increase of the 16 or 17 bushels of wheat on the Rothamstead soils.

Smith, at Lois Weedon, raises 34 bushels of wheat on an acre year after year! For turnips Smith uses per acre farm yard manure heavily, and then adds guano next spring, and gets twenty tons of turnips per acre.

Smith at Lois Weedon, who gets 34 bushels of wheat from an acre, year after year, without manure, sows his wheat in triple rows a foot apart. These triple rows and *three feet intervals* alternate with each other. The intervals admit of the crop being hoed and cultivated up to the month of June, when the wheat comes into ear, and by this means one half of the land is well stirred. The next year these intervals are sowed, and so on successively.

Smith says that his Lois Weedon soil is composed of gravelly loam, with a varied sub-soil of gravel, clay and *marl*; that this land has been worked hard for nearly a century; it has never known a bare fallow in the memory of man.

Query by H. Meigs—Will the marl explain the matter? for its influence is ascending!

Cereals are always diminishing their leafy surfaces as soon as they begin to put forth their ears, and as their *glassy stems* are not fitted for absorbing ammonia from the atmosphere, they must draw it from the soils.

RAILROADS FOR CARRYING STOCK.

It is estimated that cattle driven on a common road 100 miles lose each 20 pounds weight, sheep 8 pounds, pigs 10 pounds. In 1853 seven railroad companies brought nearly twelve hundred thousand head of live stock to London; in 1854 more than two millions of oxen, calves, sheep, lambs and pigs. And one of the most important results of this conveyance is its rapidity, so that a great quantity of country-killed meat is now transmitted to London. Seventeen thousand tons of meat and poultry were conveyed to London in 1854 by the great Northern railway.

Mr. Braithwait Poole says that in 1850 there were 67,500 tons of country killed meat conveyed to Newgate and Leadenhall markets alone.

MILK.

The dairy cows of London yield an average of nine quarts daily, and number 24,000. The railways bring more and more milk to London every year, in cans of six to eighteen gallons each, at about three farthings a gallon for 40 miles, and a penny if farther, returning the empty cans free of charge. The milk sells to large dealers for from five to seven pence per gallon. They sell to retailers at seven to nine pence, who sell it to the people at three to four pence a quart. In 1853, it is estimated that the railways brought to London three millions of quarts.

France raises eggs enough in a year that if they were strung like beads they would coil twice round the globe.

PLOWING.

The Tweeddale plow will turn over a square furrow of hard land to the depth of fifteen inches, with four horses, and after plowing and sub-soiling it can be done with two horses. There is a remarkable and exact resemblance of the mould boards of this plow, when placed opposite to each other, to the bow of the frigate Thetis, a sharp built fast sailer.

MODE OF PACKING EGGS FOR MARKET FROM DUMFRIES TO LONDON.

Wholesale egg-merchants purchase at the market in Dumfries, and convey the eggs to Carlisle by a species of land-carriage requiring skillful package. A layer of eggs so closely wedged together as to leave no openings but such as necessarily resulted from the shape of the eggs. This being done another stratum of straw and eggs succeed until the body of the cart is filled. It is said that a mass thus packed is so firm that a load of meal can be placed on it without breaking the eggs. They then take the railways to New Castle, whence they are shipped to London by steamers.

[Revue Horticole, Paris, August, 1856.]

VARIETIES OF THE GRAPE VINE IN AMERICA.

Translated from the London Gardener's Chronicle.

It is impossible to count the vines of America. Rafinesque enumerated forty species and one hundred varieties in his little catalogue published in 1830. Since that time the numerous territories added to the American Republic, contain a great number of vines, wild and cultivated. Texas and California are very rich in vines. The Catawba is a tender delicious grape—so delicate as to be difficult to handle—it is considered to be originally foreign. The Mustang and El Paso are particular varieties in Texas. The Mustang is a wild native and the Paso a cultivated variety. The Colony of El Paso is near the cataracts of the Rio Grande. It is a garden of twenty-two square miles, inhabited by 3,000 souls, situated about half way from Chihuahua to Sta Fe. This valley yields about 1,000,000 quarts of wine—perhaps the best in the world; its price there is about forty cents a quart. They also make as good raisins as those of Spain or Greece. The Mustang grape is extremely abundant in Texas, and wine analogous to Port is made of it. The culture of the vine in Alabama begins to assume importance,—the grapes are very *winey*, (tres vineuses) at a second pressing they still give very potable wine. Wild grapes in Louisiana, Mississippi and Arkansas, are known by the names of the *fox*, the *chicken*, the *bean* and the *bull*. One of these has been cultivated successfully, so that its wine has been sold by the name of the Bland Madeira. North Carolina is the native country of the Catawba, Herbemont and Scuppernong. The two first owe their reputation to the care of the cultivators of Ohio and New-York, and are but little cultivated in their native region. The vines of the Scuppernong are found growing from the Currituck to the southern counties of Cape Fear, and westward as far as the Blue Mountains. Wines made of it differ so much in quality that some sell for twenty cents a quart, and others for twenty-five to thirty francs a barrel, ($5 to $6 a barrel.) What might it become with age? It is hard and dry now without sugar. And is not the Sercial, the king of the wines of Madeira, hard, rough and repulsive, like some old Presbyterian, during its first year of age? The mode of culture of the Scuppernong reminds us of the Lombardy festoon made of vine growth. Virginia seems to us better suited to the culture of the grape than any other of the states. New Jersey formerly cultivated the vine, and at the beginning of this century Indiana furnished the largest quantity of wines from plants taken originally from Vevay, in Switzerland.

The Catawba and Isabella grapes were discovered growing wild in Buncomb county, North Carolina. In 1826, Major Adlum, an officer of the revolution, cultivated the Catawba at Georgetown, District of Columbia. "I believe," said he in a letter to Longworth, who followed his example, "that in making known to my country the merit of the Catawba grape, I have done more good than if I had paid the National debt." That prophecy is being realised!

The Isabella owes its name to Madame Isabella Gibbs, who brought it from North Carolina to Brooklyn, Long Island, where it flourished on the estate of her husband. It was first called the "Laspeyre grape," the name of a French colonist, who cultivated it in Wilmington, North Carolina. However, American wines will never equal the European!

MAMMOTH VEGETABLES.

Our Golden State, California, continues to excite wonder in the production of vegetables more than her gold.

The San Francisco Herald, of October 6, 1856, announces the exhibition of the squashes raised at Sacramento by Mr. J. S. Cohen, at the State Agricultural Fair at San Jose. One of these squashes weighs three hundred pounds, another two hundred and seventy pounds. The circumference of the largest is seven feet six inches.

RUST IN WHEAT AND OIDIUM IN GRAPES.

We are to suppose that what we see in the nineteenth century is entirely new! On reading the Geography of Strabo, long ago, I found his description of the climate of England so precisely that of our day, that I felt almost inclined to desist from my long continued meteorological observations. He remarks that in the district where London now is, fog, mist and drizzle were almost constant for a portion of the year. That once in a while, about noon, the sun broke through the fog and shone for a short time, and then the fog closed up again. His descriptions of the Crimea are known to be exactly true this day.

Horace, in ode 23d of his Carminum 3d, under his motto, "Puris tantum manibus deos placari," *The Gods are pleased with pure hands*, speaks of rust in wheat and blast in grapes. "That a pestilential air from Africa, humid and hot was very noxious to the wheat and grapes of Italy, producing rust or smut which blackened the ears and ruined the grain." The Romans worshipped a god under the name of rust or smut "*Rubiga*," and held festivals to him about the end of April, to *keep off the smut.* King Numa, one of their most venerable monarchs, by statute, in the second year of his reign, established *Rubigalia*, rust or smut feasts, to take place about the seventh day of May, annually. The disease was always attributed to excess of humidity. Theophrastus, 2300 years ago, calls it "Rubigo humescentia occupat semina," a rendering of his Greek in his Botany.

Solon Robinson—I wish to call the attention of the American farmers, through their Club, and also to place upon record a very important matter which in some future years, not very far distant, may affect all the oil producing interests of America. I allude to the discovery that we have stored up in the earth, a supply of the same substance that we obtain by planting corn, tending, harvesting, storing, feeding to hogs, and manufacturing the fat thus produced into oil. Now, how far this is going to affect those who furnish this vast agricultural product, may be thought of at least after reading the account given of the Breckinridge coal by the commercial editor of the Tribune:

Since the first developments which were made by experimental analysis showing that the coal of the Breckinridge company contains a large amount of oil suitable for illuminating and lubricating purposes, we have watched with great interest the progress of these experiments as of truly national importance, as giving a new impulse to the development of the mineral resources of the country, and as establishing the fact that we have within ourselves an inexhaustible supply of light, to be obtained with far less the expense, and labor, and danger, than the animal oil now in use. The whale, upon which we now depend for oil, is rapidly being driven by the energy of our fishermen into inaccessible seas, and will before many years, at the present rate of destruction, entirely disappear. By the discovery of the presence of a true illuminating and lubricating fluid residing in certain descriptions of coal, we have become independent of such a misfortune, and the whole whaling fleet might be laid up to rot, and we should still have light.

The production of oil from coal is not a new discovery, but the discovery of coal beds in this country of a character to yield a sufficient amount of oil to pay the expense of extraction has but recently been made. In Scotland the Boghead coal has for several years been used solely for distillation, being far too valuable for fuel. The oil from this coal is used upon the English and French railroads, and the demand is always in excess of the supply. Railroad managers prefer it to the best sperm oil. In Nova Scotia there is another deposit of coal at the Prince Albert mine which also yields a good quality of oil, and these, with the exception of the Breckinridge, are the only localities yet known where the coal yields a sufficient quantity of oil to pay the expense of manufacturing. Since the experiments of the Breckinridge company were made with such a successful result the whole country has been explored for oil-bearing coals, but thus far the experiments have resulted in disappointment. No coal has been yet found which could be made to yield much more than half the results of the Breckinridge, and of course could not come into competition with it.

When the announcement was first made of the developments in regard to the value of this coal for distillation, the statements were ridiculed as incredible; but the practical working result has, if anything, exceeded the anticipations excited by the preliminary experiments. The products of the coal are purer, and the quantity larger. The purposes to which they can be applied are also more numerous.

We have taken up this matter at this time to show the public what has been the progress of this company during the last six months, and what may be expected for the future. These results are of manifest public importance, as marking the advance of a new branch of industry, and an entirely new development of the mineral wealth of our country. When the experiments with this coal had fully satisfied the parties engaged in them of its great value as an oil-producer, a company was at once formed, under the management of the Messrs. Cairns, who made a contract for a series of years with the Breckinridge coal company for a supply of their coal, and commenced putting up works for manufacturing oil at Cloverport, Ky., the shipping port on the Ohio river of the coal company. As the works approached completion, and as the great value of the Breckinridge coal for oil purposes became more thoroughly established, it was thought to be the best policy for both parties to consolidate the coal and oil companies, which was accordingly done. Extensive fire-proof works have been erected at an expenditure of $60,000, capable of containing thirty retorts, with the necessary tanks, stills, &c., for refining the crude oil. Of these, twelve retorts have been in operation some months, and the remaining eighteen are ready. The operations of the company have been very much embarrassed by the unusually low stage of water in the Ohio river, which, by entirely suspending navigation, has detained the additional stills of the company at Louisville, and prevented the shipments of oil. The company have now on hand 45,000 gallons crude oil and 5,000 gallons of refined, and are manufacturing at the rate of 6,000 gallons per week. The accumulation of crude oil is occasioned by the want of the stills, detained at Louisville by low water. When these stills arrive, and the remaining eighteen retorts are brought into use, the product of the company will be 15,000 gallons, crude or 13,000 gallons refined oil per week. This would give 780,000 gallons or 19,500 barrels per annum. The substances obtained by the distillation of each ton of this coal are, burning and lubricating oils, benzole, naptha, parafine and a residuum of asphaltum. The coke left after the operation, is used for fuel under the retorts and stills, and is ample for that purpose. Every ton of coal produces 90 gallons of crude, or 70 gallons of refined oil. The burning oil is used in lamps for illuminating purposes. Its merits are cheapness, brilliancy and entire absence of danger of explosion, which makes the use of camphene so hazardous. Its illuminating power and duration of combustion are equal to the best sperm, while it costs only half as much. The lubricating product has been tested upon machinery and found to be equal to sperm for that purpose. As it can be sold at about one-half the price, the saving to railroads, machine shops, &c., must be very great. The benzole is used for the manufacture of gas in portable gas machines. These are much used in isolated buildings and in the country where gas companies are not yet an institution. The naptha is used for various purposes, and is valuable as a solvent for India rubber and gutta percha. The parafine is a product exactly resembling wax, and is used for making candles. The amount obtained of this product is some 2,000 lbs. from 100 tons of coal. This substance has been found very valuable in the dressing of tanned skins—putting on the fine face and softness which characterize the French dressed skins.

At present, on account of the impossibility of shipping the products on the Ohio river, the company are not prepared to supply the public, excepting in small quantities; but as soon as the river is at a boating stage—and the water is now rising—they will be receiving 6,000 or 8,000 gallons per week. Specimens of all the products can be seen at the office of the company, No. 98 Broadway.

As an explication of the national importance of this enterprise we have made a computation of its comparative results with those of the whaling fleet, by which it will be seen that the product is enormous in view of the capital, number of men and time employed. In 1855 there were engaged in the whale fishery 635 vessels, of all sizes, with an aggregate of about 200,000 tons, and employing in all departments some 15,000 men and $10,000,000 capital. The product of the fishery was 72,649 bbls. sperm and 184,015 bbls. right whale oil. The average time employed to produce this result was 42 months for the sperm whalers, and 30 months for the right whalers, making a general average of 36 months. The sperm oil sold at an average of $1.77 2-10 per gallon, and the whale at .71 3-10. At these prices the aggregate sales of the entire product realized in round numbers ten and a half millions of dollars. The present product of the Breckinridge works is, with 30 men, say 675,000 gallons annually. The same number of men and the same amount of capital as the whale fishery requires, employed in the production of oil from Breckinridge coal, would produce in twelve months the enormous amount of $275,000,000, instead of $10,500,000 as above. The whalebone in the one case, and the products other than oil in the other, are omitted from the calculation. Of course this comparison is only made as a curiosity for its wonderful results. No one supposes that whale fishing will be abandoned as long as whales can be found in the remotest portions of the great deep to reward the courage and enterprise of our hardy whalers. But we look to the Breckinridge oil company as a valuable auxiliary to supply the vacuum caused by the annually decreasing number of whales killed, and to keep down the prices of illuminating and lubricating oils within the means of the laboring and mechanical classes. And in this light we take a warm interest in its success, and desire to aid it by all the means in our power.

Dr. Alexander H. Stevens, lately president of the State Medical Society, has set out on his place at Lloyd's Neck, L. I., two thousand five hundred of the most choice pear trees, dwarfs and standards.

John M. Bixby did not admire the immense use of pork here or any where. It caused scrofulous disease extensively. Pork was justly condemned by the laws of the Jews.

As to the grapes of Vevay—I attest the excellence of those of the original Vevay of Switzerland, where I have enjoyed them. They there grow on sunny side hills, which perfects their juices; they resemble the Black Hamburgh.

Mr. Vail—Has raised sugar sorghum on the farm of Olcott & Vail, at Mount Vernon farm, in Westchester, 17 miles from the city, near the New Haven railroad. It grew thirteen feet high—hogs and horses love it—best boiled a litte—contains much syrup. Others have raised considerable crops of it this summer.

Solon Robinson remarked on the fattening property of sugar for horses, cattle, &c., that lately while sugar was so cheap, it was profitable to add it to feed for them.

P. Blot—A letter from him from Yorkville, 80th street and 3d avenue, relative to growing mushrooms—*a la mode de Paris*—for New-York market. He wants capital, which would be profitably employed in that fine edible.

William R. Prince of Flushing, sent a Chinese yam, the *Dioscorea batata*, growth of 1856, on his farm at Flushing. This one is 22 inches in length, and about six in circumference at the largest part—it contains several hundred eyes, each of which gives a new plant. It runs down deep and the cultivators of it in France and here complain of the great difficulty in digging it out.

Mr. Meigs—There can be no difficulty in planting it in ridges as we hill up celery, and it would be the better for the greater circulation of air, and of course readily got out when mature.

"How to make orchards, and how to preserve them."

The Club adjourned. H. MEIGS, *Secretary.*

December 2, 1856.

Present—Messrs. Wheeler, Rev. Eli Corwin of San Jose, California, Rev. Mr. White of Staten Island, Prof. James J. Mapes, Prof. Nash of Vermont, Mr. Darling, George Andrews, Hon. Robert Swift Livingston, Solon Robinson, Adrian Bergen of Gowanus, Frederick W. Geissenhainer, Jr., Mr. Vail of the Mount Vernon, Westchester farm, Hon. Judge Scoville, Mr. Pardee, Dr. Smith of the Times, Daniel C. Robinson, and others—36 members in all.

Hon. R. S. Livingston in the chair. Henry Meigs, Secretary.

The Secretary read translations and extracts from the books, periodicals, &c., lately received by the American Institute.

COMPARISON BETWEEN REAPING MACHINES AND HAND WORK.

With the Machine.

Wheat,	13½	acres in	23	hours;	cost per acre,	$2 12
Oats,	12¼	"	30	"	"	4 00
Oats,	25¼	"	36	"	"	2 00
Oats,	71	"	74½	"	"	1 75
Oats,	35	"	46	"	"	1 85
Hay,	19½	"	33½	"	"	75
Hay,	30	"	31½	"	"	50

Hand Cutting.

Wheat, 9 acres, cost,	$2 25
Barley, 56½ acres, cost,	2 12½
Oats, about the same,	2 12½

There seems to be a saving in time only by the machine. The cost of work per acre being about the same as by hand.

Weight of wheat in the various districts of Scotland in crop of 1855, viz:

In Aberdeen, Argyll, Ayr, Banff, Berwick, Bute and Arran, Caithness, Clackmannan, Dunbarton, Dumfries, Edinburgh, Elgin, Fife, Forfar, Haddington, Inverness, Kincardine, Kinross, Kirkcudbright, Lamark, Lanark, Linlithgow, Lairn, Orkney, Peebles, Perth, Renfrew, Ross and Cromarty, Roxburgh, Selkirk, Stirling, Sutherland, Wigtown.

Smallest weight was in Renfrew,	56 lbs. per bushel.
Greatest weight in Argyll,	64 lbs. per bushel.
General average,	60 lbs. per bushel.
Weight in Perth,	63 to 64 lbs. per bushel.

Sixty pounds per bushel is the fair common weight of the wheat of Scotland.

[Journal De La Societe Imperiale et Centrale d'Horticulture, Napoleon 3d, Protecteur: Paris, August 1856.]

Received from the Society by the American Institute, Oct. 8th, 1856.

Extracts translated by Secretary Meigs.

HOW TO PRESERVE GRAIN AND HOW TO HASTEN ITS GERMINATION.

Seeds perish by means of humidity, from which it is very difficult to save them, above all in long sea voyages. Physiologists know the longevity of a great number of seeds to whose duration it is difficult, perhaps impossible to fix any limits. Forests of second growth are instances in point. The phenomena of the growth of vegetables different from the first growth have not been, probably, sufficiently studied by botanists—such as Capucras, Restingues, Hemathes. Serious examination would doubtless yield physiological discoveries of the highest interest.

It is evident that certain precautions do preserve vegetative virtue—experience has decided that.

We see in the London Gardener's Chronicle of 29th of March last, that Mr. G. Z. Wilson communicated to the Society of Arts, that one of his zealous friends had successfully raised tropical plants, by steeping them from ten to twenty days in glycerine, (a sweet substance which forms in soap making, *saponification*, originally observed in the formation of common plants by boiling oil with oxide of lead and water—*Brande*.) The seeds grew promptly and vigorously. He says that glycerine must possess the faculty of re-establishing the vitality of seeds. Experiments ought to be tried further, both as to their preservation for transportation and their vitality.

It will be curious that in a substance hardly yet known, to find the power to preserve seeds on long voyages, &c.

Glycerine is a mild colorless syrup produced by stearic acid in the manufacture of stearine candles.

We invite further examination of its properties, for it will be very important if experience should prove it to have both the power to preserve seeds and to stimulate their growth when put into the soil!

CHESTNUT TIMBER OF OLD.

An inquiry is being made relative to the importance of this timber in architecture and the policy of re-establishing forests of it, where it anciently abounded. It is said that our ancestors, centuries ago, made their floors and many other parts of oak, because they were strong and stiff, bearing well all the weight we put upon them. But that the rafters and other parts of the roof were made of chestnut because the rafters were arranged in sharp angles, from 50° to 7°, and being covered with lead or with tiles, were very strong at that sharp angle—that spiders avoided hanging their webs upon it, and no worm bored into it! Roofs built 500 or 600 years ago of chestnut were still sound. The roofs of old Lutetia (Paris,) were built of chestnut from the extensive forests then existing in the department of the river Seine. The chestnut tree has but little (*aubier*,) sap, and loves a sandy soil, and grows more vigorously than oak. We doubt the theory of spiders not loving chestnut timber. It is true that the chestnut roofs of old churches are rather free of their webs, but they are also too high for the flies, so that spider of course does not lay his snares for them there.

Moreover, on examining the timbers of the roof of a building of the age of Saint Louis, we found them about one metre in circumference instead of square, as reported, and of oak instead of chestnut.

The timber of the cathedrals of Chartres of Paris, St. George-de-Bocherville of the Bishopric of Auxerre, the church of Saint Denis of the date of the 13th century, cathedrals of Rheims, the church of Saint Martin-des-Champs, the chapel of St. Germer, the hospital de Tonnere and others too numerous to repeat, belonging to the 14th, 15th and 16th centuries, all appeared to us to be of oak, and to have no resemblance with the chestnut which we have in our forest to-day.

However it must be said that the oak timber employed in those ancient days, was of a species different from those generally used in modern building! The peculiar character of those ancient oaks was equal size from one end to the other of the timbers used! very little sap wood—a porous tissue, silky, straight grain, almost total absence of nots, cracks, stiffness—same color almost at heart and surface—fine and equal concentric circles and the timber comparatively light. This kind of oak grew abundantly during the middle ages—as late as 1600. The carpenters found it almost formed for use—long bodies clean up to the lofty branches. By counting their concentric rings we find them to be on an average, (the largest of them,) from eighty to one hundred years of age. Our forests no longer produce such trees.

The oak and chestnut have affinity, and it is often impossible, positively, to recognize the species of a specimen of either timber. Many eminent judges of timber are embarrassed by it.

Mons. Poiteau and others say, that the growth of the chestnut is rapid—that a chesnut tree of two years growth from the seed, being cut down close to the roots will grow so as to yield—seven years after a fine tree.

[Journal de la Societe Imperiale et Centrale D'Horticulture, Napoleon 3d, Protecteur. Paris.

From the late number received we extract the following, viz:

BLUE ROSES AND DAHLIAS.

A letter read from Mr. Vergne, gardener, No. 84, route d'Asnieres a Batignolles, inviting a visit from the society, by a committee, to examine his blue roses and dahlias.

POTATOES.

Report from the experimental garden for 1856. We planted this year four hundred and fifteen varieties of potatoes, (viz:)

Round yellow,	161	varieties.
Long yellow,	68	do
Round reds,	112	do
Long reds,	89	do
Violet colored,	18	do
Thistle and Roscovites,	3	do

This is surely a fair trial of the qualities of potato.

HORTICULTURE IN GREENLAND.

Mr. H. Ring, the Danish traveller, says that in the far north there are hardly two months of summer, during which the Danes cultivate their gardens with great care. Naturally, this culture cannot produce either *fruit or seeds;* but vegetables, furnishing leaves only for use, succeed passably. Radishes do well, green cabbage, spinach, salads and chervil vegetate vigorously, but all these possess very little savour. Potatoes grow to the size of nuts. Dung has no effect, for it does not decompose for want of warmth, until it has been exposed to the weather for several years, then it is put on the garden. Seeds are grown in hot houses and then set out in gardens, the ground being frozen only a few inches below the surface.

DEEP CULTURE.

It is only necessary to observe the depths to which plants put down their roots in free loose ground, to prove the necessity of deep culture. And the poorer the soil the deeper we should till!

[London Athenæum, July 19, 1856.]

Extracts by H. Meigs.

ROSES.

"To the four sorts of roses first known to all natives of Greece, we have not added above a dozen and a half in as many centuries. The last was the Tea rose, first introduced into England in 1825. The most famous ancient roses were those of Pæstum and Samos, happy localities where the roses bloomed twice every year.

Whole ship loads of roses were brought to the city of Rome, in which there were shops where nothing else but roses were sold. The artistic garlands made there of roses woven together were held in such honor that the name of Glycera, of Sicyon, a famous artist in that line, has come down to us and would compete with the name of Constantine. Her lover painted her portrait and Lucullus paid no less than $1,500 for a copy of it. Whatever the time of year the Roman must then have a rose in his wreath. The most common bouquet was made of violets, myrtle and roses. Stout old gentlemen then who wished to drink unusually deep, without feeling unpleasant consequences, wore double wreaths of roses about their heads and necks as preservatives! The generous rose did, however, something for the ladies too. When the renowned and not over scrupulous Aspasia was a child, she had a wart on her face which defied nurses, doctors and caustic. The pretty Aspasia cried herself to sleep one night at the blot on her beauty, and lo! while she slumbered she saw Venus' dove, and the dove told her to take some rose leaves from the statue of the goddess and lay them on her cheek. The girl did so, full of faith, and she became as perfect in beauty as in intellect, and helped Pericles to corrupt the morals of the Athenians with infinite elegance. In the classical period, the rose seems to have been employed on every occasion, from the birth to the death, both inclusive. Nero did something more, fountains flinging up rose water while roses covered the ground, were stuffed into cushions on which the guests reclined, having rose garlands on their heads and rose wreaths around their necks, and at dinner a *rose pudding* challenged the appetite of the guests! To encourage digestion they drank rose wine. Heliogabalus bathed in it, and had swimming baths filled with rose wine and absynth. He got sick, however, and his doctor touched his liver and gave him a dose of rose."

Daniel C. Robinson, Esq., remarked that Pæstum of Italy was always distinguished for the roses which flourished in its vicinity. That although for ages desolate of people and culture, still he picked a charming rose, somewhat of the form of the tea rose, and very fragrant, near the celebrated temple whose ruins have drawn so much attention.

[Journal de la Societe Imperiale et Central D.Horticulture. Paris, Sept., 1856.]

THE APPLE TREE.

By Mons. Saillet Fils.

Some facts observed in Normandy, since the attack of our apple tree by disease, seem to corroborate the opinion of Mr. Charles Rabache as to the malady of the grape-vine. Apple trees and pear trees were attacked by a small insect called the *Acarus*, which seems to have caused the malady by piercing the bark. But there is nothing to justify this notion. Mr. Bernon, naval druggist of Cherbourg, states his opiniou that a sort of degeneracy which no direct experiments can prove, exerts a fundamental influence, which no human power can prevent or arrest, is the cause, perhaps in part by perturbations in the seasons and meteorological phenomena which have coincided exactly with the attack of the malady of each year of its occurrence.

This reminds us of the remarkable falling off of one of our best apples, viz: the Baldwin and others, mentioned by Dr. Wellington at a recent meeting of this Club, as well as of the wonderful effects on plants, especially potato, since the equally wonderful mysterious action of Asiatic cholera on men, almost everywhere, of all climates, manners and races—on the gems of the salt sea, the beautiful islands, or on continents full of fresh water and immense vegetable growth.

[Bulletin Mensuel de la Societe Imperiale Zoologique, D'Acclimatation. Oct. 1856, Paris.]

This number contains accounts of the African colony, the mineral discoveries, the amelioration of the race of horses in Algeria in rapid progress, remarks on horse shoes and the shoeing; that more injury is done to the horse by improper shoeing than is usually known. A horse properly shod is greatly more useful and durable than one shod by a man who does not understand the true principle of his work. But in spite of strict watching bad shoeing continues to be done. Among other maladies caused by bad shoeing are the *encastelure*, hoof-bound—a considerable *closing up of the heel.* When this begins, the horse begins to put his foot with fear as if he was walking on thorns. This soon affects his shoulders, and he has to move some time before this disappears, but it soon reappears after rest. This malady sometimes increases so as to render the horse useless. Attention is strongly called to this subject as one of importance to our horses. The effort to keep the best blood and improve it is succeeding on many thousands of horses in the colony. We invite the attention of those who wish well to that noble servant of man, to the recent remarks of William Miles, of England, on horse shoeing. This book is a quarto, with drawings colored and others—the eighth edition, by Longman, London, 1856. "While we remember," says he, "that the natural term of the existence allotted to the horse is thirty-five to forty years, yet three-fourths of our horses are worn out under twelve years old."

After centuries of experience, (says Mr. Miles,) it is curious that invention has not given us any thing better than the nailed on shoe of iron! Objection is made to the very common, almost universal practice of horse shoers, of trying the hot shoe upon the hoof, for the burning dries up and cracks the hoof to some injurious extent, rendering it quite unsound! For the hollow sole of the foot, Mr. Miles recommends felt or gutta percha to leather. Shakspeare was right in saying that "It was a delicate stratagem to shoe a troop of horse with felt."

As to the nailing on of the shoe, Mr. Miles says that five nails are sufficient to hold on a fore shoe at any kind of work, in any country, and at any pace; and I again advise you to use that number, placing three nails on the outside and two on the inside. I know that many smiths can keep on the fore shoe with three nails only—two outside and one inside. The feet of the horse should be allowed to expand to suit his weight.

A short, timid, stumbling step, and the dreaded evil, corns, are the result of over nailing.

TREVOLTINI SILK—FROM ITALY.

An essay by Mademoiselle Caroline De Susini *of Sartena, Corsica, to the Zoological Society.*

This silk worm produces two or three times a year, keeping the eggs in cool places, ice houses, so that they do not hatch until the leaves are fit to feed them. Three *educations*, say crops of silk have been obtained from this worm in one year, and silk of fine quality, white cocoons, and of a consistence and weight superior to any on the continent.

It has been said that in Asia, twelve crops of silk have been raised in one year.

SUGAR SORGHUM AND DIOSCOREA BATATAS.

These new plants are about to play the greatest part in our agriculture, the latter furnishing a new aliment to replace the potato, and the first a great number of highly useful purposes. They possess precious qualities. The seed is excellent for poultry, the skin of the seed gives a splendid and valuable dye, the flower is excellent and very delicate, it is useful in medicine internally and externally. It is almost as good as oats, and in that alone it pays the cost of the crop. The skins of the seeds subjected to chemical treatment furnishes a valuable dye. The panicles when the seeds are off are useful as well as the roots, for fuel. The stalks yield syrup, sugar, wine, brandy, vinegar, alcohol. The maturity of the plant is shown when the seeds change from a deep yellow color to red. The stalk chopped into small pieces or rings, (rondelles,) and boiled in some water a long time over a quick fire produces a marmalade—this is then pressed to get out the juice, which is put over the fire, while boiling, a little lime or any alkaline solution is occasionally thrown in to purify it—a scum rises incessantly. The juice is finally clarified by albumen. Fourteen eggs are sufficient for one hundred and forty pounds of juice. Lime in powder of about three quarters of a pound in weight, is sufficient for the 140 lbs. of juice. When this is over, put the juice into earthen vases and set them where they shall not be exposed to humidity or to heat. Thus every farmer and gardener can have his syrup, and if he chooses to make it, he can have his own sugar! Think of every farmer, little or great, making his own molasses! instead of going to the West Indies for it. And in the meantime, an admirable food, in its natural form for stock. Truly this plant is a magnificent acquisition to our country.

The Rev. Eli Corwin, of San Jose mission, twelve miles from Sacramento, California, exhibited to the Club a pear grown on the farm of Mr. E. L. Beard, of that mission. It is a result of grafting the common pound pear of New England upon a native California pear tree, about four years ago. The tree is about twenty-five feet high. This pear measures in its greatest, *i. e.*

lengthwise circumference, twenty-one and one quarter inches, and in girth fourteen inches and three-quarters, and weighs two pounds and three-quarters.

The Rev. O. C. Wheeler, of Sacramento, California, by his brother H. Hill Wheeler, of Hiland Terrace, New-York, exhibited a pear of a different kind grown at or near Sacramento, which measured nineteen inches in its length circumference, and fifteen and a-half in girth, weight two pounds and one and a-half ounces.

Messrs William R. Prince & Co., of Flushing, presented a dioscorea batatas tuber for tasting. This tuber resembled a long sweet potato, in color and shape, with this difference that the neck, it may be called, is quite tapering to its junction with its vine. It is covered all over with what may be called eyes, these are slightly protuberant, each having a slender rootlet attached, probably this tuber had on it ten times as many eyes as are found on our largest common potato. It was boiled in about half the time required for the potato, and was served up *au naturel*, no salt, no butter, or anything else. The members all tasted it. Some few prejudiced members compared the quality of it to poor potatoes, the majority were disposed to think it good. It is as pure farina as exists. Its product per acre is far greater than that of the potato. Its growth being vertical, it is troublesome to dig out. We recommend the formation of ridges and planting the batatas on the top, so that when mature they can be taken out as readily as celery; and it is probable that in such ridges it will flourish more than in the close level earth.

This plant possesses one peculiar property highly to my taste, that is, according to Chinese theory and practice, it detests all sorts of manure! This is a recommendation to our palates.

Rev. Mr. White moved the continuance of the subject of "Orchards" to next meeting. Carried.

Prof. Mapes moved to add "Isomeric compounds for agricultural purposes." Carried.

The Secretary now remarked that the time of taking up the fixed question of the day had arrived, and a considerable audience being present, he hoped that some of them had something to offer upon this very important subject.

The Chairman called on Solon Robinson, who stated that he had nothing to offer but what was well known to all present; that is that fruit is at present very scarce and high, and he feared the cause of it was a general malady affecting all fruit trees. It is well known that the Baldwin apple is failing, and perhaps going out of existence in the land of its origin. Florida once produced as fine oranges as ever grew in any part of the world, and in extravagant abundance; but a little mite of an insect is destroying the trees from the face of the earth. Here at our own door, in New Jersey, we can see how the peach trees are failing, and everywhere the apples are less fair and rich, and trees less productive than formerly. Now, if there is a remedy within the reach of man's power, we ought to search for it and apply it. At least we ought to think, and if there is anything that we can do to make those who plant trees and grow fruit think upon this subject, we should do it earnestly. Upon the subject of planting trees there does appear to be an excess of ignoranse, or want of thought, among farmers. The common method is to dig a little hole into a hard soil, and stick in a clump of a tree, with a few club roots, and pound down the dirt with a maul, and then let the ground grow up to grass, and expect the tree to grow and produce fruit. Now I have in my mind a gentleman who, by a careful preparation of the ground and special manuring of the trees, has produced healthy wood and abundant crops of fruit at his option, and, at the risk of saying what has been said before, I will ask that gentleman to favor us with some remarks upon this subject.

Prof. Mapes—I have experimented ten years, till I have found that I can make pear trees grow wood or produce fruit. By the use of a fertilizer applied to a large cargo of imported shriveled trees, a friend saved the life of all to which it was applied, while all others died. By applying certain fertilizers I have produced very large crops of pears year after year. My dwarf pear trees this year averaged 200 large pears per year. In putting out a pear tree I top them severely. I surface-plowed and sub-soiled as deep as possible. I then dug a hole four feet deep and four feet wide and filled it with surface soil. I then bored with a post auger still deeper than I dug the holes. I set my trees from four to six inches below the joining of the pear with the quince root. I trim into a pyramidical shape. To prevent winter blight I take away the mulch and earth in the fall to check the growth before winter. In the summer I keep all the trees mulched to keep the soil moist and of an even temperature. I take soluble humus and potash to make wood, but I do not do that to make fruit. For that I render phosphate of lime soluble by an excess of sulphuric acid, and apply in spring. Guano should never be applied in spring or summer; it may be in the fall. I always apply potash after the phosphate. Some of my pear trees this year, that do not occupy over eight feet of ground, brought me 200 shillings. I sold all my crop at $1 to $1.50 a dozen. My rows stand twenty feet apart, and I cultivate between, but I never use any barn-yard manure—that will always injure the trees. The surface must always be kept in a pulverulent state. I would advise to set dwarf trees eight feet apart both ways, where the land is not to be tilled. Great care must be taken in planting trees—that is all important —so is the soil. The fame of Newark cider is world-wide. It comes from the Harrison and Canfield apples, grown upon a certain locality. The juice is very rich, and not inclined to run into vinegar. The fruit of this district is possessed of a peculiar flavor. Some of the orchards are 100 years old, but the people are generally very negligent about planting new orchards. Perhaps it is because the old trees do not continue to bear well, which is owing to a want of lime and soda in the soil. The only valuable wash for fruit trees is a saturated solution of soda. Take sal soda and heat it red hot, and add one pound to a gallon of water. A wash of this removes dead bark and leaves the bodies smooth.

To a question from Mr. Bergen of Long Island, the Professor said there was no danger of his trees blowing down, as he left but little top when he set them out, and trimmed them as fast as they grew into a pyramidical form. As to the talk of overstocking the market, it is all moonshine. The confectioner's windows are full of French pears at fifty cents a piece. A pear from California on the table, weighing two pounds, no matter what its quality, would sell in any quantity at wholesale at $6 a dozen.

VEGETATION.

Those persons who become most familiar with the mighty operations of nature are most fully excited to admiration of their sublime and marvellous character. The phenomena which produce the life in plants are utterly incomprehensible, and however intimately we can know the plants, we have no power to penetrate the mysterious secrets of vegetation, which are known only to God the creator. Our knowledge is limited to such agency as is capable of being appreciated by our narrow powers of observation and study—the body and not the spirit.

Light, as to the agency in the work, plays a great part. Seeds can scarcely germinate while fully exposed to the rays of the sun. They must be buried in earth to a certain depth, doing the work of *child-birth*, we may say, best in the dark, and like a child when it first breathes the air. The seed will not germinate *in vacuo* whether in light or darkness.

The Secretary was always happy to bring before the Club from all quarters of the globe such matters as had importance to agriculture. He read from the newspaper, the California Farmer, (an able paper published in Sacramento, California,) of the 31st of October last, an account of the agricultural fair held at Sacramento in October. A sugar beet weighing one hundred and three pounds; Lima beans very large, parsnips also; cabbage fifty lbs.; pumpkin two hundred and fifty-six pounds; oats very fine, one hundred and thirty-four bushels per acre on an average; turnips three feet in circumference; a vinegar plant, likely to become an important crop. Several hives of honey of the very best quality, produced by bees very recently introduced into California where it was before entirely unknown and seems never to have existed. Some think that the sugar cane will not flourish there without irrigation. Six samples of silk by Dr. Behr:

1. Spun from native cocoons.
2. Spun from Floretti silk from native cocoons.
3. The native cocoons.
4. Wild native cocoons.
5. Cocoons raised in the house.
6. Cocoons raised on a rose bush.

We think that California will become one of the best silk growing countries in the world.

Excellent olive oil from Los Angelos.

Solon Robinson moved to continue to next meeting the subject of "Orchards."

Prof. Mapes moved that "isomeric compounds for agriculture be also a subject." Carried.

The Club then adjourned to the next regular day, Tuesday, Dec. 16th, at noon. H. MEIGS, *Secretary.*

December 16, 1856.

Present—Messrs. Wagener, T. W. Field, Vail, Waring, Stacey, Solon Robinson, Dr. Smith, Professor James J. Mapes, Dr. Waterbury, Mr. Leonard, President Pell, Mr. Brower, Mr. Chambers, Mr. Blot, Mr. Pardee, Mr. Morrell, Mr. Judd of the Agriculturist, Mr. Wheeler and others—41 members in all.

Dr. Waterbury in the chair. Henry Meigs, Secretary.

The Secretary read the following translations and extracts made by him from the works recently received by the American Institute.

THE POULTRY.

The every day quality of the Dorkings has kept them in steady popularity, and their progress has been uninterrupted. Beauty of feather and large size. They have often been sold for from five to seven guineas a piece. A cock was recently sold for fifteen guineas—$75.

Aylesbury ducks have come up to 7½ lbs. a piece in weight. Geese to 24 lbs.

SELECTION OF SEEDS.

The general opinion hitherto has been in favor of selecting the apparently best seeds of grain from the largest plants of the field with best developed ears and roundest best colored grains. And yet, in entire opposition to all this theory, it has sometimes been found that seed grain of inferior quality, even damaged by frost or badly secured in a wet harvest, produces grain of an excellent quality, while first rate seed has produced grain of moderate weight and bad color. These contradictory facts may be attributed to differences of seasons. But it appears after viewing the whole matter that the very fine quality of seed produces necessarily superior grain! It rather appears to be true that highly cultivated, finely filled and well matured grain, however well fitted for grinding or malting, has a degree of inertness about it unfavorable to propagation! Wheat in its native countries, Sicily for instance, grows year after year when self-sown, as well as at first, but in Britain wheat is exotic, &c.

Potato—We think has been so forced by high culture as to have become a degenerate plant.

BREAD FROM WHEAT.

Millers and bakers prefer the foreign soft wheat to British—not because it is cheaper, for it is dearer—but because it makes a larger quantity and better quality of bread! Therefore are the fine foreign wheats worth from five to ten shillings sterling a quarter more than the best home wheat!

SALTPETRE IN AGRICULTURE.

From a memoir by M. Boussingault, read before the French Academy of Science.

Was known to the ancients as valuable in agriculture; but its high price precluded its use to any extent. Since the recent discovery of very rich beds of it in Peru, it is being introduced into agriculture. The discovery was not known to Europe until 1821. The Peruvians derived no advantage from it in agriculture, but the Incas long before them were advanced in agricultural knowledge. They counteracted the lowering of temperature in their fields from nocturnal radiation of heat, by disturbing the transparency of the air by means of smoke. They used guano—they made an active manure out of dried fish! They made poudrette from night soil, and applied small doses of it to the roots of their maize. Nitrate of potash is now used freely.

WHEAT.

Before the flood, of Adam's two sons one tilled the ground, the other kept sheep. During the period of creation, 1655 years, to the flood, it is probable that the cereals were cultivated, being the best food for man. The flood subsided, Noah, according to the promise that seed time and harvest should not cease, began to be a husbandman. At 450 years after the flood and 100 after the death of Noah, Abraham directed his wife to "prepare three measures of fine meal to make cakes upon the hearth for the strangers who visited him." At 140 years after we have mention of the "wheat harvest," Joseph dreamed of the "sheaves," Genesis 37, verse 7. During the seven years of plenty foretold by Joseph, the land of Egypt "brought forth corn by handfulls," (i. e.) (Gen. 41, verse 47.) "seven ears on one stalk." It is not said that this was wheat, but its description exactly corresponds with the *triticum compositum* at present cultivated there, and also with the mummy wheat discovered in a Sarcophagus in the Egyptian tomb, which had probably lain there for more than three thousand years, but which when planted affords us a new kind of wheat, exhibiting the phenomenon of "seven ears on one stalk." I have some of the ears now before me exhibiting this phenomenon of seven ears on one stalk. We read continually in the Bible of wheat, "the finest of wheat," "wheat of Minneth," &c.

Inferences—Wheat has been the common food of man at least since the flood; that it has possessed about the same features and size since; that the land first inherited by man and subject of the deluge was the native country of wheat.

Away, then, with the fruitless idea of its parentage in any of the grasses bearing an affinity to it!

POTATO IN ENGLAND.

The potato malady is assuming some different symptoms from the former. The malady first appeared in July, 1845, in the Isle of Wight. The starch of potato in 1827, was about one-eighth per cent of the whole. There is no gluten in the potato and therefore has no analogy to flour—it cannot be fermented like flour and made bread—it is more nearly allied to sugar.

Another article says that this season there is nothing radically wrong in the potato as yet. It is estimated that there are two millions and a quarter of acres in potatoes, in the United Kingdom. This should give us eleven millions and a quarter for the crop, worth nearly £34,000,000=$170,000,000, and we import largely early potatoes from the continent.

Wherever an Englishman goes he carries with him the potato and plants it. One hundred and twenty years ago it was first cultivated in the United States, where it now produces one hundred milliens of bushels in addition to their sweet potatoes.

With all the discussion of some years past on the necessity of *new seed* and *new varieties*, but little has been done. We ought to do what France is doing! Introduce and experiment more on farinaceous roots. There are dozens which ought to be tested!

Mr. H. S. Olcott, of the Mount Vernon Farm School, read the following remarks on the Sorgho Sucré or Chinese Sugar Cane:

In accordance with an expressed wish of the Farmers' club, the undersigned begs leave to present the following remarks upon this very important grass, whose culture has so recently been attempted in our country.

The possibility of raising the Sorgho, even to the complete maturity of its seed and the extraction of syrup from its juice, has to our knowledge been proved by actual experiment in Massachusetts, Vermont, Connecticut, New-York, Pennsylvania, New-Jersey, Ohio, Indiana, Illinois, Maryland, Virginia, District of Columbia, North and South Carolinas, Georgia, Alabama and Louisiana, and we suppose there is scarcely any one of the States in which there have not been a greater or less amount of seed sown.

The fact of its adaptability to these wide extremes of territory, makes its introduction to the list of our economic plants a matter of general interest, and coming as it does at a period when our liveliest fears are awakened for our sugar crop, its various merits demand for it the greatest attention.

Of its origin and botanical rank we shall not in this connection attempt a description, but refer investigators to previous papers presented to this club, and to elaborate translations and articles in the "Working Farmer," for 1856.

As a sacchariferous plant its superiority to the ordinary cane consists—

1. In its adaptability to all varieties of latitude as far North as the 44th parallel.

2. In its being propagated from its own seed; which is obtained in conjunction with the saccharine matters.

3. In its ripening at a more convenient season of the year.

4. In the yield of two crops in a season.

By the first peculiarity it enables the smallest farmer in the New England, Middle, and Western States, to manufacture his own molasses and sugar, instead of as at present being subjected to the increased expense for these necessaries of life always attendant upon a failure of the crop of the Southern cane; and its peculiar luxuriance in warmer latitudes will make it a formidable rival to the latter. The great expense and trouble attendant upon procuring and saving the cutting of the cane, are entirely obviated with the Sorgho; and for this reason, even though the actual yield of sugar per acre be much less, it will be more likely to prove remunerative to the planter. The Sorgho ripens three months before the cane—having been crushed in Louisiana throughout August and September. It thus perfects its seed in full time to escape frost; and therefore would be far less liable to a failure of crop than the latter.

Its uses are so various as to obtain for it from the *National Intelligencer*, the name of "*vegetable sheep*—every part and portion of which is valuable." A few of these we will enumerate:

1. For soiling cattle. It gives two, and even three crops of succulent stalks, which are very nutritious and grateful to stock. If cut in July, the cane will have attained a growth of five or six feet, and from the stands or stubble, *rattoons* (young shoots) spring up and yield a bountiful harvest in September and October. In Georgia, Mr. Redmond obtained three crops of fodder, and Gov. Hammond of South Carolina, obtained sugar and fully ripe seed from the second crop.

Stock raisers will appreciate this feature of the Sorgho, which places within their reach an abundant yield of fodder at a small outlay of capital and labor. If they found profit in sowing our common corn for fodder, they realize twice as much from this plant, which for the same expenditure gives double results.

2. The next advantage is the yield of sugar.

Mons. Arequin of Louisiana, calculates its product of good crystalized sugar, at 1,000 pounds per acre; while Vilmorin of France, puts it at 2,386.

Each thousand pounds of sugar will drip fifty-five gallons of molasses. If the object of cultivation be simply to obtain syrup, we may count upon four hundred gallons per acre under favorable circumstances. Col. Peters of Georgia, obtained, as will be recollected, four hundred and sixty-eight gallons, and this too, with very incomplete apparatus. Prof. Henze of Grignon, France, thinks that its full proportion of saccharine matter can not be obtained without the employment of hydraulic power. Any comparative statement therefore, of the yields of the Sorgho and cane juices, should not be made until we can subject the former to the machinery used in crushing the latter, and get our results under similar conditions of manufacture.

From all parts of the Union there come to us statements of the successful production of syrup and sugar from the Sorgho sap. It has been obtained by various methods. One person pounds his stalks with a rolling-pin, boils them and evaporates the excess water; another crushes them with an ordinary grocer's sugar-mill, twists them and rinses out the sap, from which pure syrup is obtained by boiling it in a sauce pan; still another cuts the stalks into small pieces, which he boils in water without any preparatory crushing or bruising; another makes use of a pair of horizontal rollers, geared to an equal speed, driven by two mules. But, various as are these methods, they all eventuate in establishing the absolute presence of syrup in the Sorgho sap in each of these widely separated parts of the Union.

The quality of syrup and sugars obtained from it, will necessarily vary with the greater or less care and experience employed in their manufacture. We have received a present of three gallons of fine syrup from Col. Peters, which unfortunately had become scorched in boiling. What was made by ourselves for samples was better—equal, we think, to maple syrup.

Gov. Hammond of South Carolina, thinks the younger canes richer in saccharine principle than the older ones; but the experience of Prof. Henze in France, and our own at the Farm School, indicate the extreme richness in sugar to be attendant upon the full maturity of the seeds. If the canes are allowed to remain uncut for some time after the seeds have turned red and passed the milk state, a smaller quantity per cent will be obtained.

The Zooloo Caffres increase the sweetness of the sap by cutting off the tops just as the seed heads begin to show themselves. This practice we have been accustomed to in the previous attempts to make sugar from sweet corn, and was successfully practiced by Prof. Mapes at the time when Mr. Ellsworth was calling public attention to the subject.

3. From the sap of the Sorgho may be obtained several fermented alcoholic drinks, such as brandy, rum, pure alcohol and cider. Arequin of Louisiana, says the Sorgho Cognacs are greatly inferior to the usual ones; but this difference Prof. Henze says, is distinctly and entirely due to imperfect methods of manufacture. M. Vilmorin calculates the alcohol per acre at 180¼ gallons.

4. The seed makes a good meal, which has been made into cakes and pronounced by an acquaintance almost equal to buckwheat. The seeds are much relished by cattle, hogs, horses and fowls. Sicard, a manufacturer of Marseilles, has successfully used the hulls of the seeds for the production of a beautiful carmine, for dyeing his linen and cotton goods. The *National Intelligencer*, (Washington,) says that the sap if set with Oxide of tin, gives a pink color to silken fabrics.

After the seed has been removed from the tassels, the latter may be made into brooms nearly as well as broom corn.

The usual yield of seed per acre is about 25 bushels of 36 lbs. each—in some cases it is more, in some less.

The leading peculiarities of this new plant have been thus cursorily glanced over, and we may now in conclusion say a few words concerning its cultivation.

One half acre was planted on the 19th May last, in rows at three feet apart and in hills at two and a half feet apart in the rows. Ten seeds were put in each hill and the sprouts subsequently thinned out to six. The soil was a shallow gravelly loam resting upon a pure gravel sub-soil, and offered great resistance to the introduction of the plow. Despite this fact, however, I have nowhere seen finer canes than our own, nor indeed as fine, and we attribute our success to the free use of Mapes' superphosphates; for it is found by analysis that the Sorgho contains large proportions of the phosphates of lime, soda and magnesia, sulphuric acid and organic matter. The extreme heat of last summer by no means injured the vigor of growth of the Sorgho; on the contrary, its first great luxuriance seemed coincident with the beginning of our two months "heated term." We should recommend those who purpose planting the Sorgho next season to plant and cultivate it in like manner to corn, with the exception that more seeds should be put in each hill at the time of planting. The sprouts of Sorgho are so small and slow in growth that they are easily mistaken for grass, and if planted too deeply the seed will not vegetate. A small quantity of radish or lettuce seed should be mixed with the Sorgho seed, so that their quick growth and appearance above ground may enable the farmer to run a cultivator through the rows in time to destroy young weeds. The soil most suitable to Sorgho growing is either rich sandy loams, bottom lands or other light land; but, as at the Farm School, it may attain luxuriant growth even on coarse gravel. By giving proper attention to surface stirring of the soil with Knox's horse hoe, and loosening up the sub-soil with the one horse soil lifter, the certainty of a fine second crop will be greatly increased. It is to be hoped that during the coming season very general attention may be given to its cultivation and the manufacture of its products, for by careful experiment we shall obtain the favorable results of which its previous history is the prophecy.

Respectfully.

GREEN SAND MARL OF NEW JERSEY.

A note from George W. Atwood, Secretary of the New Jersey Fertilizer Company, was read, and a specimen of the marl in its natural condition was placed on the table, with printed statements of its properties, quantity used per acre, etc., confirming the experience of a long time past of its high importance to our agriculture. This was well understood by our first citizens. The distinguished Dr. Samuel L. Mitchill was loud in its praise and careful in its examination forty years ago. This native manure is now delivered at Keyport, Jersey, opposite to Staten Island, on board vessels at *seven cents* per bushel. It is a heavy article, not much if any lighter than stone.

Prof. Mapes spoke highly in its favor, as also the Secretary and others.

Prof. Mapes was requested to take up the subject proposed by him, "Isomeric compounds for agriculture," since members who would discuss the orchard question, such as Messrs. T. W. Field, of Brooklyn, President Pell, and others, were still absent.

The Professor then said it is well known that there are sixty-four substances known as primaries, and that of these all things in nature are composed. These primaries are all found in the original rocks, which by their debridation formed the soils. Hence they are all to be found in the soils. They are probably also all to be found in plants and animals, but not all in any one plant or animal. These primaries are sometimes found in progressed conditions and combined with each other. Thus the substances known as carbonic acid and lime are found in the marble and chalk. Chemists say that these are Isomeric compounds, that they are alike in composition. Thus the analysis of a piece of Parian marble, and of the chalk cliffs of England, will give alike, as results, carbonic acid and lime, and in the same relative proportions. Notwithstanding the apparent similarity, as shown by analysis, their weight is different, nor will any amount of grinding render the powdered marble as light as the chalk. There is no treatment which can be given in common to both of these substances, which will render each equally valuable as food for plants.

Nature's laboratory seems able to create differences which escape the chemist. In many of our lime-stone districts, such as Dutchess and Westchester counties, New-York, the farmers find it necessary to burn the lime-stone and then expose it to the atmosphere before its use in the soil, until it becomes carbonate of lime, by absorbing carbonic acid; and, notwithstanding the fact that their soil is a *debris* of lime-stone, (at least in part) still they cannot obtain full and remunerative crops until a new portion thus treated has been added. If, however, they should add a thousand bushels per acre of lime so prepared, the soil would cease to be fertile. Notwithstanding this truth, we know that the soil of the plains of Athens contains forty-two per cent of carbonate of lime, and that many of the chalk soils of England contain a much larger quantity. Still they are fertile. The chemist will tell us that marble dust, the lime used by the Westchester farmer, the chalk cliffs of England, are all of the same composition, and are Isomeric compounds, and many have supposed that their effects would be alike. The fact is that the English soil, and the soil of the plains of Athens, with ten times the quantity of lime which would render another soil barren, if the lime were made from our limestone rock, are still fertile and capable of raising full crops. Thus it is clear that a difference exists, which chemistry alone cannot point out. Still, when the true cause is understood, there is no difficulty in comprehending its action. The plain truth is, that every time one of the primary substances, originally from the rock, and then from the soil, enters a growing plant and becomes part of it, it has progressed, and in a manner which analysis alone cannot recognize; and when, from the decay of the plant, the primary has again returned to the soil, it is rendered capable of being absorbed by a higher class of plants, which in its turn, by its decay, renders up its primaries fitted for a higher assimilation. It is fair to suppose, and indeed is generally admitted, that the first plants grown upon our soil were mere lichens and mosses. They took carbonic acid from the atmosphere, retained the carbon to increase their bulk, and received from the soil the inorganic primaries, which, upon their decay, were returned to the soil, thus fitting it for the growth of higher organisms, which, in their turn, performed similar offices. This is, as we shall show, equally true of animal life.

The fresh *debris* of the rock at the mountain side is incapable of producing the higher class of vegetable growth. The double rose cannot be sustained in such a soil, while the single rose taken from a primitive soil and carried to the older soil of the garden, may be gradually improved to the double rose; and simply because the inorganic constituents of the garden soil have been in organic life many times, and have thus been rendered fit pabulum for the new comer.

Every practical farmer, who has a sufficient knowledge of chemistry to observe truths as they occur, knows that the sulphate of lime made from bones by treating them with sulphuric acid to render them surperphosphate of lime, is worth many times its weight of native sulphate of lime known as plaster of Paris; and that while the one is suited for the use of a higher class of garden crops, the other is comparatively inefficient.

Now it is evident that the lime in the bones of the animal was received from its food, which being a higher class of vegetable growth, could assimilate only such lime as had been before many times in organic form, and therefore is rendered capable ef entering the higher class of plants, and of being appropriated instead of being parted with as excretia; for plants do throw off any material held in solution by water, which is not sufficiently progressed to form part of their structure. The same truth will apply to the phosphate of lime separated from the bone, as compared with that resulting from the chlor-apatite rock which has not before found a place in organic life. Thus the phosphate rocks of Estramadura, that of Dover in New-Jersey and elsewhere, nothwithstanding the fact that they are composed of phosphoric acid and lime, and in the same relative proportions as in the phosphate from the bone, will *not* fertilize plants of the higher class, nor will they even after treatment with sulphuric acid. Thus, notwithstanding the fact that all the phosphate of lime found in the bones of animals and elsewhere, came originally from the rock, still, before it attained its greatest value for agricultural purposes, it must have passed through that chain of progression through which all the primaries have passed through before reaching the higher forms of organic life.

Suppose an acre of soil to be fertilized by a thousand pounds of bullock's blood dissolved in ten thousand gallons of water, and another acre to be fertilized by a synthetical representation of this blood taken from more original sources. Thus, let the potash be taken from the feldspar rock, the phosphate of lime from the apatite rock, and each primary from an original source, and in the precise quantities in which analysis proves they exist in blood. Divide them through an equal amount of water, and the acre thus treated will *not* grow as progressed a class of plants as would be furnished by the blood; and simply because the primaries themselves are not progressed.

Every farmer knows, or may know, that if his soil is deficient of phosphate of lime in some available form, so that the crops cannot furnish it to the cow, that she will have the propensity to gnaw bones wherever she can find them; and that if the milk is deficient in phosphates, the bones of the calf will not have sufficient strength to sustain it; that by feeding the cow small quantities of bone-dust, the difficulty may be remedied. But does he believe that the powdered phosphatic rock fed to the cow would produce any such result? Or would it pass off with the fœces without being assimilated? Does any practical agriculturist believe that ground granite or feldspar (the latter containing fifteen per cent of potash) will benefit the growing crop as much as wood ashes? So great is the difference, that even the ashes from a higher class of plants will furnish potash superior to that from a lower class. Thus a burnt haystack renders the soil beneath it capable of bearing larger crops of potash plants than would the same area of soil treated with a greater quantity of potash from forest production. Green manures of a high class, decomposing in the soil, furnish progressed inorganic materials, and although very minute in their quantity, still, from their progressed condition, they will produce larger crops than greater quantities of similar primaries from lower sources. The manure of the stable owes its value to this truth. Much of the inorganic matter contained in the manure is in so progressed a condition that the results are greater than would arise from the same primaries obtained elsewhere. The whole system of nature has been progressing, and our forefathers could not have had many of the luxuries we now enjoy, simply because the primaries of the soil in their time had not been so progressed as to produce them. Soils that formerly would produce but a kale and lower class of cabbage, will now grow the cauliflower. All animals, if not overfed in quantity, appropriate such primaries from their food as are sufficiently progressed by frequent use in organic life, and discard as fœces such portions as have not reached the point for assimilation; and we have yet to see any other cause why an animal should yield excretia at all, other than from excess of quantity, want of progression, presence of inappropriate or unrequired primaries or undue relative quantities. Why is it that night-soil will produce effects such as are not warranted by its analysis, and such as cannot be imitated by any synthetical arrangements of similar constituents? Is it not because the food of man contains the primaries in a more progressed condition than that of other animals? Animals are part of the machinery used by nature for the progression of the primaries, and bear the same relation in their decay to the supplying of pabulum for a higher class of plants to feed a superior class of animals, as did the rocks to the soil, the soil to the lower class of plants, those to the higher, and so on to nature's ultimatum, man.

Now, let us see if we can comprehend why the chalk soils of England and of the plains of Athens are not barren, as would be our soil, if one-tenth the quantity of lime they contain should be added to it.

Where did the chalks of England come from? We suppose them all to be either coralline or fossiliferous; and hence to have occupied organic life perhaps millions of times before they found their place in those soils. Perhaps we may trace them thus:—The decay of organic life caused the primaries to be yielded up in a state more readily soluble than before. Large proportions of these primaries are carried by the streams into the ocean. There the lime may have been appropriated to forming the bones of fishes, shells, etc., and perhaps this process was repeated millions of times before the coral insect appropriated the lime to the construction of its habitation. Finally an upheaval exposed it to atmospheric and other influences, and thus formed the chalk-soils of England, which, although isomeric with the soil containing a disintegrated marble, is far different from it for all practical purposes; and this difference arises mainly from the progression of the primaries it contains. We find these views confirmed by the materia medica.

The magnesian rock at Hoboken, contains veins of carbonate of magnesia. Treat this with sulphuric acid, and crystalize it, and the result will be sulphate of magnesia (Epsom salts.) Take this to the chemist, let him analyze it—he will pronounce it sulphate of magnesia, and if carefully made, will find it pure. Use this as a medicine, and if it does not take life, it will cause griping, so as to give great pain, in addition to its action as a cathartic. Dissolve these crystals in water and re-crystalize them. Do this one hundred times, and take them again to the chemist for analysis, and he will again inform you that it is sulphate of magnesia, (Epsom salts) and does not at all differ from the first crystals he analyzed; but use it as a medicine, and nature will inform you that the continued re-crystalization has progressed the primaries it contains; that it will now act as a cathartic without griping you at all.

For more than a century a medicine has been manufactured in London, known as Pulvis Jacobi (James' Powders). For a long time its composition was a secret. The medicine, however was in general use, and large quantities were annually sent to the East Indies by the East India company, for the use of its medical department. It was very effective in the treatment of fever, and its action always found to be uniform. The Messrs. James, the original discoverers of this medicine died, and their successors of the same name, from philanthropic motives, made known the composition, and the recipe for its manufacture found its way into the pharmacopia. It was said to be composed of phosphate of lime and oxide of antimony in certain relative proportions, which were stated. James' Powders were soon manufactured by every apothecary, as well as by the immediate successors of the original discoverers. The East India Company advertised for proposals to furnish them with medicines, among which was a large quantity of James' Powders, and a large and respectable chemical manufacturer of London, named a lower price for this article than that named by the Messrs. James themselves. It was furnished and sent out. The medical department reported that it failed entirely to produce the usual results. The Company refused to pay the bill, and a suit ensued. Many of the first chemists of England, including one of the Messrs. James, made analyses of this article, and gave evidence that it was the same composition as that made by the Messrs. James.

It appeared in evidence that the new manufacturers had calcined the phosphate of lime-rock from Estramadura, and then combined it with the antimony as directed; that the Messrs. James' made their medicine by calcining bones of oxen, and mixing the phosphate so obtained with oxyd of antimony. Every chemist, Mr. James included, believed and stated that there could be no difference in the effect of these two medicines ; that after the Estramadura rock was calcined, and the bone was calcined, the results were alike, and the verdict was given in favor of the manufacturers. The Company, however, sent out a new quantity manufactured by the Messrs. James, and unlike that made from the Estramadura rock, it was found to be efficient. Notwithstanding these facts, even at the present time, it continues to be manufactured by both of these methods.

Thus it is clear that men, like plants, can only assimilate, during the process of digestion, such primaries as are sufficiently progressed for their use. And this gives us a clear insight for the formation of proper rules in the selection of manures. They should always be chosen, when practicable, from the higher, and not from the lower sources.

A soil may be full of feldspar, (the original source of all potash) and still need potash produced from higher organisms for the use of the current crops. Farms in the immediate vicinity of the Dover locality of chlor-apatite rock, (phosphate of lime) and with soils fully charged with the debris of this rock, are still improved by minute doses of calcined bones treated with sulphuric acid, and for the same reasons that the soils of Westchester and Dutchess counties, made of the debris of lime-stone, are improved by new quantities of artificially prepared carbonate of lime. It is true of every primary, and is traceable throughout nature. While plants have been thus progressing by having their pabulum progressed, animals, at least those useful to man, and necessary to remain in existence, have progressed, while those which Nature's laws seem to have formed as mere machines for the progression of primaries, by the mastication and digestion of the food, its assimilation and their decay, have gradually become extinct.

We find the tooth of the largest living shark but one inch high, while the sharks' teeth found in the green sand marls of New Jersey are many times that size. The mastodon (whose bones are found at Great Bone Lick in Kentucky, and in Liberia,) are many times the size of the modern elephant. The skeletons found in the hyena caves of England, are three times as large as those of the hyena of the present day. Our largest saurians represent in inches, what fossil geologists have found represented in feet. Indeed, this is true of many extinct species of animals, which even at this time, from their fossil remains are furnishing the phosphates and other primaries which were received from the rock, and progressed by them for the use of man. But it is far otherwise with the useful animals. Look at the returns of the Smithfield market of two hundred years ago, and the returns at the present time, and we shall find that the modern ox slaughters one-third heavier than his predecessors. Even the horses represented in the Elgin marbles, although beautiful as works of art, will not fill the eye of a horse-breeder of this day. They are inferior in form and size. And this is true notonly of the inferior animals, but also of man.

At the Eglinton tournament which occurred a few years ago in England, many of the young nobility appeared in the armor used by their great grand sires, and in almost every case their suits of armor required to be enlarged before they could be worn. It is true we hear of giants in the olden time, but we have them also in our day. They were then and are now exceptions. Mankind as a race are larger and enabled to perform a greater amount of labor physically and mentally than at any prior date. The exceptions do not disturb the rule, nor will the overfed and pampered inhabitants of large cities compare (beyond a mere per centage in number) with the agricultural portions of mankind.

This hypothesis of the progression of the primaries (if it must be so called) has at least much to support it. It shows truths in nature which both the laboratory and the microscope have failed to perceive, and it enables the practical agriculturist who really understands so much of the sciences as entitle him to the appellation of a farmer, to select and prepare his fertilizers with greater economy and greater certainty of success and not to mistake, as those do who rail out against the use of analyses of soils, the analyses of pebbles for that of progressed primates mixed among them.

John A. Underwood, Esq., of Yonkers presented, from his garden there, a new cabbage of valuable quality. It is about the size of our Early York. In figure it is a kind of double cone, the bases united. It is more solid and heavy than any we have ever seen. It is said to be in taste, etc., like and equal to cauliflower. He will favor the Club with some of the seeds.

Mr. Wagener presented Catawba grape vines, grown this last summer from cuttings. They are very fine with a very remarkable quantity and size of roots for one season's growth.

Mr. Field asked Prof. Mapes whether the ammonia from our gas works was equal to that derived from bones?

Prof. Mapes replied that there was no comparison between them.

Mr. Meigs remarked that we were familiar with the doctrine of progression in all things. Vegetables show it. Our common potato is from a very little tuber, not fit to eat, originally, and of a family somewhat poisonous—the *solanums*—yet it has progressed so much in my time as to be, to me, one of the most delicious and wholesome articles of food. When I was a boy we had the potato very frequently on table, the same sort condemned in the articles of apprenticeship, an irregular nodose figure, skin light red, flesh reddish colored almost to the centre, and there yellowish white, waxy, rather strong taste. It was a long time before we had a good potato, mealy and well tasted. I rejoiced in the first we received from England and Ireland. I used to give gladly two dollars for a wicker basket of them containing about three pecks. In 1808, I first tasted delicious mealy potatoes from Nova Scotia. They were all roundish in form—skin dark blueish brown color—about two inches in diameter, flesh very solid and when boiled very white, mealy and delicious. After that we had some most excellent potatoes from England and Ireland, and some of our own. They had, according to Prof. Mapes' theory progressed! we all know this to be generally true, as well as its opposite, deterioration. But we have had dark ages among men, intellectually and physically, and also reinstauration as Bacon would say.

Solon Robinson said that potatoes from our Lake Superior lands were of very superior quality.

Prof. Mapes remarked that the progression in the potato is not so marked, for it is as yet rather a new plant.

Mr. Robinson—We are assured by a potato cultivator that he has always good crops of good potatoes, never touched by disease, and he ascribes it to his mode of culture. He uses a small gouge to take out the eys for planting, and keeps the body for use.

Mr. Field—Don't confide in that! But experience has proved that what is termed the seed end of the potato should be cut off and planted. That the other end brings forth poor spindling imperfect plants.

Prof. Mapes—I have tried that, and so has our President, Mr. Pell, it does not amount to much.

Mr. Field—Ireland grows the best potatoes. Put a potato one foot apart in the plowed furrows, so that every square foot has its potato, and we can have five hundred bushels of good potatoes on an acre.

Mr. Waring remarked on the production of new plants from soil dug from considerable depths.

Mr. Field—Much of our fruit is failing of late years, from some unknown cause or causes. Trees of half a century die as well as young ones. There is a melancholy falling off. The Pomological Convention at Rochester, this fall, recognized these facts. The Baldwin, Spitzenberg, Newtown Pippin and the peach are not flourishing. We want more knowledge and perhaps better culture. The epidemics in plants like those in man exist for a time and pass away.

Mr. Waring could not help saying that his sympathy for trees is so strong that when any one treads on their corns I feel as if he was treading upon mine. I believe that tearing their roots by heavy plowing is all wrong. I hate that practice.

Mr. Robinson observed, that in reference to the culture of trees, the land where they are to be planted ought first to be underdrained five feet deep, if it can be done. The trees will all show the value of it.

Mr. Field thought that tearing their roots in plowing is bad, but clean sharp cutting of them at suitable distances from the trunks, is a good plan and also giving them fresh soil. The new roots from these cut roots grow with great vigor.

The Chairman was of opinion that pruning was of great value, and that in doing it we should be careful to give a proper handsome shaped head to the tree, well proportioned and balanced.

Mr. Wheeler coincided strongly. Judicious pruning gave us not only beauty and health to the tree, but we were rewarded in quantity and quality of its fruit.

Mr. Waring moved that the subject of "How to make and preserve orchards" be continued to the next meeting, and "Winter work on the farm."

Mr. Pardee spoke of the flourishing condition, generally, of fruit trees in our West. That Wayne county is justly celebrated in this respect. That county sends to market half a million bushels of fine fruit. The Baldwin, Spitzenberg, and Greening apples bear heavy and excellent crops, and there are no signs in the trees of disease or failure.

Subjects for next meeting "How to make and preserve orchards," and also "Winter work of farmers."

The Club then adjourned to the first Tuesday of January, 1857.

H. MEIGS, *Secretary.*

January 6, 1857.

Present—Messrs. Clarke, of Brooklyn, Adrian Bergen, of Gowanus, Doughty, of Jersey, Thomas W. Field, of Brooklyn, Vail, of the Mount Vernon Agricultural School, Geo. E. Waring, of the same, President Pell, Hon. Robert Swift Livingston, of Dutchess county and the city of New-York, Rev. D. Carter, of Brooklyn, Solon Robinson of the Tribune office, Mr. Wagener, Mr. Graef, of Brooklyn, Prof. James J. Mapes, of Jersey, Mr. Brown, of Jersey city, Mr. Aycrigg, of Passaic, N. J., Dr. Waterbury, Dr. Wellington, Mr. Stacey, D. C. Robinson, Esq., Mr. Leonard, Mr. Chambers, Mr. Pardee, Dr. Smith of the Times office, Mr. Wheeler, of Wayne county, and others—forty-seven in all.

Hon. R. S. Livingston in the chair. Henry Meigs, Secretary.

The Secretary read the following translations, &c., made by him since the last meeting.

[From Bulletin Mensuel De La Societie Imperiale Zoologique D'Acclimatation, Nov. 1856, Paris. Presented to this institute.]

Essay on the Goat, by Monsieur Sacc, Professor of the Faculty of Science, Neufchatel. Switzerland, Delegate from the Society of Wessaling.

"The goat belongs to the group of Hollow-Horned Ruminants, and particularly characterized by the absence of incisive teeth in the upper jaw, they being replaced by a sort of pad which is very callous. Between the incisive and the molars (grinders) we find a void space caused by the want of canine teeth. These molars (six on a side) are furrowed on the inside and outside with undulating elevations. Their crowns are oblique and marked by lines resembling a half moon, with its horns turned up without and turned down within. The feet have two fingers, covered with a sort of shoes behind, above which we find two little spurs.

Like all ruminants a goat has four stomachs, or rather, we ought to say, a quadruple stomach. The first one on the left side under he cavity formed by the junction of the thigh to the belly, is very large, largest of all. It is called the paunch, and it receives the vegetable matter partially chewed, so that it occupies considerable space.

DIOSCOREA BATATAS CULTIVATED AT NANCY.

Letter from Mr. Godron, Dean of the Faculty of Science to the Imperial Society, President of the Regional Society of Acclimation for the north-eastern division of France:

"The Dioscoreas sent to me by the society for experiment last year, arrived late and were not planted until the last of June and first days of July. They were distributed to thirty members of our Regional Society for trial, which has been made throughout this region. Reports have not yet come in except from our Nancy. I planted about fifty tubers in our garden of plants, and in soil bad enough, for in thirty years past and more it has never been manured or dug up. I planted them one foot apart every way. They vegetated soon, but could not attain their full growth. I left them in the ground during last winter, and by way of precaution I scattered over them some leaves of trees. None of them were frozen, although the thermometer marked 15°. In the beginning of May the young growth came up; a late frost killed the upper ends of them, but lateral shoots soon sprung up vigorously, and grew from ten to thirteen feet long. Many flowered in August. When I gathered the crop I was astonished at the result, and especially in a piece of ground consisting of silicious alluvion, mixed with reddish clay, making a very compact soil. I found we had to make a trench between the rows to dig them out. The vines grew to ten and twelve feet long. One half of them produced tubers nearly three feet long. They were, some of them flattened, broader in one place than another, with very unequal surfaces. We attributed this to the nature of the soil and especially to the gravel in it.

Mr. Kaufman a member of the Imperial society, and also of the Acclimation society of Berlin, states that the tubers were not injured by the winter (left in the ground,) any where in Hanover.

The President presented (among other things) the Igname of Brazil, just brought from thence. Mr. Tannay says that we should compare them (Caladium esculentum) with the Dioscorea batatas of China; also the tubers of Cara (Dioscorea alata and Bulbifera.) The two latter grow wild at Rio, and require only one planting) after which they keep possession of the ground.

The Japan potatoes sent by Dr. Sacc, raised by him without any special care, are absolutely like our common potatoes.

Mr. Lacoste said that Mr. Vialle, a distiller at Orleans, has invented an apparatus for obtaining the syrup of the Sorgho by cold maceration.

Translations from periodicals received by the Institute in Oct. 1856: by H. Meigs.

[Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimatation, September 1856.]

SEEDS AND ROOTS FROM THE ANTILLES RECOMMENDED FOR TRIAL IN ACCLIMATION.

Canna gigantea or Toloman of Guadaloupe, yielding starch equal to arrow root, yellow igname, saffron, Angola peas, twenty thousand franc peas, Doliques or Jerusalem peas, are most esteemed in the Antilles, (West Indies.) Several others will be tried.

The Sugar Sorgho from the north of China meets encouragement in France, and more in her African colonies. Near Toulon the juice of it has been mixed with that of the grape and produced a pleasant wine.

We think it a duty to speak of another Sorgho, the introduction of which into Provence, is due to Mr. Grellet Balgnerie of Guadaloupe. This Sorgho which has been an object of study by Mr. Leopold Wray, (the botanist,) is the *Imphy* of the Caffres; and the one that Pietro Arduino tried (probably,) in Italy in 1766.

Mr. Grellet Balgnerie declares that its grain is very superior to that of the Sugar Sorgho, and being ripe earlier. In the island of Martinique, Mr. Hayot has cultivated it for food for his Indian Coolies, because its farina is preferable to that of Coaley rice, and is more nourishing—its leaves are relished by the cattle, and excellent Tafia is made from its sugary juice. But the Sorgho presents a peculiar feature in the coloring matter contained in its glumes—the seed covers—a rich and new product. The coloring matter extracted from these glumes is a very fine solid carmine, and is sought for by the silk manufacturers of Lyons for dyeing their silks.

Hardy says that wax is gathered from the outside of the stalks in China.

Mons. Le Compte Moignerie has produced perfect vinegar from its juice.

Mr. Beauregard has gathered about 30,000 lbs. of stalks off one acre, from which he extracted over 10,000 quarts of sugary juice.

Mr. Raoulx has obtained from about 100,000 lbs. of stalks, at the rate of fifty to fifty-five per cent of juice. The saccharine richness of the stalks does not appear to diminish by the ripening of the seeds. It is therefore important to the cultivator to let them get ripe, for we estimate the seed at much above one hundred bushels per acre, and it weighs about 80 pounds a bushel.

SEEDS OF MELONS OF ASIA MINOR.

Extracts from a letter by Madame the Princess Trivulce De Belgiojoso, to the President of the Society:

Sir—The melons transmitted by me to the Society of Acclimation, from my garden in Mount Parnassus street, were from seeds grown on my farm in Asia Minor, situated south west of Sinope, and north west of Angora, six hours travel from the little city of Saffrau-Bolo, in the Pachalic of Cassau-Bolo and twenty hours from Barten, a small harbor on the Black sea.

These melons are a variety which I have never seen elsewhere, either in Asia Minor or Syria.

In my garden these melons flourished, yielding abundantly with little culture, and the quality of the fruit good. We took no more pains with them than with cucumbers or squashes. These melons are my favorite fruit, eaten at the proper point of maturity. These are incomparably superior to all other melons, abounding in juice which makes a delicious drink. The seeds I sowed were two years old, and late, not till near the end of May, yet some of them were ripe by the middle of August. A Secretary of the Turkish Embassy, who saw some of my little melons at Paris, said that he was acquainted with them at Constantinople, where they were raised under glass! When perfectly ripe, one of them was an acceptable present to our most distinguished friend.

There are some other similar melons—such for instance as the Gheredale melon, which keeps all winter, and finally becomes in its rind full of juice of an exquisite perfume.

There is another fruit which I have seen no where else. It is of the size of a large nut, with a bark like an onion skin, with a flesh absolutely dry as a mealy potato and a decided vanilla taste.

I regret that I could not send some peculiar wild ducks we have, quite easy to tame, and singular color. They are red all over, have a crest of metallic green splendor, and a curious keen cry.

A German Society of Acclimation was established in Berlin July 31, 1856.

The Messrs. H. A. Graef & Son, of Brooklyn, exhibited a very interesting contrivance of their own invention under the name of "Parlor Conservatory." This consists in an elegant round flower stand of about two feet diameter, with a border five inches deep, in which are planted a collection of about eighty different plants with the most distinctly different formed and colored foliage, tastefully arranged, in very nutritious soil among living mosses and lichens, and covered with a glass shade about eighteen inches high. In the centre of this group of plants is a neat little cottage of Parian, shaded by weeping and running plants.

The exhibitors had charged themselves with the task to procure for the amateurs of flowers the gratification of ornamenting their apartments with their favorites, without incurring the trouble and inconveniences incident thereto. This they appear to have accomplished in their "Parlor Conservatory," in which the plants are thriving most luxuriantly, and where they are protected from the influences of their worst enemies, the dry air, the dust and gas, and the sudden changes of temperature incident to dwellings, and besides has the advantage of saving the trouble of watering, the glass shade keeping the water from evaporating. The whole is so tastefully arranged that it will be a most elegant ornament for even the most luxuriously furnished parlor, into which they seem destined to be very generally introduced.

The members of this Club were much pleased with it. It resembles a separate world, in which the dew and the rain seem to alternate daily. It can be altered in the arrangement and ornamental plants many ways, requiring supplies of water but few times in a year.

Mr. Blot gave a description of his method of raising mushrooms. He makes trenches three feet deep, filled in with the proper materials, chiefly horse dung, which originate the mushroom spawn. Mr. Blot can raise on an acre eighty quarts a day of the genuine mushrooms, in winter and summer. That this delicate article is always in demand, and that our cities will consume all that can be raised. Mr. Blot desires persons of capital to examine his place, and if convinced of its success, carry his plan into operation on a large scale. He lives now in 119th street, five doors from the Second avenue.

Mr. Pardee coincided with Mr. Blot in his account of the nature of the spawn in horse dung.

Mr. Bergen presented an invitation from Messrs. Hecker to examine their flouring mills, at 265 and 267 Cherry street.

The Chairman called up the order of the day, viz: "Orchards, how to make and preserve them," and "Winter work of the farmer."

Thomas W. Field of Brooklyn, being an active and practical orchardist, was requested to speak. He complied as follows:

What agricultural science now needs most in this country, is an extension and diffusion of the principles of Vegetable Physiology, to serve as a foundation for more comprehensive theories. Though American agricultural practice has its peculiarities for economical reasons, on investigation these peculiarities will generally be found to be based on established natural laws. True agricultural hypothesis must be derived directly from nature.

The tree itself has told men from the beginning that the pyramidal was the best possible form. That the stem or trunk is an expense to which the plant is put, by the competition of surrounding plants, to elevate its top to the influence of light and air. As the most essential part of a plant is the leaf, and as the functions of this organ are by means of solar forces to reduce carbon from the carbonic acid of the atmosphere, and to fix it in plant tissue, so it follows that pruning for the benefit of the plant should be to the end of extending leaf surface. When two branches are struggling for the same light one of them should be removed that the other may attain full development, because in this way a less aggregate amount of stem is required. Plants in destitute circumstances do not attain trunks, but remain shrubs. A greater amount of leaf surface is exposed on a given space by this arrangement, yet, where the valuable products of an acre are a result—as they are in most cultivated crops, of the full development of the individual plants—this is to be secured, though at some expense. Thus an acre of thick grown carrots may give more bushels of stunted product than an acre properly thinned; but there will be a greater amount of worthless fibre in the plants. Hence, where one fully grown plant can appropriate the sunshine, no attempt should be made to raise two; and the distribution of the plants of a growing crop should be such that at their maximum development they shall completely cover the ground, presenting a uniform mass of green leaf surface.

The same principles apply to the amount of live stock a farmer may find it profitable to keep on a given area. When one animal can appropriate the food, any attempt to keep two will result in loss, for both will become too feeble to render valuable products of either growth or labor. In this way does a worthy theory run like a guiding thread through the recesses of agricultural science.

It is an error to undertake to discard all theories because none of them are perfect. Only as science improves do we make any progress in art. By a convenient hypothesis the child of the present may comprehend what mighty men of the past attained only through years of patient toil. To their crude notions, indeed to their very errors, are we indebted for our present advanced position, and the men of our day who lead the van of science, are generally those who have made themselves most familiar with the mighty intellects of the past, and with the difficulties and imperfections under which they labored while effecting progress.

The best theories represent the aggregate wisdom of mankind. To be without any theory, would be to live six thousand years ago. The principal difference in the power of men arises from the more or less comprehensive and complete character of their theories;

they are the ideal out of which man creates the actual world, and after it is created classifies, comprehends and governs it. The multiplicity of facts in agricultural or in any other science is now so great as to be an incumbrance rather than resource, unless arrayed by some theory. Like a mass of type in *pi*, they must be assorted and allotted before they can be used.

The greatest and best of these forms not only include the known but also reach forward into the unknown, and indicate the direction in which future discoveries are to be made, so that when what purports to be a newly discovered fact in nature controverts approved theory, it takes a great amount of evidence to establish it. It must not only prove itself, but it must remodel existing theories to find a place. Thus, to prove a plant to grow without air, or to prove the perpetual motion, would be to violate all existing theories; and yet there are those, who, for want of the elements of theoretical knowledge, spend their lives in the vain attempt. To theories we owe that great conservative element in public opinion which prevents too rapid fluctuations, as the latent cold in ice prevents a general inundation with the first warm days of spring.

So unconsciously do men's theories mould their minds that those who are loudest in the denunciation of all that is hypothetical, are generally those wedded to some narrow and inchoate notion for which they are the greatest sticklers. This is often the case that a man can practice with no theory. Such a man takes his saw and pruning knife and enters his orchard ostensibly without theory; but if we follow him we shall find his ideal tree a *fishing rod.* He is the most presumptuous innovator on nature, because he understands least of her plans. Men must and will have some theory. The fisherman who fashions a Grecian temple into a hut, improves towards his notion of perfection.

All honor then to the man who gives us the broadest and most perfect theories; those which do most good. And equal, but no greater honor to him, who, having the advantage of these theories, overturns them by giving us better. Both deserve well of the public. The work of both must become dilapidated, and fall to pieces, in course of time, to furnish the material for newer and more magnificent structures.

Mr. Wheeler of Wayne county, spoke of the fruit of his county, and several adjacent counties—of its good qualities and large crops for many years past. The apple trees are of large size, many of their heads run together so closely that the red squirrels run along their branches from tree to tree, over the orchards. It is very desirable to know how we should prune them profitably.

Solon Robinson expressed his approbation of the lesson taught us by Mr. Field. He has rendered a distinguished service by showing us the rational treatment of our fruit trees. There is generally a most unaccountable stupidity in our country on this very important subject. It is wonderful to see how many folks illtreat trees in every step. At New Orleans I have seen fellows boring post holes (as I imagined,) to put in trees! The poor tree's roots all cruelly reduced to such a size as would fit the post hole. When the trees were set no one would take them to be anything but posts or stakes. Stupidity of brain! Their sculls are probably solid, except a small post hole in the centre!

Mr. Wagener exhibited grape cuttings rooted last year in a remarkable manner. He described his method to be mainly very deep tillage, two or three feet deep. Thus the young vine at the *outset* gains a vigorous constitution, which in its after life can give corresponding vigorous crops of grapes.

On motion of Mr. Solon Robinson, "Farm work for winter, and the necessary and economical preparation for spring," seconded by Dr. Waterbury, was adopted.

The Club then adjourned to January 20th, at noon.

H. MEIGS, *Secretary.*

January 20, 1857.

Present—Messrs. Judge Scoville, Spear, Stacey, Leonard, Waring, Olcott, Solon Robinson, Prof. Youmans, President Pell and others—25 members.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary said that the standing rules of the Club admits the use of the first hour of meetings for miscellaneous matter, but members may at any time dispense with the rule, take up the stated question of the day, or any other subject, by laying all others on the table.

He said, we possess the advantage of receiving from abroad the first information and books, and he was in the habit of giving to the club all those matters deemed worthy of note. He thought some of those last received by the Institute very acceptable. They are due to the two principal societies under the protection of Emperor Louis Napoleon, sent gratis to the American Institute by them.

Journal De La Societe Imperiale et Centrale D'Horticulture. Napoleon 3d, Protecteur. Paris, October, 1856.]

Translated by Henry Meigs.

APRICOT.

An article written by Monsieur Jonghe on this fruit, in June, was published in the London Gardeners' Chronicle of the 31st of May, 1856:

"It is an essential point and not well understood by the author, that is, that the apricot, from the pit of a good kind of the fruit, is as robust in the open field as our pears or cherries. I said that when the apricot grows directly from its own roots it is robust, and I request a committee from the Imperial society to examine the apricots in my open garden at Brussels. They will see more abundant fruit on them than any grafted tree in the Garden of Plants, or the Garden of Luxemburgh, or at Durand's Garden, and this has been the fact for the last consecutive five years; and I find in the writings of the late Mons. Van Mons that he was equally successful in his Experimental Garden Fidelity at Brussels, at the beginning of this century, the whole secret consisting in selecting the proper pits for planting. Twenty years ago I began with planting apricot pits from Van Mons' trees, but I have since found other pits which gave me more healthy, vigorous and hardy trees.

Complete success depends on two other points: the manner of treatment of the young trees, and suitable soil in order to produce perfect apricots. For five years past amateurs have seen the results of my method and bought good pits from me."

COLOR OF FRUIT HAVING SEEDS OR PITS.

Duhamel, the father of pomology and horticulture of France, said that such fruits can be colored by means of the following operations: When the fruit is fully grown, remove the leaves which shade it, first on one side, soon after on the opposite side, and soon after the two other sides; and to make the color on its cheeks deeper and more brilliant, take a hair pencil, dip it in fresh water, and draw lines on the sunny side. This mode is peculiarly successful on pears.

Mons. Flotow, in his Monatschrift fuer Pomologie und Praktischen Obstan, gives his experiments at length. He operated on the Napoleon Beurre d'hiver, (Butter winter pear,) Diel, Merveille, Charnen, and chiefly on the long white Dechant, on which he had observed the least redness. He wet these pears every morning and repeatedly during the day on their sunny sides, whenever weather permitted. The result proved the truth of Duhamel's experiment, for all the fruit so treated on the same tree showed more deep red color than those left to nature; the Dechant pear particularly showed color, it being naturally pale. Streaked apples and pears are always so marked longitudinally, none equatorially. The experiments show that the streaks and color are owing naturally to the dew on the fruit being acted on by the rays of the sun. The sun causes the dew on the fruit to gather into spots more or less large, and some evaporated quicker than others, and as the rays of the sun are more or less powerful, color more or less deep, and according to the greater or less delicacy of the skin. The fall and winter fruit are most deeply marked. (Query—Do the drops act like the prism in producing color?—H. Meigs.) As a general thing pears are not much marked.

FERNS—THEIR INTRODUCTION FROM FOREIGN COUNTRIES.

Every body knows that Ferns are naturally propagated by means of little brown bodies growing on the under sides of their leaves—these bodies constitute *fern seed*. The real seed is contained in these bodies and can hardly be seen with the naked eye. When ripe these bodies (which are capsules,) open spontaneously with an elastic force. The brown dust which we find come off the fern leaves when we pull them off, are the capsules emptied of their seeds. These seeds may be gathered by applying humid soil to the leaves, thus absorbing the fern seed. This should be kept in a warm, humid shady place. The seeds vegetate soon and as abundantly as the mustard and cress do. In six months the plants will be nearly six inches high.

Note by H. Meigs—Lindley in his Vegetable Kingdom, calls Ferns "Polypodiaceæ, of the Filical alliance." There is an enormous disproportion between Ferns and the rest of the Flora, in certain tropical islands, such as Jamaica. They are found in all countries, even in Greenland, where they constitute one-tenth part of the Phœnogamus plants. These Ferns contain 183 genera with 2,000 species.

Mr. Meigs observed that the fall of the old charter oak of Connecticut, had excited much attention, and thought that a similar event 1800 years ago was worth mentioning. In the year 58 the great tree of Rome, called Ruminalis, (from the ancient word Rumen, which meant Teat,) under whose shade Romulus and Remus were suckled by a wolf, began to wither in all its branches, and threatened total decay. It stood in the place where the election polls were always held. The Romans felt a superstitious dread at this, but the old tree recovered its ancient verdure, although eight hundred and forty years had passed away since that miraculous nursing of the founders of that famous Empire.

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d, Protecteur. Paris, Nov. 1856.]

From this work, which with others are regularly sent free to the American Institute, by those Imperial Societies, we extract the following:

On the work of Mons. Payen of the National Institute—by Le Docteur Boisduval.

On alimentary substances and the means of ameliorating them, preserving them, &c.

From the most certain data Mons. Payen states that all the meat from slaughtered animals on the whole surface of France, is seven hundred millions of kilogrammes, or in round numbers about one thousand seven hundred millions of pounds; to which is added fish, game, poultry, eggs, cheese, &c., nine hundred and eighty millions of kilogrammes, or about two thousand two hundred millions of pounds weight. These divided among thirty-five millions of people, give to each individual about twenty-eight kilogrammes of azotized substance a year, or little more than seventy-six grammes, or less than one-quarter of a pound per day. In Paris each individual consumes per average, about five times as much.

The second chapter relates to the various qualities of meat, according to species, feed and age, and the effects of these on their digestibility; the cooking, &c.; of butter and its sophistications; milk and its falsifications; the table oils and their fraudulent imitations.

The sixth chapter relates to sugar and articles more or less sugary, such as the sugar cane, beet, maple, palm, &c.; the peculiar character distinguishing the raw sugar of the beet, from the raw sugar of the sugar cane; the falsification of sugar; the syrups from starch or glucose; sugar from grapes and fruit; honey and its falsification; on fecula (starch,) of arrow root, turpentine, &c.

Eighth chapter on grain.

[Journal De La Societe Imperiale et Centrale, D'Horticulture, Napoleon 3d Protecteur. Paris, Nov., 1856.

EFFECTS OF CERTAIN MANURES ON CERTAIN VEGETABLES.

From the Algemeine Gartenzeitun.

The cabbage turnip (Chou-rave,) when manured with sheep dung is good, full of juice and sugary; with hog dung it has a detestable taste. In a garden not manured, it has much juice and a sugary delicate taste. Night-soil (Les excremens humains) is not so good as sheep dung. Horse dung gives it a dry and moderately savory taste; while with cow dung it is delicate and full of juice. In ordinary cooking of it we find no difference between those raised by night-soil or horse or cow dung, or from the garden without manure.

Mons. Blot, of Harlem, presented a statement of his method of producing mushrooms in this vicinity, and which would, no doubt, answer almost anywhere else. And as the mushroom is very delicate, cannot keep long nor bear much handling, they might be grown near railroads at great distances from markets because of the easy transportation by those roads. It is well known that the mushrooms are delicious, and the eatable ones perfectly wholesome.

CULTIVATION OF MUSHROOMS IN NEW-YORK-

With an acre of ground they can raise no less than 80 quarts of mushrooms a day, or 29,200 quarts a year, at 36 cents a quart,

would give,		$10,512
From which there would be to take, for rent of house and ground about	$400	
For manure and compound,	500	
For two working men,	730	
For keeping of two horses,	400	
		$2,030
Clear profit,		$8,482

The expenses of establishment would be of about $1,500—$1,200 to make covered trenches and $300 for two horses and a wagon.

To Make the Experiment.

With about $50 worth of boards and posts they could make a curved trench to raise from 20 to 30 quarts of mushrooms a day; they could raise in five months about 4000 quarts, at 36 cents a

quart, would give,		$1,440
The expenses would be, for rent of the ground about,	$30	
For manure and compound, comprising the transportation of manure, about	150	
For boards and posts,	50	
		$230
There would be a profit of,		$1,210

Mr. Meigs had devoted much time to the examination of the subject of Agricultural Colleges. The original incitement to such establishments was chiefly owing to the remarkable system of Von Thayer, some fifty years ago. The French academy has recently employed a competent person to examine the agricultural schools, experimental farms, &c., of Europe. He reported in an octavo volume the result of his examination. When Von Thayer died it appears that the great school almost expired also

—that it was the peculiar character of that single individual which made all its fame. No second Von Thayer has appeared. That those scholars who have been fully educated in these schools are universally so proud of their acquirements, that when employed on large estates (for no small one can employ them at all,) their manners are so disgusting to the laboring masses that they cannot maintain their positions as overseers, &c. And in reference to all colleges it is known that their alumni do not love practical labor in agriculture or in mechanics—they aim at exemption from all muscular and hardy exertion; they claim to rule the rest of mankind by head work, not hand work. And yet all men know the great law of our Creator, "to earn our daily bread by the labor and sweat of our bodies;" nor is there any other way, nor would it be good for men not to sweat for it! The evil one watches for those who do no work, of such is his kingdom. Enough said, perhaps. We may conclude, however, by leaving experiment to the few who will take it up and tell us the result, but not to encourage the wild idea that the vast labors of the agricultural world can be done by alumni of colleges. No, sir! Mr. Waring, a very young observer, has hit the point: Give as many condensed cheap books for the farmer's use as may fill every common school and every farm house. That's it, sir!

Club adjourned.

H. MEIGS, *Secretary.*

February 3, 1857.

Present—Messrs. Pell, A. Bergen, Hon. R. S. Livingston, Waring, Vail, Professor Mapes, Amos Gore, Pardee, Brower, Leonard, Chambers, Mons. Blot, Stacey and others—46 in all.

Secretary Meigs read the following papers, translated by him, viz:

AGRICULTURAL BUREAU OF CANADA.

We have received from our valued and learned correspondent, Mons. L. A. Huguet Latour, N. P., of Montreal, in Canada East, a copy of the Act of Parliament, 16th year of the reign of Queen Victoria, relative to this subject. We are fond of bringing before our fellow-citizens all such acts, as so many good examples for us to follow, unless we lead. Published in the French language, at Quebec, 1852. We translate the following extracts from it:

Chapter 11th. Considering that the amelioration of agriculture is of the greatest importance for the people of this province, and that the establishment of central chambers and local societies, are known to be eminently proper to accelerate such amelioration, and that without suitable means for collecting and distributing all authentic facts relative to agriculture, we cannot attain that full advantage which we require. Considering that it is therefore expedient to provide an Agricultural Bureau, &c.: It has been enacted by her most excellent Majesty the Queen, by the advice and consent of the Legislative Council and Assembly of the Province of Canada, &c., &c., that the Governor and Council may organize a Bureau, whose Chief shall be entitled Minister of Agriculture, who shall be ex-officio, a member of all the local societies. The members of the Bureau may annually elect a president and vice-president.

The Minister shall receive all communications, models, &c., &c., and register them, and shall inquire throughout the Province as to the state of agriculture, and to circulate all valuable facts acquired by him.

All the societies, agricultural, mechanical, public officers, &c., shall answer the questions of the Bureau, promptly.

Every town to have its society, with officers chosen annually.

Every county a society.

Fairs to be held in the chief towns of counties.

County societies with 25 Louis in their treasures shall be paid three times that amount and in proportion, provided it do not exceed 250 Louis per annum.

Section 43. Each county society may establish an agricultural school—but not more than one hundred acres of land.

Mons. Latour also sends us a report of the Superintendent of Education for Lower Canada, for 1855; octavo, pages 220, published at Toronto, 1856.

Mr. Ely Phelps of Rochester, New-York, recently from California, where he has resided six or seven years, presents to the Farmers' Club, seeds of a squash raised at Napa valley, in 1856, from seed taken from a squash from Japan. This squash is shaped like an old fashioned water melon, and about ten inches diameter and twelve long, shell like a gourd, meat white and about one and a half or two inches thick, taste something like that of a green apple but nicer, makes one of the best pies I ever ate made of green fruit—grow just as water melons do.

Oats—42 lbs. per bushel, will give 80 bushels per acre.

Barley—51 lbs. per bushel, will give 60 bushels per acre.

RICE.

An interesting paper on this subject, by R. Russell of Kilwhiss, in 1855, on the culture of rice in Carolina.

Good rice land near Savannah, is worth from $150 to $200 per acre, i. e. more than twice the value of the best sugar lands on the Mississippi.

The average produce of rough rice on the Savannah swamps is from 45 to 55 bushels an acre—sometimes on old rich fields 70 to 80 bushels are obtained. When this land becomes foul through weeds, or the "volunteer rice," (self planted,) they lay it under dry cultivation for a year. This is a great benefit—for without any manure they get first a crop of oats and next of potatoes, and yet the land is so renovated that the succeeding crop of rice is often increased one half, and sometimes even doubled. The oats are sown in the beginning of January, the surface of the land merely scratched with a hoe to cover the seed. The warmth and moisture of April and May, commonly send up a very thick, tall crop of the oats, which almost smothers the grass and volunteer rice; and in May the oats are harvested. Then potatoes are planted, but they are waxy.

The rice plant adapts itself to the most opposite conditions of soil, moisture, &c. The same kind of rice which flourishes on the flooded swamp lands, also flourishes on the upland cotton soils and dry pine barrens. Rice grows from $3\frac{1}{2}$ to 5 feet high.

The rice grounds are comparatively healthy for white men in winter, but not so in summer and autumn, while the crops are growing and ripening. It is said, with some truth, that the swamps when uncultivated, were far more healthy—undrained lands covered with their vegetation, for instance. The Campagna de Roma (says Dr. Arnold,) after its drainage, became much more unhealthy. It is said to be extremely dangerous for a white man to remain, (in the hot season,) one night on the rice grounds of Carolina. The custom of laying the rice grounds dry at intervals during the growth of the crop, seems to give rise to miasmata of the most deadly character to the white inhabitants, but from which the colored race is entirely exempt! But they have pulmonary disease, and their children are peculiarly liable to measles and whooping cough, often fatal to them. The allowance of the negroes is a half lb. of bacon with Indian corn meal and molasses a day, with the privilege to almost every man to raise pigs and poultry.

AGRICULTURE A DIVINE ART.

The American poet, Barlow, author of "Hasty Pudding," and the epic poem of America, "The Columbiad," in his correspondence with Josiah Meigs, late Commissioner of the United States Land Office, in a letter from Paris, in 1801, speaking of National Education, recommends chemistry, botany, mineralogy and the divine art of agriculture.

EFFECT OF COLORED LIGHT ON THE GERMINATION OF SEEDS.

If you desire to determine the commercial value of any variety of garden or other seeds, you may place one hundred or more in a pot, and quicken their growth in a hot house. If they all germinate, you may consider them first quality, and of the highest marketable value. If seventy only germinate, the seed loses thirty per cent in value. To determine this fact, requires about sixteen days. It is now found that the value of seed is known in four days, by the use of blue glass, which is a matter of great commercial value. It is known that the yellow ray of light diminishes the growth of rootlets, and the absorption of water; the red ray prevents the proper development of plants; darkness produces a very great growth of their white rootlets, as it prevents the formation of green coloring substances.

CHINESE SUGAR CANE.

Report of Dr. Robert Batty, of Augusta, Ga., Nov. 1856.

It seems well adapted to Georgia. Let no Broom corn or any like it grow near, land prepared exactly as for corn. Dr. Peter's mill, worked by two mules, grinds it—wooden rollers lose juice badly. Sixty to one hundred gallon kettles for boiling the syrup to keep pace with the mill, broad and deep for good evaporation. Double the canes for the rollers. Judgment as to how much boiling. Yield of syrup from one-eighth of an acre fifty-two and a-half gallons, poorest forty-three and a quarter, about four hogsheads an acre, may be near six hogsheads.

D. K. Pringle of Bethany, Genesee county, N. Y.—Green stalks ten tons per acre dried.

J. W. Briggs, West Macedon, N. Y.—Plant it as soon as corn, rows three and a-half feet apart, six to eight inches between the plants. Seeds like coffee corn, called Chocolate corn, Egyptian corn, millet, etc. Avoid having Broom corn or Dourah near it.

Messrs Olcott & Vail, of the Mt. Vernon Agricultural School, Westchester, presented a bottle of the Sorghum syrup to the Institute, January 26, 1857.

[Revue Horticole, Paris, Dec. 1856. By the last arrival.]

AZEROLIER.

With a drawing colored after Nature.

The Cratægus Azarolier of Linnæus, etc., of the Rose family tribe of Apple, (Pomaceæ,) has been by turns put among the Pears, the Neffliers, or Medlars, and the Alisiers, (or Beam tree). These trees grow about twenty to thirty feet high, wood hard, is used for veneering. Fruit a round or oval fleshy apple with a thick skin, originally from the Mediterranean zone. In Provence it seems to be a spontaneous growth. The Phoceans of Marseilles introduced several new species of fruits, and besides they improved our native fruits by grafting, according to the then very perfect Greek methods. The white Azerole was brought from Florence, in Italy, the large red ones from Naples or Spain, and we have some from Canada.

Olivier de Serres said that this Azerolier comes from the Hawthorn originally, and its fruit owing to a graft on a Quince stock, but this is manifestly erroneous in De Serres. This fruit is in the markets of Provence, Italy, Spain, and the Levant, for eating as a fruit or for confections and jellies. In the East it is a dessert fruit. We distinguish five or six varieties common. This tree grows much as the pear tree does.

The Baron Tschuody's cleft graft ought to be placed among the number of those which have contributed most to the progress of arboriculture. Living as he does, retired, in a magnificent domain in the environs of Metz, he has consecrated all his time to the introduction, etc., of new forest and ornamental trees.

NEW-YORK, *February* 3, 1857.

HENRY MEIGS, Esq., Sec'y:

Dear Sir:—We herewith present to the Farmers' Club a moiety of domestic wine, made from that remarkable fruit the Lawton Blackberry, which first came into public notice through the medium and endorsement of the Club. We wish there was more of it, but we bring all we have, and hope, as in the case of the widow's mite, our disposition may be appreciated. We hope there is enough to fairly test its flavor.

This wine is made as follows: one part pure juice of the berry to two parts water, with three pounds of sugar to a gallon of the mixture, put away in kegs with free vent till fermentation ceases, and then tightly cork. No spirits of any kind have been added. The fruit yields juice very largely, eight quarts of the berries giving five quarts of pure juice. Of its merits as a beverage we have nothing to say, we leave that, as in the case of the original fruit, to the judgment of the Club.

The medical qualities of the blackberry, in the form of syrup, cordial, and wine, particularly as a safe, agreeable and efficient remedy for summer complaint, are unquestioned; and as the knowledge of its medical value becomes extended the demand will, in all probability, be sufficient to make the growing of the fruit for wine making profitable in sections too remote from large towns and cities to admit of its being profitably marketed.

The plants are now being diffused so rapidly that a few years will suffice to give us a goodly quantity of the fruit and some wine; but the increasing demand for the blackberry, the only fruit we believe which in sickly seasons is deemed entirely innocent, is such that, considering the yearly decreasing product of the wild berry, an overstock cannot occur for many years.

The Club has rendered a most valuable service to the public by its early notice and commendation of this choice and prolific variety.

The wine presented was received from the largest growers of the fruit, Messrs Geo. Seymour & Co., of South Norwalk, Conn.

Yours, respectfully,

DREW & FRENCH,

85 Barclay street.

Prof. Mapes commented on the importance of hot beds, stating its great value to himself, and to others who would avail themselves of this means of great advantage to income.

Mr. Meigs—As in the course of nature seeds of many plants are scattered on snow, would it be well to try grain in that way? Some think it would do well by absorbing the ammonia at the surface of the soil when the snow melts in spring, and when the ground becomes dry enough to harrow the seed in.

Amos Gore, of Jersey—I have found clover do well sowed on snow.

Adrian Bergen, of Gowanus—All farmers should improve winter by cultivating their minds—reading what's best.

Messrs Olcott & Vail exhibited mólasses from their Chinese sugar cane—*sorgho sucre.*

Professor Mapes—Suitable pressers will be wanted for this new sugar cane. As to wine, our Newark cider is superior to most of it. It will not become vinegar unless diluted with water! Toggle joint presses are good for apples.

Can we invent a mowing machine which will cut off all the heads of weeds before they ripen their seeds?

I recommend it to this Club to have conversational meetings—as we once had.

Questions for next meeting, by Prof. Mapes, "Making and treatment of hot beds," and by Mr. A. Bergen, "Fence posts."

The Club then adjourned.

H. MEIGS, *Secretary.*

February 17, 1857.

Present—Mr. Van Epps, Daniel C. Robinson, Stacey, Judd, Wm. Leigh, Pardee, Henry A. Dyer, Secretary of the Connecticut State Agricultural Society, Waring, Solon Robinson, Bixby, Martin E. Thompson, John W. Chambers, Adrian Bergen of Gowanus, Thomas Field of Brooklyn, Anderson, Dr. Smith, Dr. Wellington, Dr. Waterbury, Mr. Clapp, and a gentleman in firm health ninety years of age, on his way to settle a new farm out West, Mons. Blot of Harlem, Secretary Leonard, Swan, President Pell, Prof. James J. Mapes, and others—47 members in all.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following extracts, translations, &c., from the works received by the Institute by the last steamer, viz:

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d Protecteur. Paris, December, 1856.]

This Society and several others transmit free of all charge, (even of postage,) its numbers to the American Institute. We translate from this number.

THE CHINESE SUGAR CANE. (*Sorgho Sucre.*)

Proces Verbal. Journal of proceedings of Nov. 27th, 1856.

Mons. Pepin said that the Sorgho has not, this year, answered the expectation of cultivators in many of the southern parts of France, but that, as yet, there does not appear any reason for not persevering in its culture.

Mons. Forest said that a cultivator in the south of France had obtained perfect plants from it in 1854.

Mons. Masson confirmed this by stating the perfect ripening in the Society's garden in 1854.

Mons. Bourgeois also succeeded in his farm at Rambouillet.

Mons. Pepin saw it mature at the end of September at the place of Mons. A. Passey, at Gisors, on the river Eure, from hot-bed plants set out in May.

The samples of Sorgho were referred to Mons. Payen, to be analysed.

[Revue Horticole, Paris, Nov. 1856.]

WATER CRESS.

Many of our provinces have not learned how to cultivate this valuable plant. Growing naturally in our valleys where limpid streams flow, it has not been considered necessary; but in great cities where we can have no cress unless the country people choose to bring some, the supply in our markets is very irregular —all is left to chance. Now, as we know the cress to be an excellent, wholesome vegetable, having valuable medicinal hygeinic properties, effecting some cures without drugs, (all the crucifers are anti-scorbutics; cabbage is a principal among them,) why should we not have a constant supply by cultivation? It is very simple and easy. It is indeed now cultivated around Paris and London on a very great scale.

Water cress belongs to the numerous class of the Cruciferæ. It had been cultivated a long time in Germany, when Mr. Cardon, an old director of the Hospital of the Grand Army, about the year 1811, established cress nurseries near Paris, at Chantilly, after those of Erfurth of Germany. It is now cultivated at some seventeen or more places.

These cress gardens or nurseries are fed by natural or artificial streams of water. The garden is divided into ditches about ten feet wide by twenty inches depth. The spaces of land between the ditches are planted with cabbages, artichokes, &c., not an inch of ground is lost. The seed may be sound in spring, but does better in August by setting out the buds; small branches are set out about four inches apart. When it has taken root well, water is let in, by means of little gates, to the depth of three or four inches, and kept so. After cutting the cress the ditch must be let dry and some well rotted cow dung spread over the bottom of the ditch, and by means of a plank put over the ditch we fix the plants so as to let them have best chance to grow again.

The heavy rains and frost are enemies of this garden, yet, by letting in water enough the plants can be protected from the latter. We draw off the surplus water as soon as the frost leaves it. The goodness of the cress depends on the limpidity of the water in which it grows. All this depends on management. In 1853 Paris consumed 2,320,000 bunches, of about 250 grammes weight, and in London 15,000,000 bunches a year. The chief cress gardens of London are at Cookham, Shireham, Richmond, Waltham Abbey and Springhead, near Gravesend.

LOUIS ANDRE.

RASPBERRIES

Are grown in Holland in a peculiar way, which we deem very judicious.

They are planted in rows, about forty inches apart, at intervals in the rows of about sixty inches apart. They are carefully cultivated, by gradually from time to time drawing the earth up to the roots. When they are grown, during the first summer, the stems are bent in opposite directions and separately tied to small stakes, except four stems, which are left erect. After the bent stems have given their fruit, they become dry and are taken away and the erect one bent into their places. This operation is performed every year.

HOW TO COLOR HORTENSIAS BLUE.

It is now rather an old practice with us to make hortensias of any shade of the *cyanic scale*, (blue,) by employing Roman alum, which is a triple sulphate of alumina, pot ash and iron. With this we dust the pots containing the hortensias, in March, before the plants begin to grow. The quantity of dust regulates the *cyanic shade*, (the shade of blue.) We repeat this dusting of the soil in the pots once or twice when we want the flowers to be of the deepest blue.

Note by H. Meigs.—Hortensia is of the order 215 of Lindley's vegetable kingdom, called Hydrangeads. It is a hydrangea of which China and Japan own one half of all known species; and there they have been the ornaments of their gardens from remote antiquity. Weak solutions of glue are good for them. At Torlonia, in Castel Gandolfo, near Rome, there are gardens of these plants of beautiful rose, and some of deep ultramarine blue, the latter color is owing to the ferruginous silicates, in a state of decomposition in the soil, which is of volcanic origin.

CULTURE OF MUSHROOMS.

Mons. P. Blot, at No. 18 Second avenue, 119th street, desired some gentleman who had capital, to examine his plan for raising a regular supply of mushrooms for the markets of this city. The great cities of the old world are supplied, and ours may easily and profitably be well supplied with abundance of the perfectly wholesome and delicious edible mushroom.

Mons. Blot acquired his knowledge, in part, in the mushroom gardens in Paris; but he now grows them perfectly well in gardens, as well as they do in the stone quarries of Paris.

John W. Hamersley of 44 Bond street, recently from a tour through Europe, had been strongly drawn to notice what he justly deemed a valuable new vegetable—and sends the following description of it, with the tubers and the seeds, to President Pell:

New-York, *December* 15, 1856.

Dear Sir—When recently at Berlin, a dish called Teltoro turnips attracted my attention. They are similar in shape to small carrots or radishes, and from two to three inches long. The flavor is exquisite, just enough of the turnip to justify the name, and something of the flavor and consistency of chestnuts.

I sent the seed to several experimental agriculturists in America, and with the exception of Mr. Hookus, gardiner at Poughkeepsie, I have heard of no success, but of many failures. The seedsman at Berlin, told me that he had sent the seed to America and every country in the civilized world, but had never heard of their coming to perfection; assuring me that it was not worth the trouble of further experiment. They grew (he said,) only at Tilton, on a few square miles about twenty miles from Berlin, the soil an iron sand, and the only manure, (if such it may be called) that of the occupation of numerous flocks of sheep. It is the poorest land in Germany—produces nothing else.

I take the liberty of sending you specimens, (which are now withered,) to exhibit to the Agricultural Society, or Farmers' Club. With us they have succeeded perfectly, without any artificial adaptation of soil, but avoiding of manure. I enclose a package also of the seed. It would be a great addition to our tables if we could naturalize this vegetable in America.

Believe me most truly yours,

JOHN W. HAMERSLEY,

44 Bond street.

To Robert L. Pell, Esq.

J. Burrows Hyde of New-York, presented a sample of molasses made from the Chinese sugar cane, (Sorghum Saccharatum,) by Giles Haley, Esq., of Groton, Connecticut, with an account of its culture, &c., (viz:)

GROTON CENTRE, CON., *Feb'y* 6, 1857.

DEAR SIR—I forward herewith by my friend, Mr. Hyde, a sample of molasses made from Chinese cane, grown by me last season; and submit the following as the result of my experience in the matter.

I received from Washington about ¼ oz. seeds during the spring of last year. About the middle of May I planted in hills as with corn, six in a hill, in a space of about nine inches, the hills being two feet apart. It was on a side hill, southern exposure, light siliceous soil ; season dry and hot. Space employed about eight feet by sixteen feet of ground. The plant came out of ground in fifteen days, and attained in a growth of three months a pretty uniform height of about thirteen feet, while the stocks were about one inch diameter at the base.

About the 15th September, when the seeds were not entirely ripe, I (fearing frost,) cut two two thirds of the lot, removed the seed, and crushed in an old cider mill with upright corrugated wooden rollers; and from this imperfect process obtained five gallons juice, which I evaporated to one gallon in an iron pot. The molasses I found equal to first quality New Orleans, well charged with sugar granules, is of fine flavor and cooks white.

The remainder of the cane stood about twenty days longer, during which time had experienced a severe frost, but with no visible injury. The seed had become fully ripe. I cut and proceeded as before. Obtained about same proportionate quantity of molasses, but of better quality, which may have been owing to more careful manipulation.

The trial gives a result of about 300 gallons per acre first quality molasses. I saved seed to plant fully an acre this year—half of seeds have distributed among my friends—and now having faith in the experiment shall take more care.

I planted too thick. Shall this year try some seeds in the forcing bed, and transplant. I shall plant in ridges not less than three feet apart, running north and south; and shall keep the plants at least six inches apart, thinning out if necessary and transplanting such as I take up.

I find the first seed saved sprout as well as the last. I may add that I manured slightly my hills from the barn yard.

I am dear sir, very respectfully yours,

GILES HALEY.

To Henry Meigs, Esq.

WELL OF WATER FOR STOCK—DRAWING IT THEMSELVES.

Henry A. Dyer, Engineer, Secretary of the Connecticnt State Agricultural Society, exhibited to the Club a model of the apparatus and explained its operation. It is the fruit of the ingenuity of Mr. Jared A. Ayres:

A movable platform only wide enough to admit one animal at a time to approach the well, falls enough with the weight of the creature, as it reaches the well, to lift a bucket, which immediately pours a sufficient stream of the water into a trough for the creature to drink. When satisfied, the animal backs out and another thirsty one takes its place; thus securing to a farm stock a full supply of pure, refreshing water, without the least trouble to the farmer. The idea pleased members very much. Some said, suppose a large herd want to drink? Answer—Then have several *temperance platforms*, so that several may be filled at once.

Mr. Tompkins exhibited a model pig-pen, invented by Mr. Abbe. By means of cheap iron frames projecting over the trough so as to allow pigs to get their heads in to eat, but not their legs or bodies, the food is kept clean, is not wasted by slopping overboard, and the rear boards of the pen open so as to allow the troughs to be supplied with the food from behind.

This plan is approved and practiced by a large number of our distinguished farmers. The saving of food is about one third, and is kept clean instead of being, as is usual, made filthy, full of the hog dung of the pen, stirred in by the feet of the pigs, making the pork smell and taste of the abominable stuff.

Geo. E. Waring—I have witnessed the experiment of this Abbe pen, and it is very good.

President Pell requested James J. Mapes to take the chair.

Prof. Mapes in the chair—Desired to have the discussions here limited wholly to statements of facts, curt and crisp—no theories, no contradiction. One may say it snowed red, another says white or blue—no contradiction.

Mr. Meigs—Such is the rule of the club from its foundation, and the Professor was one of the board which established the rules.

Adrian Bergen called for the subject of fence posts: Carried.

Mr. Bergen—I find that posts seasoned for one or two years last the longer for it by half.

Mr. Meigs mentioned his trial of a locust timber which supported the pulpit in St. John's church here, the lower ends of the post having stood some twenty odd years in the ground below the floor. On trying it with my penknife, I found the wood under ground perfectly sound. I remember the locust posts of the gate of the late Prof. Jared Mansfield's house in New Haven, which had been often boarded up. They were full of rusty old nails, all the original sap wood gone, and the heart, with numerous knots, sound, after having served as gate posts between fifty and seventy-five years.

Mr. Bergen—They will last sometimes fifty years. Posts rot at the surface. It is useful to char the bottom of the posts.

Dr. Smith spoke of the valuable character of this discussion. Fencing required the benefit of deep counsel, it was so costly. A small saving would contribute a great sum in a nation.

Mr. Pardee—The red cedar posts, the heart of it, lasts well more than thirty years. As to the locust, in the western parts of New-York, the trees have been destroyed for years by the borer, so as to cause our farmers to despair in raising them. Posts upside down are most lasting.

Mr. Meigs—Locust grows readily. I have raised them from the seed. My old friend, James Thomson, when retired from business rich, having nothing to engage his activity, followed my advice and planted locusts on a north river farm of his, 40,000 trees. After some few years he seemed unoccupied, and I desired him to plant 50,000 more.

Mr. Eckford, (whom I call the Hon. Henry Eckford,) the eminent ship-builder, often conversed with me on that topic, not only as to the feasibility of building ships which would sail fifteen miles an hour, but of the high importance to the future marine of our country in cultivating best ship timber, such as live oak, white oak, red cedar and locust, all of which would soon become scarce. He said that on the left bank of the Hudson, up the river, he had found noble, perfect locust trees of the largest size, for which, as they were house or mansion ornaments, he had paid one hundred dollars a piece for his ship building.

Mr. Waring had found benefit to his bean poles by charring the ground ends of them—double duration.

Mr. Swan—My chestnut posts charred at bottom, last five years.

Daniel Robinson had observed the benefit of charring.

Orange Judd remarked on the preservative quality of asphaltum and thought that a coat of melted asphaltum might be very usefully and economically used on the bottom ends ot posts. The asphaltum costs but about four dollars per ton, and a very small quantity would suffice for a post—not exceeding one or two cents for each post.

Mr. Clapp—Unless the wood is fully seasoned before it is used for posts, dry rot frequently ensues, and timber rapidly grown will only last about half as long as timber of slow growth.

Dr. Smith remarked on the strong action on wood or metals at the surface of the ground—probably due to electric influence—showing the point at which we should aim to preserve our posts or metalic fences.

The Chairman mentioned rosin oil as put on the bottoms of posts and then set on fire so as to produce some charring on the surface—and various degrees of charring practiced by him—such are sound after ten years standing on his farm—upside down more durable than butt down. Corrosives ublimate applied has kyanizing effect preservative. The railway sleepers on Amboy railroad, kyanized nearly 30 years ago are good yet. The cost of fencing in this country is immense. It has been said that those of Pennsylvania only, cost ten millions of dollars.

Dr. Wellington observed that Prof. Mapes has now by his long remarks, violated the rule he himself had established, as to crisp and curt facts.

The tree of which posts should be made should be of mature growth, then a length of locust will make three posts where cedar usually gives but one post.

Dr. Smith thought well of the protection for posts in earth by a coat of asphaltum, and in commerce it is readily obtained—he had walked over the extraordinary lake of asphaltum in the island of Trinidad, whence any desired quantity can be imported.

Adrian Bergen—Out of 100 locusts set out by me hardly one lived. My seedling locusts do better. Locust seems to hate transplanting.

Mr. Pardee—The duration of timber is found to depend greatly upon the season of the year when it is cut down, and the month of March, in our latitude, is the best to fell it. There is no time like it.

Thomas W. Field of Brooklyn—My experience in tree culture is something large, and I find that locust trees will not grow every where. Much injury is done by recommending plans sometimes, for what would flourish in one place will not do it in another. These theories resemble bladders blown up, prick them and they collapse like this locust notion. Nor is this true only of locust. We must learn to suit our plants to our places, and not go for pine apples on Long Island, where I live, but for pine trees—I mean in open air!

Fencing is pronounced very costly. But to all rules and theories there are exceptions, for in a large portion of our north, we have lands covered with stones. Now when we want to farm it we first want fences, and then we take all the stones off and make fences with them—they making durable fences and making our farms capable of cultivation—without which we could have no crops.

Solon Robinson moved that "fences" be continued to next meeting.

Mr. Judd asked, how shall we prevent our fence posts from being lifted by frost?

Prof. Mapes suggested a hole larger than the post, so that the post may be entirely surrounded by small stones to be grouted with hydraulic cement—that is not dear.

Mr. Judd thought that any material about the post would be frozen with it, and of course lifted with it.

Mr. Servoss called the attention of members to a tree feller, which chisels out posts from timber, and which will chisel down a stout tree in a few minutes. The machine can be examined at the depot of the New Haven road here.

Same subject ordered to be continued.

The Club adjourned. H. MEIGS, *Secretary.*

March 3, 1857.

Present—Messrs. Pardee, Judge Scoville, Swan, Stacey, Darling, Dr. Smith, Solon Robinson, Newell of Boston, Dr. Charles T. Jackson of Boston, Consul Cowden, Doughty of Jersey, Brower, do, Hon. John G. Bergen of Long Island, Dr. Edgar M. Peck, do, Dr. Wellington, Mr. Barney, Secretary Leonard, Mr. Chambers, Prof. J. J. Mapes of Jersey, Thomas W. Field of Brooklyn, Mr. Smith of Chenango, Mr. Blot, Geo. E. Waring, Jr., President Pell, Wagener, and others—44 members.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following extracts and translations made by him from the articles received by the Institute from Europe and elsewhere since the last meeting of the Club, viz: from The Journal of Agriculture and the Transactions of the Highland and Agricultural Society of Scotland. January, 1857:

GUANO, AMMONIA—THE LABORATORY.

It is found in the analyses of guano and other manures, that in guano from Peru 100 tons contain 16 tons of ammonia, worth £955, almost $1,000 worth.

Potash is comparatively rarely found in manures. Peruvian guano contains about three per cent.

[Journal De La Societe Imperiale et Centrale D'Horticulture, Paris, 1856. Napoleon 3d Protecteur.]

From The London Gardeners' Chronicle.

The Lilium-giganteum has flowered lately in the garden of Mr. S. Townshend Boscawen, at Lamarron, near Truro, in Cornwall. The plant appears to be the most beautiful one of the kind that has ever flowered in Great Britain, and perhaps in Europe. It has surpassed its usual size in its native country.

Dr. Wallich, the distinguished botanist, discovered this flower and described it in his "Tentamen Floræ Nepalensis Illustræ," a work printed in Calcutta, in 1824; but the honor of introducing into Europe belongs to Colonel Madden, who sent the seeds of it to England in 1846 or 1847.

All the plants now growing in the gardens of Europe came from, in part, those seeds and some from more recent importations made by Messrs. Veitch. The first one which flowered in Europe was in the establishment of Messrs. Cunningham, near Edinburgh. A drawing of it was made in July, 1852, and afterwards engraved for the Botanical Magazine, plate 4673. Col. Madden says that this magnificent lily is common in the thick, humid forests of the Himalaya, in the provinces of Kumaon, Gurwhal and Bushur, in a rich, black, vegetable mold, the bulb very near the surface; the land at the elevation above the sea of 7,500 to 9,000 feet, and which is covered with snow from November to April. The stems commonly grow nearly five feet high, are hollow, and instruments of music are made from them.

It bears winter well. Dr. Wallich describes one of them which grew about ten feet high. Mr. Cunningham's was as tall. The flower stem was about twenty inches in length (508 millimetres,) and bore twelve flowers. The one at Lamorron was near eleven feet high, and bore eighteen large white lilies, inclining,—very like the white lily, excepting that the inside of these flowers were deep purple; and these lilies when fully blown, were about seven inches (14 decimetres) in diameter, and they exhaled a delicious odor.

MULTIPLYING SOME PLANTS BY THEIR LEAVES.

By M. A. H. Floricultural Cabinet.

Some years ago we tried to multiply the Ornithigalum, (a lily from Cape of Good Hope,) by a leaf bud of it. We cut it off just below the surface of the soil while it was young and before the flower stem began to appear. We put it near the edge of the pot containing the mother plant. It grew well to bulbs and flowered. We tried again without success, and concluded that the leaf must be cut while in fresh growth.

AGRICULTURE.

The earth attracts putridity from the air and from decaying animal and vegetable matter, and we know its peculiar power in this respect, and unless earth be super-saturated with putrid matter, it will confine it entirely. And it is universally admitted that those who dig or plow up soil receive from it healthful element, and after showers when we turn up the soil there rises from it a delicious and wholesome smell. This odor is usually attributed to the vegetables, but Reaumur says that a like fragrance rises from the soil after the crop is removed, that it is not perceptible at much distance from the soil. The stooping farmer has it in perfection when he turns up the soil.

Dr. Home and others, have prescribed an earth bath for sick persons, on the theory that the earth would absorb from their bodies the contagious miasmata as it does putridity from meat, &c., &c.

[The Journal of Agriculture and the Transactions of the Highland and Agricultural Socity of Scotland. January 1857.]

From this valuable publication, one of the most acceptable to us of any in the English language, we extract the following, viz:

MECHANICAL AIDS TO STEAM CULTURE.

Agriculturists live in stirring times. No sooner is their attention directed to one innovation which they confess "there is something in it," than another is presented to them of a still more startling character, giving a more painful shock to the prejudices of the "slow," and a more decided impulse to the progressive faculty of the go-ahead farmer. Now that machine-reaping has made progress in spite of a few mechanical difficulties which will soon be fully overcome—thinking men are pondering over a problem possessing still greater difficulties, but yet holding out a more splendid prize—that is "steam-culture." In full view of the wondrous aid steam power has afforded us in our mills, on our railways and alike on the placid lake, or restless ocean—it has as yet given but little on our farms—but we have no difficulty in believing it to be capable of performing great things.

The patent of David Ramsay in the year 1630 for "making the earth more fertile," was but an idea without attempting to carry it out. He seems to urge the application of the steam engine—then called "fire engine," to propel carriages and cultivating instruments.

In 1767, after an interval of 137 years, Francis Moore patented a "fire engine to supplant horses, &c." So confident of success was he and his friends, (*an Inventor's friends!* lucky man, luckier than inventors now a days.) He said that horses were doomed, so they sold their horses to avoid the loss, for steam would supersede them all as the motive power. Horses would soon be sold for a quarter of their present value! Those dreams were comforting,

The next patent was in 1770, by Richard Lovell Edgeworth. This was a fore-runner of Boydell's recent traction-engine.

In 1784, the celebrated James Watt patented "steam-carriages," the propulsion of "land carriages."

In 1810, Major Pratt took out a patent for—

1. A series of plows revolving in a horizontal axis—the plows being raised over the plowed land.

2. Harrows worked in a similar manner.

3. Land cultivated by means of chains, having tines or grubbers fixed in them, working longitudinally over two vertical pullies, one at each end of the machine.

4. An endless chain passing over horizontal pullies or carriages placed along the field, one pulley being on each carriage.

To one side of the endless chain, a plow is attached, and works alternately between two carriages, the carriages being moved forward as the work proceeds. Thus a carriage on four wheels, one at each end or side of the field, and a locomotive or portable engine in the centre with endless chain and two plows, would form the details for plowing a piece of land.

In 1812, Messrs. Chapman patented a steam-carriage with a "rigger" working on a stretched chain or rope secured at both ends by anchors. This principle of "rigger-traction" for giving motion to plows has been carried out under numerous modifications by many inventors, and very recently with considerable success.

In 1832, Joseph Saxton patented a system of differential pullies, partly applicable to the working of plows—an endless rope being used to give motion to a windlass, to which the plows, &c. were attached.

In the same year, John Heathcot of Tiverton, in Devon, patented a plan of plow-traction by means of a direct pull from a stationary engine. One end of a drag rope is fixed on to a long drum, situated horizontally over the boiler, and in length, equal to the length of the field, coiled upon it. The rope then passes to the opposite head-land round a large pulley there of an auxiliary carriage which serves for an anchor. The rope then returns and is fixed to the opposite side of the long drum. To one side of this rope the plow carriage is fixed, the drum is then set in motion when it coils up one end of the rope as it gives off the other, the engine-carriage and auxiliary carriage moving opposite headlands as the work of plowing advances.

In 1850, Mr. James Usher, of Edinburgh, patented a series of plows in the same plane round an axis, so that the plows successively come into action; secondly, giving rotatory motion to a series of plows, or rather instruments, (Mapes' digger,) to till the earth.

We have by no means exhausted the plans and patents for this object. The most important is "Boydell's Endless Railway."

Drawings are given of Usher's rotary digger, (Mapes.)

The next plan is that promulgated by the celebrated author of "Talpa, or the Chronicles of a Clay Farm"—Chandos Wren Hoskyns Esquire. While other plans have for their object the pulverizing of the soil by an action similar to that of the plow, this proposes to introduce a new principle of action, namely: the abrading or rubbing down of successive portions of soil until a fine tilth of considerable depth and of somewhat uniform quality is obtainable. This abrading action is produced by the rapid rotation of a series of cutters, a slow progressive motion being given at the same time to the machine to which these cutters are affixed. This progression is regulated according to the nature of the soil. The cutters make and maintain a trench of a given depth, in which it works and cuts, or abrades the soil on the land side, and deposits it behind in an inverted, comminuted and ærated condition Moved by a cylinder steam machine, &c.

Let American engineers look into this matter, especially with reference to our vast prairie lands,

An extensive essay on Geology as applied to Agriculture, will reward the reader of it by sound knowledge.

Basaltic rocks contain phosphoric acid, and are, when reduced to soil, capable of furnishing plants with almost all the necessary ingredients.

ITALIAN RYE GRASS.

Grown by sewage manure, near Glasgow. Mr. Young measured its growth and found it to be about two inches in twenty-four hours. Within seven months Mr. Kennedy has cut seventy tons of this rye grass from an acre being cut four or five times. A suitable soil for this growth is found to be clay or clay on an open bottom, loam on gravel, old red sandstone, or black peat drained and limed; but limestone soil should be avoided.

In France an experiment has succeeded in growing wheat by mixing many kinds together. Fifteen varieties mixed and sown, yielded 29 1-4 bushels per acre, while the best gave separately 26 1-2, and the poorest 12 3-4. The different times of flowering giving more chances for production, and the different heights of the straw prevents the ears from being too closely packed and giving freer circulation of air among them, and more liberty for the ears to expand during the filling of the grain. Five or six varieties are sown in some parts of France. The results of these mixtures has always been successful, produce never being inferior to any one sort sown.

HYBRIDIZATION OF THE SWEDISH TURNIP AND TRANSMUTATION OF WILD OATS.

Mr. Morton's experiments since 1851, show the origin of our oats to be the wild oat and the Swedish turnip, a hybrid of rape seed and our common turnip.

These experiments are interesting, for they show us the way to vary and multiply our cultivated plants.

The following letter from William J. Townsend of Skaneateles, an early and valuable member of the Farmers' Club and the Institute, was read :

SKANEATELES, *February* 20, 1857.

FRIEND MEIGS—I will try to give you a little sketch of the proceedings of this branch of the mother tree which was planted by a few of us on the 23d of June, 1843, at the Pacific Hotel in Greenwich street, which has grown to a great size, with many branches spreading over all quarters of the United States.

We have been in operation two years and a half, and we have held two fairs which were well attended, and fine stock as well the productions of our farms were exhibited.

We call our club "The Skaneateles Farmers' Club." We awarded three hundred and eighty diplomas for best articles. We had last year forty-eight paying members, at fifty cents each. We meet seventeen times a year for discussion, and seven times on fair business. The subjects discussed were:

"The best method of Wintering and Fattening Cattle.

The best method of Erecting Farm and other Buildings.

The best method of Fencing Farms.

The best method of Managing Colts and Steers.

Kinds of Spring Wheat and Wheat Crops in general.

Use and Abuse of Domestic Animals.

Draining and Watering Farms.

Best Mode of Seeding lands and the use of the Roller.

Fruit and Fruit Trees.

Miscellaneous.

Is Farming Profitable?

The best kinds of Grass and Grain for this locality.

Agricultural Implements."

Our fair is free to all. Our expenses were eighty-two dollars last year, which was willingly paid by our merchants in the village. Thus far this year seems to promise fair to beat last year. We meet every Saturday afternoon, and on the first Saturday in January our election is held. At the last one the officers elected are:

William J. Townsend, President; W. P. Giles, P. Rhodes, Vice Presidents—and thirteen directors.

We think of buying five acres of land to hold our fairs on. The first part of this winter was very cold here, but this month has been very spring-like, so much so that some of our farmers have started the plow, and I have begun to make fence. We will thank you for some Chinese sugar cane seeds and such other seeds as you have. I like to try all new varieties. Our Club will be glad to get some of your Transactions, and anything which you think would be interesting to us. Make a bundle and send by express.

I shall be very much pleased to have a visit from you. Write me when, and I will meet you at the railroad.

I remain yours,
W. J. TOWNSEND.

Mr. Newell of Boston, requested permission to exhibit his patent safety lamp, which was granted—as farmers having no gas lights, want a cheap and good portable light.

Mr. Newell explained his plan. It is founded on the interesting invention of Sir Humphrey Davy, for the use of coal miners, to guard against these terrible explosions of fire damp.

The openings in the cans and lamps are all covered with wire gauze well electrotyped with silver to prevent corrosion. The gauze contains 40 meshes an inch in length and of course 1,600 on one square inch. Burning fluid, camphene, &c., pass readily through, but flame cannot. Mr. Newell opened the door of the stove having a bright coal fire, he put the nose of the can into it, poured out enough to fill the stove with flame, and on withdrawing the can, the nose of it had a very small flame momentarily on the end of it. He exhibited the can emptied, and by applying flame to a small hole near the bottom of it, the flame was drawn and the cork forcibly expelled by a violent explosion caused by the small amount of camphene remaining on its inner surface and the air admitted through the hole. He filled a glass lamp while burning, and there was no more explosion than if filled with whale oil.

Dr. Charles T. Jackson of Boston, being requested to express his opinion of it, said that he was originally consulted on the subject by Mr. Newell—had fully examined it, every point and was assured of its being truly a safety lamp. That about five hundred thousand of these lamps have been sold and no instance of an explosion had come to his knowledge.

Prof. Mapes and Dr. Jackson interchanged remarks. The former suggesting that although the flame will not pass through the gauze, yet the explosive mixture would.

Dr. Jackson was satisfied that in these lamps the explosive gas cannot be formed.

Dr. Smith pronounced the invention good, yet not perfect.

Mr. Field—Yet there must be care in this thing.

The Chairman called up the questions of the day—"Making and treatment of hot beds," "fences," "cold frames for plants."

Mr. Meigs stated his experience with hot beds, which he had used for half a century. In 1825 he had some of the first seeds of the dahlia. They had been grown first in Spain, next in France, and then in England. He planted them in a hot bed in February, carefully attended to the lifting (whenever weather was suitable) the glass frames to admit air. When the plants had become about ten inches high, he neglected one cloudy morning to lift the frames, the sun came out strong and large drops of water in the inside of the glass had become lenses and ruined the greater part of the plants by burning them.

Prof Mapes illustrated upon the black board and explained fully his successful hot and cold frames—the latter being most profitable by far. Cabbage plants were sold for four times as much as the common plant—they were very hardy. The cold frame was covered only by boards which were carefully at proper times opened to admit air. Here the young plants pricked in an inch apart became frozen of course, but sudden thawing was prevented by the covering. He has thirty beds in one, and most of them have lasted ten years. The Professor illustrated his successful practice with Lima beans. He places in a suitable box a sod upside down, cuts incisions across it at right angles, puts a bean eye side down into the intersections. Here they have all those advantages required. They come up easy—no turning over to the injury of the plant. They are right and when the weather is safe these are placed in the open air and duly poled, and as they reach some five feet high the stems are shortened so as to throw the growth into a larger stalk and branches, to the great increase of the crop.

Mr. Pardee thought well of this box plan, and that the boxes might as well be larger, say two feet square.

The Professor spoke of the club foot in cabbage as a consequence of the use of hog manure, from which soil containing *shell* is nevertheless free.

Hon. John G. Bergen had raised great crops of cabbage, and found that when grown one year on a field good, they would next year have the club-foot.

Mr. Pardee mentioned the successful plan of old Colonel Stoddard in growing cauliflowers. That is to have the plants ready in the fall when cold weather is coming, to form of boards a pent roof over the row, open at both ends to let air pass through—as the cold gets down towards zero, he stops up the holds at both ends and heaps earth over the roof and sides. When spring opens he gradually opens his pent roof to admit air, and when frost is gone takes away all cover, and his cauliflowers are fine by July. (Transplanted of course.)

Prof. Mapes observed that in Bergen, New Jersey, where the soil contained much shell, club-footed cabbage is not known.

Mr. Meigs had remarked fine cabbage from Communipaw, for half a century past, and never knew of the club-foot there. Shell must be in that soil in abundance.

Mr. Bergen—Cucumbers have been grown by me for market many years, on some of my fields twenty years consecutively and well. I send them to market before their seeds are perfected! So I have raised early potatoes for ten years following with advantage, for they never perfect their seed balls.

Henry Stanton, the messenger of the Institute, from a basket of seed packets, supplied each member with a portion of the seeds of the Chinese sugar cane, (Sorghum saccharatum.) These seeds were given to us by the Hon. John G. Bergen of Long Island.

The Club adopted as subjects for next meeting—"Fence posts," and on motion of Dr. Edgar F. Peck of Brooklyn—"The best mode of raising forest trees from the seed or nuts of the trees, such as hickory, chestnut, sugar maple, yellow locust and white pine."

Mr. Pardee moved that the "Seeds" be first discussed—Carried.

A cow owned by Mr. Robert J. Swan, near Geneva, had a calf about the 1st Feb'y, that weighed 120 lbs. the day it was born.

On motion of Mr. Field, the Club adjourned.

H. MEIGS, *Secretary*.

March 10, 1857.

Present—Messrs. President Pell, Judge Livingston, Judge Scoville, Dr. Edgar S. Peck of Brooklyn, D. Robinson, Dr. Waterbury, Adrian Bergen of Long Island, Mr. Van Epps, Mr. Pardee, Dr. Wellington, Mr. Boon, Solon Robinson, Mr. Olcott, Sen., Mr. Lockwood, Hon. Horace Greeley and others—fifty members.

President Pell in the chair. Henry Meigs, Secretary.

The Secretary read the translations made by him from works received by the last steamer, as usual, free of all charges, the Bulletin Mensuel De La Societe Imperiale Zoologique D'Acclimatation.

On the Chinese sugar cane, (Sorgho a Sucre,) and particularly on the wax obtained from it. By Mr. Hardy, Director of the Central Nursery of the government, at Hamma, near Algiers:

Dr. Turrell has very well remarked, in Provence, that this sorgho does not secrete more wax than any other species of it, and they all give but little of it in Algeria.

I have endeavored to ascertain the amount of wax to be obtained from it in different locations.

Mr. Avequin has found that an acre of the violet sugar cane would furnish about 100 lbs. of wax. The white kind of sugar canes gave much less.

The Sorgho a sucre contains much more wax than the violet sugar cane.

This extractiou of wax from the Sorgho is yet confined to our chemical laboratories, and it would be wrong in us to say what general value may be made of it. Many very valuable industrial products owe their birth to the laboratory. So it was originally with Caoutchouc (India rubber)—first used by savages only.

The extraction of the wax requires labor, which perhaps at present may be wanting; but it will come from the Sorgho Sucre of the north of China, imported into France by Monsieur De Montigny.

On the general cultivation of the Chinese Yam, Dioscorea Batata or Igname of China, by Mons. Remont of Versailles, in the departments of the Seine-et-Oise, the Drome and the Landes, (waste land.) Addressed to the President of this Society by Mons. G. De Lacoste.

" It has been pretended by some that this tuber was imported into Europe a long time ago; but it was not before 1849, when the museum of Paris received the first, sent by Mons. De Montigny, and also the information relative to it, from our Consul at Chang-Hai—pointing out the important part which this plant would probably have to play among our alimentary plants. Since then, and after our experiments with it in our *Jardin des Plantes*, Mons. Hardy, in the Central Nursery of Algiers, has raised them at the rate of ten thousand pounds weight per acre, about equal to the best potato crop of Europe. Messrs. Decaisne and Mons. Louis Vilmorin have published instructions for raising them. Mr. Vilmorin says that fifteen thousand pounds can be raised per acre. Mons. Decaisne believes in over twenty thousand pounds. At Versailles, on the same spot of ground where Parmentier planted the first seeds of this precious tuber, which seems likely to become of indispensable utility to our subsistence, and for which the learned chemist claimed the protection of a monarch.

Mons. Remont, who is not only a horticulturist and distinguished nurseryman, but a very distinguished and learned agriculturist, has with the greatest praiseworthy perseverance met with great success in the propagation of the Chinese yam, Igname, &c. Besides the fruits at Versailles, Mr. Remont has established a large building with vast glasses for sheltering plants, and has many intelligent and industrious men employed to bring forward plants; and out of doors we behold some seven or eight acres of the Chinese yam flourishing. The soil of this field is far from being fertile—it is an argillaceous silicious very oxydated soil, very sensible of variations of temperature. It seems to suit the Dioscorea batata. This tuber does not like fresh dung. Stubble manure is recommended for it by the Chinese agricultural books. There are about three millions of the plants in this field.

Mr. Remont has ten millions of bulbilles of the Igname—each one of which will yield from thirty to forty cuttings the first year of their planting—thus prepared to produce from three hundred millions to four hundred millions of plants. In twenty years it may become a national crop.

Another fact is that this Chinese yam is eminently hardy—plants grown from almost imperceptible pieces of the tuber suffer no alteration from frost or any hard weather. It will take a place among our national crops as extensively as the potato, and it has one advantage over that tuber, in this, that in August when its stalks or vines are from six to nine feet high, whether we let them creep on the ground or tie them to poles, furnish food for horses and cows, who find it very dainty feed. It is said to be an exhausting crop, but it pays for it by its abundance. The digging them up is easy when they are planted on ridges! And one good effect of this crop is that we shall be compelled to do what we ought to do, turn up the soil deep. It is the great crop of China. Here it must take place by the side of the potato because of its hardihood, powerful nutrition, yield and easy preservation.

Mr. Cotheal, to whom we have been frequently obliged for valuable seeds imported from foreign countries by him, for gifts to agriculturists, presents a package of the seed of a grass growing at Mozambique, on the south-easterly side of Africa, about opposite to the island of Madagascar. It has been grown here in 1856, and attains the great height of fifteen feet. It is of the species Fundi or Fundungi, of the west coast of Africa, about Sierra-Leone, but three times taller. It is the Paspalum exile of Lindley, and in Abyssinia there are other species of it, as the teff and tocusso—Abyssinian corn plants. The teff is the Poa-Abyssinica; the latter is the Eleusine tocusso—both noted by Linnæus.

Hon. Horace Greeley spoke of a letter he had just received from Mr. Wray of France, who has had large experience in Africa, in the cultivation of the variety of Sorgho known under the name of *Imphee*, and who intends to visit this country this spring, to try to introduce it to more extended cultivation.

I have tried the white pine, and I think it is easily grown from the seed, and that we too much neglect this tree. I planted last spring, but only a few seeds came up; my opinion is that pine seeds should be planted in the fall. Seeds have been planted on Nantucket to save the land from drifting. No farmer should ever allow cattle to run in the forest—fence it off and keep all cattle out. If this was done our sparse wooded lots would soon grow up with valuable trees.

SORGHUM.

Judge Meigs, Secretary, read the translations of some notices of this new sugar plant in France, and among other things noticed the quantity of wax upon the stalks. It is stated that the violet-colored common sugar cane will yield 1,000 pounds of wax to the acre, and that the Sorghum plants give a larger amount.

Dr. Edgar S. Peck of Brooklyn, made interesting remarks on the forests of Long Island—its great fruitfulness in trees—its constant loss by cutting for fuel for this city and elsewhere—the thick contiguous growth of forest trees—the stinted oaks touching each other over great spaces, covered thick with acorns, once a favorite of the bears, from whom it is called bear's oak—the valuable character of this dwarf tree for burning, &c.,—the splendid growth of pines, oaks, locusts, &c. on the island—the richness of the yellow soil on which those timbers thrive—grapes especially excellent on it.

Hon. Horace Greeley rose to say that he cordially joined in the wise and good policy of planting in good time all our useful and ornamental forest trees—pines, white pines especially, grow readily and luxuriantly on lands less suitable for the farmer than others. Such lands should be fenced in to prevent all access of our cattle, &c., for they destroy the young plants which spring up without our care, every year. Keep your stock off your forest tree ground and the young trees will grow.

Mr. Pardee had noticed the local taste of trees—they love certain spots and not others, and we must consult them in forming new forests—for each species will and ought to have its way—chestnuts, sugar maples, and even *wheat*, will flourish on some lands and not on others. The grand secret for us to find out what lands the various trees and plants love best, and to suit them accordingly.

Mr. Greeley had observed the hurtful effect of the winds on our western prairies on trees, which find hard work to thrive on that account. The houses, fences, &c., held in same measure to shelter the trees.

Mr. Pardee spoke of the distinct choice of our chestnut tree for certain locations. At Elmira, not a chestnut tree is to be seen—it does not like high gravelly soil.

Dr. Peck said that our knowledge does not reach the wonderful natural growth of one species of tree when a wholly different one has been destroyed. After a hemlock forest was cut off he knew a sugar maple forest to grow up. Our yellow pine reproduces itself from the seed. I have raised oaks from acorns, and have noticed rarely that under the branches of an oak tree the ground covered with young oak trees just out of ground, all of which I found were destroyed by animals.

Adrian Bergen of Gowanus, Long Island, had grown the black walnut and horse chestnut from the seeds and they grew into trees much faster and better than such as he transplanted. Red cedars grow up among our lands where the forests are off—we think that our crows plant the seeds. The black walnuts fall off when ripe in autumn, still green outside, and I then plant, and they grow readily; but if kept till spring they hardly grow. White pine has a rapid growth. If you would grow forest trees, all animals must be kept of the ground.

Dr. Peck—Two little children planted, each one Madeira nut, which grew and flourished, giving abundant crops of that valuable nut.

The Secretary, many years ago, had one tree about twenty-five feet high, which annually yielded many thousands of nuts, which were universally sought for when green to make catsup. They were always sold at not less than one cent a piece.

Dr. Peck remarked that in clearing up an acre of bear oak on Long Island, twenty tons weight of their roots have been obtained, which sold readily for $1.50 per wagon load—used by blacksmiths for heating the tires of wheels.

Solon Robinson—Our subject is how to grow forests from the seeds or nuts. Some pour boiling ley over locust seeds, or hot water—Osage orange seeds want it—black walnuts dried are hard to grow—give them boiling water, *but not enough to cook!*

Mr. Meigs stated his success in growing sugar maples. As the winged seeds fell in autumn he gathered and planted them in drills as he did peas. They came up about as quick as peas and grew rapidly.

Mr. Boon remarked on the success of some of his ancestors in raising trees.

Dr. Waterbury had found that when a hemlock forest is cut down, it never grows up again, other trees of superior character take its place—that there appears to be a progression from lower to higher character when left to nature. Man does alter this at pleasure.

Mr. Meigs said that the earth is of so recent a formation, that the plants and animals have had no opportunity yet to be spread over it. All the means of distribution have been wholly insufficient. Animals and plants confined since creation to certan countries, have not yet been transferred, although thousands of them are found to flourish more in foreign than in their native places. Modern wisdom seeks to carry out this distribution. The Emperor of France is exerting his power most beneficently in this great operation—already giving us a substitute for the sugar of the tropics—the rich sap of the Chinese sugar cane, first had from the Consul of France in China, Mons. DeMontigny. Our worthy fellow citizen, Mr. Cotheal, has given us to-day a package of seeds of a precious grass, imported by him from Mozambique—he has often before given us seeds from abroad—remembering in his commerce to bring home valuable new plants from distant lands.

Dr. Waterbury—To be covered with forest seems to be the normal condition of the soil of this part of our continent. The primitive wilderness begins to return to its ancient domains as soon as the efforts of man to prevent are remitted. Hence when a mere thicket is desired, we have simply to make an enclosure of the required space to keep cattle and sheep from destroying the young plants and the seed is soon attained. If meadow lands are not clean cut these annual sprouts soon become a bushy second growth. Burying grounds enclosed and left to nature become a matted thicket. Wherever villages are planted on the western prairies trees grow thriftily, and I can only account for these great national meadows by supposing that the fires which run over them annually in their wild condition destroy the young trees.

Whatever may be the origin of the germs that are wanting in the soil, for the conditions of vegetation there are always enough of them present, and those which are best adapted to the soil, by more vigorous growth, overshadow and extinguish the others and appropriate the whole ground to themselves. Thus in the great plan of nature, the right growth occurs on the right soil ; and this also, the best indication that we yet have of the nature of a soil, is the character of the plants that thrive on it.

In the original distribution of the forest trees of this country, the nature of the soil was indicated by the character of the timber. The soft woods, poor in ashes, such as the coniferous evergreens, occupied the poorer lands, while the hardier woods, rich in ashes, like the maple and the beech, grew in better soil. So well was this known to the early settlers as to affect the price of lands; and many farms to this day are affected by the designation and value thus given them.

By successive vegetations progressing from lower to higher forms, nature has converted the barren face of this continent into alluvial surface. One natural order of that progression is from mosses and lichens by the way of wood sorrel and wintergreen to wild grasses, and thence through briars to a stinted growth of pine and other coniferae, to be followed by hard wood, decidua. Used in this way a crop for pine may doubtless be made of service in a very long rotation to bind together the moving sands and form soil for higher organizations ; but the second growth of this timber has not yet been fit to be used to any extent for building purposes. It is stunted, hard and knotty when compared with the gigantic trunks of the primitive stock—trunks that run up free from limbs a single shaft for sixty feet or more, and must have required as shown by the concentric rings, centuries for development.

In this progression the soft wood evergreens occupy a position inferior to the hard wood deciduous trees. When the "hemlock" or Canada spruce is once destroyed it is never restored, but its place is occupied by a growth of beech and maple. The condition of the soil in which its germs originally vegetated has been so changed that higher organizations by a more vigorous growth now supplant it and by overshadowing destroy it. At what period these ancient conifera were planted we have no means of accurately determining. What types were supplanted by them we may yet know, though I am not aware of a single instance in which their domain is extending by natural causes. The microscope shows their internal structure to be similar to that of primeval firs of geology, whose remains form the coal fields. Like the red Indian, they belong to an age gone by, and like him are giving way to the law of *progression by change of race*—a law which lies at the foundation of all general agricultural practices, whether of nature or of man, from the supplanting of one species of forest by another on continents to the plowing in of buckwheat or clover to improve land.

President Pell—The subject of restoring an almost lost vitality to seeds is interesting. I have succeeded in some by immersion in dilute oxalic acid—one ounce in one gallon of water. Mummy wheat has so revived.

Mr. Jay, from the committee on farm buildings, was requested to report, and his report was read.

He deprecated the great want of good farm buildings in this country. There are a few model barns, but generally good farm buildings are only to be found upon the lands of a class called "gentlemen farmers." One great difficulty is, that farmers have no ready means of procuring suitable plans for barns and other farm buildings, and therefore the committee recommend a liberal premium for new plans—say $1,000 in three prizes. The scope of the plans should be calculated for all parts of the country, and no doubt immense good practical benefits will result from the offer of such prizes. Specifications are also recommended for various building materials, and perhaps for some but little known in this region. The plans should embrace all the wants and improvements of an improved state of husbandry. Rail-cars are recommended in all large farm buildings.

This report was recommitted to the same committee, with directions to prepare specifications for the offer of these prizes for the best plans of farm buildings, from which it is hoped some valuable results may be obtained.

The same subject continued to next meeting, viz: "The best mode of raising forest trees from the seeds or nuts, such as hickory, chestnut, sugar maple, oak and white pine," and "fence posts."

The Secretary, Mr. Meigs, called the attention of the members to the extraordinary condition of China at this time, and its probable great effect upon our commerce with them. He had long ago been industrious to learn as much of that most remarkable Empire that has ever existed upon the face of the earth. He desired to learn its language that he might better learn its civil and moral history, its resources of nature and of art. He began by purchasing the first great dictionary ever published out of China. The imperial copy published by Napoleon I, at the cost of about $180 a copy, and had 1,000 copies charged to his own funds. These copies were presents to nations, libraries, etc. It is an elephant size, containing about eighty thousand chinese characters with explanations in Latin and French. I purchased my copy in 1815, when Wellington was in Paris. It was probably then stolen and brought over here. This great work aided me in studying China. I read everything published relative to China.

The great similitude of China and the United States has been remarked. In all things it is a great one. Pekin, in nearly the latitude of New-York, experiences similar extremes of weather, the mean temperature of a year being 54° Fahrenheit. The rivers there are usually frozen from December to March. In September, 1816, the heat attained 90° and 100° in the shade.

The Empire was hardly known to the ancients and entirely lost sight of for ages, and when the first enterprising travelers visited it and on their return home published the wonderful things they saw there, they were called liars, until the voyage of Vasco de Gama opened the way to Canton and Japan, and gradually the eyes of Europe were awakened to the strange and interesting condition of the unknown 300 or 400 millions of comparatively civilized men whose social system, arts, etc., had remained unchanged, while the barbarians of early Greece and Rome had gone through changes to high civilization and to the dark ages when kings could neither read nor write.

Christian missionaries were admitted into China at first kindly, they were hospitably treated both there and in Japan. A long time passed and the Chinese and Japanese altered their conduct. They murdered vast numbers, sent the rest away, and closed the doors to the Empire.

When the early Dutch traders appeared in Japan, they were refused leave to land because they were "Christian dogs!" The traders denied being Christians. The Japanese officer said "let me see you trample upon the bible!" This was immediately done by the traders, and they were admitted. The hatred of the Christians was felt for several centuries past by every man in

China! The enormity of the opium trade has deepened that hate in every intelligent man in China. The recent attack on Canton is known to have rendered that hatred of us so extreme that the Chinese lower classes will rush to certain death to be revenged. We have supposed (weakly,) that China was deeply interested in the great demand for tea among our christian nations of the West. We know little of that empire yet, but we have data to determine that China grows annually above one thousand millions of pounds of tea of which she has never yet exported so much as *ten per cent !* The trade in tea, therefore, is of no importance to her.. The exasperation of the people against us seems to have stopped the civil war in China, and we may be assured that they will not again, for an indefinite period, trade with us at all, and we must try to provide for a supply otherwise. France has been anxious for many years to grow tea. Ten years ago, finding that Brazil had succeeded, sent a commission to examine it, whose report I have translated and it is published in our transactions.

In the year 1846, a valued member of this Institute, Junius Smith, he who was first to say, (when Dr. Lardner declared the impossibility of ocean steam navigation,) that the day had nearly come when steam ships would cross the ocean in less than half the time required by sail vessels. Mr. Smith having an intelligent daughter resident in the East, employed her to obtain genuine tea plants and tea nuts for him. She succeeded and he having decided that the upland of South Carolina would probably be best for this trial, formed a tea plantation. He prepared a full and valuable paper on tea, which was published by a member of the Institute, Mr. William E. Dean, and it was also published in our volume of Transactions of 1847. Mr. Smith received no encouragement. His little plantation was about to flourish when he was assailed by some wretches there, he was attacked, came back to New York, and soon died in consequence of the wounds he had received.

This was the pioneer attempt. It cost much time, knowledge, labor and the life of a most valuable citizen. This melancholy result will not deter others from trying to Americanize the tea plant, for its admirable qualities admit of no argument. Tea we must have! and that whether we have lager beer, whiskey, wine, brandy, or even cider. The scientific analysis of tea, by Ure and others all show its excellency for all orders and ages of men.

We believe that the United States can and will grow a thousand millions of pounds too! and we now know that the error will vanish as to the gathering of this crop. Light moveable seats adapted to young and old persons, are used in the tea harvest so that the pickers are as much at ease as in parlors while they pick. The buds forming Imperial tea are as large as small rose buds, and yet a child can pick a pound of them nearly as quick as it could strawberries, and when it comes to picking the leaves at the various stages of their growth, the picker takes a branch and strips all the leaves off at one pull. A hand can pick a greater weight of tea leaves than of cotton in a day. And it is not true that it is necessary to use them as we have them with Prussian blue or other drug to give them bloom, etc. The Chinese use them in the natural way. There is no need for rolling them up after their acrid principle has been removed by heat and manipulation. It is only necessary as soon as possible to have the leaves packed so as to exclude air.

Mr. Smith examined the several states, and concluded that tea would flourish from the Gulf of Mexico to latitude 40° North—that is in about fourteen states—especially in soils containing limestone and gravel. He thought the upper lands of South Carolina were particularly favorable, from lat. 32° to 35°. The uplands of Georgia were approved by him. He especially recommended Arkansas as well suited for tea growing. Low flat lands must always be avoided.

The Celestial Empire hates us! It will probably not let us have any more tea, and if she does I should like to have a *taster* for ever box of tea, before I go to tea! But at any rate it is too poor an apology for a run round the globe to get a dish of tea when it can not only be raised here for our own drinking, but we may supply one or two hundreds of millions of our friends with tea in northern Europe as well as with cotton! And we can fortunately obtain all the plants to begin with from Brazil.

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d, Protecteur.]

We translate the following extracts, viz:

At the meeting on the 11th of December last, Messrs. Pelvain and Brailly of Pont-Audemer, placed on the table two large cabbages which were examined by the committee. They are the apple or quintal cabbage of Alsace. They are called quintal (hundred pounds) cabbage on account of their enormous weight, which some of them have gained, that is fifty kilogrammes—about *one hundred and eight pounds* avoirdupois. [The largest we have seen was on the farm of Mr. Wyckoff, some years ago, forty-seven pounds. H. Meigs.]

A gold medal was presented to Mr. Remont for his successful culture of the dioscorca batatas, in several districts of France.

Messrs. Vimont, Son & Vacher exhibited oil radish seed, which were analyzed by Mons Payen, and have yielded a very important oil.

Mons. Mitjans of Montgeron, exhibited 49 varieties of pumpkins, squashes, gourds, melons, &c.; sixteen varieties of tomatoes, six of pimento, and eleven of potatoes.

Numerous large *dioscorea batatas* from the culture of Mons. Remont of Versailles, and from Mons. Foucher of Saint Assise. They are magnificent specimens of that excellent vegetable. The highest premium of the society, the gold medal, was awarded for them.

Fourteen new grape vines, from seed, were exhibited. They are deemed analogous to existing varieties.

Eighteen new dahlias, from seed.

[Memoires De La Societe Imperiale Des Sciences Naturelle De Cherbourg, Tome 2d. 1854.

From this valuable work laid on our table since the last meeting of the club, we translate, viz:

Mons. Ad. Chatin, on the Oidium, (Grape Disease.)

Mons. Chatin, Professor in the school of Pharmacy, has studied this malady and reached the conclusion that after examining vineyards for hundreds of leagues in the south of France, Piedmont, Lombardy, Trieste; the north of France, Savoy, Switzerland and Austria, I found when I was in any given latitude, and ascended from vallies or level lands towards Alpine regions the disease gradually diminishing until at length there was none to be found, and that in France, in the Cevennes of Jura, Switzerland, Piedmont, the passes of Mount Cenis, of Saint Bernard, of the Simplon, Splugen, the Cols de Tende, and of the Bochetta. In Austria, at many spots in crossing the Julian Alps between Trieste and Graetz, the disease did not exist. It is just to say then, that the development of the grape disease is subordinate to the altitude of the vineyard; and as we descend towards vallies the temperature rises; so that the limit of the disease is both altitude and temperature. Soil has no effect.

Experiments on the Disease.

By layers, a good effect; incision of the vines, no succes; fall pruning, no success; late pruning, no success; no pruning, no success ; use of alkaline salts, sulphates, phosphates, nitrates, chlorhydrates of pot-ash, soda and ammonia, no success; earthy salts, carbonates and sulphates of lime, of magnesia, no success ; milk of lime, feeble action; metallic salts, sulphate of iron and of copper, pretty good results ; black soap, the Ridolfi plan, pretty good results; sulphur, the Kyle & Gontiplan, success; monosulphurate of potassium, no success ; monosulphurate of calcium, a similar action ; polysulphurate of potassium or lime of sulphur, half success; polysulphurate of calcium, Grison plan, success.

The treatment of the vines with sulphur or sulphurates before buds are out has no effect. But after that giving them a washing with it three or four times, has destroyed the disease.

Mr. Schmitt, horticulturist, Lyons, sends petunia seeds, flowers of which are of variegated color and very double.

You are greatly concerned to find a succedaneum for our precious potato. If Mr. Remont can succed in giving us the *dioscorea batatas* for a general crop, he will do a public good which will forever make his name great.

GLASS FOR HOT BEDS, CONSERVATORIES, &c.

Experience has taught us that we cannot pay too much attention to glass for such purposes, or to the frames for it. About forty per cent of the solar light which falls on the purest crystal is reflected from it and never passes through it; and we may readily infer that three-fourths of the light which falls on green or impure glass never passes through it. Large squares of glass burn plants much more than the small ones. The worse the glass the more necessity for careful ventilation. The English make better glass for these purposes than we do. The squares of glass at Hatley, are three millimetres, (one-eighth and a quarter of an inch) thick, and are marked with fine parallel rays. Mr. Lindley, (of the Vegetable Kingdom,) recommends these much; they disperse the light without loss of transparency, and thus render shading it unnecessary when the sun shines ardently. Much is said as to the best color for such glass. The learned Mr. R. Hunt, decided on a pale yellowish green, produced by using a little oxide of copper in making the glass. That it is very advantageous to the plants.

LIGHTNING.

Pliny thought that there were three sorts of lightning—one dry and the other humid. The first struck and scattered wood, &c., without setting it on fire; the humid blackened and smoked. The third which they called the *clear*, was deemed a prodigy ; it exhausted a cask of all its liquor without injuring the cask, and leaving no vestige behind it. It melted copper and gold and silver in bags without burning the bags. It struck Marcia, a Roman lady pregnant, killed the child without hurting her. The Decurion Marcus Hennerius of Pompeii, was struck by lightning in a clear day.

The Tuscans had nine Divinities who used lightning, and there were eleven sorts of lightning, of which Jupiter used only three.

The Tuscan annals show us that by means of certain sacrifices and formula, lightning could be drawn from the heavens. That when a monster called "Volta" ravaged Etruria, the king, Porsenna, used the process and killed the monster by lightning. Lucius Pisa, a writer of great credit, says in his first book, that before Porsenna's time, the Roman king, Numa Pompilius, had often used lightning, and that by a mistake in the process Tullus Hostilius, was killed by the lightning which he drew from the heavens. [This reminds us of the case of Prof. Richman, at St. Petersburgh, in 1753, killed on the 6th of August, by lightning drawn by himself from the clouds. H. Meigs.]

Man is the only being which can be struck by lightning and frequently survive; all other creatures when struck are always killed, notwithstanding many of the beasts are constructed much like him and much more robust. The animals when struck, always fall down on the side opposite to the stroke. When a man is struck standing up, and is not killed, he is always found sitting! If he is struck while awake, he is found with his eyes closed—if struck while asleep, his eyes are always found open! The place of his body where he was struck is always found to be colder than the rest of his body.

Lightning never penetrates the earth deeper than five feet. Fish are never struck by it. The eagle has never been struck by it, while other birds have. He is therefore called the *thunder bearer!*

It was not until 1749, that the phenomena of electricity were by Franklin, began to be rationally understood.

VINEGAR.

A valuable essay on this subject by Mons. Bernon.

The perpetual secretary, Mons. Liais, has caused an astronomical instrument to be constructed by means of which angles are measured with accuracy as great as possible, and without any error in the graduation of circles.

HEIGHT OF CLOUDS.

Mons. Lias states his method of measuring the height of clouds. It seems easy to be quite accurate in the angular measurement, as much so as high points on the land.

Mr. Henry of Flushing, son-in-law of William R. Prince the nursery proprietor, laid on the table handsome specimens of well grown Chinese yams, (dioscorea batatas,) with an account of them carefully prepared by Mr. Prince.

Mr. Meigs read the paper, as follows, viz:

CHINESE POTATO—DIOSCOREA BATATAS.

Few persons are fully aware of the advantages which a study of Chinese horticulture is calculated to impart to our country. The Chinese Empire comprises nearly the same latitudes as our own land, with a climate which, in contrariety to that of Europe, exhibits a mean temperature colder by two degrees in similar latitudes than that of our Atlantic States, as the Isothermal charts of Humbolt reveal to us; and it therefore offers us productions which must here become readily acclimated.

The God of Nature has stamped a similarity of character on the vegetable productions of North America and China, far greater and more striking than between any other sections of the globe. More than twenty genera, comprising a vast number of species, are no where found growing naturally on our wide spread earth, save in China and the United States. The magnolia, the glory of our forests, the mulberry, deciduous cypress, aralia tree, gleditschia, illicium, calycanthus, hydrangea, wistaria, wiegela, scisandra, and the panax or ginseng, are confined solely to these two countries, and even the dioscorea is found in no other northern clime.

Our intercourse with China, until within a few years, has been confined to the port of Canton, a city situated in and representing that strip of China comprised within the tropics; and even there our encroachments were restricted to a small section of one suburb called the English or Foreign Factory. No stranger was permitted to enter the city, much less to penetrate the interior; and any further knowledge was obtained only by stealth and at imminent personal risk.

The productions of the district of Canton are *sui generis*, and being tropical, are unsuited to our country—the teas and silks, the mighty commercial products of that Empire, being easily transported, are brought to Canton from the interior, thus supplying the demands of the commercial world. The tropical sugar cane, the Chinese orange, rice, the dioscorea sativa or tropical yam, and other products of the district which Canton represents, have long since been acclimated to congenial regions in other portions of the globe. It was not however, until commercial treaties were made with China, opening her more northern ports, that we were enabled to become conversant with the natural productions of those portions of that Empire which, there extend as far toward the north, as the State of Maine, in our own country.

The importance of such knowledge acquired, and yet to be acquired, has never been properly estimated. There exists among us a prejudiced inclination for continually resorting to Europe for precedents, and this is even persisted in on points in which we are in fact far in advance of that continent. How much more rational, so far as natural productions are concerned, to look to a country whose agricultural and horticultural advancement was a source of amazement to Lord Macartney's embassy in 1795—a country where a mighty development in these pursuits, as well as in other departments of the useful and fine arts, had been attained while Europe was yet in a state of utter debasement and barbarism. It was not until the years '48 and '49, that foreign consuls were admitted into the ports of Middle and Northern China. In the year '50, we find the French government, which is always more regardful than any other European nation of its agricultural interests, introducing the productions of those regions, and submitting them to the experiments and tests of her appointed professors in the grounds of her national horticultural institutions. Among the articles so introduced was the Chinese northern sugar cane, (not a *species*, but a *distinct genus* from that of Canton;) and five varieties of the Northorn yam or dioscorea, *a totally distinct species* from that cultivated at Canton. These estimable northern plants we had never previously obtained at Canton, because Canton, situated within the tropics had its more congenial tropical sugar cane, and tropical yam. The question has been mooted, Why have not the Northern Chinese sugar cane, and the Northern Chinese yam or potato, been previously introduced to our country? This question we think we have now answered, and when it is further considered that it was not until seven or eight years ago that the potato malady caused us to think seriously of a substitute for it, and a still less period since the Northern ports of China became fully accessible to us, the whole of this cavilling amounts simply to this, that we did not seek a substitute before one was wanted, and that we did not seek for such a substitute in localities which we were not permitted to enter.

The Rev. C. E. Goodrich of Utica, who is a grower of fancy potatoes for sale, published last year a statement that a missionary printer did not in the year '42 find this root at Canton, and that it consequently did not exist at all in that country; thence deducing that the present statements of its existence there are a hoax. Any individual conversant with geography must be aware that the Chinese Empire extends from the tropical till it approaches the frigid zone, and will thereby understand that a person might with quite as much reason seek for New England potatoes in the West India Islands, as to seek for this northern root at the port of Canton.

On page 241 of the Journal of the U. S. Agricultural Society for 1856, will be found a report made by its committee at the Philadelphia Fair highly favorable to this esculent, and declaring it *fully equal in quality to our best potatoes.*

I will now cursorily enumerate some points of importance, and correct some errors which exist with regard to this plant. The five Chinese agricultural works translated into the French language which I have consulted, devote a large space to the details of its extensive culture, and state that more than fifty varieties are there cultivated, as distinct in color and character as are the varieties of our ordinary potato. In addition to its immense product and great excellence as food, raw, boiled, or roasted; they extol its medicinal properties, and believe it to be remedial in all diseases of the chest. Five varieties have been imported into France, and described in the annals of the Imperial and Central Horticultural Society of that country. The variety which in China obtains precedence over all others, is called by the Chinese equivalent of "blanc de ris," or *rice white.*

The French Institute, through Prof. Decaisne and others, assert that they have found at length "a more than equal substitute for both the common and sweet potatoes, a substitute that has under their cultivation produced 800 bushels to the acre." In one of their quarterly publications they have devoted 20 pages to this one subject, and to recounting the successful experiments in France, and they state, as the result of such investigation, that "this esculent has now been tested in every department of France, even to the shores of the Rhine, and is to be hereafter deemed incorporated into the agriculture of France." To no other subject in this volume have more than two pages been devoted by the French Institute. In the same quarterly, the "Revue Horticole," we find the following remarks by Prof. Decaisne: "Independently" he says "of the fecula which is so abundant in this root, there is a combination of *azote* which does not exist in the common potato, and which augments in an eminent degree its nutritive character. The experiments made in France, and in Algeria greatly assimilate in their analysis, and they both present the characteristics of this root, as alimentary in the highest degree. The primary constituents of the Chinese potato are essentially those of the common potato, and if there is a small degree less of starch in the Chinese root, it is most amply compensated by the *azote*, which is very remarkably combined, and which I must here state is a most astonishing constituent, and cannot fail to exercise a most happy and important influence on this estimable plant whose qualities are now submitted to our examination. The mucilaginous principle of this root approaches to albumen, in consequence of the combined azote, and coagulates by heat.

The Chinese potato cut into sections and dried by a stove attains such a condition that it may be reduced to a powder, and then, by the addition of water, it forms a dough closely assimilating to that made from wheat flour.

We do not assume that the azote in this root is equivalent to the gluten contained in wheat flour, but we urge special attention to the point, that this root can enter to a certain degree into the manufacture of bread. The chemical analysis demonstrates to us the close relation which exists between this root and our common potato, and by the greater nutritive qualities of the Chinese root, we elucidate the cause why it enters so largely into the consumption of the Chinese Empire.."

With these remarks of Prof. Decaisne, I will now proceed to give the results of my own experiments. During the years 1849 and 1850, my attention and that of many other Americans then at San Francisco was attracted to the importation from China, by the emigrants, of numerous bags of a root resembling the sweet potato, which had been cut into sections and apparently kiln-dried. These roots were ground or pounded by the Chinese and made into bread.

On my return home I found, on perusing the French periodicals, that Mons. Montigny, the French consul in Northern China had sent to the Royal Institute at Paris a root corresponding to that which I had seen at San Francisco, and I took measures to procure some specimens. It was impossible to obtain a full grown root at any price, but in the course of two months I received some small weak tubers, less in size than a pea. These I planted and cultivated with care, and was greatly amazed to find in the autumn that they had formed roots 18 to 24 inches in length. On cooking they proved so excellent that the conviction was forced upon my mind that this must prove a most perfect substitute for the potato. I took measures at once to procure a full supply by importations and otherwise, paying as high as $700 per bushel. These were all tubers, or small pieces of roots, as I was unable to purchase a single perfect root though I offered $25 each for one hundred. My plantation the past year covered two and a half acres, consisting of 36,000 plants procured at a great expense.

During the winter of 1855 and 1856 I left a considerable number of the roots in the open ground, when as will be remembered the mercury fell to 10° below zero, and I have allowed two acres comprising 33,000 roots to remain out the present winter during which the mercury has sunk to 17° below zero, an extreme of cold never before experienced on Long Island.

The success of the former experiment was attested by the roots which I had the pleasure of exhibiting to you last spring, and with regard to the latter, the perfect condition of the roots which I here present and which were dug the present week for the purpose, is sufficiently conclusive.

With regard to hardihood, if the earth becomes frozen to the entire depth of any root within it, that point is tested quite as effectually with the mercury at 10° as at 40° below zero The root in question has been grown successfully in Aberdeenshire, Scotland, lat. 57°, and there exists no plausible reason why it may not be grown at Quebec. Indeed, considering its general character, it would seem destined not only to spread over our own country, but over the Canadas, Sweden, Norway, Denmark, Russia, Germany, and all other countries in the temperate zone, producing a complete revolution in their alimentary basis. In the preparation of the ground for planting, only decomposed manure should be used, and that should be placed as deep as possible and but little near the surface, as this vertical root seeks the manure below, the lower end of the root being the enlarged portion which requires the most nutriment for its full development.

Coarse manures should never be used, and such manures as are used must be so applied as to not come in contact with the roots, as they evince the utmost repugnance to any contact with crude manures, and will fail to develope their growth if in proximity with them. This instinctive repugnance of the plant to all filth presents a most peculiar and distinctive character. It can, however, be so easily grown on any loose soil, poor as it may be, that it may be emphatically termed "the poor man's potato."

The flesh is snow-white, not sweet, delicately farinaceous, being midway in flavor between the finest Mercer potato and Arrow-root. It can be eaten raw, boiled, or roasted, and requires in boiling about half the time of the common potato. In France excellent bread has been made by adding forty per cent of it to wheat flour.

The root is of a pale russett color, oblong, regularly rounded, and club shaped, and it differs from other perpendicular roots in being largest at the lower end. The culture is the most simple. The plants produce small tubers in great abundance; these or small pieces (eyes) of the root may be planted as soon as the frost is out in the spring, in drills one foot apart, and kept free from weeds during the summer. The crop should not be dug or plowed out until the last of autumn, as the roots which have penetrated deep into the earth during the summer make their great increase in size during the cooler autumnal months. When the crop is taken from the ground the roots should be spread and allowed to dry for a few days preparatory to storing them for the winter, either by burying them or placing in cellars.

The haulm is so nutricious, that cattle and horses eat it with avidity. On small weak tubers the top growth is but moderate, but when strong pieces of root are planted the shoots run twelve to eighteen feet, and are strong and vigorous. The Chinese cut off the small neck of the root to be reserved for planting, making use only of the large part for ordinary consumption.

Heretofore we have been compelled to plant only the weak and imperfect imported tubers, which were all that could be purchased, and some persons failed of success the past year from this cause or from obtaining only spurious tubers. Fair tubers or eyes, such as we now possess, of American growth, if planted early, will produce roots the first year weighing from eight to twenty ounces; and pieces of the root measuring one and a half inches in length, have produced the past season one, two, or three roots from each, weighing in the aggregate from twenty to thirty two ounces, and in some instances thirty inches in length, but usually eighteen to twenty-five inches.

Twelve entire roots of only moderate size that were left in the ground until the second season formed shoots fifteen to eighteen feet long, and produced 3,600 tubers, in addition to a mass of roots weighing eighteen pounds. The same root does not continue its growth the second and third years as has been supposed, but the old roots decay, each giving birth to a number of very large roots, forming in field culture as the Chinese express it "a magazine of food" at all times ready for use. A crop, when allowed to remain over to the close of the second season, is estimated by the French Institute at 2,000 bushels of sixty pounds each to the acre.

The cost of culture is less than that of the ordinary potato, the expense of digging not exceeding one-fourth the usual cost, as the root can be thrown out with the carrot or beet plough so generally used in France on the immense plantations connected with the beet sugar manufactories of that nation. It may be successfully grown on any sandy, gravelly, or other permeable soils that are neither very rich nor wet. In China it is cultivated on terraced hill-sides and in localities where little else could be produced.

The culture of the different varieties is universal on account of the certainty and abundance of the crops, arising from the circumstance of this being the only alimentary root which, by penetrating the earth vertically to a great depth, can make up by its size and elongation for the great deficiency in the superficial area of the land when contrasted with its population.

Hitherto our surmises had fixed upon rice as being the only alimentary plant capable of sustaining the vast population of China; but when we recall to mind the fact that rice can only be grown on wet soils, and requires irrigation, and that such soils constitute but a small proportion of the land in populous countries, we are compelled to revert to the upland as the only means by which an ample supply of food can be produced.

Heretofore we have not been cognizant of any plant cultivated on the upland that would produce a sufficient supply of food for so redundant a population, and we are now amazed to find that the present plant so far surpasses every other in alimentary results, that a statistical investigation would prove that if China were deprived of this one esculent and received in lieu of it every other known vegetable, more than one half of her population would perish from famine.

Perhaps the most important fact is its not being subject to rot or decay, rendering it possible to preserve it in a perfect state for lengthy periods. This circumstance constitutes it the most important esculent for prolonged sea voyages and for the prevention of scurvy. And can we overestimate the importance of introducing this new esculent to general culture throughout our country when the potato rot has so materially diminished the average crops of that root in most of the states, and when in portions of other states its culture has been entirely abandoned. In my own behalf, and after devoting half a century to horticultural pursuits, I ask of my countrymen no other boon than to award me the claim of its introduction. As it will succeed also in every part of our southern and western states, and can be grown at so small an expense it must become the principal food of the slave population, and its combination of azote will render the use of meat unnecessary as in China, and thereby greatly reduce the cost of their support.

It is a matter of interest that we have here a solution to two enigmas which have long been inexplicable to statisticians and economists. Firstly, that this vertical root, by its small lateral extension and consequently immense product together with its remarkable nutritive qualities, constitutes the alimentary basis of the 300,000,000 souls comprised within the limits of the Chinese Empire. Secondly, that the *azote* so essential to the formation of muscular fibre, and in the possession of which this root is unique, reveals to us the reason why Chinese laborers are vigorous and healthy without the use of meat.

This latter consideration, derived from analysis, forces upon us the conviction that this esculent is destined to occupy in other countries the same position which it does in China,—that it will usurp a portion of the present consumption of wheat and Indian corn, and may by its cheapness affect the price of meat.

As a summary of its properties, we have 1. Its agreeable and highly nutricious quality. 2. Its abundant product. 3. Its easy and cheap culture. 4. Its perfect hardihood and capability of being preserved dry and perfect above a year, free from sprouting or decay.

It would be difficult indeed for man to conceive of or demand a more perfect boon from his Creator.

WM. R. PRINCE.

Flushing, New-York, 1857.

Subjects for next meeting "Liquid manure, why sometimes preferable," and "Fence posts."

The Club then adjourned.

H. MEIGS, *Secretary.*

March 17, 1857.

Present — Hon. Robert Swift Livingston, Mr. Lawton of New Rochelle, Solon Robinson, Dr. Peck of Brooklyn, a lady, President Pell, Prof. Youman, Richard Strazmikii of Hungary, (introduced by Prof. Youman,) Mr. Jenny of the Tribune, Dr. Smith of the Times, Mr. Van Epps, Mr. Darling, Mr. D——, 90 years of age, Cornelius Baker, Mr. Swan, Mr. Stacey, John W. Chambers, C. C. Parsons of Feltonville, Mass., Mr. Pardee, Judge Scoville, George E. Waring, Jr., Dr. Waterbury, Mr. John L. Brower, Dr. Wellington, Mr. Henry of Flushing, and others —63 in all.

Hon. R. S. Livingston in the chair. Henry Meigs, Secretary.

The Secretary read the following articles translated from works received by the Institute since the last meeting, viz:

[Bulletin Mensuel de la Societe Imperiale Zoologique D'Acclimatation.]

We find that the Chinese sugar cane will not flourish in our Algeria without irrigation, requiring much trouble. It will take the place of sugar beet, for that does not thrive in a hot country. The sugar beet yields not over eight to ten per cent of sugar, and cannot compete with the cane, which yields from sixteen to twenty per cent of sugar; and the juice of the sugar beet gives but three to four per cent of alcohol, while the Sorgho gives from six to ten per cent of excellent alcohol, suited to all industrial and economical uses. This plant has but just appeared above the agricultural horizon, but recommends itself by its precious qualities. The seeds of it yield alcohol like other cereals, yielding 24 70-100 per cent of its weight. At maturity this plant shows on its surface a wax efflorescence like some of the varieties of common sugar cane. This is a true vegetable wax; it is dry, and can be pulverized; melts at 90° Centigrade equla to 193° of Fahrenheit. When mixed with tallow it makes candles which give a very brilliant light. An acre will yield nearly one hundred pounds of this wax. Bees-wax is worth about thirty cents a pound average. The Sorgho Sucre will acquire importance.

In Algeria the plants are perennial, new shoots giving up from them in the third year; but it is doubtful whether this will prove an advantage over annual planting. In order to obtain two crops in one year, cut off the canes before they form seeds, and the under growth will be good feed for stock.

This very valuable plant was brought into Italy three hundred years ago, probably Venetian or Genoese, at about the commencement of their commercial development. About the year 1500, there was quite a considerable cultivation there of this Chinese sugar, but whether they failed in their efforts to obtain sugar from it for want of proper methods, or because the sort they had was not as rich in sugar as that we now have, its cultivation was abandoned. The botanic garden of Toulon long possessed in its school specimens of it. Mr. Roberts, then director of the school, cultivated it for a long time, and then gave it up, and it was entirely lost. This sugar cane belongs to the north of China. It has been called the Holeus Saccharatus.

The taste of the alcohol obtained from it resembles tafia, is very agreeable, and a wine is made of it much like Normandy cider.

Mons. Louis Vilmorin pressed out the juice of this cane by a cider press, at the rate of about fifty per cent. He concentrated it by evaporation.

[Rapport du Comite Speciale sur Le-Rapport De La Societe D'Agriculture du Bas Canada, &c.]

Printed by order of the Legislative Assembly.

This work has just been presented to the Institute by Mons. L. A. Huguet Latour, N. P., of Montreal, who has made us donations of many works of value.

We translate with pleasure from this authentic work some views of the agricultural doings, capabilities, &c.

HORSES.

The best race which we have for raising here is the pure Canadian. This horse is unrivalled for beauty of form, proportion of limbs, cheap and easy keeping. They sell well in the United States. Although they are smaller than other races, they are in demand for ship yards to haul timber, &c. By selecting the largest and best stallions, we have obtained from largest mares horses of a size surpassed by few of other races. It has been too general a custom to feed our colts during the second and third winter with inferior forage—the remains of that from the racks of other horses, or with grain husks, and what is very bad, deprive them of oats. This practice will not do. They should have oats and the best and tenderest hay; all vermin kept off them, for they are subject to it, and they should be kept clean and neat. They require much care and good handling, free air and action, and he loves a thick litter often renewed. Before the fatal potato disease here we raised thousands of *minots* (39 quarts each,) of them, and fed to our stock. It took the place of oats with all our animals except the horse. Now we resort to roots, the turnip and carrot—the latter taking the place of oats advantageously, and at a cost infinitely less. Our fine race of Norman cows flourish here. They are small and better for the beef. Calves should suck three months.

The Agricultural society of Lower Canada, attach the greatest importance to the action of proper schools of agriculture and model farms. Before establishing these, we must secure competent Professors! Men of the *first ability—well compensated.* Suitable learners can be made in two years close study and practice fit for Professors. And such are the wants of the Canadas as well as of the immense majority of lands in the world.

Our Canadian horses crossed with the English or United States races, present a most beautiful appearance and are larger. But notwithstanding all that, they do not sell as high as our best pure Canadian horses.

HOGS.

The Berkshire and Chinese cross, winter well here and fatten easily. The Ohio hog crossed with Berkshire, make a fine race, which reach 400 to 500 pounds weight.

The best time to begin fattening them here is about the middle of July or first of August. They fatten faster while the weather is mild than when frosty weather comes.

WEEDS.

We are annoyed with Canada thistles—with the Margaret, (ox eye or daisy,) one large and the other small, covering fields almost entirely—very troublesome as well as the thistle. The Margarets ought to be destroyed while they are in flower. We have couch-grass too.

The Margarets are not only scattered from the flower, but cattle eat them and plant the seeds with their dung. We have sowed buckwheat on a field covered with Canada thistles and it suffocated the thistles. We sowed about three quarters of a *minot*, (thirty-nine quarts) of buckwheat per *arpent*, (a little over an acre,) the little of the thistle that made its appearance could not go to seed. Sow a field two years running and it will entirely kill off the thistles.

We are pestered with mustard, couch-grass and golden rod.

WHEAT.

The wheat from the Black Sea does well here—it does not degenerate. The flour from it does not look so well in bread and sells at a lower price.

Fall wheat does not do well—the plants survive winter, green, but our cold springs have destroyed it. Some do not prefer the Black Sea wheat.

Mr. C. C. Parsons of Feltonville, Massachusetts, exhibited horse-shoes of several sizes, made at the rate of six shoes per minute, by machinery invented by Elbridge Wheeler, of that place, and furnished with eight nail holes and conical works secured into the bottom of the shoe, so as to save the necessity of taking the shoe off to mend its corks. The shoes were admired for their accuracy of figure.

President Pell stated that about four years ago the plan of steel corks secured on to the bottom of the shoe, was invented and tried by himself to save the trouble and expense of removing the shoe and nailing on again to the constant injury of the horses hoof.

Mr. Morgan exhibited an orange having a longitudinal segment extending from flower point to stem point, growing over (apparently,) the original skin of the orange. Was it artificial ?

William Lawton, the introducer of the well known peculiar fine blackberry, at New Rochelle, presented seeds of the great United States cedar of our Pacific shore, which sometimes grows 100 feet in girth, and over 300 high. These seeds are about the size of very large barley seeds, and the tree grows readily and its beautiful symmetrical figure recommends it as an ornament to lawns, &c. In Oregon they call it the red-fir.

Mr. Meigs—It must be called eminently—The *Great United States tree !* Is of rapid growth while young.

It is a majestic witness of the average climatic ranges for several thousand years past in steady succession. For if there had been, on the spot where they have so long stood, any change of temperature, fire, cold, drought, wet, winds, earthquakes, or any unusual changes, even for six months at a time, these great witnesses would have been destroyed ! They therefore testify better than all our historians the average state of things since the "dry land appeared after the Mosaic deluge." And such is the testimony of the great trees in South America, in Australia, Teneriffe, &c., &c.

The journals of the late John Jacob Astor, of the original settlement of Astoria, were lent to me by him soon after the settlement in 1811. I made by his permission extracts therefrom in 1813, and was astonished at the accounts given of the enormous size of vegetables grown by the party at Astoria, from the seeds taken by them from New-York. Radishes, instead of their constant small size, growing as large as a moderate leg, turnips as big as peck measures, &c. And the unlucky accident which befel the party of nearly 200 men, *by a tree blowing down across the road* towards the interior, made by them with great labor, and now the necessity of hard labor to get around it ! It was one of the great trees, so full of moisture they could not burn it, so large they could neither cut nor saw it, and would take more time and gun powder to bore holes and blow it up than they could afford. That tree is said lately to still occupy its bed, sound as ever.

Mr. R. L. Pell remarked that the utility of timber plantations to a country is very great, and unless some steps are taken by our government to renew them, future generations will be compelled to import from other countries. The wood lands of France now occupy 17,000,000 of acres, nearly one seventh of the whole productive soil of that kingdom. In England the forest lands belonging to the State amount to, ... 2,900,000 acres.

Princes of the royal family, ...	500,000	"
Crown, ...	170,000	"
Public bodies, ...	4,900,000	"
Private persons, ...	8,700,000	"

The royal forests of Great Britain cover 126,000 acres. The crown has inclosed and planted within thirty years, 39,000 acres.

The United States should follow the glorious example and create forests, by planting and preserving those already growing, then frame ordinances, and appoint officers to take charge of them. The consumption of wood is enormous—for example, a single railroad company, the Hudson river, consumes annually between 65 and 70,000 cords, and the Central road, 200,000 cords. We must supply this want, and it can be easily accomplished, as there is scarcely a spot in the country too cold, or too poor for successful cultivation; if we take nature for our guide, we will find the birch, the ash and the beech growing luxuriantly upon the lime formations, the elm on the alluvial bottoms, the oak on clay, the pines, cedars and hemlocks on sand, chestnuts on the gravel, and if we drain our peat soils, numerous valuable timber trees will spring up spontaneously upon them.

I would recommend plantations of cedar, as its wood is of great value for posts, and other purposes, and has been neglected because an erroneous impression exists, that it is a slow growing tree, from the fact that for the first eight years it does progress slowly, but after that period, no tree except perhaps the ailanthus grows faster. Great mistakes are often made in grouping trees in plantations, as it is known that all trees have certain secretions, which they excrete by their leaves and roots to the detriment or advantage of their neighbors–the locust and ash are obnoxious to nearly all other trees; I have had grape vines much injured by locusts; the larch may be planted in the vicinity of any other tree with advantage to it; the chestnut, fir and birch grow well together, and so do the hazel, hornbeam, and oak. The Romans imagined that the elm was grateful to the grape vine, and therefore called it the husband of the vine. The grape vine and the elm accompanied each other to England. Every farmer should select the poorest part of his farm and plant it with the locust, or some timber tree, and he will not fail with reasonable care and experience to produce an ample return for capital and time. The fact cannot be denied that the American forests are being destroyed with great precipitancy. Those coming after us, will feel the want not only of timber, but water, as it has been found that when forests are cut off springs and water courses dry up. In India streams now dry in November that formerly flowed until April; this is attributed to the destruction of forests, that once crossed hills now bare and desolate. The people of Pinary have memorialized government against the destruction of forests, on the ground that by so doing their climate will be ruined. The excessive droughts that now annually visit the Cape De Verd islands, are due to the destruction of the forests, and where trees have been cut down in Greece, the springs have disappeared. Trees shade the soil from the sun, they give off vapor during the day, and so moderate the heat, while they obstruct the direct rays from above, and occasion the precipitation of dew.

The reason that so many thousand trees that are set out annually die, is that they are taken up carelessly and denuded of the small fibres and rootlets, upon which they depend for their support, as it is through these that the requisite fluids are communicated to the stem. The fibres are found at the extreme end of the principal roots, remote from the trunk, and are generally left on the ground from whence the tree was taken, they consequently wilt and die, notwithstanding they have been well pruned and skilfully treated. No man should undertake to plant a tree unless he has judgment enough to know the character of the tree he desires to move ; some have roots similar to a sponge, and contain water enough in store to subsist on until the proper fibres are grown to sustain them, such for instance as that curse of our country, the ailanthus, which is a greater nuisance than the Canada thistle, and never could be sold until the importer called it the tree of heaven, and raised the price from one shilling to one dollar each, by which scheme he made six thousand dollars in one year—the paulownia imperialis, willow, catalpa, and half a dozen poplars.

A dozen maples, half a dozen evergreens, the ash and horse chestnut roots are very thick and fleshy, and contain considerable moisture, enough in fact to sustain them through much dry weather after being removed, and therefore do not suffer half as much as the beech, birch, oaks and hickories, the roots of which are not well supplied with fibres.

The generality of trees should be planted in the fall, immediately after the leaf falls, this gives them several months before the ground becomes thoroughly frozen to form rootlets, and prepares them to undergo the vicissitudes of a changeable spring. I planted last fall some ten thousand trees, and with the exception of the locusts and a few evergreens, consider the fall the only safe season, because the root has an opportunity of fixing itself permanently in the earth through the medium of its numerous ramifications, and thus forming at its extremities spongelets to absorb the necessary fluids, as these become the only true roots to supply the tree with nourishment. There are in roots two fluids of different densities, the one flows inwardly and is called endosmose, the other outwardly and is called exosmose. The fluid in the interior of the root is rendered dense, by mixing with the descending sap, and as long as this difference exists the roots absorb fluids. This may be proved by growing plants in water, when it will be found that a gummy matter is discharged impregnating the water with a taste peculiar to the plant; therefore if the planter desires his plants to continue in a healthy state, he must maintain the conditions of exosmose and endosmose. As we rarely see in nature a large number of the same variety of forest trees growing together, except perhaps pines and hemlocks, therefore when we plant it would be well to follow nature, and plant varieties. Deciduous trees always succeed better when planted among firs; pine leaves, pound for pound, yield thirteen times more ashes than pine wood. The annual fall of these leaves gives alkalies to the land, a source of fruitfulness advantageous to deciduous trees.

Why do pine trees succeed oaks, and beech pine, the soil must be rendered by a growth of pines uncongenial for a second growth, but congenial for another, or else the labors of man cause it. I have found that nature protects trees that stand in exposed situations, first by allowing them three times the quantities of roots that would be necessary in the forest; second, by clothing them with many more branches, and they so formed as to balance the tree perfectly; thirdly, their stems are shorter, and consequently stouter, and fourthly the bark is much thicker, nature remembering (and man should do the same,) that trees as well as animals are organized beings. We know that in nature there are two great kingdoms, the vegetable and animal, the distinctions between which are daily disappearing, as nearly all the organic matters which were supposed to distinguish the vegetable from the animal have been discovered in both, and motion even no longer separates the two.

You often hear persons say that it is difficult to make tap rooted trees live, because in taking them up the tap root is necessarily cut off. This is an error that cannot be supported by my experience, the tap root is only of advantage during the infancy of the tree, and at mature age cannot be discerned from the other roots. It is only those who are unacquainted with the physiology of plants that meet with bad success in planting. Trees must be adapted to their proper soil and appropriate climate, or the efforts of nature will be counteracted. Plants should always be headed down when two years old. I have often tried this experiment with different species, by heading a row and leaving a row; those headed in made seven feet of a growth in a year, those not headed two feet. Some of the headed rows grew twenty feet in two years, while those not headed grew six feet. Many persons when they remove a large tree head it in upon the principle that the roots have been much reduced by transplanting, and that the heads should be so in proportion, this is wrong, though I have practiced it largely; for without the heads the roots cannot receive nourishment, and the sap is lost not only at the top but the bottom of the tree also. Try the experiment, and you will find that the tree with the top left on will do the best by one-half, showing that the treatment which is proper for a small plant is not so for a large tree.

The idea that trees when transplanted should be replanted in the same position and exposure in which they stood, although a prejudice of very great antiquity, is fallacious, as I have never observed any difference, and have made repeated trials. In planting trees the roots should be trimmed instead of the tops. I regret to be compelled to make one statement in this connection that militates against trees in pasture fields, because I so delight in forest trees that I dislike to say anything about them that will have a tendency to induce the farmer to cut them down, still I cannot deny but that animals will increase much more rapidly in open fields, exposed to the hot burning sun, not only in fattening but milking qualities, than they will if permitted to enjoy the shade of trees. In the first instance they are continually eating and taking on fat, secreting milk, etc., and in the second instance only digesting the morning meal, as they will remain almost the entire day in the shade. Transplanted trees should never be watered after they are set out, if set properly.

We all know that trees require a great deal of moisture, and that it is absorbed through the instrumentality of the spongioles and rootlets which pierce the soil in every direction. As holes retain moisture nearly in proportion to their depth and size, therefore they should be large and widest at the bottom. The ground must be thoroughly pulverized, and just before the tree is set fill the hole with water, then throw in a sufficient quantity of the pulverised earth and mix it until formed into a perfect mortar, spread the roots of the tree by hand in this mess and cover them with the finest surface soil, without pressure, then tie your tree firmly to one or more stakes and it will never require water at your hands. When trees are watered, after planting, the ground becomes hard and baked by the action of the sun's rays and prevents the absorption of moisture, air, and heat. If you ever find it necessary to water trees that have been planted after the usual fashion, draw away the earth for a considerable distance around the tree, to the depth of several inches, fill the basin with water after sun-set, let it stand until the next morning, and then fill in the soil to its former position without pressure. The roots of trees extend, comparatively speaking, great distances in the earth in search of water and other requisites. I followed the root of a horse chestnut tree through a wooden pipe that had been laid for the purpose of carrying water from a pump to my barn yard, a distance of ninety-four feet; there was not a single fibre projecting from it. Sanfoin has been known to penetrate the earth fifteen feet, and rye seventy-two feet. There are a great many mysteries connected with the phenomena of vegetable life still to be revealed to us.

Before you collect seed for planting you must be sure that they are mature, and when sown must be placed beyond the action of light, as they start more rapidly in the shade. Heat is a necessary condition, as no seed has been known to germinate at the freezing point; they cannot grow without moisture and atmospheric air, nor in carbonic acid, hydrogen or nitrogen gas, but readily in pure oxygen gas. When the leaf is perfectly formed a new stage of existence is opened to the plant, the food in the seed has fed it to this period, it must now depend upon the earth and atmosphere for its future existence, and as it grows is subject to numerous diseases. When the soil is barren and neglected by man, it is attacked by consumption, the bark exfoliates, and thousands of insects fasten upon and destroy it; sometimes the pores are closed by transpiration, when the plant suffocates and dies. If the weather is too hot or too cold gangrene attacks it, the inner bark immediately turns black and death is inevitable. Honey dew often coagulates on the leaves of forest trees, in consequence of a warm east wind, at a particular stage of their growth, this attracts numerous insects and they kill the tree. Long and continuous rain storms induce dropsy on trees, the leaves drop off, the fruit rots, and the tree dies. Blight stops the circulation of the sap which induces the leaves to fall, invites insects, and they destroy the tree. Mildew often coats the leaves of trees with a white powdery substance, induced by hot nights without dew, and causes their death in a very short time. Flux sometimes ensues when a tree has a superabundance of sap, bursts the bark and bleeds continuously, and unless a remedy is applied the tree dies.

After planting, the most important work is to destroy the insects and animals that prey upon our fields and crops; but this destruction must not be indiscriminate. Many wage war upon moles which, in my opinion, should not on any account be killed, because in their subterranean excavations they destroy thousands of grubs. The destruction of crows multiplies noxious insects that do inconceivably greater damage to our corn fields than the crows themselves. I never permit them to be killed. The Hessian and 15,000 other insects, so formidable in our wheat fields, may be outwitted by steeping the seed and sowing early in well-tilled ground. The few that escape will be devoured by their relentless enemy, the yellow bird.

The moth Gortyna zea destroys our Indian corn by penetrating the stalk just above the surface of the ground, and the Agrotis Segetum the tender roots. My remedy is late planting, say the first of June, and high manuring. The wire worm destroys our grass fields. To prevent its depredations I use lime freely as a top-dressing, from one to two hundred bushels to the acre. The beetle (Areoda lanigera) destroys our hickory trees, the Elaphidion putator our oaks, the Canker worm our elms, the Hylobius pales our pine trees. In thirteen days, last August, thirty-one workmen destroyed in a vineyard 41,000,000 of the eggs of a small and very destructive moth, which would have hatched in sixteen days thereafter, and might, if left undisturbed, have produced three or four more generations the same season, to be nourished by the vine. I have seen flies deposit their eggs on the living body of a caterpillar. Linnaeus has said that three or four flies will devour an ox in as short a time as several lions, by each producing 30,000 maggots. I am opposed to the destruction of beetles with one exception, because they consume an immense amount of decomposing vegetable matter, which, were it not for them, would destroy the air we breathe. I cherish wasps, because they put an end to the existence of countless thousands of spiders and other similar insects. The tiger beetle should on no account be destroyed, from the fact that it is the enemy of all living insects, and kills indiscriminately. Hornets, dragon flies and ants should be protected, as the earth would be overrun with insects were it not for them. Many insects show great instinct in choosing a proper place for the deposit of their eggs, where they will not only be protected from the attacks of their foes but from the effects of tempestuous weather. When the mosquito lays her eggs she balances herself on water, and as they drop catches them between her hind legs, which are so positioned as to represent a triangle. Here they are formed into an oblong, concave shape, numbering about 350 eggs, which is finally dropped into the water, and there sails about for a certain period, when they hatch, descend below the surface, and remain until they undergo transformation, and finally become the pests of mankind.

The excepted beetle belongs to the family of the Buprestidæ, and is, when full grown, half an inch long, striped brown and white, and generally flies after sunset. It is the progenitor of the apple-borer, and deposits its egg near the root of the tree, about the middle of June. It prefers a bruised spot where the bark has become partially decayed. The grub resembles a tadpole, having a large body and head, and grows to the size of an inch in length. It preys upon the tender wood and minor bark, and leaves a track of dust behind it by which its course may be easily followed. They sometimes remain several years in a tree before assuming the beetle form. They are frequently introduced into different sections of country by the importation of nursery trees. I have often found them, and never plant without critically examining such before planting. A vigorous growing tree is seldom selected by the beetles, nor will they attack a tree that has been carefully scraped in May and washed with a preparation made as follows: four pounds of soft-soap, one pound of powdered sulphur, half a pound of strong tobacco, diluted with boiling water, and applied with a whitewash brush.

I have always found, in my endeavors to destroy destructive insects by poisons, such as honey, sugar, &c., mixed with arsenic, cobalt and other virulent substances, that my friends have suffered likewise. My honey bees have partaken and died. They have been eaten by the wren, king bird, cat bird and other choice friends, and they in turn by cats. I have likewise caused fires to be lighted at night in my orchards and gardens, when a like destruction of friends as well as enemies has taken place. I have often heard farmers say that a cold winter destroys an immense number of insects, and imagined such was the case until last spring, when I examined the chrysalids of many insects that had withstood, in exposed situations, the preceding intense winter with the thermometer often many degress below zero, and invariably found them full of life. From whence do they obtain the source of heat necessary to preserve their temperature when thus exposed? Plants likewise, that were frozen to such an extent that they broke off by the slightest touch, were uninjured. In Siberia the ground becomes intensely frozen to the depth of the remotest roots of trees, and remains so from seven to eight months, and still they thrive with unabated vigor in the summer following. Still, I suppose a complete solidification of the fluids would overcome the latent heat and result in death. Pruning, after the destruction of insects, is the next important operation, having for its principal object the production of a large bole of perfect and sound timber. To accomplish this end you must prune the accumulation of ligneous matter in the trunk. This is done by shortening and cutting back the limbs for five or six years. This substance has neither taste nor smell, and is identical in its chemical properties whether it be from the willow or solid oak tree, and constitutes a large portion of the gigantic productions of nature.

President Pell observed that sometimes by wind or otherwise, valuable young fruit trees are broken off below the branches. I have sawed off the tops of them, and with a very sharp knife cut on four sides four inches in length. When this is done new bark soon grows again I then inoculate a new top on the stump, and get a new tree well worth the trouble mentioned.

Dr. Peck of Brooklyn, mentioned the objection of many men to plant seeds of trees, being the long time before they could gain any advantages for themselves by it. But that we have in modern times the noble conduct of the Duke of Atholl, who has covered desolate lands with precious timber—particularly the larch, and proving in a few years to be worth five thousand dollars an acre.

Solon Robinson adverted to the success of the good Deacon Lord in growing trees. He took small elm trees on his shoulder on horseback, carried them home and set them out, and lived to see them four feet in diameter and shaded from the heat of summer by their wide spread branches and thick foliage, and with that superior protection to his dwelling and his family from lightning! for the tens of thousands of points of one of the trees are so many times superior to the points of common lightning rods!

Messrs. Lawton and Meigs remarked on the disease of the sycamore for many years past. Mr. Lawton had noticed that at the beginning the malady appeared simultaneously in several States, therefore not propagated by contagion—no insect has been found as cause of it.

Mr. Pardee had examined the black knot, especially on plum trees—it seemed contagious, spreading gradually to adjacent trees. His remedy was to watch it, and from the punctures in them like pin holes to a more advanced disease, could find no cause; but he cut off all the attacked branches and burned them.

Mr. Meigs had examined the black knots at spring, summer and autumn; has not found insects or other cause; but rows of trees affected in proportion to distance from a tree very diseased.

Dr. Peck supposed that some matter poisonous to the tree had been deposited, for experiment has proved that the poison of the rattle snake kills small trees.

Dr. Smith adverted to the remarks of President Pell on insects, their vitality, &c., and that the phenomenon has existed of certain insects, among them some beetles had been prepared for study by transfixing them with pins, and nevertheless were revived at the end of four years!

Mr. Lawton said, in raising young treees about our dwellings there is a pleasure analogous to that we enjoy in lovely children, for these are the children of the forest!

Dr. Peck said that a tree was to us an interunion between heaven and earth—its leaves in the heavens and its roots in the earth. Let every man who goes to the treeless lands of our west, take a quart of acorns in his pocket and plant them there.

Subjects adopted for next meeting—"Irrigation" and "fence-posts."

The Club adjourned. H. MEIGS, *Secretary.*

March 24, 1857.

Extra meeting.

Present—Messrs. Pres't Pell, Rev. Mr. White of Staten Island, Mr. William Lawton of New Rochelle, Dr. Waterbury, Mr. Pardee, Wm. B. Leonard, Prof. James J. Mapes, Dr. Smith of the Times; Judge Scoville, Geo. E. Waring, Jr., Dr. Wellington, Mr.

Stacey, Mr, John W. Chambers, Mr. Atwood, Hon. Robert Swift Livingston, Mr. Redding, Mr. Daniel C. Robinson, Mr. Vail and many others—51 in all.

President Pell in the chair. Henry Meigs, Secretary.

The miscellaneous business being first by rule.

The Secretary read the following translations and extracts made by him since last meeting.

[The Farmers' Journal and Transactions of the Lower Canada Board of Agriculture, Montreal, March 1857.]

[We have received this paper from our valued corresponding member, Mons. L. A. Huguet Latour of Montreal. H. Meigs.]

THE FARMERS' FRIENDS AND HIS ENEMIES.

The parasitic Fungi, often individually invisible, taking root on or in the plants and feeding upon their juices. The fungi are leafless plants of very simple structure, growing from little creeping flims or fibres called their mycelium or spawn. They are of various sizes and forms and are propagated by extremely minute seeds called spores, (which is Greek for seeds, H. M.) either naked or in cases called sporidia, (pods). The mushroom, toad-stool, and puff-ball, may serve as examples of the larger forms, and the fine dust with which the latter is filled, may give good idea of the minuteness and diffusibility of the spores of such plants. The moulds which grow on stale bread, cheese, and other decaying matters are examples of the smaller kinds, and when we consider that some of these produce spores even smaller than those of the puff-ball, we need not wonder that they appear so readily whenever the conditions are afforded for their growth. Such are rust, mildew, smut, dust-brand, &c. Some of these attack the straw, leaves, chaff, others the flower and the grain; but all are alike minute fungi, spreading their spawn through the tissues of the plants, and producing quantities of minute spores to continue the plague.

Rust or mildew, is a reddish, rusty, or dark-colored substance which appears in the stems and leaves of wheat, speedily arresting its growth and bringing on premature decay. When examined by the microscope, it is found to consist of innumerable minute fungi, that have burst through the skin and are growing in dense patches and absorbing the sap of the plant.

The rust plants probably belong to different species of the genera *puccinia* and *uredo*, (fungi). How do these species enter the plant? It may be in two ways: by the minute pores or stomata, (mouths) of the leaves, which serve for the respiration of the plant, or by the roots from the soil. Possibly different species may enter by these different paths. We cannot prevent the entrance of these spores! We will give all that we have learned, and we have been carefully trying to know all about it. And we ask our practical friends to be attentive to the subject.

Attacks of rust are favored by—1st. Damp and cold weather succeeding warm weather, at the time when the straw is still soft and juicy—hence late grain is very liable to rust. 2d. A deficiency of the outer silicious coat or an unnaturally soft and watery state of the plant. These unhealthy conditions may proceed from poverty and want of alkalies in the soil, from the presence of too much crude vegetable matter, as sod, or raw manure, or a wet and undrained land. 3d. It is probable that when the grain of rusty wheat is sown, or sound wheat in land where wheat rusted in previous years, the seeds of the fungus being in the soil.

The best Preventives.

1. Healthy seed. 2. Early sowing. 3. Draining.

4. Abstain from sowing wheat in lea-lands (pastures,) or bog.

5. Make the soil rich, but not filled with crude vegetable matter.

The Dust-Brand—A very minute fungus fixing itself on the flower or young grain of wheat or oats, and turning the head into a mass of black dusty spores, which blow away. Change of seed is a remedy for this. 3d. Washing the seed is a useful preventive.

Smut or *bunt*—Parasitic fungus growing within the grain, converting its substance into a dark colored fetid mass of spores or mould balls, which under the microscope look like rough berries, and are filled with the minute dust-like seeds of the smut. Its mode of propagation is pretty well understood and easily guarded against. When smutty grain is threshed, the infected seeds are broken, and the smut being of an adhesive nature, attaches itself to the sound grains, and these when planted give a smutty crop. Good wheat put into bags or boxes, or that threshed on the floor where smutty wheat was threshed, will be smutty. Seed wheat, however, should always be well washed before sowing. The adhesive nature of the smut is converted into soap by alkali and so washes off. Ley therefore should be used in washing the seed. Lime is not so good, for by too much slaking it often loses its power, pot-ash, ammonia.

Much attention is now given here to the breeds of all the various kinds of farm stock, from horses to bantams. The old world has been pretty thoroughly explored for choice specimens of animals, which have been purchased and brought to this country with very little regard to expense. At nearly all our cattle shows, may now be seen, the representatives of the herds of England, France, Spain, and even of the Celestial Empire, and they very often carry away the highest premiums. We do not object to this. We rejoice to see American farmers manifesting a determination to have the best stock the world affords, and to avail themselves of all the improvements, whether made by the Arabs, by the caravan drivers, or by the graziers of Europe.

He quotes Prof. J. A. Nash for his discourse on "Less land and more labor," and Mr. Greeley on his doctrine, that "No poor man can afford to be a poor farmer."

On carrots for horses—He says, " For two months past, I have fed my two horses upon carrots and hay. They are in constant service on the road; and under this treatment they usually come out at the end of the 'pile' looking better than when they commenced. My dose is two quarts, morning, noon, and at night four quarts to each horse, and as much good sweet English hay as they will eat, and *cut* whether fed to them dry or otherwise. There is no waste, the horses eat it better, and have more time to rest, which is quite an important consideration, when the horse is liable to be taken out of the stable at any moment. I always cut them quite fine, before using. Carrots are most excellent for horses whose wind is in any way affected. Last year I paid for carrots nine dollars per ton, this year eleven—and at the latter price I prefer them to oats, measure for measure!

ENGLISH MODE OF FATTENING POULTRY.

Oatmeal with milk or water, scalded. Cooped fowls fed at day break, noon and at roosting time, and as much as they can eat. What they leave should be taken away and given to other fowls, because it sours and they wont eat it freely Their feed troughs should be scalded sweet and clean every day, so that spare troughs must be ready. A constant supply of clean fresh water and a little gravel every day, a little sliced cabbage, some turnip tops or a green turf to pick, variation of diet; occasionally give boiled barley instead of oatmeal. Some feeders give them some grain to pick. If you want the fowls to be very fat chop up some mutton suet or trimming of the loin and scald them with the meal, or boil them in milk or water before pouring them over the food. The fat of fowls so fed will be found exceedingly firm.

John Bailey says that the grey or speckled dorking is the best fowl for the table.

ANCIENT AUTHORITY.

Mr. Wainwright of Dutchess County, New-York, has an early agricultural work, the English *Improver Improved* or the *Surveyor of Husbandry Surveyed.* Discovering the improvableness of all lands, some to be under a five or six fould, double and treble. Yea! many under a tenn fould, and some under a twenty fould improvement. Dedicated to Oliver Cromwell, Protector. Its title headed by the term "*Vive la Republick.*" By Walter Blythe, *a Lover of Ingenuity.* All the above are inclosed in a border coarsely engraved on copper, representing the days when *swords shall be beaten into pruning hooks, etc.*

A FARMER'S WIFE.

One woman is worth two men on a farm. She makes $30 per annum from one cow, and can manage twelve, add the hog and garden and she makes all the money to support the family. Poultry too belongs to her. She must, however, always be perfectly supplied with good dry fuel in plenty, and with pure and plenty soft water.

NUMBER OF SEEDS IN A POUND.

Strange that this is neglected. Messrs Kendle of Plymouth, answers it; of

Wheat,	10,500
Barley,	1,540
Oats,	20,000
Rye,	23,000
Canary grass,	54,000
Buckwheat,	25,000
Swedes turnip,	155,000
Cornish do	239,000
Orange Jelly,	233,000
Cabbage, Scotch drumhead,	128,000
do Savoy do	117,000
Clover, red,	249,600
do white,	686,400
Rye grass, (perennial)	314,000
do Italian,	272,000
Sweet vernal grass,	923,200

MOLES.

The Royal Agricultural Society affirms that in one year and every year sixty thousand bushels of seed wheat, worth £30,000, are destroyed by *wire worms!* This prevents 720 thousand bushels from being grown, worth £300,000. If our farmers and others instead of killing moles, partridges and pheasants, would *protect them*, 720,000 bushels more wheat would go every year into the English markets. But the creature designed by a kind Providence to perform the chief part of this immense good is the *mole!* Some years since I had two fields one of which was full of wire worms, the other perhaps a third full. My crops failed on these fields for the first two or three years but afterwards improved rapidly, for I bought all the live moles I could find at three shillings a dozen and then two shillings a dozen, and turned them into these fields. I had eight quarters of barley per acre and seven of wheat where the moles were at work all summer making the ground like a honey comb. Next year the wire worms being all cleared out my innocent little workmen who had performed for me a service beyond the powers of all the men in my parish, emigrated to my neighbor's lands to perform the same service, but of course they met death wherever they moved so that my little colony was wholly destroyed. Now I will receive all the moles that the farmers will give me and turn them into my glebe.

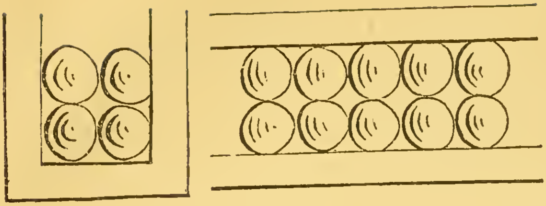
WASH FOR TREES.

Should be put on the latter part of March or early in April. I used it last year on some large elms that had in previous years been troubled with caterpillars, and not one appeared during the last summer. Before putting on the wash I scraped off the rough bark with a drawing knife *immediately after a rain*, about eight feet to the ground. I have found it an excellent wash for every description of fruit trees.

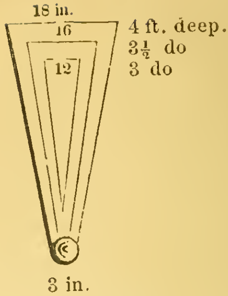
Take twenty pounds of potash, half a bushel of air slaked lime, half a bushel of wood ashes, sifted, and half a bushel of fresh cow dung. Put these ingredients into a tight barrel, and make into a wash of suitable consistency for putting on with a white-wash brush.

Cornelius Baker, Esq., has preserved his elms entirely from caterpillars by using this wash.

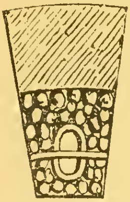
Mr. Pell observed that the Chinese did use such teas as foreigners demanded. The coloring of some with deleterious colors—Prussian blue for instance—was that bloom admired by foreigners. That the most precious teas sent out of China found



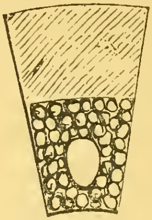
Clay Ball Draining.



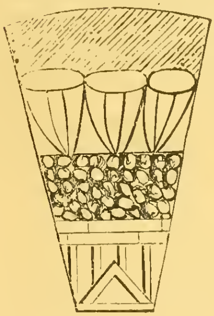
Pipe Tile Drains.

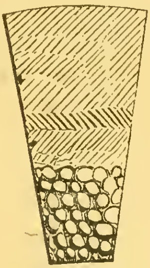


Compound Drain—Two Semi-Cyliudrical Pipes, with a Flat Sole between.

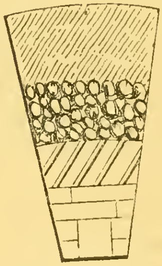


Egg Shaped Pipe.

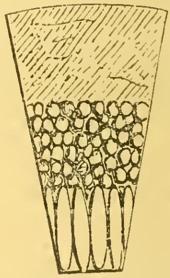




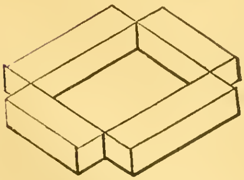
Stones and Soil.



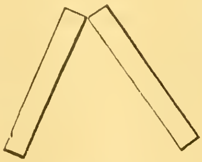
Side Stone Drain.



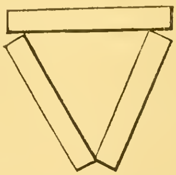
Rough Stone Drain liable to get out of order.



Four Bricks.

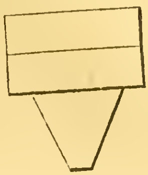


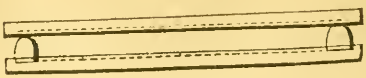
Two Bricks.



Three Bricks.

Inverted Sod.





Rail Drain.

their way overland to Russia, and cost from *five to fifty* dollars per pound.

Mr. Wm. Lawton was of opinion that tea was a most valuable article, peculiarly favorable to health, generous in its efforts, and he referred the Club to Ure's analysis of tea.

Mr. Meigs remarked the great difficulty experienced in France and elsewhere in obtaining sound tea nuts. It was supposed that the Chinese never suffer a nut to go abroad without first *boiling* it to destroy its vitality.

Mr. Pell—We found a like difficulty in obtaining sound multicaulis seeds from Italy. The silk trade desired no competition abroad.

Mr. Geo. E. Waring—Under-draining, as an art, has made great advances among the better class of farmers, especially in England, since the introduction of draining tile, or, perhaps we should say, since the *modern* use of the tile, for prior to 1620 the garden of the monastery at Maubeuge, in France, was drained with earthen tile, placed at a depth of about four feet; and so late as 1850, when the conformation of the surface was changed to make a park, this garden was famous for the excellence and abundance of its productions, and the people of the district had been at a loss to account for its astonishing fertility until the grading spoken of exposed a thorough system of drainage, which had evidently been made earlier than interments dating at 1620.

The tile is an innovation—a new idea; it is a revolution in the art of draining; but it is at the same time a silent and timid one, producing but slowly the change of system which its first coming predicted, and which its long use (since about 1841) has steadily advanced. It conforms so easily to popular ideas, and makes itself so useful in nearly all cases, that its distinctive features and strong points of advantage are not so readily seen as if it had no other features or advantages. The old stone and brush drains acted as permeable spaces to relieve the soil of the excess of water which it might receive from rains or springs; and such drains serve a very fair purpose, sufficient, in the absence of other materials, to command respectful attention; but, as they rarely offer more than a channel for the slow percolation of water, they can by no means compare with tile, which forming, when properly laid, a perfect conduit, that can be entered only by water and air, and which is, therefore, not liable to obstruction, remains as a free outlet for whatever excess of moisture the soil may contain. Add to this the far greater cheapness, in most cases, of the tile, and we see that there are but few soils requiring drainage where it would ever be advisable to employ any other material.

Assuming, then, that tiles are the cheapest and best aids to under-draining, let us examine their action with a view of ascertaining the proper manner in which to construct the drain,

Drains of the old fashion require of course to be made of considerable size, that the dimensions of the passage for water may be sufficiently large to compensate for its want of perfection. Then, again, such drains—partly in consequence of the cost of their construction—are located chiefly in low parts of the land, and only at long intervals, or where they may tap springs or deposits of water. Each drain is regarded as complete in itself, not as a part of a system of drains aiding each other. It is, therefore, made of a large size, and is filled with stone toward the surface of the soil, that the water which runs over the surface to this lower portion of the field may find easy access to the drain by filtering down from the top. They are generally, if we may use the expression, *covered surface drains*, and as commonly coustructed, they have little of the effect of thorough under-draining, still, it is possible so to arrange them that they shall, for the time of their duration, perform all of the work of tile-drains; as may the tile replace the stone-drain for the purpose of surface-drainage.

The object of under-draining is not simply to relieve the wetter parts of the land of their surface water, but to remove from the whole soil, to a depth of from thirty to thirty-six inches, all water which does not attach itself to the surface of its particles by force of capillary attraction. This, and nothing less than this, is thorough drainage, and this condition of the soil must be attained before we can anticipate all of the good results which are rightfully attributed to under-draining. Such a condition is best effected by the use of the tile, and it is well always to bear in mind these principles—that in thorough drainage the object is to provide an outlet for water at the *top* of the water-level, and that water which falls on the soil does not travel diagonally toward the drain, but settles at once in a vertical direction, and thus raises the level to such a height that the water enters the tile and is carried away. It continues to flow until water from the upper soil has ceased to descend to raise the position of that below.

To illustrate this more fully, let us suppose a barrel, standing on its end to be filled with soil, and that water be poured into it until the soil is saturated—that is, until the space between the particles are filled with water. If we now remove the bung of the barrel the water will flow out until that above the level of the lower side of the bung-hole is entirely removed, except so much as is held by capillary attraction. The water which has passed out is not all of it that which was originally above the level of the outlet, for that water did not take a diagonal direction toward the outlet from all parts of the upper half of the barrel. Its weight carried it directly down, and caused it to force up that which was below until it passed off by the outlet. Probably, for a short distance from the hole, the water moved in a slanting direction; but this is only local, and does not invalidate the illustration.

Now, if we pour more water into the barrel, in imitation of a heavy shower, it is at once absorbed by the soil in the upper part of the barrel, and it passes down as before, raises the water level to a point above the lower edge of the bung-hole, and the outflowing again commences. Here we see that the water passes out as soon as it reaches the lower part of the outlet, and (except for the removal of water close to the side of the barrel) it would not accelerate the flow to enlarge the hole on its upper side—supposing it originally large enough to carry off the water as fast as it settles and raises the level. The same is the case with the soil. The position of the lower side of the tube which is formed by the tile decides the water level; and whenever from rains or any other source water is given to the upper soil, it passes down in a vertical direction, and raises the level until a like amount passes off through the tile. It may move sideways for a foot or two each way from the drain, but this does not affect the principle. When a cubic inch of water falls on the soil at a point midway between two drains, it does not travel along until it finds an outlet, but it passes down to the level of the water below, and by its weight it causes a rise in the whole mass until, other things being equal, a corresponding amount of that which is in the immediate vicinity of the drain passes out. Hence we see that water enters the tile almost entirely from below; and in view of this fact it is obvious that all that is necessary in practice is to so lay the tile that it will carry off the water thus received. Filling in the ditch above the tile is entirely useless in all cases where the tile is large enough to carry off the water—and it should of course be always so—for it does not at all facilitate the entrance of water into the drain. If there were any loose material needed it should be placed below the tile, for it is from below that the water comes. But it is never needed. Lay your tile so that the water will run out, and you cannot keep it from running in.

There is, of course, very much connected with the construction and action of tile drains that could not be comprised within the scope of a single article. My object has been merely to show the fallacy of supposing that water enters the tile mainly from above, and that it is therefore necessary to place loose material, such as small stones and leaves above them. In making stone-drains, which are very liable to obstruction, it is often well to do so, but with tile (properly laid) it never is necessary. Let us have a reform in this matter, and thus cheapen the construction and extend the use of tile-drains.

Dr. Waterbury—In 1851 I purchased a meadow of about six acres, consisting of two very different kinds of land. The upper part of it was composed of what geologists term drift or loose stone, with their corners worn off by attrition against each other and deposited in a direction and inclination nearly uniform during some uncertain ancient period. The lower part which was not quite so large was composed of swampy ground underlaid by clay, and was very much the most productive. A mountain brook that crossed a corner of the upper part suggested to me the idea of converting the dry hill side into a wet land like the lower part, and thus rendering it equally fertile. Accordingly, by means of sluices from the stream taken along the side of the hill, at a downward inclination of about the half of one degree, I managed to obtain a sufficient supply of water, but when applied instead of wetting the soil generally I found it to percolate almost directly down until it met the impervious lower strata, running along which it made its appearance as numerous springs at the upper edge of the naturally wet part of the meadow. During the same and the subsequent season I had occasion to subject some fifty acres or more of meadow land of clayey soil to irrigation with in every case a beneficial result, in some cases the annual growth of grass being more than quadrupled. From these experiments I drew the conclusion that irrigation to be of practical value must be practiced on soils not too open, but which have enough plasticity of composition to prevent too rapid filtration through them, and that when practiced on such soils as nature dresses with water it is one of the cheapest and most effective means of improving them in fertility.

The water that was supplied to this hill side during the two years in which the experiment was conducted was like all surface water, roilly, that is more or less charged with organic matter, and yet after the filtration, when it made its appearance in the springs, it was not only quite free from any such taste but it had dissolved out and brought to the surface from within the hill such salts as rendered it *hard*. The extent of this experiment and the time during which it continued, leave no doubt that the water under certain very common circumstances carries no organic matter which may be dissolved in it below a foot or so in the soil, while it dissolves and brings to the surface continually soluble substances from within the earth.

The water of irrigation is merely a substitute for rain, and consequently irrigation is most necessary and of course furnishes the most striking results on such soils and such crops as feel drouth soonest. As the substances that compose plants must at first enter into their composition in a soluble condition, and as the solution from which they are revived by the action of the sun on plant tissue is exceedingly dilute, it follows that the growth of the plant is principally governed by the supply of moisture. It is the principal province of the laborious processes of tillage to retain the natural supply of water and furnish it to the plant as it is needed during the action of the sun. In the same manner that a cloth *wrung* is freed from moisture and refuses to absorb so does a hard soil. The bed of a turnpike road is sooner dry than the neighboring plowed field. The surface of the earth stirred by the plow to the depth of six inches will absorb and retain one or two inches of rain which will give growing plants a fair supply of water for ten days or two weeks of exposure to a bright sun. By increasing the depth of tillage to twelve inches the risk of a longer drouth is avoided and a greater aggregate growth is secured, as there are less extremes of variation. It is in this way that deep tillage of land seems to effect so much benefit and indeed it is extremely difficult to account for the well known benefits of frequently stirring the soil on any purely chemical hypothesis.

The supply of rain to the different countries of the earth, when not interfered with by local causes, such as ranges of mountains, will be found to correspond to the intensity of sunshine, and the same is generally true of any given place for the different seasons of the year. Thus, while we have some thirty-five inches of rain annually, the average fall in tropical countries is over a hundred, and two-thirds of our thirty-five inches fall during the hottest third of our year.

In countries that are thoroughly cultivated the greatest part of the rain that falls never passes into the earth more than a foot, being absorbed and retained to be exhaled again by the growing plants. Of that other part which passes down by filtration to appear again in springs most of it is also evaporated from the land those springs irrigate, but a very small percentage finding its way to the ocean.

It has been frequently remarked in clearing away the forests of this country and superseding them by a growth of the grasses that the springs become smaller and in some cases dry quite away at times, where previously they had been permanent, and also that the annual freshets in the streams do not rise so high as when the country they drain was wooded. To account for this we may refer to some late experiments in Europe that show that when soil is trenched to the depth of three feet there is no filtration, and that at less depths the plants growing in it can use more water during the season in addition to the rain than what drains away. Indeed common observation shows us that most plants growing on the banks of streams where they obtain an unlimited supply of water by upward filtration are greatly increased in growth. Hence we may conclude that if in addition to culture so deep as to retain all the rain that falls we were to supply some additional water it would increase the growth.

We are not to conclude from these facts that an unlimited supply of water to a soil is all that is necessary to render it fertile; although a soil in this condition does give a much better growth than one in the opposite state of aridity. Water and air are both necessary for the decay of organic matter, and consequently for the supply of carbonic acid in the soil on which vegetative growth depends. It is probably by furnishing air as much as by removing water that underdraining produces its effects. It is a well known practical fact, that in those under drains that are working effectively, a current of air is continually generated, and this draft is probably connected with the oxidation of organic matter in the soil.

If the processes of agriculture then, laborious as they are, derive their principal value from the fact that they furnish a steadily continuous supply of water to plants ; and if the fertility of a country may be judged of by its rain gauge; and if we have sunshine enough to use up all of our rain, and even more if it fell, then we ought to make such arrangements as would save the greatest possible amount of the water that annually falls, and leave as little of it as possible to run away into the sea. In the case of meadows, when we cannot plow them annually, and when consequently the soil becomes very hard, so that they are the first to suffer from drought, every little rill should be scrupulously saved and distributed over the greatest possible amount of surface. The same is equally true of pasture, and even plowed soils may be vastly benefited by an additional supply of water, as some experiments in the culture of hops by my friend the late Mr. Ferguson of Delaware county, in this State, during life an esteemed member of this body, fully show.

I have taken occasion sir, a number of times previously, to advocate here that great and wide doctrine on which American agricultural practice is founded—a free use of the resources of nature for improving the soil—and I take pleasure in adding in consonance with what I have previously said, these remarks on irrigation.

Prof. James J. Mapes remarked that the subject of the day—"irrigation," should be considered with reference to the soil to be watered, and its lower strata. That drainage is first in order to deliver the soil to a suitable depth from surplus water, which suffuses the roots of plants to their damage or death. The Professor illustrated on the black-board his method of determining the courses of water beneath the surface. He uses a borer of about two inches diameter to bore holes about four or five feet deep in regular alternate spots about ten feet apart. He has laths prepared with a coating of lime and molasses. These he puts into the holes. The water rising in these holes according to quantity is shown by the loss of coating on the lower ends of the laths, with such accuracy that on examination we trace the lowest point or channel of the water on the entire field, and then lay our drain pipes accordingly. He uses pipes of two inches bore, as all sufficient for all ordinary under-draining. The Professor explained the very great importance of this system in order to suit plants. He also remarked on the very singular difficulty there is in making a proper mixture of soils with manure. Take for instance equal quantities of white and black sand, work at them for hours in effort to effect a homogeneous mixture and you will fail, and yet every particle of soil and every atom of manure should be equally united to render the supply to the roots easy and perfect. One of my fields, seven acres, was fit for plowing ten days ago!

Mr. Pardee said that the club was aware of the valuable experiments tried by President Pell on his large farm at Pelham, and he for one would be pleased to get a full account of his drainage from himself.

Mr. Pell said that if the club pleased, he would render an account at the next meeting of the club.

Dr. Smith, of the Times, has ascended Snowden and Ben-Lomond, in Wales, and was much surprised to find tussock bog and wet ground nearly all the way up to their summit, (over 3,000 feet.) Water finds its way therefore where we should naturally least expect it.

Rev. Mr. White of Staten Island, has often remarked the wet condition of ground in the ascent and summits of the high grounds of Staten Island. Some of the best springs of water rise there, and there are swamps also on the elevations.

Mr. Meigs stated the existence of abundant waters on mountain ranges; lakes on the Himalayas over 10,000 feet high; fish ponds on our own Hudson river mountains, 3,000 feet high—as at Catskill summit for instance. These cannot all receive their supplies from rain, but probably from deep natural artesian holes.

David Cotheal, Esq., one of our merchants of high standing, in the busy commercial affairs of his house does not forget to import from distant lands such plants as may benefit his country.

He gave us seeds of Mozambique grass—south-easterly side of Africa—which grows fifteen feet high and bears abundance of useful small grain or seed. And last season some of it grew here to nearly that great height. Forty packets of the seed were gladly accepted by the members.

The Secretary recommended planting of it in six inch double drills, and these two feet apart to give this tall crop a better chance to stand up, and to permit the cultivator to go through it in the two feet spaces.

R. L. Pell—I have germinated seeds in moistened hair, and they grew finely until the mineral matters contained in them were exhausted, when the plant, notwithstanding it had blossomed, died. If the necessary ingredients had been supplied it would have borne seed. I have grown oats in pure sand to the height of twenty inches, when they died. In similar hair and sand, by artificial preparation, the same variety of seeds were grown to full perfection and ripened their seeds, showing that there is great art in manuring.

The farmer should understand what the inorganic constituents of the grain he intends to sow are, and likewise of the soil, to know whether it will give to the crop a sufficient quantity of mineral food to bring it to maturity. For example, if we intend to plant potatoes we should know that potash and lime are both required, the former to perfect the tubers, and the latter the leaves. Turnips require phosphate of lime for the bulbs and magnesia for the tops.

The plan now adopted by farmers is to cultivate blindly, not knowing either the requirements of the soil or seeds, which is pursued until their farms are rendered so sterile by carrying off crops annually, without making any returns, that finally weeds refuse to grow. Land may be brought to this unfortunate state sooner by one variety of plant than another; for instance, if the soil has but a small portion of the phosphates in it and a great quantity of the silicates, wheat will ruin it more rapidly than barley, for the reason that a single crop of wheat will remove a larger portion of the phosphates than three crops of barley, and if there should be but a small portion of lime, barley will not succeed at all. The phosphates may be retained in a soil by a proper rotation of crops. If we grow plants that are not intended to go to seed they will require no phosphate, and will therefore leave the soil in an admirable condition to grow a crop of wheat. It is for the want of such cultivation as this that large portions of Virginia, North Carolina and Maryland, once remarkably fertile, have become unproductive to such an extent that vast tracts have been doomed to hopeless impoverishment. From every acre of this land probably 13,000 pounds of enriching substances have been removed, in the course of a century, in the shape of leaves, tobacco stems, roots, etc., and nothing returned. The roots alone would have preserved it.

Thousands of acres in our own state might produce admirable crops, if their owners would analize the earth and add the missing requisite, which, nine times out of ten, would be found to be lime, phosphate of lime or potash. I have, by the application of one of these substances, produced sixty bushels of oats to the acre on a soil considered worn out. Grazing animals take a very large percentage of phosphate of lime, which may be returned in the form of ground bones. The most valuable of all manures are the excrements of men and animals, as they consume oxygen, nitrogen, hydrogen, carbon and sulphur, together with mineral ingredients. A man consumes annually a larger weight of food than his body would weigh, and probably animals do the same. The food and oxygen form combustion in our bodies, similar to the burning of hydrogen and carbon by fire heat. These are expelled through the pores of the skin in the shape of carbonic acid, and the nitrogen forms urea. So animal heat is generated, and our vitality sustained until old age comes upon us, when our body decreases, as more matter leaves it than enters it.

It is the business of the farmer to find out what proportion of the valuable ingredients of his soil are removed by his animals, or his bushel of wheat, he will then know how much to return to induce the growth of the next year's crop. We must restore to the land the substances taken from it by our crops or animals, as the atmosphere cannot.

There is nothing more portentous than the alarming deterioration of our soils in this Empire State; for example, in a little less than five years seven hundred thousand acres of choice land was brought under cultivation, in addition to that already improved, consequently we should look for a corresponding increase in agricultural productions, instead of which listen to the facts, and make up your minds to become more prudent and skilful cultivators of the soil, or at some future, and no very distant day, find yourselves importers of the staff of life. The decrease, during that period, in

Horses, was	59,000
Cows,	64,000
Oxen and other cattle,	128,000
Sheep,	3,000,000
Hogs,	600,000
Potatoes, bushels,	7,300,000
Beans, peas, etc., bushels,	1,200,000
Buckwheat, do	500,000
Wheat, do	300,000
Flax, pounds,	2,000,000
Wool, do	4,000,000

We are not alone, the same fact may be observed in Massachusetts, where 100,000 acres of mowing lands were added, and the hay crop has depreciated thirteen per cent. The rich alluvial lands of Illinois that formerly produced sixty-five bushels of corn to the acre, now yield forty-two bushels. Wisconsin, thirteen years since, produced forty bushels of wheat to the acre, now only twenty, plainly showing that agricultural prosperity has a downward tendency, and can only be arrested by returning to the soil those substances that we abstract from it. In sixty years our population will number a 100,000,000, and how are they to be fed if we pursue our present impoverishing system.

By plowing under a green crop, such as buckwheat, or rye, vegetable matter may be diffused very equally through a field, and by its decay afford a large portion of ammonia and nitric acid for the succeeding crop. I have enriched my lands very much by this process, particularly with clover when in full bloom.

Sawdust saturated with the liquor of the gas houses is capital for turnips. The seeds of plants enrich a soil rapidly, far more so than their stems, particularly those from which the oil has been expressed. Soot is a most valuable manure, it contains nearly fifty per cent of mineral matters, such as gypsum, sulphate of magnesia, &c., from the lime in the chimney, also sulphur from the fuel, and sulphate of ammonia. If used in large quantities on grass lands, it will cause the milk of cows feeding on it to taste bitter, but produce a magnificent pasture. Coal tar diluted with water improves land very much, and destroys insects, it should only be used on stubble intended to be ploughed under. Tanners bark may be used advantageously if composted.

The blood of animals operates very rapidly on the growth of plants, as it decays quickly, and as soon loses its value on succeeding crops. Fish are often used, and should be composted with head-lands. Animalized charcoal from the sugar refineries I have used advantageously when treated with sulphuric acid.

Blood contains about 85 per cent. of water. Two tons of hair, or woolen rags, is of as much value for agricultural purposes as twenty tons of blood, they do not appear to us as valuable, because they decay more slowly.

Two hundred pounds of bones ground fine, will convey to the land more organic matter, than 800 pounds of blood, their inorganic matter, such as magnesia, common salt, soda, lime, phosphoric acid, &c., is also valuable, it may be dissolved with sulphuric acid in four days, rendering it particularly available to the farmer, and may be diluted with sixty times its weight of water, and then applied with the sprinkling cart.

If you wish to manure a field of potatoes advantageously, and produce remarkable results, use the manure of hogs fed on potatoes. For grass or turnips, animals fed on those productions. Pigeons' dung is admirable for wheat and rye, rabbits and sheep for garden vegetables, and the excrements of man for all known seeds. The urine of man is much more valuable than that of the sheep, the cow, or horse, as it contains over eight per cent. of the phosphates, which are not found in the urine of other animals, except possibly the hog. In Flanders the excrement derived from a man is considered worth $6.75 per annum.

The dung of birds possesses wonderful fertilizing properties, from the fact that it is both liquid and solid, containing nearly all the food the bird eats, and consequently a large proportion of the food of plants, with the exception of potash, which should be added, through the medium of ashes. Guano owes its celebrity to this fact.

I consider the pomace from my cider mills an excellent manure, it contains a large per centage of azote, and either decomposed with lime, or composted, makes a fine fertilizer, particularly for orchards, for which purpose I prefer it to farm yard manure.

I have noticed one fact in agriculture that is remarkable. It is this: if two farmers living contiguous to each other, treat their land differently as respects cultivation and manuring, the difference will be perceived by the most casual observer. That is to say, if one plows deep, and manures high, and the other does neither, the highly cultivated land will draw all the floating gases from the neighboring land, and annually impoverish it, until it becomes perfectly barren.

By experience with the thermometer, last summer, when the sun was shining bright, and the open air indicated a temperature of eighty degrees in the shade, I thrust it in the ground, and it ran up to 140 degrees in a very short time, showing that nature was supplying the roots of plants with the proper warmth to induce proper growth. There was a great difference between dark and light soils in this respect, the light indicating at that time, 12 o'clock A. M., 130 degrees, the dark 140. At 5 o'clock P. M. the light sandy soil still indicated 130 degrees, and the dark soil 110 degrees, showing that the sandy soil retains heat much longer. At 7 o'clock P. M the dark soil was covered with dew, when not a particle could be found on the light sandy soil. This experiment has induced me to think, that the agriculturist possesses entire control over his lands, by plowing, subsoiling, top dressing, changing the color by the admixture of sand and muck, rendering it porous, or close, by casting on gravel or clay, wet or dry by underdraining, supplying by art the mineral constituents withheld by nature. Thus he may alter the chemical constitution of his farm, as well as its physical qualities. When the rays of the sun pass through the atmosphere, they do not heat it to any very great degree, but by impinging against the earth they heat it, and from this heat the lower stratum of air derives its temperature. If our liquid manures were led to the roots of plants, through iron or lead pipes, perforated above, I think the production would be so prodigious that we would not count the cost. Farmers do not pay sufficient attention to the hygrometric property of soils. If I were selecting a farm, it would be one capable of attracting moisture from the atmosphere rapidly, and this valuable property depends upon its porousness and capacity of containing deliquescent salts, this faculty becomes less apparent as the soil absorbs moisture. Humus is particularly hygrometric, perhaps more so than any other substance. We know that silicious sand does not absorb a large quantity, therefore a soil rich in humus would be my choice, and this should be deeply plowed, that the interstices of the soil may become thoroughly aerated, to induce the growth of vegetables, and by so doing we bring up the sub-soil into the arable surface, the fertility of which will inevitably be retarded for a season, in spite of all the enriching substances he may draw on, as the sub-soil must be exposed to atmospheric influences, before it can produce the desired effect, but the advantages afterwards will be great.

You have all probably noticed that when white clay is brought to the surface, and exposed to the oxygen of the air, it turns blue in the process of condensing oxygen, this superoxidation is the means by which our soils become ameliorated. I never would consent on any consideration to work a clay soil, because in wet seasons, they absorb an immoderate quantity of water, assuming the appearance of mortar, and during drought are so dried, and become cracked to such an extent that the roots of vegetables cannot penetrate them, and if they have been successful before the dry weather, the roots perish for the want of covering. Frost has the same effect as drought upon a clay soil, therefore it cannot be tilled in early spring, being a mass of mud, nor in the fall, as it is nearly as hard as rock, and being an oxide of a metal is a bad conductor of heat, which is so necessary to vegetable growth. It would cost one hundred and fifty dollars per acre to convert a clay soil into a productive loam. From a niggardly economy, the resources of clay lands, have never been half developed, and never will until legislative enactments convert sterility into productive fruitfulness by endowing agricultural colleges and model farms.

Unless a clay soil contains at least thirty-five per cent of sand, it will be so tenacious as to render the labors of the husbandman difficult, and the growth of a crop precarious; still with this percentage, and a fair share of humus, wheat will succeed. Barley will do pretty well if there is twenty-eight per cent, and oats thirty eight per cent. Light soils seldom accumulate too much moisture, they are worked early and late, with great ease, and at small expense; vegetation springs immediately, and the harvests are early.

Farmers often complain of long protracted droughts in summer, much to my surprise, as I glory in dry weather, because it restores the constituents of succeeding crops, and renovates the soil, by increasing the mineral matters that have been dissipated by growing grain, and occasional rain, and were it not for droughts, a barren waste would in time result. God thus counteracts man's thriftlessness, by evaporating moisture from the earth's surface, and thus inducing lower stratums of water to rise by capillary attraction, which carry in solution soda, potash, lime, magnesia, &c. to the earth's surface, when evaporation carries off the water, and leaves these valuable substances for man's crops. I discovered this fact by having a sample of soil analyzed in the spring, when a mere trace of these matters were found, in the fall following after a very severe drought, a portion of soil from the same spot was analyzed again, and contained them all in very appreciable quantities, showing that they had been freed from their silecious coatings by atmospheric influences.

I am constrained further, after numerous experiments, and in direct opposition to the advice of all mankind, to affirm positively that too frequent plowing, is a great disadvantage to soil, and I now only practice it when absolutely necessary, from the fact that the humus in the soil, when exposed to constant stirring, (old Tull's practice,) to atmospheric influences, decomposes and wastes. This substance humus is vegetable matter in process of decay; it is insoluble in water alone, and if kept dry will last for centuries, but when moistened, it immediately converts the oxygen of the atmosphere into carbonic acid gas, which with ammonia contains elements that support both animal and vegetable life, and this remains unchanged in the earth until the roots of plants begin to grow in it and absorb the gas, which in the process of growth they again return in part; thus a soil well stocked with vegetable matter, or humus, endures agricultural processes for a long period, when not often exposed by the plow to atmospheric influences, and is capable of growing all the innumerable vegetable productions of nature, which after having performed their part as designed by the Creator, resumes the form from which they sprung ; showing that the end of one vegetable generation after death becomes the source of existence to another.

A soil should never be idle. Plant your crops, keep the land free from weeds, and depend mainly upon the inorganic compounds elaborated by nature for their success. You may rest assured that more attention should be paid to the inorganic constituents of crops than has been. As for example, I prepared an inorganic manure for wheat thus: to five pounds of silicate of potash in solution, add five pounds of bone dust; when dry, incorporate with it fifteen pounds of common Turks Island salt, and thirteen pounds of plaster of paris. This composition produced great results, not only in the yield of grain but plenty of the straw, which was thicker than a pipe stem. I then added the following year to the same compound, twenty pounds of wheat bran, and ten pounds of the ash of wheat straw, and the production was enormous. If land was so manured, eighty bushels of wheat would result from an acre. I have grown by another process, at the rate of seventy-nine and three quarter bushels of wheat to the acre.

When I think of the yearly destruction of organic matter upon which farmers have always supposed vegetables almost entirely depend for nutrition, and take into consideration that to supply the consumption, there must have been twelve feet deep of organic substance all over the earth, my surprise is great, and leads to more dependence upon inorganic matter. To have fed the cattle raised in France in the year 1845, the process of nutrition would have required eighty millions of pounds of organic substances, at least seven times more than the cattle contributed for its reproduction. I have lots on my farm from which I take three crops in a season, five times more in amount than the organic matter I return. And what is still more wonderful, each crop evaporates during the process of growth, five millions of pounds of water! Who can fathom the magnitude of God's processes?

Excess of moisture is the cause of fogs and damps, even on lands not evidently wet. Dampness, we all know, is the medium through which decomposing substances are evolved, affecting the atmosphere injuriously, by aggravating impurities.

The evaporation of surplus moisture likewise lowers temperature, produces chills and fevers, by creating rapid fluctuations by which the health of the surrounding inhabitants are more or less injured. Where there is a large accumulation of moisture holding in solution animal or vegetable matter, the public health must and does suffer. Evils thus arising are perceived in great intensity in districts that lie low, in river valleys, particularly those below high water mark. People even living in high districts overlooking such illdrained low lands, are not unfrequently afflicted with marsh fevers, wafted to their abodes by the winds.

You have, no doubt, often observed when passing from a retentive clay soil, to one of sand, or a porous nature, the difference in temperature, the one cold and raw, the other warm. This difference can be obviated artificially by drainage, so as to leave less water to cool the air by evaporation. Thus you save heat, as much being required for the vaporisation of water, as would elevate the temperature more than three and a quarter million times its bulk of air one degree.

It is therefore true that every inch of water carried off by drains, which would otherwise evaporate, as much heat is preserved per acre as would elevate twelve thousand million cubic feet of air a single degree in temperature; showing how much the want of drainage renders the air cold, and liable to the formation of dew and fogs. You can readily understand then how local climate is affected by surplus water in the soil, and the reason why it is so vastly improved by drainage.

I asked a farmer who resided near a twenty-six acre tract of land that I drained in Ulster county, what the effect had been on the temperature, he replied " that all he knew about it was that before I drained it he could not go out at night without an overcoat, and that now he could with perfect impunity, on account of his improved state of health; that before the drainage some member of his family was always in the hands of a physician, and that now a doctor was never required.'' I am perfectly convinced in my own mind that in consequence of this improvement I have raised the temperature of the whole district one degree, the evaporation being greatest in summer, the rise of temperature is of course the greatest at that season. Experiment last summer with the thermometer showed me a difference of nearly seven degrees between the piece of land in question and a neighboring swamp, and there was a corresponding difference in the temperature and dampness of the atmosphere. Therefore, farmers, you may make a climate for yourselves, genial by draining or otherwise by neglect. How can you employ your capital more satisfactorily? The following are the principal agricultural advantages of drainage:

1. By removing that excess of moisture which prevents the permeation of the soil by air, and obstructs the free assimilation of nourishing matter by the plants.

2. By facilitating the absorption of manure by the soil, and so diminishing its loss by surface evaporation, and by being wasted away by heavy rains.

3. By preventing the lowering of the temperature and the chilling of vegetation, diminishing the effect of solar warmth not on the surface merely, but at the depth occupied by the roots of plants.

4. By removing obstructions to the free working of the land, arising from the surface being at certain times from excess of moisture too soft to be worked upon, and liable to be poached by cattle.

5. By preventing injuries to cattle or other stock, corresponding to the effects produced on human beings by marsh miasma, chills and colds, inducing a general low state of health, and in extreme cases the rot.

6. By diminishing the damp at the foundations of cattle sheds and farm buildings, which causes their decay and dilapidation as well as discomfort and disease to the cattle. All these evils lower the productiveness and diminish the money value of lands, as well as the comfort of the farmer.

When there happens to be two outfalls into the same main drain, from the same description of land, the one from surface drained, and the other from under or thorough drained, the water from the thorough drained will run perfectly clear and pellucid, while that from the surface drained will be thick and muddy from the solid particles contained in it. Draining is generally regarded as the means of freeing the land from springs, which are the cause of underwater.

Springs may be explained on the principle of Artesian wells. Rain falling on high lands runs over the surface to all lower levels. If in its progress it passes over clay or impervious rock, it of course cannot sink. If it encounters sand or gravel it sinks and flows until it reaches an impervious basin from whence it rises to the surface by pressure of the water entering at higher levels, and causes outbursts in great numbers in all undulating and hilly countries, and on clay lands usually from marshes.

When you find the main spring, by boring or otherwise, you must ascertain its subterraneous bearings by means of leveling, you can then cut it off effectually in a cheap manner; if you do not do so, all your labor will be lost. I have sometimes cut within three feet beyond a spring, misled it, and found my drain of no service. After great cost and numerous failures have struck upon the vein, bored a hole to the spring, and thus been successful. In other cases I have drained five feet without success, and have then gone down two feet further into a gravel bed and found water enough to turn a mill, and many of my drains are seven feet deep, on land that no casual observer would suppose required draining at all.

Drains should invariably be dug parallel to each other, and run directly down the steepest descent, because the water will have the shortest way to percolate to enter the drain, and when once in, its delivery is of course very rapid. Formerly this plan was objected to, and oblique drains always used. The direction of the main drains and sub drains depends on the nature of the ground. When the surface undulates, lay the main drain along the hollow and open into it at right angles.

The distance at which small drains are placed apart depends upon the nature of the soil, the depth of the drains, and whether it is sub or surface water they have to deliver.

In stiff clays you may dig your drains two or three feet deep, and twenty feet apart, in porous soils from three to three and a half feet deep, and thirty feet apart. If the outfall will permit, I would never drain less than four feet deep on any ordinary soil, and from twenty to thirty feet apart, though they are sometimes efficient forty-five feet apart, in soils of varied texture. When lands are to be drained, much judgment must be exercised by the overseer, as some soils would give inferior crops during a dry summer if drained deeper than two feet. I have always employed stones in the construction of my drains, in preference to all other materials, and have made in fifteen years very many miles; next to stones, I would prefer tubes over soles and tiles, they are much cheaper, occupy little space, are easily transported, and not so liable to break. They are easily laid, effect a more perfect drainage, and are less liable to sediment.

When we drain land thoroughly, we anticipate that every drop of rain will sink precisely on thé spot where it falls, and pass down to the drain. Thus all the water is so filtered as to leave its valuable substances held in solution in the soil. If your drains are successful, excess of water will immediately sink to them.

I have found some of my lands that have been drained for ten years, have changed their sub-soil, into the nature of the surface soil to the water in the drains; this is produced by the ameliorating effect of water and air, decomposing the inorganic and organic constituents, and thus eliminating matters which constitute the pabulum .of plants, also by eradicating deleterious substances, rendering the texture loose for the penetration of roots, and thus increasing the fertility of the land to a great degree, often doubling the crops.

I have discovered that my thoroughly drained fields, stand drought and wet far better than undrained fields containing the same quality of soil. It is not surprising that they should stand wet better, but it is that they bear drought so well, and show superior verdure throughout the summer, and that they should be fit to undergo the operations of tillage far earlier and later than undrained fields, and that manures produce twice the effect, and last four times longer. Another wonderful advantage of thorough drainage is, that air is admitted into the soil by an underdraught through the chimneys of the drain. You all are aware that air and water must be supplied to the roots, and if you can give it to them as well below as above so much the better. If you would be convinced of this, knock the bottoms of your flower pots out, and compare the plants growing in them with those in the one hole pot, and you will order five or six holes made in all the pots you purchase afterwards. The object of drainage as many suppose is not to deprive the soil of moisture, but to regulate the quantity, and not drown the plant. You will find that if the yearly increase of plants on undrained land is five per cent., it will be on drained land ten per cent., and on land drained first and then irrigated twenty per cent. I have heard farmers say that they did not believe in draining, that they had not been successful, the reason was that they did not pay attention to the regular inclination of their drains, instead of having a uniform fall at the bottom, they left a rising in the bed of the drain, where the descending water accumulated above the level of the rising, causing stagnation, and destroying the fall, the floor of the drains must be perfectly straight in their descent to the outfall. This can be easily accomplished by rods such as I once before explained in the club as follows, to wit:

"Take three staffs with cross pieces on the head, two of them two feet long, and the third as much more than two feet as the drain is deep, one of the short staffs is planted on the ground on a level with the field at the head of the drain, and the other at the lower end, the third is held in the drain, and as long as its top is on a line with the other two the bottom is uniform."

It is a remarkable fact that the evaporation from very wet land is almost equal to the evaporation from water, the wetter the land is then the greater the evaporation, and consequent excess of coldness. Evaporation is less in the shade than in the sun; wet land is warmest therefore in the shade. Persons suppose that an immense amount of the water that falls during rain storms in a year passes off by filtration. This is a mistake, as only about five inches of rain out of twenty-five inches that fall in a year percolate to the depth of three feet. This would almost lead us to believe that lands do not stand much need of drainage; but experience teaches differently. It is well that it is so, as an excess of water produces a corresponding diminution of the amount of air beneath the surface of the ground, which air is indispensable to the nutrition of plants, if excluded the seeds would lie dormant and germination would not take place. The temperature of a wet soil through the winter and summer rains is only six or eight degrees, whereas to induce health and vigor to a crop of wheat, it should vary from thirty-five to forty degrees. These injurious effects can be readily overcome by thorough draining, and a field of wheat made to pay twenty-six per cent on the expenditure. The crop will not only thus increase, but the seeding, cultivation, and maturing will be earlier, and a consequent increase of quality and weight; the manures used will be preserved, and their application will be easy and economical. In clay lands particularly, proper drainage will render the success of wheat sure where it was previously precarious.

My experience has proved that deep underdrains, particularly those seven feet in depth, yield water peculiarly soft and fine for drinking, washing and culinary purposes, and is selected by stock in preference to that obtained by shallow draining, which is often offensive. I am making thermometric observations on drainage water to discover the temperature at different periods of the year to find the effect on soil and climate, and will at some future time report. I noticed a singular fact when in the country two weeks since—the snow had all melted away on my drained land, and was still lying in some places two feet thick on undrained, showing a great difference in temperature between the two, and the beneficial effects of perfect drainage.

Drained land does not, as has been supposed deteriorate, but constantly increases in fertility, and retains the increase from season to season, though it may be washed by heavy rains every week, if manures are supplied in a liquid form, they do not find their way to the drain, but are retained chemically by the soil; this I have proved from the fact that the water passes off as pure as crystal, and fit to drink. You may place liquid manure on a thoroughly drained field in the winter, and it will remain in the soil in readiness for your fall crop. I speak understandingly when I affirm this, for I have tried the experiment.

You may place your liquid manure on your drained fields whenever time and circumstances will permit, and take my word for it, that though it may rain two months, your crops will find it all, and what they may not require, will be left for the succeeding crop, if 190 days intervene between the two. I would recommend all farmers to use liquid manures in preference to solid. You may dilute it until smell is extinguished, when it is in a fit state for the ready assimilation by the spongioles of the plant, and is then rid of the fibrous matters that clog the porous soil, and impede the growth of vegetation, and likewise the millions of devastating insects contained in all solid manures, as well as hurtful and injurious seeds. You all know that the best microscope ever yet invented, has failed to discern the little mouths of the spongioles of plants. How then can solid manure compare with liquid, which at once performs its duty by feeding these minute apertures? All the attempts heretofore made to induce plants to absorb solid manures, though minutely divided have proved ineffectual. Make a mixture of gum and water very thin and a plant will grow well in it; thicken the same and it dies immediately. Apply diluted cows urine to wheat growing on drained land and the head will become so heavy that the straw will not sustain it.

As before stated all my underdrains are made of stones, and notwithstanding all that has been said and written against them, I am confirmed in opinion, after twenty years experience, that notwithstanding they are far the most expensive, and as those say who are interested in tiles, liable to casualties—if I had a hundred miles to build, would use no other material. A stone underdrain, properly constructed, after my plan, which I will explain on the black board, will never require attention after it is finished. Can any man say the same in favor of tile, which are the prevalent material now used for forming drains in this country and in Europe? They were used fifty years ago, and for some cause abandoned; but within seven years the practice of laying them has again become general. Horse-shoe tile with sole is used by some; pipes glazed inside by others; clay balls by others still. Whichever way you drain, be assured that nothing in the way of farming pays better.

Next in importance to draining is irrigation. The produce by the application of liquid manure, has exceeded that obtained from grass land by any other means in agriculture, and has continued to increase without exhaustion or deterioration of the soil for fifty years. In Milan and Edinburgh, the average yield at which latter place has been four thick crops a year of grass, eighteen inches long, and the collective weight of grass cut was stated to be at the rate of eighty tons to the acre. With root crops of every description—carrots, potatoes, turnips, onions, beans, rhubarb, and all kinds of fruit, heavier and quicker crops have been obtained by the application of liquid manure on undrained land than by any other method on record. And if an almost inappreciable amount of nitrate of soda could be dissolved in water intended for irrigation the improvement to growing crops would be fully equal to 30 per cent. The supply of this substance is inexhaustible in Peru, and might be imported here probably for twenty-five dollars per ton. A cargo of this invaluable fertilizer was in 1820 sent to England from South America, and there thrown overboard for want of a purchaser, since which period twenty-five millions of dollars have been paid for it. I tried two experiments to test its value as compared with guano on grass land, and found it superior ; and one on oats, where it was inferior. I likewise discovered by experiment, that masses of superphosphate of lime, produced far better effects when diluted with irrigating water, than in a dry state; and also that a mixture of common salt with guano before it is used in the irrigating stream, appears to fix the ammonia and produce far better effects on contiguous pieces of land than guano alone. Though out of place, I still will state in this connexion, that guano when exposed loses its nitrogen, ammonia, &c., very rapidly, and should be mixed as soon as received on the farm with salt or charcoal dust, which will preserve it.

From numerous experiments that I have tried, my conviction is strong that vast amounts of ammonia are concealed in the earth in combination with organic acids, awaiting the ingenuity of man to make it available to the growth of plants, and I have succeeded by mixing blood with my irrigation water, which creates fermentation, or excites some chemical action by which large quantities of ammonia are liberated. And I can nów, notwithstanding the practice has been unconditionally condemned by scientific agriculturists, grow a cereal crop annually, or any other crop in fact, by a proper selection of irrigating ingredients. I likewise use in my water the elements of farinaceous and albuminous food, that will fat cattle feeding on the pasture in half the time that they can be fatted in any other way.

If you would produce great effect upon your soils, irrigate with soluble mineral substances containing the constituents of plants. three and a quarter grains of carbonic acid to every pound of water is all a meadow requires of that ingredient. An acre of grass exhales during four months about six millions of pounds of water, two hundred and twenty grains of which liquid must pass through each individual spear before three quarters of a grain of solid accumulation can take place within it. One twelfth of a grain of ammonia to every quart of water suffices for the requirements of vegetation, and probably no water in the world contains so small a quantity.

Last year I was desirous of increasing the bones of several calves, and not having sulphuric acid at hand to dissolve bones for that purpose, I tried an experiment with lime water that proved to be perfectly effectual. The bones were placed in a large iron kettle filled with slacked lime in solution, and boiled for four hours, reducing them to a powder, which was used with irrigating water on grass land from which the calves fed, adding to it the necessary phosphate of lime.

There are several kinds of irrigation, by filtration, regurgitation, submersion and catch meadow; that adopted for pasture and arable lands is by filtration, when water is spread thinly over the soil and allowed to filtrate through it; by submersion, when water is permitted to remain on land for some time, and by regurgitation when the drains are stopped at their mouths and the water allowed to rise to the surface. I have twenty-three acres that can be so treated. The catch water irrigation is where gutters are arranged along natural slopes, and the water falls from the upper one to that below it, which spreads it again lower down, and so on until it reaches the bottom. I have twelve acres so controlled.

I find the vegetation on lands I have irrigated with simple water has tissues of a soft and spongy nature with very tender stems and thick green leaves, presenting a luxuriant appearance beautiful to look at. Cattle prefer and greedily eat the herbage so treated.

American farmers have too long only considered that substance a manure which they can place in a wagon with a fork; but they will, before long, come to the conclusion that it is then only in the first stage of preparation, and unfit for agricultural purposes until it can be placed in a hogshead instead of a cart. If he uses liquids at all, he only considers that valuable which is as black as ink and as strong as lye, whereas it is only fit for use when weak, transparent and almost devoid of odour. I have experienced the following advantages by irrigating with liquid manure:

1. It is amazingly prompt in its action, produces rapid growth and is particularly advantageous to all cruciferous, leguminous and cereal plants.

2. When placed upon the soil it passes directly into it, and unlike solid manure that requires from one to three years to bring its entire force into agricultural action, produces a return in a few weeks by quadrupling the crops.

3. It goes immediately to the relief of the half dying plant that it finds suffering not only for food but moisture, and changes it from the sickly yellow hue to a green and flourishing color.

4. For grass and clover fields nothing can surpass it, as it conveys nutrition and water to the very spot most requiring it—the roots and spongioles.

5. That the application of town sewage has produced far heavier crops than any other known variety of manure; and that a four-fold production of grass above the usual growth has been maintained for half a century, as I before mentioned, in the vicinity of Milan.

6. That the wonderful increase of the fertilizing power of manures applied in the liquid form, not only on sands, but clay and loams, has been proved to be far superior in every respect to the solid applications, producing in every instance remarkable effects, being economical and prompt in its action, preventing the loss which invariably occurs by drying in the solid form, and being at the same time free from injurious emanations while in solution, as it is immediately carried beneath the surface of the soil.

7. The method of distribution through pipes is very effectual, and cheaper than any other, requiring less outlay, less liquid, and applies it with far less waste and but little danger to the farmer's health, at the same time is applicable to grass as well as arable land, and prevents inconveniences and losses which are occasioned to all farmers by irregular showers of rain.

All manure made by human individuals, as well as animals, contains thirteen out of fourteen parts of urine; every human being on an average, contributes to town sewage, during every twenty-four hours, four ounces of solid, to forty-eight ounces of liquid excrement, therefore the solid manure of 1,250,000 persons would weigh 140 tons. Observe then the enormous value of city sewage, all of which is carried to the ocean, representing the products of agricultural industry, raised with so much care, and then to be so ruthlessly wasted. If a few of the many millions of dollars annually spent for guano, were only one year expended in our great city of New York, we could construct at the mouth of every city sewer, a large well cemented receptacle for the daily collection of the sewage water of the city, and connect there with pipes to two reservoirs, one on the east and the other on the west side of the town, these might have attached to them two large pipes, the one leading along the rails, beneath the surface of the ground of the Hudson River railroad, and the other along the New Haven, into the rural districts, and be tapped at pleasure, through underground pipes, and the liquid sold to farmers at almost any price the company might feel inclined to charge. The liquid would be forced from the receiving reservoirs by means of proper engines, through the main pipes, and from them through the smaller ones on the different farms. Fifteen dollars per acre would furnish an abundance of these, and the pressure would be sufficient without jets.

I would estimate the value for agricultural purposes of New York sewage, if it could all be saved, at many millions of dollars per annum. One great advantage that I have not named, of liquid over solid manure is, that it arrests and conveys ammonia, which dissolves the silica in our soils, and vastly stimulates and increases the production. The total manuring substances, liquid and solid, produced in New York annually, is equal in weight to two tons for each inhabitant, or 1,400,000 tons per annum, each ton of which is more than is absolutely necessary to place upon an acre of land to obtain an abundant crop every year; you will therefore readily perceive, that 1,400,000 acres of land could be supplied with all the nitrogen and phosphates that it requires annually. If some of our wealthy citizens would form themselves into a stock company, and make the necessary arrangements, they would not only enrich themselves by declaring forty per cent. dividends, but be of great advantage to the agricultural interests of the country, as their example would soon be followed by every city in the Union. Think of turning the sewage of New York, now the cause of pestilence and disease, into so great a source of national wealth by its application to the glorious purposes of agriculture. It would even be better to incur the total loss as enriching substances, of urine and excretiæ, or of vegetable and animal excrements in the city, than to permit it to be retained as at present, for occasional removal, during which intervals it decays, and creates noxious impurities amidst our habitations. As yet there have been no successful chemical investigations made of substances as disinfectants and deodorisers as preventives on a large scale, giving general satisfaction. I fear then that our noble Hudson, as well as the air we breathe, will long be polluted by putrefying filth.

Good arable soils must be capable of holding from thirty-nine to sixty-nine per cent. of their weight of moisture; if less than this I would plant them with pine trees, as they never would yield fine grass. Capillary action is great in light sandy soils, and when these are properly irrigated they produce remunerating crops, the waters as they descend carry down soluble matters to the roots of plants, and as the soil drys the water re-ascends and distributes the saline ingredients through the surface soil.

I once had a piece of land that was not too cold, warm, wet, dry, heavy, light, sandy, or clayey, and yet would not produce a crop; notwithstanding all the manure put on it still remained entirely unproductive. I then carefully underdrained it, plowed it, and left it for a winter, the next spring sowed oats, and harvested seventy bushels from an acre, analyze it and found an abundance of copperas; this the water carried off through the drains, and thus freed a poison soil from those noxious substances that would have lingered in it to the end of time.

Remember that water irrigation will produce the most beneficial results on thoroughly drained land, where the liquid, after the irrigation has ceased, can immediately find a proper outlet; the same benefits are derived from the draining of irrigated land as from that of your arable fields. The sub-soil and soil are cleansed and released from the poisonous matters they may contain, and the soil is likewise completely aerated.

The Duke of Bedford receives in money value from twenty-five acres of irrigated land, twelve hundred and fifty dollars per annum.

The Craigentinny meadows, formerly worthless, now rent for one hundred dollars per annum per acre. Other meadows near the above, worthless twenty-five years since, now valued at three thousand three hundred dollars per acre.

Mr. Harvey's farm, near Glasgow, containing 400 acres, now cuts sixty tons of grass per acre in six months, and the whole cost of steam engine, pumps, underground iron main pipes, and iron distributing pipes was only seven thousand two hundred and fifty dollars.

The Myer Mill farm, in Ayrshire, containing four hundred acres, cost of engines, &c. seven thousand nine hundred and thirty dollars, cuts seventy tons of grass per acre in six months. Canning Park cuts fourteen and a quarter feet thick of grass in seven months. Dundaff farm, forty acres, irrigated by gravitation, underground iron mains, gutta percha hose, and jet pipe, cut and cured 80 stocks of hay last year.

The Duke of Portland, Nottinghamshire, has three hundred acres, irrigated by catch-meadow, gravitation and other gutters, previously worth one dollar per acre per annum rent, now worth sixty dollars rent.

The land of the Tavistock meadows quadrupled in value after four years irrigation.

Therefore, the primary condition of pure air is, that all refuse and town odor should be immediately removed from the vicinity of dwellings; and this, in my opinion, can be most economically and completely accomplished by saturation in water as proposed. The application of this liquid on farms through the medium of irrigation would be far less injurious to health than the common method of solid top dressings. These liquid substances would not be exposed to evaporation before they reached the farm on which they were to be distributed for absorption by the land.

A Mr. Neilson of Halewood farm, on the Earl of Derby's estate, eight miles from Liverpool, raised by liquid manure, as he says, on a well underdrained acre of land, previously fertile and in good condition, one hundred tons of green crop of Italian rye grass within one year. Think of that gentlemen of the Farmers' club, and eschew the solid compost at once, as most of us would require fifty acres of good land to equal Mr. Neilson's single acre, the produce of which was worth three dollars per ton at least, more than the interest on four thousand three hundred dollars for a single acre of land. If Mr. Neilson can do it, we can—let us try.

The principle is to give a new born plant an abundance of food in its infancy, that it may acquire sufficient strength to avail itself of the stores of food provided by nature within its reach. The same rule follows with regard to young animals—feed them well when young and they will take care of themselves afterwards; starve them in infancy and their growth and strength will be stunted, and their after life wretched and miserable. You must recollect when irrigating your lands that some require much more water than others—for example, take one hundred pounds of quartz sand and saturate it, you will find when it has absorbed twenty-four pounds, water will drop from it; calcareous sand, thirty pounds; loam soil, thirty-nine pounds; clay loam, forty-nine pounds; pure clay, sixty-eight pounds.

Six tons of night soil diluted with twenty-four tons of water will produce a far more fertilizing effect than a top dressing of thirty loads of stable manure, and the weight of grass on the land irrigated will be fifty-two per cent greater. The time when liquid manures may be distributed with the best effect on vegetation is when the rootlets are out, and the plant in vigorous action. In March and April you may irrigate at any hour during the day—in May, June, July and August, from four to ten o'clock, A. M., and from half-past five to half-past eight o'clock, P. M. In the fall at any time before four o'clock in the afternoon.

The club then adjourned.

H. MEIGS, *Secretary.*

April 7, 1857.

Present—Messrs. Wray of England, Pardee, Dr. Smith of the Times, Stacey, Judge Scoville, Judge Livingston, Mons. D'Ouville of Philadelphia, Aaron Roberts (colored man) of same, Prof. Mapes, Hon. Joseph Blunt, Dr. Waterbury, James Davey of Pomfret, Conn., 90 years old, James DePeyster, Lawton of Morrisania, Vail, Olcott, Solon Robinson, Mr. Aycrigg, Daniel C. Robinson, Mr. Chambers, Mr. Field of Brooklyn, Atwood, Stacey, Horace Greeley of the Tribune and others—fifty-eight in all.

Hon. Robert Swift Livingston in the chair. Henry Meigs, Secretary.

Mr. Greeley introduced Mr. Leonard Wray, of Natal, South Africa, who has had more experience in the culture of the various species of *Imphee*, (including the Chinese sugar-cane,) than perhaps any other European, and has succeeded in obtaining as fine crystalized sugars directly from the juice as those resulting from the Louisiana sugar-cane. He is referred to as the highest authority by M. Vilmorin, of France, Count de Beauregard, and the illustrious gentlemen of the Imperial Acclimation Society, and has visited this country, on invitation of a governor of one of our Southern States, for the purpose of cultivating the varieties of the new sugar plant which he considers most valuable, and to introduce the methods, discovered by himself, for obtaining the valuable product of crystalized sugar. His arrival at this moment of our first experience with the sorgho can not but be considered most opportune, and the very valuable information which he possesses will be of first consequence in its prospective bearing upon our national revenue.

Mr. Wray commenced by stating that he had discovered, growing wild upon the south-west coast of Caffraria, the curious plant *imphee*, which was in common use amongst the natives as an article of food. He had been so favorably impressed with its qualities as to undertake protracted journeys to collect new varieties, and met with such success as to procure no less than sixteen distinct kinds of greater or less saccharine richness. Some of the more precocious ones will complete their growth in three months, while others require as long as four and five.

The names of the sixteen varieties are as follows: *Nee-a-za-na*, *Oom-se-a-na*, *Boom-ve-va-na*, *Shla-goo-va*, *Shla-goon-dee*, *Vim-bis-chu-a-pa*, *E-a-na-moo-dee*, *Zim-moo-ma-na*, *Zim-ba-za-na*, *E-both-la*, *E thlo-sa*, *Boo-ee-a-na*, *En-ya-ma*, *Koom-ba-na*, *See-en-gla-na*, and *E-en-gha*. The first four of these are of quick growth, and will produce one crop of sugar at the North; the others are suitable to the South, and some of them will give two full crops.

For feeding to stock Mr. Wray says there are no crops possessing an advantage over these *imphees*. They are fully equal to Southern cane, and are greedily eaten by every description of stock. He had fed his horses, cattle and pigs on them. The idea has been advanced by some in this country that the *bogasses* (stalks which have been crushed for sugar making) would be good feed for stock, but Mr. Wray had lost some animals from making use of them, and on opening their stomachs after death the fibrous Sorgho stalks were found to have formed into hard balls and accumulated in such indigestible masses as to cause death. If, however, the *bagasses* had been fed with the scum which is removed from the boilers, this bad effect would not have been experienced. If fed green, as are cured corn stalks, there can be no more profitable or nutritious article employed, and for this alone its cultivation would be profitable. These crushed stalks, or *bagasses*, make an excellent paper, and Mr. Wray has samples in England which are superior to straw paper.

Judge Meigs desired to know if there was much value in the seed. Mr. Wray said that for a feed for fowls there could be no better, and that from his African *Imphees* very fine bread can be made. The Chinese variety is not so good for this purpose, because of the bitter pellicle which surrounds the seed proper, lying under the outer black hull, but he had a process for obviating this difficulty. The seed would have an immense value for the manufacture of starch. The amount practically obtainable is forty-five per cent., and is more easy of extraction than that from the farinaceous Mexican corn; and from the ease of its manufacture and the high price of corn, it is evident that the *Imphee* will be cultivated to a considerable extent for this purpose.

The remarkable vitality of the plant is shown by a statement made by Mr. Wray. He had a plantation of it on his estate in Africa, which he wished to remove to give place to a crop of arrowroot. The field was thoroughly plowed at the end of the season, and the stumps removed; but the few which escaped the notice of his workmen shot up into great luxuriance of growth, and in two months and five days had attained the height of seven feet. As many as twenty-two stalks grew up from a single stump, and the juice of all these made as good sugar as the parent stem.

In our own country there have been similar instances during the past season. Mr. Browne, of the Patent Office, it will be remembered by those of our readers who saw the articles previously published in the *Evening Post*, states that five cuttings have been made in Florida from one set of stalks. In South Carolina, Georgia, Illinois and New Hampshire, three and two have been obtained; and we may safely calculate that as a fodder crop both the Chinese and these new African varieties will give us at the North two crops of excellent nutritious forage.

Mr. Olcott, of the Farm School, asked if the coloring matter from the seed hulls could be procured in such quantities as to make it a profitable department of industry? Mr. Wray replied that as yet the matter had not been definitely settled. He had not supposed it would; but more extended experiment might prove to the contrary. The tint is abundant in the envelope of the seed of the Chinese variety of sorgho. Fowls which had been fed on the seed were found to have been tinted even to the cellular structure of their bones. Their dung was colored of a purplish hue, and could be readily distinguished in the yard from that of birds which had not partaken of the seed; but this peculiarity did not lessen its value as a food. He had not tried it as a feed for horses because of its extreme high price; and when he went to Kaffirland the natives told him not to feed horses on it, as it made them "puffy." Mr. Olcott exhibited specimens of ribbon colored with the dye from the hulls of the sorgho seed, and stated that he had scraped off some of the waxy efflorescence from the stalk, and it burned with a clear flame. Mr. Wray said this production would not be of consequence, as the small quantity obtainable and the tediousness of the operation of scraping it from the stalks, would much more than counterbalance any profit from its sale. He thought the computations made by Mr. Hardy, the Director of the Imperial Nursery at Hanima, Algiers, could not be considered as at all practically valuable.

The seed heads should be thoroughly dried before the stripping of the seed is attempted, and can then be threshed out with flails in like manner to wheat, barley or other grain.

Professor Mapes inquired if the sap in the stalks will sour on exposure to the atmosphere, as is the case with the Louisiana cane, and if the crystalizable property was injured?

Mr. Wray stated that on one occasion he had been absent from his estate when the canes were ready to be harvested, and his Kaffirs, thinking he would return within a day or two, had cut up and stacked his entire crop. He was not able to return, however, until after the expiration of a fortnight, and he then found that about one inch of either end of the stalks had soured; so, without further loss of time, he had set his men to work to remove these portions, and when the juice from them was boiled down, it made quite as good sugar as any previous sample.

The Zulu Kaffirs put the stalks into pits which they dig in the ground, and preserve them perfectly for several months.

In regard to the density of the sap, Mr. Wray adverted to a trial which had been made in Martinique, upon the estate of the Count de Chazelle, the object of which was to decide the comparative densities of the sugar-cane from the celebrated Grand Terre districts and of Mr. Wray's *Imphees*, both of which had been grown by the Count. The result was that the latter showed a density superior to the former by three and one-half degrees. The sugar-cane gave seven degrees Baume, and the *Imphee* ten and one-half degrees. This richness is quite remarkable, for ordinary Louisiana cane does not average higher than seven and one-half degrees to eight, if we remember aright, and it shows what we may in future expect from the introduction of this valuable plant to the domain of our national agriculture.

The quantity of juice to be obtained from the stalks was dependent upon the power of the mill. Count de Beauregard had sixty per cent; but his mill was an imperfect one. Under favorable circumstances as much as seventy per cent might be calculated upon, and of this seventeen per cent was crystalizable sugar. The quantity of sugar per acre he estimated at three thousand pounds, but both quantity and quality would be controlled by the perfection or imperfection of processes of manufacture. Mr. Wray had discovered the only successful method of obtaining the sugar which has been made public. M. de Montigny, Count de Beauregard and others, had sought in vain for it, but he had been fortunate enough to arrive at a complete success, as was proved by the samples of sugar which he exhibited to the Club.

Several specimens were shown. One of them is not purged of the molasses, because Mr. Wray desired to prove that the syrup from the *Imphee* possesses no unpleasant flavor. We tasted it, and found it very pleasant in flavor, reminding one of maple sugar. Another sample had been purged; it presented the appearance of fine *clayed Havana.* The crystals are firm and sharp, and the taste is not different from good Havanas, which are now selling in the New-York market at eleven and twelve cents, by the quantity.

If Mr. Wray is not amiss in his calculations as to the yield per acre, or if we can obtain but one thousand pounds, what an immense gift to American agriculture is he about to make? Our rapidly waning crop of sugar is at once exchanged for the greatest abundance, and a vast source of wealth is opened for our farmers. He has already expended some twenty thousand dollars in his experiments and attempts to introduce it into Europe, and it is to be hoped that his visit to our country may prove remunerative in proportion to the importance of his discovery to ourselves.

Inquiry was made by a gentleman present in regard to some suitable crushing apparatus. Mr. Hedges, the inventor of the Little Giant corn and cob mill, said he had invented a mill for this purpose, which he had exhibited at the recent fair at Washington, and received a silver medal. He had planted some five hundred hills of seed in a hot-house in Philadelphia, and would be able to crush the canes and make sugar as early as June 1st, which would be in ample time for the next fall's crop. His mill, of which he showed a cut, consists of three vertical iron rollers, of great strength, one of which is firmly anchored in a beam set in the ground; the other two are attached to the platform, so as to revolve simultaneously with the progress of the horses. The canes are fed to the rollers from a feeding table, the expressed juice runs down through a shoot, and the bagasse drops out at the opposite side.

Monsieur Auguste d'Ouville, of France, called the attention of the Club to a new corn-planter of his own invention, and a committee, consisting of Messrs Field, Pardee and Waterbury were appointed.

Horace Greeley spoke of Mr. Hedges's new steam boiler, for cooking food for stock, etc., and moved the appointment of a committee to go to No. 197 Water street to examine it. The chair appointed Mr. Greeley and Messrs Pardee and Olcott on this committee.

The subject of the day "Manures," was next in order. Prof. Mapes addressed the Club upon the varied excellence of manures in a more or less progressed condition, claiming that if phosphate of lime, carbonate of lime, magnesia, or any other plant ingredient had passed through the animal economy and should then be applied to nourish plants, it would give a greater product than a substance of like chemical constitution, but less fully refined organism; that there was a regular progressive refinement in the ultimates, from their first departure from the original rock, to enter into the constitution of plants and animals, each time being more improved, and capable of sustaining a higher growth of vegetable.

Dr. Waterbury differed from the views of Prof. Mapes, and offered some remarks.

Extracts by H. Meigs.

CHINA SIX HUNDRED YEARS AGO.

Peaches of two pounds weight. Pears of ten pounds weight. Pears are found now in Fo-kien by chief officers of the East India Company, as large as a wine decanter. De Guignes and Van Braam call them *Beurre* and fondante—very large and excellent. Rice, Millet and Panicum yielded one hundred for one. Grain enough for a supply of three years in case of loss of crops by inundations, violent rains, locusts, worms, etc., saved by the Emperor. Trees planted on both sides of public roads. Officers of rank to see all roads in order. A religious opinion awarded long life to every one who planted trees.

Post office. Ten thousand buildings at the stations at every twenty-five to thirty miles. The post office buildings large and handsome, hung with silk and provided with entertainment fit for kings. At each station four hundred good horses in constant readiness. Even mountainous districts remote from main roads, like buildings, horses, etc., and the land above them all cultivated to supply the station. In all this the Emperor excelled all other governments on earth.

Mr. Meigs—Agriculture, strange to say, is forever lapsing, like some religionists, from grace! Even requiring aid from the best men in every age to *keep man up to his work!* Go ahead and be happy.

You ask me to say something of the Chinese sugar cane. So far as all the authorities ancient and modern go, I find this sorghum saccharatum to be a production of the temperate zone, while common sugar cane only flourishes in the torrid zone! This peculiarity then gives as much soil of the earth suitable for it *out* of the torrid zone as there is within it, and a great deal more. In China, six hundred years ago, it was cultivated extensively up to north latitude 40°, and generally grew to about eight feet in height. Here we find it grow to a greater height. Perhaps our climate, which is almost a fac-simile of that of China, is more favorable to it. The Chinese then (six hundred years ago,) had not been able to make sugar of it. They made only a rich syrup called Jaggri. Some persons arriving there from Cairo, (then commonly called Babylon,) told the Chinese how to make sugar of it, that is, too add to the syrup *ashes of certain woods.* Alkaline substances, such as lixivium of wood ashes or some quick lime are now mixed with the boiling syrup towards the end of the boiling. Our sugar makers ought to be asked to try it. I am not able to decide,—*they are.* Caromel always crystalizes to some extent. Grape sugar on a raisin shows this plainly, and that too in quite a large proportion to the real uncrystalizable molasses. But let us try! It will be a *sweet* victory for all nations of the temperate zone to grow their own syrup only; but the sugar will crown that eminent success.

Solon Robinson remarked that when experiments were made on making sugar from our Indian corn stalks, it was found necessary to do it before the ears of corn matured. He observed that all sugar cane has the wax, or kerosene mentioned; but he pitied the poor creature who should be condemned to scrape it off.

Dr. Smith—Can chemical science add to the amount of wax on sugar cane ?

Professor Mapes spoke interestingly on the subject of sugar—remarking among other things that when the finest loaf sugar was churned with some water, it could never be crystalized again.

The Professor spoke as to the theory entertained by him of progressive refinement of plants and animals by using those elements which have been appropriated by them hundreds or thousands of times. He again recalled the Eglinton Tournament, where the modern Englishmen tried to get into ancient armor, and found it too small for them—to the horses on the Elgin marbles, very inferior to the modern—to the old ox of England, hardly a fourth the size of the modern ox of the market.

Dr. Waterbury hoped that opportunity would be afforded him to show the errors of this new theory, and he would prove that all history is against it.

Dr. Smith said we have recently heard this idea touched here several times already.

Mr. Greeley asked for a special committee to examine Hedge's new steam boiler for cooking feed for stock, &c.

The Chair appointed Messrs. Greeley, Pardee and Olcott.

Mons. Auguste D'Ouville asked for a committee to examine and report on the new patent corn planter of Jeffers, Sparks & Jeffers, of Philadelphia.

The Chair appointed Messrs. Field, Pardee and Waterbury.

Subjects for the 14th of April—"Liquid manures, why sometimes preferable;" "fence posts," and "the origin of the varieties of plants and animals."

Seeds of parsnip presented by the Hon. Joseph Blunt were distributed among the members.

The Club then adjourned to Tuesday, April 14, 1857, at noon.

H. MEIGS, *Secretary.*

April 14, 1857.

Present—Messrs. Pres. R. L. Pell, Lawton of New Rochelle, Rev. Mr. Carter, Dr. Wellington, Dr. Waterbury, Mr. Pardee, Mr. Field of Brooklyn, Judge Scoville, Dr. Smith, and others—18 members. (The day stormy.)

Mr. Pell in the chair. Henry Meigs, Secretary.

The Secretary read the following extracts translated by him:

[Journal Du Cultivateur, Montreal, Canada.]

From this valuable journal sent to us by our excellent corresponding member Mons. Latour, we translate the following:

ROASTED CHEESE.

This may be found a useful article, and is prepared as follows: Cut the cheese into slices of a moderate thickness, put them in a tinned copper vessel with a little butter and cream and boil the whole until the cheese is all dissolved, then take it off the fire let it cool a little, then put in some yolks of eggs well beaten. Put some of this on bread and brown it before a fire.

DEAD LEAVES.

A careful and wise gardener gathers all these and digs them in, for they are of nature's own best fertilizers. So should all the leaves and trimmings of grapes be buried around the roots of the vines.

COLORED GLASS TO MAKE SEEDS GERMINATE QUICK.

Messrs. Lawsons, of Edinburgh, have built a house of stone and covered it with blue glass for the purpose of trying the vitality of seeds and for early growth. They take from a quantity of seeds which they wish to prove, 100 seeds, and sow them in their blue conservatory, and instead of taking as usual ten or fifteen days to come up, these come up in two or three days. This saving of time is worth to Messrs. Lawsons, $2,500 a year.

We believe that by the use of colored glasses we can make flowers grow as richly as they naturally do within the Tropics.

A NOVEL AGRICULTURAL EXPERIMENT.

The learned chemist Liebig, says that he has found the illustration of the importance of mineral and organic ingredients to plants. During 1845 to 1849 I made a series of experiments upon the action of different mineral manures on a large scale on about ten acres which I purchased near the city of Giessen. My former experiments in my city garden had produced no results. Whatever I did, whatever I added to the soil were in vain, I could not find any perceptible effect from any of my mixtures. The only cause of this which I could discover appeared to exist in my soil which had been already so rich in these mineral constituents that what I had added was inappreciable. This was my inducement to buy the sandy land at Giessen, on which ten acres one sheep could not live. The soil partly of light sand, quartz sand and a little soil. I filled pots with this and sowed wheat, barley and red clover in them. I added mineral manures alone—not one of the plants grown in them did more than merely flower. I obtained from a soda factory a quantity which I spread uniformly over the land; excepting a vineyard on it of 2,000 vines.

THE EMPEROR OF THE FRENCH EXPERIMENTS ON FLOUR.

The Emperor, Napoleon III., has on many occasions shown himself to be an extraordinary man. He has conceived the idea that it was possible to reduce the volume of flour so as to facilitate its transportation without injury to its quality.

The earth is never ungrateful to him who applies to her intelligence, science and industry. That man of Britain who first taught the rotation of crops, doubled their amount in Britain. The man who first introduced turnips and root crops, doubled it again; and he who first used drainage, will double the whole again. So that within the last hundred years the produce of Britain on the same lands, has been eight times more than it was, and still we may put the question—Where is the limit of this progression?

The old Fly-coach gave way to Royal-mail coaches, making eleven miles per hour! What a marvellous change has occurred since that, in about thirty years past!

We consider drainage and deep culture the grandest inventions of modern times.

When the circumstances are favorable, the depth should be three, four and even five feet. Every cultivator should treat his farm as his laboratory, and his labors and science in it—not merely for himself, but for the good of the whole human family.

The committee appointed at the last meeting of the Farmers' Club to examine and report upon the merits of a new agricultural boiler for steaming food for stock, and other purposes, invented by Mr. J. A. Hedges of Cincinnati and Philadelphia, and on exhibition at 197 Water street, in this city, respectfully report that they find the said boiler to consist of a cast iron kettle of a capacity of some sixty gallons, which is provided with flanges at the top and bottom to enable it to be set in brick, and a cover with a flange to be bolted upon the upper flange of the kettle. This cover is provided with a sliding valve with two apertures for the escape of steam into flexible tubes at either side, which valve is so contrived that steam can be shut off from only one tube at once, and thus prevents such sudden checking of it as would cause explosion. Besides this precaution there is a safety valve in the cover which is simple in construction and admirably adapted to its intended purpose. The heat is applied beneath the boiler, the grate bars being arranged for burning either wood or coal. The quantity of fuel required is not greater than for a cooking stove of average size.

In fifty-two seconds a pailful of water, previously cold, was boiled by inserting in it one of the steam pipes. Another, when the heat of the fire had much diminished, in ninety seconds.

We found that if the steam was entirely cut off from escape through the pipes, by closing the valve on one and tieing the other in a knot, that at the expiration of fifty-three seconds the pressure was entirely relieved by the safety valve rising sufficiently to permit the escape of all excess of steam; so that if, through carelessness or other cause, the usual escapes were closed, no evil would ensue.

The apparatus is very simple in construction, and can be put up in three hours by an ordinary farm hand. It requires 350 brick. The cost is $35, $45, and $60, according to size. One of the former capacity will cook food for twenty head of stock or fifty hogs in four hours. In view of the manifest advantages of cooked food for stock, and because of the other purposes to which it may be applied, your committee are unanimous in recommending the steam boiler of Mr. Hedges as a useful and meritorious apparatus for the use of farmers.

Signed, HORACE GREELEY,
R. G. PARDEE,
HENRY S. OLCOTT.

The Secretary read a letter from the Hon. James Hudson, Secretary of the Royal Agricultural Society of England, conveying the thanks of the Society for copies of our Transactions, and tendering their journals to the Institute.

President Pell presented the following proceedings of our Legislature relative to the highly important plan for the production of salmon, shad and other valuable fishes:

To the Hon. the Legislature of the State of New-York:

Your petitioner, Robert L. Pell, of Pelham, Ulster county prays your honorable body to pass a law for the preservation and increase of salmon in all the waters belonging to the State, adapted to the purpose, in the manner following:

§ 1. All persons are forbid taking or killing salmon in the rivers, lakes, bays, estuaries, creeks, or sea ways in which they may flow, for the space of six years, under the penalty of two hundred dollars for each offence.

§ 2. All mill owners, or proprietors of water power, on streams adapted to the purpose, shall attach to every fall, or dam, exceeding five feet, an apron, extending from the lower side of the dam to the bottom of the stream, at an angle of forty-five degrees.

Report of the Committee on Agriculture in relation to the petition of Robert L. Pell concerning salmon fisheries in the State.

Mr. Ferdon, from the committee on agriculture, to which was referred the petition of Robert L. Pell, of Pelham, Ulster county, for the passage of a law for the preservation and increase of salmon in all the waters belonging to the State adapted to the purpose, respectfully reports:

That they have given the petition the consideration due to its importance, and would earnestly recommend the enactment of a law favorable to the wishes of your petitioner were it not for the present advanced state of the session. They deem the subject one of so much importance, however, that they have concluded to treat it at some length, hoping that it may receive the favorable consideration of the next Legislature.

The rapid increase of population, with the present high prices demanded for nearly every description of food, seem to make it incumbent upon the government to encourage every feasible method proposed for the increase and development of the natural resources of the State. Our agricultural interests have justly received a share of legislative attention and patronage. Kindred to these, and of nearly if not quite equal importance, is the subject embraced in the petition of Mr. Pell. We wish to call your attention to the means best adapted to multiply the sources whereby may be derived the supply of animal food to meet the wants of a rapidly increasing population.

Hitherto we have relied to a great extent upon the bountiful hand of our mother Nature. Our lakes and streams, our forests and rivers, teeming with animal life in its various forms, have been the vast and seemingly inexhaustible storehouses to which we have been accustomed to look for our supply.

The experience of every year, however, is teaching us that without the hand of man actively co-operating with that of Providence, we cannot much longer draw from these sources.

As our woods diminish game becomes scarce. Our fisheries, ill protected by legislation, are rapidly deteriorating, and should the present state of things continue will soon be little more than a name.

The method proposed by Mr. Pell for stocking our inland streams and rivers with salmon, is one which has been tried in France and Great Britain with complete success. We quote from a communication sent by him:

"Fish may be artificially propagated two ways in any quantity.

"The first is by taking the male and female alive and compelling them by gentle pressure to deposit their ova and milt, which are then mixed together, and so placed that a constant stream of aerated water will pass over them, and if the water retains an average temperature of 37 degrees they will hatch in 108 days; if 45 degrees, in 99 days; if 48 degrees, in 75 days.

"The second method is to mix the ova and milt of fish that have been some time dead and subject them to the same treatment. They will produce living fish. When young salmon first emerge from the egg, the yolk remains attached to the abdomen behind the gills, and affords the small fry sufficient food for at least thirty days, by which time they will grow nearly an inch in length, and are then fully capable of taking care of themselves. This is the period to enclose them in any vessel containing water, and they may be moved with perfect safety until they are thirty days old, after which they must be turned into streams with gravel bottoms, where they will remain for two years and then return to the ocean. The third year they return without fail to the waters where they were hatched and deposit spawn to reproduce their species, weighing at this time from twenty-five to thirty pounds.

"Fecundated eggs may be wrapped in wet woolen cloths and placed in boxes lined with moss, to prevent them from jolting, and be safely conveyed by land or water a ninety days' journey and may then be frozen stiff before planting, without injury.

"Judicious protective enactment in re-creating salmon fisheries in rivers where they were dying out in Ireland, has increased the product from forty tons of fish annually, in twenty years, to three hundred tons. Parliamentary regulations were enforced for the protection of salmon in the river of Newport, County Mayo, and in three years the produce was raised from half a ton to eight tons of salmon and four tons of white trout. The supervisors of Oswego, New-York, have re-established fisheries in Salmon river and its tributaries by the enactment of prohibitory laws.

"It will be as easy to stock the Esopus Kill, Wallkill and other appropriate streams in our State with salmon as your fine pastures with cattle."

As corroborative of Mr. Pell's statements with regard to this matter we will give some extracts from an "Essay on artificial breeding of fish," by Rev. John Bachman, of Charleston, read before the State Agricultural Society of South Carolina, in 1855.

He says, "It must be admitted that every effort that has a tendency to multiply and cheapen food and thus afford support to millions of our race, must secure the countenance and approbation of the philanthropist at all times. We are scarcely aware of the immense number of the human race that are supplied with cheap and wholesome food from the waters of the seas, the lakes, rivers and streams. The most important cities of the world are maritime. The sea not only gives wings to commerce but it furnishes us with the oil that feeds our lamps, the turtles and terrapins, the lobster, the crab, the prawn, the parent of the shrimp and other crustaceæ—the oyster and other shell fish, and an endless variety of the finny tribes, which serve to cheapen our markets and afford wholesome food to the poor, and delicacies to the rich.

"Jacobi, an eminent German naturalist, after having been engaged thirty years in experiments on artificial fish breeding, communicated his discovery to Fourcroy in 1758. This communication was written in the German language. A Latin translation was furnished by the Count de Goldstein. Its title was 'An essay on the artificial fecundation of fishes' eggs and on the employment of the process of stocking rivers and ponds.'

"The whole process of Jacobi was carried on near Nortolem, in the kingdom of Hanover. He not only stocked the river with salmon by his artificial process, but rendered them an object of considerable commerce. England to reward his services granted him a pension.

"The details of the process of Jacobi are as full in every particular as those recently published in France as the results of Remy and Gehin, &c." Dr. Bachman further says, "In 1838 we attended the meeting of the Zoological Society, in London, of which we were a corresponding member. The whole subject, which had awakened interest in consequence of the decline of salmon in most of their rivers, was there discussed and regularly published in their proceedings. The whole process of artificial fish breeding was fully understood and familiarly spoken of, as facts well known to men of science, and successfully practiced not only in Hanover but in Great Britain."

We have thus endeavored to show not only the importance but the feasibility of stocking the rivers of our State according to this simple process. It is well known that the salmon thrives and propagates in waters in this latitude, and is identical with the European salmon, to the successful propagation of which we have referred. Enough has been adduced we hope to call the attention of future legislators to the subject, and we hope at some time not far distant to see such protective laws enacted as will enable those who wish to engage in this highly laudable and beneficial enterprise to carry out their endeavors successfully.

A word in passing with regard to our shad fisheries may not be deemed inappropriate. A bill was at one time introduced into the New-York Senate requiring every fisherman to impregnate the spawn of two dozen female fish with the milt of the same number of males, at or near the close of the fising season, and plant the same on his fishing ground in the presence of a justice of the peace. This bill was not passed, but if it had been would have been of little avail, as this species spawns only in fresh water. Should pains be taken to select suitable spawning grounds near the head waters of the Hudson and stock them abundantly, our tables might again be plentifully supplied with this delicious article of food. At present, artificial obstructions in the form of dams, prevent their seeking their former spawning places, as it is well known that the shad, unlike the salmon, will not leap up a water-fall.

Eye witnesses have informed us that fifty years since these fine fish were caught in the seine by thousands, four or five miles above Waterford, at the head of navigation. Now they are no longer found there, and in consequence are rapidly diminishing in the river below.

Attention has from time to time been turned to the subject of the protection of fisheries in particular localities in our State. In a copy of the Laws passed in the year 1832, we find an act for the preservation of salmon trout in the waters of Herkimer county.

In the year 1835, laws were passed for the protection of fisheries in Salmon river, county of Oswego.

For the benefit of those curious in such matters, and to show that this subject was considered worthy of interest as far back as the days of our colonial history, we insert the following copy of an act to prevent the taking and destroying of salmon in Hudson's river, passed 16th of February, 1771:

"Whereas, It is thought that if the fish called salmon, which are very plenty in some of the rivers and lakes in this and the neighboring colonies, were brought into Hudson's river, that they would by spawning become numerous, to the great advantage of the public:

"And whereas a number of persons in the county of Albany propose to make the experiment and defray the expenses attending the same, in order that the good design may be carried into more effectual execution, it is conceived necessary that a law should be passed for prohibiting the taking and destroying the said fish for a term of years.

"Be it therefore enacted by his excellency the Governor, the Council of the General Assembly, and it is hereby enacted by the authority of the same, that if any person or persons after the publication of this act, and for and during the term of five years next to come shall take any salmon in Hudson's river, creek or brook emptying itself into the same, and kill or destroy the same, every such person shall for every salmon he or she shall so take and kill or destroy, forfeit the sum of £10, to be recovered with costs of suit by any person who shall sue for the same before any one of his majesty's justices of the peace in any of the counties within this colony, who is hereby impowered and required to hear and determine the same.

"JOHN, EARL OF DUNMORE, *Governor.*"

It is to be regretted that we have no law comprehensive enough on this subject to protect all the fisheries of different kinds throughout the State.

Not only salmon and shad, but various kinds of smaller fish which are now nearly extinct in our waters, might be multiplied a thousand fold. We see no reason why all the important streams in the State might not be made to yield abundant supplies for the localities through which they pass. And our larger and more important fisheries might easily, by a proper course of management, become a source of profit.

We would call particular attention to the fact that Mr. Pell asks no pecuniary assistance from the State, but simply requests the enactment of protective laws, offering to stock the localities referred to in his petition at his own expense. He concludes thus:

"Your petitioner asks no privilege of your honorable body further than the passage of the law, and will stock the waters aforesaid at his own expense, as he conceives it will be a great national benefit, furnishing abundant food for the masses."

An offer so munificent as this of Mr. Pell, should, and we trust may, meet with the response it deserves. While so much is being done in a variety of ways to ameliorate the evils attendant upon a rapid increase of population; while objects of charity and philanthropy make frequent, and we are happy to say not unheeded calls upon the Legislature of our State, let this truly beneficent enterprise, which will result in great good to all classes of community, meet with the ready interest and attention which it merits.

The subject of the day viz: "Liquid and Solid Manures," was then taken up.

Robert L. Pell—Our subject to-day is the use of liquid and solid manures. We all know that the mode of fertilising by liquid manure is not of modern origin by any means, as the Chinese at a very early period employed fermented soluble manures. Virgil in his Georgics speaks of its practice in Italy. Cato says a mixture of grape-stones and water were employed to fertilise olive trees. Columella speaks highly of putrid water for apple trees and vines, and modern writers unite in approving of various liquid manures. Evelyn in his treatise on earth, gives several receipts for liquid preparations, one of which is composed of salt one part, and lime two parts, mixed together and allowed to remain in a heap for three months, it is then mixed with water and applied to the land. The yield of wheat after this treatment is superior, the strength of straw great, and the yield in grain heavy. All substances, earthy, organic, or saline, can only become at once serviceable food of plants when presented to the roots in solution. Though this may appear to you a sweeping statement, yet it is really true; farm yard manure, muck, magnesia, lime and silica must all be dissolved before vegetables can absorb them. The Egyptian and Greek philosophers went so far as to assert that water was the only food of plants. In your liquid preparations be careful not to use any poisonous ingredient, such as opium, arsenic, or any alkaline or metallic poison, as they will kill the tree or plant as readily as they will human beings. Soluble matters are frequently imbibed by plants in an unaltered state, in other cases they are decomposed during absorption. Davy discovered that mint plants, which he forced to vegetate in sugar and water, absorbed the sugar unaltered ; and it is an ascertained fact that the spongioles and rootlets of plants will take up in their systems or reject sundry earthy matters of a soil, in a very astonishing manner. The roots of the persecaria for instance, when placed in equal parts of a solution of gum and sugar, absorbed thirty-six parts of the sugar, and only twenty-six of the gum ; and when placed in precisely the same proportions of glauber salt, common salt, and acetate of lime, it was found that the roots separated these salts from the solution with perfect ease, absorbing six parts of the glauber salt, ten parts of the common salt, and not a particle of the acetate of lime. These facts are particularly interesting as they account for the beneficial action of liquid manures.

The use of artificially prepared liquid matters is not well understood in England or the United States, but thoroughly so in France, Germany and China. In Germany all the excrements of stall-fed cattle are swept into the underground cisterns, and mixed with five or six times its bulk of water, according to the richness of the excrement. Five cisterns are usually employed, of such a size that they each require a week to fill ; and thus each has four weeks to ferment in before the mass assumes a uniform consistence. It is then removed upon the land by means of a pump, hose, or water cart. German farmers all say that no manures are so powerful in their operation as liquids, urine and blood being invariably found the best. The ammoniacal jets of urine have a certain stimulating power that appears to hasten vegetation more rapidly than any other substances, and at the same time produces more than double crops. However we may view the question of liquid manure, a great field of research presents itself on all sides, and no investigation will pay the agriculturist better than the labor and thought he may bestow upon it.

By such enrichers nourishment for plants may be more equally diffused through the soil, and becomes more rapidly and surely beneficial to the crop than by any other known mode of cultivation, and you will find by practice, that a vastly more minute quantity of manure, uniformly and equally mixed with land, is sufficient for the purposes of fertilisation than you imagined.

My advice to you is to go on and try experiments. If you are successful, you will deserve the thanks of the agricultural interest of the country; and if you are unsuccessful, you will still be entitled to praise for pointing out errors by the acquisition of knowledge.

Professor Schubler, the writer of the most esteemed, and certainly the most able treatise on Agronomia, or the best mode of farming and treating every species of land, added to the experiments of Hembstadt, and formed the following valuable table: to wit,

If a given quantity of land sown without manure yield three times the seed employed, then the same quantity of land will produce, five times the quantity sown when manured with old herbage, putrid grass or leaves, garden stuff, &c., seven times with cow dung, nine times with pigeons' dung, ten times with horse dung, twelve times with goats' dung, twelve times with sheeps' dung, fourteen times with human urine or bullocks' blood. But if the land be of such quality as to produce without manure five times the quantity sown, then the horse dung manure will yield fourteen, and human manure nineteen, two-thirds the quantity sown.

In addition to this information it was ascertained that the most important crops, yielding the most profit, such as flax, can only be obtained in abundance and of the finest quality, by employing human manure.

By far the most important point of practical knowledge in this matter, put forward by the same great authorities, is that while the manuring with human excrement has produced fourteen times the quantity sown, where horse dung has only yielded ten; the proportion of the human manure employed was, to that of the horse dung, as one to five only; so that with one ton of human excretiæ, a larger produce is obtained than with five tons of stable manure.

Accepting these conclusions as the result of actual experiment, they place an equal quantity of fertilising matter in the form of liquids above all other manures, considered with reference to its producing capability alone, irrespective of the greater pecuniary economy of its application. It has been found that the miscellaneous nature of liquid manures is very favorable to vegetable production. In every instance of irrigation with compounded or miscellaneous manure, as compared with the applications of comparatively solid manures, the grass which had received the liquid was far the richest, and the cattle went first to feed on the portion of the field so irrigated. These results are in accordance with the principles of vegetable physiology, for the roots of plants have the faculty, not only to seek their food, but when they have arrived at it to select that which is most suitable to them, as Sir Humphrey Davy long ago ascertained ; they do not take up every thing that is presented to them. A distiller in Glasgow had a cow shed attached to his distillery, in which he kept several hundred cows ; their liquid was permitted to flow into a stream near at hand, and became so serious a nuisance to a neighboring farmer that he threatened prosecution. In order to get rid of it, the distiller determined to try it on his land instead of the solid manure which had only been used before, and the production on stiff ill-drained land was four fold, he now sells all the solid manure on which he previously depended, to other farmers, amounting to two thonsand tons per annum, for twelve shillings per ton.

The expense of applying fifteen loads of solid stable manure would be if near the barn:

Labor of three men half a day,	$1 50
Cart and two horses half a day,	1 50
Man and boy spreading one day,	1 37
Bush harrowing man and horse half a day,	1 25
Labor of one man two days removing the effect of poaching	2 00
	$7 62

The expense of applying fifteen loads of liquid by cart:

Three men half a day,	$1 50
Water-cart and two horses half a day,	1 50
One man two days removing poaching,	2 00
	$5 00

This illustrates the question as to the expense of distribution.

It has been proved that by mismanagement of solid manures, whether from farms or towns, by their retention for long periods on the surface, by the evaporation of their most fertilising portions, and by bad management of them in the ground, as much as two-thirds, and frequently more, of their fertilising qualities are lost, and that the loss of the liquid manures is generally total. In all such cases, where the manure of the stable and of the cattle sheds is seen exposed in the open barn yard to the weather, and where the washings from it by the rain, together with the urine of the farm, are permitted to run off into the ditches, it may be safely declared that the loss of production, from such abominable management, or the sacrifice of the gain derivable from an improved application of the manures, is at least equal to the average rental of the land.

All countries in which liquid manures are collected with care have acknowledged their utility, and I was struck with the general beauty of the meadows and other crops where these manures were used in England, and by the luxuriance of the meadows in Germany, Switzerland, and particularly in the Cantons of Zurich, Argovie, and Berne. You cannot be surprised at the results which experience have given in this respect if you will only reflect:

1. That manures begin to serve as food for plants only when by successive operations they are almost entirely dissolved in water.

2. That animal liquids, such as urine, the contents of drains and stables, and sewers of houses, contain a very large amount of nutritive matters and stimulating principles.

Two methods of using liquid manures are to be distinguished, either they are distributed on lands already covered with vegetation, for the purpose of at once increasing the growth of the crop, or they are used on fallow land for the purpose of storing up in it a certain quantity of nutritive matter ready to be absorbed by the crop that is to follow.

This difference of object requires a similar difference in the nature of the liquids to be employed, and in the method of using them. When it is intended to spread it on living vegetation care must be taken, first, that the manure is not so strong as to burn the crops, nor so diluted as to reduce the benefit merely to that arising from irrigation with so much water; secondly, the manure should be distributed at a proper time relatively to the age of the plants, to the season, and to states of the atmosphere. On the other hand, when the object is to spread liquid manure on fallow land as a store of nourishment, the strength of acridity of the manure need not be dreaded; neither is there any fear that the time may not be suitable. The first method requires more care and attention, but gives larger immediate results. The second is more certain, easier, and more generally applicable.

The quantity of the water to be applied should be varied.

1. To the object of the culture: when for leaves, more water should be given than when for flowers; less water should be given when for fruits and grains.

2. The depths of the roots: the application should be more frequent to the plants the roots of which are superficial, less frequent to deeper roots.

3. The structure of the foliage: those which evaporate much, such as plants with large leaves, more frequently than perennial, or plants with thick leaves.

4. In regard to the stage of vegetation, it is important to bear in mind that young germinating plants require light and frequent waterings; those that are growing well abundant waterings, and when the fruit or seed is maturing the waterings should be infrequent. Those plants that have been transplanted abundant watering.

5. The nature of the soil, according to which these rules must be modified. The lighter the soil the more frequent and plentiful

must be the waterings. If it is a compact and clayey soil less watering will be required.

6. The state of the atmosphere. It will be readily conceived that the watering must be more frequent when the temperature is high, the sky clear, the air dry, and during drought. So says De Candolle.

Liquid manures used in agriculture are, first, drainings from cow houses and stables; second, urine from dwelling houses; third, the greasy water from sinks.

The drainings from stables are obtained in two ways, and the properties of the manures differ widely, according to the mode of their extraction and fermentation. The liquids from stables should immediately pass into a cistern underground, and when full be permitted to undergo a mucous fermentation, during which process it must not be disturbed for a week, after which time it may be diluted with a large quantity of water, and is fit for use. The other method is to allow it to run into pools, by which much of the ammonia is lost. The urine, greasy water, and wash water, from the dwelling, may run together in a proper cistern, and the quantity be vastly increased by the addition of water, thus gaining in quantity and other conditions. There appears to be misconception in relation to the power of pumping mixtures of common dung through pipes on account of clogging. I have seen tolerably thick sand delivered by pump through a hose one thousand feet long, and distributed with ease, in a pottery. And was so struck with the feasibility of moving thick substances in water, that I would sooner undertake to clay a sandy field through this medium than by carting, and the distribution would be far more effectual. In Tuscany the Bonificamento of the Maremma, is a work that by means of water power upwards of two feet in thickness of solid earth has been spread over forty square miles of country, a mass of earth work equal to eighty-two and a half million cubic yards, regularly deposited.

The power desirable from the prompt applications of plain water to arable cultivation may be said to be unknown to the agriculture of the United States. Even at this late day in Paris water is distributed by hand labor by the use of the scoop, at great expense, but for which the extra produce amply compensates, and this is strange, when it is known that a quantity of water equal to the fall from a heavy thunder shower may be distributed by engine power at an expense of a few cents per acre.

Pumping in large quantities through ten miles in length of closed pipe is in practice abroad, and no limits have yet been ascertained to the possible extent of distribution by such means. The results continuously obtained beyond all agricultural precedent, even of the highest market garden cultivation, having been obtained by means of liquid manuring, there is little danger of failure from the prosecution of similar work by new and untried hands.

But the determination of the best seasons and times, and with what degrees of dilution liquid manures may be applied, and in what intervals of rain or of applications of simple water, are points of skill to be acquired by further experience, for which at the present time the best guide is to be found in the practice of horticulturists.

AMOUNT OF MANURE APPLIED TO AN ACRE OF LAND.

Two acres of land contain eighty-seven thousand one hundred and twenty square feet, nine thousand six hundred and eighty square yards, or three hundred and twenty square rods. Six hundred pounds of guano would be sufficient for two acres ; four hundred and four pounds would give an ounce avoirdupois to each square yard. Two cubic yards of night soil, would manure two acres well. Three hundred and forty barrels of liquid manure, would give a gill to each square foot. Four hundred pounds of Peruvian guano will cause two acres of land to yield, if in ordinary condition, four thousand four hundred and eighty pounds of oats—equal to one hundred and forty bushels. Five hundred pounds of Mapes' superphosphate of lime on two acres will cause it to yield three thousand four hundred and thirty pounds of oats: equal to about one hundred and fourteen bushels. Four hundred and sixty pounds of bone earth on the same quantity of land will yield three thousand three hundred and sixty pounds—about 108 bushels. Twenty-four dollars worth of barn yard manure will cause two acres to yield 1,520 lbs. of carrots; twenty-four dollars worth of guano 1,350 lbs. do ; twenty-four dollars worth of Mapes' superphosphate, 1,280 lbs. do; twenty-four dollars worth of potash, 1,270 lbs. do; twenty-four dollars worth of street manure, 1,100 lbs. do.

Last year two hundred and fifty pounds of nitrate of soda, with one hundred and twenty-five pounds of salt added, were spread upon an acre of new grass sub-drained swamp land, and the yield was six thousand seven hundred pounds—worth $57.00. Another acre manured with four hundred and fifty pounds of Peruvian guano, yielded six thousand pounds—worth $51.00.

By experiments I discovered that five bushels of bones dissolved in sulphuric acid, or boiled with lime water, was fully equal and produced the same effect that twenty-five bushels did in a dry pulverized state.

I find further by experiment that ten loads of barn yard manure hauled upon land and plowed under before fermentation commences, is fully equal to fifteen loads thoroughly rotted—it produces more immediate effect upon crops, and serves the land better.

Farmers often say that plaster exhausts the soil. This is a mistake—no manure ever exhausts a soil. If plaster for instance causes a field of clover to yield twenty per cent more than it would had there been none used, then of course twenty per cent more of potash, phosphorus, &c., would pass into the crop than would if no plaster had been put on. This must be renewed by other manure. No sane man would attempt to keep his land in heart by the use of plaster alone. Very many causes and conditions must be brought to bear to produce a healthy plant. Plaster only adds sulphuric acid and attracts moisture and ammonia—twice in six years is often enough to apply it—put in two hundred pounds per acre when the grass seed is sown, and two hundred pounds the following spring when the vegetation is about four inches high. It has no influence on soil containing sulphate of lime, or on a poor exhausted soil devoid of potash, or phosphoric acid, or on a cold heavy clay soil, unless your land is dry and in a good state of cultivation it is worse than useless to use plaster at all.

This is not the case with lime—wherever agriculture has been advanced, the presence of lime is indispensable—all classes of dry soil are immensely benefited by its use—sandy, silicious, clay and gravelly lands are almost barren if it is absent. All the analyses of fertile soils that have come under my consideration, have universally shown lime to be present. If it is found in very small quantity in the surface soil it will be abundant in the sub-soil, because its nature causes it to sink. And notwithstanding it is virtually necessary as a food for plants, still the quantity in a soil need not be large, as a four years rotation of crops only carries off about two hundred and forty pounds from an acre; but this quantity is now indispensable to ripen and perfect cultivated plants, and if not added artificially, infertility will undoubtedly ensue. It is often found in several states of combination, ar for example: in chloride of calcium, which is soluble in water, and is detected in the sap of plants; in sulphate, silicate, carbonate, and humate of lime. I use from forty to two hundred bushels of shell lime to the acre, and renew every six years, and have always found high farming the most profitable, and land so tilled always grateful.

The question is often asked whether green manuring will invariably prevent soils from becoming exhausted? I answer, that provided it is judiciously practiced, land may be secured from exhaustion for an indefinite period of time, not by only plowing under the green crop raised upon the same field, but that raised on another, and spread upon it. Still the crop growing upon a field may be advantageously turned under for a few years. Rye I have found admirable for that purpose, because it is a sure crop, grows rapidly in the spring, and covers the ground thoroughly. When I use red clover, two crops are cut, and the third plowed under in full bloom. You may alternate clover with a wheat crop very advantageously without other manure for a time; but notwithstanding that poor land may be brought to a remunerative fertility, it will most assuredly go back to a state of nature, if it does not receive sooner or later, saline matters in some shape. A load of unripe dry straw will afford a far richer manure than ripe dry straw, because in its partial green state it contains the substances of which grain is formed; but in the dry ripe state it has restored these matters to the soil on which it grew.

I discovered thus that too large an application of manure produces bad effects upon crops. An acre of wheat was divided into four quarters--on one, fifty pounds of guano were spread, and the yield was,.................................... 10 bushels.

Seventy pounds yielded,....................	12	do
Ninety pounds yielded,.....................	13	do
One hundred and ten pounds yielded,........	8	do
Unmanured,.................................	6	do

Another divided acre was manured with soot applied dry, with similar results.

Fifty lbs. of soot produced on a quarter,			.....	10½	bushels.
Seventy	"	"	.....	12½	do
Ninety	"	"	.....	13¼	do
One hundred and ten,		"	.....	7½	do
Unmanured,		"	.....	6	do

In this experiment the soot proved more valuable than guano.

Pea and bean haulm decomposed are far more valuable than oat, rye, or wheat straw as a fertiliser, because they contain more nitrogen, and it is generally allowed that the efficacy of manures is in proportion to the quantity of this substance in them. Dried blood contains from ten to thirteen per cent. of nitrogen; wool and hair from fourteen to sixteen. Therefore the employment of enriching substances abounding in nitrogen produces not only a larger crop, but likewise a grain richer in gluten.

Rest assured of one fact, that neither guano, soot, superphosphate of lime, or any other single substance can replace barn yard manure for an indifferent length of time, because all the matters required by rotation of crops are not contained in any one of them except barn yard, which no judicious farmer should ever neglect to save. It shows wretched economy and bad calculation in agriculturists to buy concentrated manures, for the purpose of increasing the productiveness of their lands, when at the same time their farm yards are neglected.

Dr. Waterbury on the question "The origin of the varieties of plants and animals" was read and received by the club with very marked approbation.

When Dr. Waterbury had advanced in his reading Dr. Wellington moved an adjournment to enable Dr. Waterbury to complete in writing for the next meeting his valuable remarks.

Dr. Smith expressed his great pleasure in hearing so interesting an essay from a professional brother.

Mr. Lawton agreed with those who warmly appreciated the essay.

Mr. Pardee said that it supplied a great want. That is, a clear abstract of the most interesting description, from multitudes of books! It was comprehensive and full. He hoped to see it carefully written out and published.

Mr. Field believed that to be the true doctrine. And our learned brother has grouped the constituents of it in a remarkably lucid and condensed form. It is that sort of report is so much needed and called for in our Agricultural Societies—the best form of essays. Mr. Field believed that circumstances affect men in their physical condition as well as plants and animals. That men fed on corn and pork are dangerous! but among the eaters of wheat bread we are safe. Wheat is proper food for civilized Christians.

Dr. Wellington moved to continue the present subjects at the next meeting. Carried.

The same subjects ordered to be continued, viz.: "Liquid manures, why sometimes preferable?" "Fence posts," and "The origin of the varieties of plants and animals."

The Club adjourned. H. MEIGS, *Secretary.*

April, 21, 1857.

Present—Messrs. Dewey (over ninety years), Judge Scoville, Mr. Doughty and Mr. Brower of New-Jersey, Adrian Bergen of Gowanus, Long Island, Wm. Lawton of New Rochelle, Mr. Johnson of New Haven, Wm. W. Fox, Dr. Waterbury, Thomas W. Field of Brooklyn, D. C. Robinson, George W. Waring, Jr., of Staten Island, two Ladies, Vice President Reese, Benjamin Pike, the optician (over eighty), Solon Robinson, Mr. Atwater of New Haven, Dr. Wellington, Dr. Smith of the *Times* and others. Fifty-seven in all.

Hon. Robert Swift Livingston in the chair. Henry Meigs, Secretary.

The Secretary read the following translations made by him from articles received since last meeting, viz.:

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d Protecteur. Paris, January, 1857.]

RASPBERRIES.

From the Gardener's Chronicle London: "We are astonished that an article like this, so very agreeable in taste and odor, should still be generally neglected by such gardeners as have performed prodigies in the strawberry line. In ten years past we have hardly obtained one new variety of the raspberry while the new strawberries are numerous, and for the most part of superior merit. Yet there is no reason for saying that the strawberry is easier of cultivation or perfection than the raspberry which will flourish in places where strawberry can hardly exist.

"Raspberry loves low places, rather moist, grows as a bush, flourishes on soils of various sorts from clayey to black vegetable soil. The fruit has more odor when grown on good vegetable mould. Every body knows that the raspberry stem lasts two years only and requires peculiar trimming. All old stems which bore fruit last year must be cut down to the level of the land and those for fruit this year left.

[Journal of the Society of Arts, and of the Institutions in Union.]

This noble society, with its 350 branches, prints a number every week, containing every useful idea yielded by its extensive brain. Its journals are given to us free of charge.

We extract the following on bread:

LIME WATER IN THE FORMATION OF BREAD.

To neutralize the deterioration which the gluten of flour undergoes by keeping, bakers add sulphate of copper, or alum, with the damaged flour. Professor Liebig, however, has conceived the idea of employing lime, in a state of solution, saturated without heat.

After having kneaded the flour with water and lime, he adds the yeast, and leaves the dough to itself; the fermentation commences and is developed as usual; and if we add the remainder of the flour to the fermented dough at the proper time, we obtain, after baking, an excellent, elastic, spongy bread, free from acid, of an agreeable taste, and which is preferred to all other bread after it has been eaten for sometime.

The proportions of flour and lime water to be employed are in the ratio of nineteen to five. As the quantity of liquid is not sufficient for converting the flour into dough, it is completed with ordinary water. The quantity of lime contained in the bread is small. 160 ounces of lime require more than 300 quarts of water for solution. The lime contained in the bread is scarcely as much as that contained in the seeds of leguminous plants. Prof. Liebig remarks that "it may be regarded as a physical truth, established by experiment, that flour is not a perfectly alimentary substance, administered alone, in the state of bread, it does not suffice for sustaining life. From all that we know, this insufficiency to sustain life is owing to want of lime, so necessary for the formation of the osseous system."

The phosphoric acid likewise required is sufficiently represented in grain, but lime is less abundant in it than in leguminous plants. This circumstance, perhaps, gives the key to many of the diseases observed among prisoners, as well as among children, whose diet consists chiefly of bread. The yield of bread from flour kneaded with lime water is more considerable. In my house, nineteen pounds of flour treated with lime water, rarely give more than 24½ pounds of bread; kneaded with five quarts of lime water, the same quantity of flour produces from 26 pounds 6 ounces to 26 pounds 10 ounces, of well baked bread. Now, as according to Heeren 19 pounds of flour furnish only 24 pounds 1½ ounces of bread, it may be admitted that the lime water bread has undergone a real augmentation.—*Annalen der Chemie und Pharmacie.*

[Journal De Cultivateur. Montreal.]

DRAINAGE.

Mr. Brown, of Essex county, Massachusetts, had a piece of eight acres, part of which was covered with stagnant water the greater part of the year. A part of this was underdrained by him, and has borne since the greatest crop of onions ever raised in Essex, viz: upwards of one thousand bushels an acre. This crop was verified by a committee.

CELLARS.

Clean out the cellars under your dwellings perfectly, and make a mortar bottom to them. The gases from neglected cellars hurt our health sadly.

GARDENS.

Every farm should have a garden. A family of six persons want half an acre. Make a shelter for it on the northerly, easterly, and westerly sides, of cedars, or other evergreens, so that all the southerly opening may admit warmth, and underdrain the whole of it, and the better you do that, the nearer will your garden come to perfection.

YELLOW BIRDS.

Our little yellow bird resembles the canary. Some supposed that it eat wheat. One was killed, and his crop examined, and found to contain 200 *coleopters*, and only *four grains* of worm-eaten wheat.

Mr. Johnson of New Haven, thought the use of lime, as stated by Prof. Liebig's experiments, was upon the ordinary sour bread of Germany, though he did not doubt it would be found beneficial, as he states, to our sweet flour bread, and as the quantity of lime held in solution that would enter into a loaf of bread is so small, it cannot be injurious to health.

Solon Robinson stated that bakers in this country use lime now, but, perhaps, not as directed by Prof. Liebig.

Mr. Bergen of Gowanus, wished to know, in answer to a statement read by the Secretary, whether all soils require draining. He said his soil never holds the water; it drives off as fast as it falls, even in such a hard rain as the late storm. No one was ready to answer this question.

Dr. Wellington stated that he had often noticed elms transplanted from a hard soil, are far more likely to live than when taken from a swampy soil.

Wm. Lawton said that trees in the coal region of Pennsylvania, grow with roots very near the surface, none having penetrated the earth more than six inches. On his place at New Rochelle the soil is a heavy clay loam, and he finds the roots of his fruit trees all near the surface. He thinks that tap roots should always be removed. He does not consider the black knot upon plum trees any serious calamity, because they are so easily got rid of by pruning.

Solon Robinson—Mr. Chairman, I want to ask Mr. Field a question. I want to know how he would treat this tree with the long roots, if about to set it out where it is to grow?

Mr. Field—I can best answer that question with my pruning knife. This he did, by cutting back all the new wood to one or two buds, and cutting off about one-third of the roots, with a downwards cut from the inside of each root. In setting it in place I spread out the roots so that they stand like legs, and the cuts fit down to the earth. The roots will then throw out fibres, and they, being near the surface, are ready to receive whatever you are disposed to feed them. No tree can be found, out of the tap-root family, that will flourish with its roots running deep down in a loose soil. I would recommend setting trees, upon the prairies, upon artificial ridges. It is not the severity of winter that kills fruit trees—it is the unripe wood, which is easily killed in any weather.

Mr. Field—Trees planted upon a rich, deep and alluvial soil, throw down long tap roots, without fibres, and in exactly the same ratio grow into tall slim stems, deprived of radial shoots near the ground. On the contrary, a soil sufficiently deep and rich, whose nutritive qualities are divided by coarse sandy or gravelly particles, induces a fibrous growth of roots. These two trees are specimens of each of these effects. The difference is very remarkable. This, grown upon a deep, alluvial soil, has seven long tap-like roots descending nearly three feet into the soil, and almost entirely destitute of fibres. The other grown upon a deeply pulverised coarse sandy soil, with a good supply of manure, has a mass of innumerable fibres. The cause is undoubtedly due to the complete æration of the soil, effected by the coarse particles of the soil. The impalpable condition of the first forms a compact covering to the root, impenetrable by air, and the root descends in almost right lines. These trees succeed but indifferently in transplanting, while the fibrous rooted grow almost without check on transplanting, and without the loss of one in a thousand. The tap rooted trees grow late, have a succulent formation of wood, the sap is not sufficiently condensed to resist the freezing of winter, and the tree is blighted. The fibrous rooted tree, with its pores near the surface, early feels the change of season, ripens its leaves, its sap becomes condensed, and the wood thoroughly ripened and prepared for winter.

ORIGIN OF VARIETIES IN ANIMALS AND PLANTS.

Dr. Waterbury—The different species of animals and plants now existing on the surface of the earth, have maintained the same forms and the same peculiarities on which their identity depends from the beginning of each species. The progressive changes from lower to higher organizations in the geological history of the earth are abrupt. When a new species makes its appearance we always find it fully developed from the first—neither preceded nor followed by any *hybrid* forms. There is no evidence that a single species has ever originated in any process of variation, or in fact from any other causes than a direct interposition of created power. In our native forests the black ash delights in moist ground, while the white ash chooses the drier elevations. Though these two trees differ so little from each other as to be distinguished only on considerable acquaintance, yet the black ash, transplanted to dry grounds, never becomes the white ash, nor does the white ash become the black ash under the opposite conditions. The hard maple and the soft maple side by side have traveled over half the continent vegetating together in various soils and together subject to ten degrees of change of climate, and yet, though both produce sugar, and the two are not readily distinguished from each other, yet no confusion of species has occurred, nor does the one become the other in any stage of its growth from that of a shrub in high northern latitudes to that of the most stately and majestic of trees in New-York and Vermont. The same is equally true of the white and red beech.

A large tract of land on which the city of Hamburg is situated rests on the remains of an ancient forest, sunk some thirty to one hundred feet below the surface, and composed of limes and oaks exactly like those now met with above excavations, also in the same locality throw up hazel nuts in immense quantities that are precisely like those now produced in the same region. In digging wells on this continent the germs of ancient vegetation have occasionally grown after being thrown up, but in no case have they produced any new species. In one case, the circumstances of which came under my own observation, the wild red plum common to this country was thus introduced, although not occurring within some miles. Timber buried in swamps by accumulations of muck and soil to the depth of many feet has always proved to be identical with that of existing trees.

On a former occasion I submitted here measurements of the lower jaw of a mummied bull in Dr. Abbott's Egyptian collection, and showed that it differed neither appreciably nor significantly from the same bone in average sized modern oxen. Cuvier regarded all the domestic varieties of the ox as descended from one species—the ancient Egyptian stock. The mummied cats and birds derived from the same source are complete antetypes of existing species, in no case differing more from them than individuals of the same race differ from each other. Bonastre found more than eighty kinds of animals and plants either existing or represented in mummies, and in every instance they were identical with existing species.

The descriptions of animals as given by Aristotle are as true to nature as when he composed them, and the medical properties of plants are found to be the same when identified as observed by the ancients. As man represents the last and most complete form of physical organization, an argument to prove there has been no change of consequence in his construction for thousands of years may be supposed to include inferior organizations, and such an argument may be drawn from the works of the ancients. Their poetry appeals to the same passions and aspirations that move men now; their moral philosophy shows as delicate a sense of right and wrong as that of which we boast; in architecture we do nothing but imitate them; in the exact sciences no important advances have been made for two thousand years—the demonstrations of Euclid having never been improved. While in mechanics, after all our boasting, we of the nineteenth century look up to the Pyramids with awe and stupidity, and ignorantly wonder by what means they were built. No doubt the thing might be easily done again if we only knew how.

I am told by military surgeons that bayonet wounds very rarely occur in their practice. But few men are bold enough to face a naked point of steel. At the point of the bayonet England is carrying her empire round the world, the stability of which is based on the physiological law that inferior races of men cannot stand the charge of this instrument. Yet Leonidas and the four hundred, though "a forlorn hope" stood the charge of the bayonet and fell to the last man rather than fly. Did the six hundred at Balaklava do any thing more; or is thère an instance in modern history of greater bravery in as many men ?

If then the variations of form in animals and plants are confined within certain narrow limits and were so confined not only during historic periods, but even during the ancient geologic epochs, maintaining certain clearly defined types and preventing that successive mixing of races that would have ended in the production of a common form, it becomes a matter of exceeding interest to enquire on what circumstances the limited variations that do take place depend—to what extent they may go and within what bounds they occur.

CAUSES OF VARIATION IN ANIMALS.

It is a well known fact that the muscles of men and animals, if well supplied with nutriment, grow more powerful by exercise. To produce this effect the exercise must be repeated at short intervals, and must be sufficient to tire without exhausting, while the food must be of the proper quality, and sufficient in quantity. If the exercise be carried too far for the food, diminution instead of augmentation of the bulk of the muscle results. The same is true of the other organs of animals, and in this one law carried out we shall find the origin of varieties in animals and plants.

Liebig has shown indisputably, that two different parts of the food of animals are used for two different purposes, viz: the nitrogenized parts, for the nutrition of muscles, and consequently for the production of motion while the purely carbonaceous parts are oxidized for the production of animal heat, passing out of the lungs in the form of carbonic acid. He has inferred, and that inference is now adopted generally by physiologists, that all the different organs are supported by different properties of the food, and that the appetite for different and various kinds of food in men and animals, is the instinctive expression of the various wants of the organs of the system in some such way as the sensation of thirst is occasioned by a deficiency of water in the blood.

When the different component parts of the food are made to correspond most perfectly to the wants of the different organs for the production of animal heat, of motion, of nervous influence, etc., both in absolute and in relative quantity—the highest condition of individual health results. Practically, however, this is never fully attained, a certain amount of surplusage being taken into the system to furnish sufficient nutriment for some particular organ, this surplus material being thrown out as waste, when in excess produces obstruction of the natural drains, and thus originates disease. Thus horses fed on hay, or other food poor in nitrogen, sweat with exercise, for they must dispose of much carbonaceous matter to obtain the necessary nitrogenous matter. Or when stabled in cold weather, and prevented from exercise, if highly fed on oats the nitrogenous matter must be disposed of as waste through the kidneys, in order to obtain the carbonaceous matter necessary for the support of animal heat, and thus urinary obstructions arise. For the same reason horses thus fed feel an instinctive desire for motion, or are antic, have great power to endure exercise, and perspire very sparingly.

As the duties of a muscle are made greater it increases in capacity to perform them only to a certain limit, beyond this limit it succumbs, and organic disease results. The stage men increase the labor of the horses as long as they eat more, and decrease it, when practicable, as soon as they begin to eat less. The excretory organs have been proved, like the muscles, to perform their duties and form their secretions by a like species of cell growth, and consequently are subject to the same law. Their organic diseases probably arise also in the same way. When science has fully succeeded in adapting the food of men and animals to the requirements of their systems, and has accurately learned the limits of variation to which the different organs may go, the secret of health and longevity will have been discovered.

In the two matters of *exercise* and *food* we are to look for the causes of all the variations of form in animals and plants. In the case of animals, the exercise may be, and is, in fact, very much varied, yet as the nature of the exercise and the extent of it has been found to be, after all, absolutely dependant on the nature of the food, we are brought at last to the *difference of food* as the one great controlling cause of varieties in animals, and the predisposing cause of the most of their diseases, i. e. the constitutional ones, or those which do not originate in external injury. This is the class of diseases which are now most fatal, and of the causes of which we know least; and it is undoubtedly reserved for organic chemistry to reveal the origin of these diseases, and to indicate some clear and easily understood method of avoiding them. Hippocrates said, "the truth is always easy of apprehension." It is only when men are in the dark themselves that they "darken counsel by words without wisdom." When the cause of a disease is once known, the treatment of it is generally very plain.

In illustration of the wonderful influence of food in developing animals, I may state that when the queen bee is lost, for any reason, the bees of the hive take an egg from those cells which in ordinary circumstances breed neuters or undeveloped females, construct a larger cell in which they enclose the egg, and instead of feeding the grub when hatched, with bee bread, supply it with a peculiar stimulating food of entirely different quality, being of jelly-like consistence and pungent stimulating character. Thus the grub that would have become a neuter or working bee is transformed like Cinderella in the story book, into a fine queen, three or four times as large as a worker, with a long body and short wings, a peculiar shaped tongue and jaws, a fancy sting, with no hollows on the thighs for carrying pollen, and without the power to secrete wax.

In this country, where the farms are large and many, men keep from fifty to one hundred cattle before any improved breeds were introduced, as well as since, the stock of each man has a common resemblance and generally differs so much from that of his neighbors as to be easily distinguished. Yet, where two calves are mated when young, and subjected to the same tasks and fed in the same manner, they resemble each other through life as much as if both had been "to the manor born." The uniformity of color, size, and general appearance of wild animals also occurs from the same cause. That climate has nothing to do with it we know from the fact that domesticated animals in the same regions with those which have escaped from man, are subject to all the variations of form common to their condition of servitude. Thus the wild horses and cattle of South America differ in appearance from the domestic stock of the same countries though both are of common origin. The same is also true of the wild dogs of Contantinople. The life of the sailor, aside from casualties, has never been regarded as unhealthy while he is confined to ship fare, but when in port and surfeiting on foreign productions he is peculiarly liable to disease. We never hear of the mariner degenerating from the influence of climate.

As further evidence of the direct effect of food rather than climate in modifying animals, we may notice that the climate of the earth has not varied for three thousand years. We know this not only from astronomical observations but from observations in our own science. The grape and the date both grew in Palestine, in the earliest historic periods, and both grow there still, although a variation of one degree of average climate would have carried this common margin on which they meet, to the north or south by some hundreds of miles. And yet, as there have been great changes in the character of the different races of men who have inhabited the different eastern countries, these changes must be due to progressive improvement in their food. Tacitus speaks of the Germans as a wild race, inhabiting dens and swamps and living on the coarsest kind of food. But these same Germans are now the most metaphysical nation on the face of the earth. The same is true of the English and French nations as described by ancient historians.

With the acquisition and general use of the cereals the process of amelioration seems to have commenced. And the same thing is now happening on the west coast of Africa. The colonists sent there from this country preserve their bread eating habits and delight in the exercise of that authority over the rice eating natives which they found so unpleasant here. These natives are passionately fond of bread, a fact of much significance when we consider that their race in this country has ameliorated very much, yet has never attained to separate existence in independent communities. It is because he improves the physical condition of domestic animals that man succeeds in keeping them tame servants. He renders them docile by ministering to their appetites—by making them provide themselves with comfort by serving him. In this way the colonists keep the natives about them and make them servants by giving them bread. I am sorry to say the production of the cereals is not likely to succeed in this colony and that as yet it has been entirely dependent on the mother country for flour.

When the African race is transplanted from the eastern continent to the trophical regions of the West Indies and this country, the difference in climate is not enough to allow us to attribute it to the fact that the negro becomes more intelligent and rises in the scale of being with the change. Climate in this case is nothing—food is every thing.

If further evidence is necessary of the effect of food rather than climate in modifying the character of man, we have it in the fact that the Nomadic Tartar hordes living on the produce of their herds—have subsisted on the same kind of food for thousands of years, and have made no progression. The Tartar of to-day wanders in just such another ox cart as is represented in the ancient sculptures. His boats and tools are of the same fashion. The aborigines of this country also built mounds and approximated to civilization only in those regions, such as Central New-York and Ohio, where they could raise maize, their only cereal. The higher civilization of Mexico was connected with the culture of this plant.

Let us take another step in this direction and see if nations and races degenerate by change of climate or rather by change of food. The earliest indications of the presence of man on the earth place him in the East. Nineveh and Babylon were among the most ancient countries. Their former grandeur is attested by architectural remains that the sore eyed descendant of Assur and Nimrod has scarcely life enough left to wonder at. The present race are *nomadic*, while their ancestors were eminently *agricultural*, as the remains of their extensive works for irrigation prove. Egypt was known within the historic period as the granary of the world, producing corn and pulse in plenty. It is to this period of her history that her great works of art are ascribed.

Now no Pythagoras need caution his disciples in regard to the dietetical properties of pulse, for Egypt "cannot raise white beans." Homer speaks of bread-corn, or wheat and barley, as furnishing substance for his heroes and forage for their horses; and there is no doubt if they were thus fed that the men were brave and the horses were noble.

It is much to be regretted that history should have been so much absorbed generally in the startling and tragic acts of man as to pay but little attention to their domestic condition. As far as we have evidence it seems that "not only do Ceres and Minerva journey together, but Mars is found with them." The military glory of Spain was based on a prosperous agriculture, and her present gloomy condition is the result of the prostration of her agricultural interests. The Saracens built extensive works of irrigation in that country which the Moors completed and extended. In the late Crimean war it is well known that the French arrangements secured the soldier a plentiful amount of bread while the English soldier was scantily supplied. France took a common sense view of the thing, acknowledging the relation between glory and the belly. Bull could'nt think it amounted to so much. Crapeau was generally in luck while Bull would have been if something had only been a little different. The Russian soldiery carried in their knapsacks a rough hard kind of bread and fought as well as they might on such food. Take all together it was only by supplying the armies with flour and meat by commerce that another great battle was fought in the East.

The pictorial representations, on stone and paper, from the ancient countries of the East, show us that the art of the baker was held in high estimation there. The construction of an oven is one of the first tricks of civilization; and ovens are of greater influence on man than steam engines. The sacred writings mention Pharaoh's baker as an important personage; and the connection of the Israelites with Egypt arose out of the monopoly which that ancient country held in wheat. The crowning glory of Joseph's administration as Premier in Egypt, was to equalize the grain market of the world for fourteen years ; thus preventing during the seven years of famine the extinctien of the most civilized nation in the world. It was only after they left Egypt that the Jews became an agricultural rather than a pastoral people; substituted bread extensively in their diet and were prepared to receive the sacred mysteries. Bread the emblem of their advancement was kept continually in their innermost sanctuary.

The Romans derived their first bakers from the Greeks or Persians. They came to Rome with the army from Macedonia. In nothing was the wise and cautions policy of their government more fully displayed than in the regulations of this trade, by which the art and mystery, while perpetuated in a class, was preserved to the State. Before the fall of the Roman Empire, however, the knowledge had escaped into Gaul, and probably Germany; and it is undoubtedly as much to the improved condition of the northern barbarians as to the declining condition of Rome that we are to attribute the fall of the Roman Empire. It is easy to conceive that the men whose blood runs in our veins would only brook masters so long as their comforts were enhanced by them; and that once having learned the arts of civilization they would soon set up for themselves. Beyond the southern line of the kingdoms of Norway and Sweden, which by the way is the northern line of the kingdom of wheat, civilization progressed very much more slowly, and so late as the middle of the sixteenth century, the only bread known in the northern part of those countries was unleavened cakes kneaded by women.

The present distribution of the principal cereals shows that the most enlightened and advanced races of men correspond in locality to those of these grains that are most rich in the *proteine* compounds. To the extreme north barley and oats are the only grains. Rye occupies the south of Sweden and Norway, together with the countries bordering on the Baltic. Denmark and the north of Germany and on this continent, the southern part of the Russian possessions, buckwheat occupies the same ground.

Schouw, quoted by Lindley, from Jameson's Philosophical Journal, April 1825, says:

"To these there follows a zone in Europe and Western Asia, where *wheat almost exclusively furnishes bread.* To this zone belong England, the low lands of Scotland, France, Germany, Hungary, the Crimea and the Caucasus, and some lands in the middle of Asia. Next comes a district where wheat still abounds but no longer exclusively furnishes bread; rice and maize becoming frequent. To this zone belong Portugal, Spain, that portion of France on the Mediterranean, Italy and Greece, and also the countries of the east, Persia, Northern India, Arabia, Egypt, Nubia, Barbary and the Canary Islands. In these latter countries, however, the culture of maize or rice towards the south is more considerable, and in some of them several kinds of sorghum or dourrha are used. In the region of wheat, rye only occurs at considerable elevations and oats still more seldom until both entirely disappear, barley affording food for horses and mules. In the eastern part of the temperate zone of the old continent, in China and Japan, our northern kinds of grain are very unfrequent, and rice is found to predominate."

So far, this could not have been written better to substantiate the views we are taking, but he adds:

"The cause of this difference between the east and the west of the old continent, appears to be in the manners and peculiarities of the people."

Why not, to use an agricultural expression, put the horse before the cart? He continues:

"In North America wheat and rye grow as in Europe, but more sparingly. Maize is more reared in the western than in the old continent, and rice predominates in the southern provinces of the United States."

He then goes on to define in the same way that the kingdom of wheat has been defined, the kingdoms of, first, rye and buckwheat, second, barley and oats; third, rice; fourth, maize. We wonder how, even in the then imperfect state of organic chemistry, a man who took so wide views could not look a little further and compare the races of men that inhabited these kingdoms with each other. He adds:

"To the south of the tropic of Capricorn, wherever agriculture is practiced, considerable resemblance to the northern temperate zone may be observed. In the southern part of Brazil, in Buenos Ayres, in Chili, at the Cape of Good Hope, and in the temperate zone of New Holland, wheat predominates; barley and rye, however, in the southernmost parts of these countries, and in Van Dieman's Land. In New Zealand the culture of wheat is said to have been tried with success."

The weight of these considerations is still further enhanced when we consider that the food of men and animals consists essentially of caseine, albumen, and fibrin, of the one kind, and starch, gum and sugar, of the other, both of which classes exist ready formed to the greatest extent in the cereals; that the animal is after all nothing but a robber and plunderer living on the stores of the plant—stores, too, that the plant had laid up for its own use.

As improvement in food and the comforts of life ennoble a race so the opposite change debases it. In the case of two tribes in South Africa, this deterioration is now going on. The Bushmen have gone from the pastoral condition to that of robbers and hunters, and have become correspondingly degraded in intellect and vitiated in morals. The Koranas are also undergoing the same change without any emigration to effect a change of climate in either case.

The influence of food on the system is very evident in the lower orders of animals, by the chemical changes it effects in the nature of their flesh. Swine fed on beech nuts have a softer fat. The flesh of the American black bear, when he feeds on fish, is regarded as unfit to be eaten by even the Indians, so frouzy is its flavor. The flesh of the partridge tastes of the buds on which it feeds, and its range is limited to the region of those buds. No body thinks of eating the bobolink or skunk black bird as he is called in this latitude, though known as the reed bird during the southern period of his year, when he feeds on rice, he is the tit bit of epicures. Climate produces little difference in this case, as the bird migrates to avoid extremes of temperature.

Some additional light may be thrown on this matter by considering the relation between the food of the animal and its condition as expressed in the *forces resulting from that condition.* There are some millions of miles of travel annually run by stage coaches in this country. The labor is performed during every day in the year, and in extremes of temperature from 30° below zero to 100° above that point—a variation equal to the average difference between polar and equatorial climates. Now this wide experiment settles some facts of much interest, such as that the amount of grain required to do a mile of travel is very nearly definite, being about a quart of oats or half as much maize per animal. During winter and summer the food does not vary, but during summer the animals throw off the surplus carbonaceous portion in the form of sweat. There is no such thing known in this country as a stage line maintained on hay and root feed, and that fact is significant of a deep and broad physiological law. Horses at pasture are well known to be unfit for any long continued severe labor, their flesh being soft and becoming harder only after the use of grain. Grain fed animals also have a higher market value in the shambles, corn fed pork than milk fed pork, and corn fed beeves than grass fed beeves. How insignificant is the influence of climate when compared with food in all these cases!

CONDITIONS OF VARIATION IN PLANTS.

As we have found the cause of the variation in animals to lie in the food which is appropriated in different ways, and to different extents, by climate and exercise, so we shall find the great cause of variation in the plant to be the same, and that *climate merely indicates the amount of exercise of the plant.* It is true that the general distribution of plants on the earth's surface is in broad belts, corresponding with the parallels of latitude; the centre of the belts being most developed, and the sides less, until they gradually merge into other floral zones. This general distribution depends on the law of Bousingault, that the sun's forces are spent in building up vegetation, and that when all the conditions of vegetation are present, such as the germ, water enough and a proper soil, the resulting vegetation is the annual exponent of his accumulated rays.

Bousingault has shown that the aggregate action of the sun for building up plants is about the same, and that the different varieties are provisions for availing of different climates. Thus barley growing in

Egypt requires 90 days at a mean temperature of	67 deg.	48 min.
Tuguleré̀s, do 168 do do	50 "	12 "
Santa Fe De Bogota, requires 122 days at a mean temperature of, ...	57 "	24 "

The same results were obtained for wheat, maize, and the potato. It is probably for this reason that winter wheat, requiring more of the sun's forces for its growth, has more value than spring wheat.

Thus the mass of vegetation gradually decreases from the tropics towards the poles, and such plants as maize, whose varieties adapt them to extremes of latitude, give the greatest annual product where they assimilate the most of the rays of the sun. The apparent exceptions to this rule in the case of deserts, do but confirm it in reality, for wherever water occurs for any cause, the most arid plain is immediately covered with vegetation. In inquiring into the causes of the success of irrigation lately, we found that the annual fall of rain in tropical regions was greater —being on an average 100 inches annually—while in our own climate it is only about 35 inches, and ceases as we proceed north with the region of trees. We found, also, that in most countries the action of the sun on the plant was, so to speak, able to *digest* more rain than falls, and hence the advantages of an artificial supply. That the perfection of irrigation in any country would be to deprive it of all its rivers, except in cases where, for topographical reasons, the fall of rain is beyond a certain limit, a result which the extensive arrangements for irrigating the plains about Babylon and Nineveh must have in great measure effected.

Connected with this matter of the great amount of rain in tropical climates, it is interesting to notice that the water upon the earth's surface does not, in accordance with the nebular theory of La Place, assume permanently the vaporous condition, and take its place between the air and the earth, but for electrical reasons, as yet entirely unknown, after ascending into the air it is precipitated in the form of drops. The same thing must have occurred during the first geologic period, and from the highly heated condition of the earth the oceans of rain which fell escaped immediately into the air as steam. One objection that has been urged against granite as a building stone in this city is the fact that it disintegrates and crumbles to powder if water is thrown on it when hot. In regions distant from the sea shore thrifty housewives use the erratic boulders for obtaining sand by heating them, and then suddenly cooling them by the affusion of water. When the earth became cool enough to allow water to exist on the surface in the form of oceans, they were extensive boiling cauldrons, giving rise to immense quantities of rain, that falling on the dry, hot rocks, still further disintegrated them, and washed the sand down to the ocean, as bare hills and mountains are now washed, only to thousands of times greater extent. In these seething oceans were formed the first stratified rocks, while the water was yet too hot to allow of organic life, and hence no fossils are found in them.

But the rain and sun shine though circumstances which govern the distribution of plants are only conditions to which all plants are subject—conditions which affect them only as exercise affects animals, by increasing or decreasing the amount of food which they may appropriate. There are two or three other conditions of the same sort, such as in the soil a proper degree of fineness together with a certain degree of humus and of clay; also a definite quantity of carbonate of ammonia. But these conditions, however strenuously we may insist on them in the practice of agriculturer, are always present like rain or sunshine, to a greater or less extent, and are only to be regarded as means of assimilating the true food of the plant—the inorganic matters it derives from the soil.

To that doctrine of Liebig that regards the mineral ingredients of plants as the basis of a definite chemical organization, it has been objected that analysis of no two plants of the same species ever agree. Though this is true it proves nothing as long as they originate on different soils. Indeed no two plants growing in the same field are in circumstances exactly identical, and as the plants thus grown are each the resultants of uniform causes with the exception of soil, in the chemical nature of the ground they stand in we are to presume the difference arises. On a former occasion I have shown how hopeless is the prospect of our ever being able to recognise by any quantitative analysis the difference on which these variations depend.

But the analysis of plants has been carried to as great nicety as possible in the existing condition of chemistry. They differ from a uniformity of chemical composition wherever they grow but little when compared with other individuals of the same species, and yet quite considerably when compared with other species. Hence the most valuable practical indication of the character of a soil is the known chemical composition of the plants that thrive best in it. This is the indication that has always guided the first settlers in taking up farms in this country from the primitive wilderness, and I know of none other yet worthy of so much reliance.

To this fact that there are certain limited differences in the chemical composition of the same plant grown on different soils, we must attribute certain peculiarities in the distribution of plants. Thus the cucumber wood tree is found in this country only in the "Genesee Valley," and to the south of it to its limit of climate extending neither to the east nor west. The Geological Survey of this State speaks of the old red sand stone formation as appearing through just this district. The tamarisk tree does not inhabit the soil of the Catskill mountain rock though it extends to the north and south. The sassafras also, is never found in this formation though existing abundantly in the North river counties, and extending in New Hampshire as far as 43° north latitude, and existing on western formations. The locust, which is a native American tree, in the original distribution was never found within fifty or one hundred miles of the sea. The balsam spruce, existing on the old red sand stone, does not cross to the Chemung group. The wild poplar exists east as far as the Connecticut river but does not cross it. The cotton wood exists as far north as 43° in the valley of the Genesee, yet is not found in lower latitudes to the east. It is well known that the original flora of the valley of the Mississippi was quite different from that of the Atlantic slope. The buckeye is unknown in the seaboard States, and it is equally true that good butter has never yet been produced west of the Atlantic slope.

But the selections of soil by trees in limited districts under our immediate observation, are equally noticeable. The chestnut inhabits the loose dry soil of hill sides, while the butternut chooses the rich bottom lands. Where fires have been built, and the saline matter thus increased in the soil, the choke cherry springs up; while around the deserted habitations of man in the wilderness, briars thrive, and the fœtid Jamestown weed finds a habitation. So delicate is the relation between the distribution of plants, and the nature of the soil, that where man has once interfered, the original distribution is never again restored.

With change of soil, and consequent change of chemical composition, there also occurs in plants more or less change of constitution. Thus the white pine which inhabits the eastern portion of this continent from Hudson's bay, where it is a mere shrub, to our own latitude, where it sends up a clean stem for eighty feet; thence southward to the southernmost spur of the Alleganies, manifests different physical properties in its wood. In New England and New-York, it is clear and close grained, with little *alburnum*, and known as *pumpkin pine;* while further south, it is more completely composed of sap wood, and worth less for building purposes. The same difference exists also between the original growth of pine and the *second growth*, occurring as it does, on a soil that varies in its chemical constituents from the conditions that attended the primitive growth. "The vegetation of the black gum," says Michaux, "exhibits a remarkable singularity. In Maryland, Virginia, and the western States, where it grows on high and level grounds with the oaks and walnuts, it is distinguished by no peculiarity of form. In the lower part of the Carolinas and Georgia, where it is found only in wet places, with the small magnolia or white bay, the red bay, the loblolly bay and the water oak, it has a pyramid at base, resembling a sugar-loaf; a trunk eighteen or twenty feet high, and seven or eight inches in diameter at the surface, is only two or three inches thick a foot from the ground." Climate can have nothing to do with this.

But it is with the domesticated plants, when supplied with an increased quantity of salts by agricultural processes, that the effect of soil is most clearly shown. Thus, growing on the one side of the fence in the garden of the western settler are full double varieties of flowers, while outside of his enclosure are the wild single congeners; within is the rich carrot and parsnip, while without are their brethren which have escaped from the dominion of art, woody, spindle-shaped and poisonous. The poppy of the east in any other soil is worthless for the production of opium. Rhubarb is of value according to the district in which it grew—raised in England, being nearly worthless as a medicine. The market value of tobacco depends on the locality from which it comes, not the latitude in which it was raised; and, finally, there is no such thing on the face of the earth as a flora, either natural or artificial, extending as far as the condition of no variation of climate extends.

LIMITS OF CAPACITY OF VARIATION.

We have seen that notwithstanding all these variations in the form of animals and plants, species always remain the same. A mule may be produced by breeding between the ass and the horse. The older naturalists and some of the later ones, inferred from this that a sufficiently extensive practice of crossing different species would produce new races, and thus essentially change the face of animated nature. But a little more experience has shown us that different species maintain their forms and perpetuate them for natural reasons. The negro of the ancient sculptures exhibits the same characteristics as the negro of our day, and is as easily recognized. Though the mule has existed from the most ancient times, there is no race of mules; for mules though in limited instances, productive with each other, are always more productive with the parent race, and in these cases, after a few generations, the peculiarities of the one race are lost in the other. So there is no race of mulattoes on the face of the earth permanent—the tendency being to run into one or other parent race. The same law holds good throughout all nature—hybrid forms being transient, because they are more fruitful with either parent stock, as a ball rolling along a ridge has its progress accelerated by leaving it in either direction.

As we have seen the variations in any species to be dependent on the different qualities of the food, so we shall find that the variations are greater in those species that may live and thrive on the most different food. Thus, the common fowl being omnivorous inhabits all climates and assumes almost all shapes. While the American partridge which can only subsist on certain buds is limited in locality because it is poisoned by corn. The dog being almost equally omnivorous with man, accompanies him in all climates. Swine accompany him every where except in the extreme polar zones, because they are equally omnivorous. It is probable they would go to the very pole with man if equally protected. The cat having a less accomodating stomach confines herself more to the house, the region of artificial climate, and is yet more limited in range. The horse and ox, graminivorous only and unable to obtain the advantages of the fire are more limited than man in their range. Rats and mice equally omnivorous accompany him wherever they may surreptitiously obtain advantage of the artificial climate he makes.

Of these different species the dog is the one that has the greatest range, and he is the one that undergoes the greatest variations, being so small in some races as hardly to weigh two pounds, and large enough in others to weigh an hundred. Though not strictly necessary to our conclusions yet in confirmation of them, we shall find that those species that vary most in size are those that may vary most in distribution.

Though man provides for himself an artificial climate to which he may resort at will, and protects himself from extremes of temperature by clothing, yet when he migrates he must make a change in his food to meet his altered necessities. Thus Dr. Kane and his company to meet the demands of the polar climate for animal heat were compelled to adopt the habits of the Esquimaux and came to eat train oil and candles with as good relish as those children of the North. But as the furnaces for the consumption of anthracite coal are of a different construction from those for the consumption of wood so the digestive organs of an Esquimaux differ from ours. Nature, all kind, modeled the Doctor's furnaces as far as might be after the Arctic fashion for digesting and consuming the most substantial fatty matter, and to such an extent that they answered the purpose pretty well. On his return to this country the reverse process was performed in a measure, but his constitution failed. Under these circumstances he unfortunately asked her to further adapt his heat-producing organism to a tropical climate, and in making the attempt she destroyed him. Thus, as an eminent surgeon of our own country once remarked, "do men often die getting well."

The North American Indian is a further illustration of this law. Naturally the most carnivorous of men, he is most given to motion and cannot be civilized for organic reasons. Like the partridge he cannot be made to live on civilized food. Spirits that I am sorry to say are at the extreme end of civilized diet, containing no nitrogen, are so fatal to him as to have received the appellation of fire water. There is a limit then in the individual beyond which if the necessity of modification be urged the result is death.

As the limits of variation are determined in animals by the variety of their food, so they are determined in plants in the same latitudes by the different soils they may inhabit, and consequently the different inorganic constituents that may be expressed in their ashes. For these reasons the cultivated plants vary more in their analysis than any others, inhabit a greater range and are never as *reliable* for medicinal use as the wild ones.

LAW OF VARIATION.

The typical animal and plant have been developed into different varieties by the process of *adaptation*. The forms of the trees in our primitive forests are very different from the forms which the same trees assume when growing in the open plain. When the topmost sprout of the spruce, which runs up into a single spire, is broken, the sprouts next below having more light and rain shoot up and rival each other for the supreme place, until the one which enjoys the most natural advantages shades the others, and by superior growth assumes the middle line and restores the symmetry of the top. It is only because the central sprout enjoys more natural advantages that it grows faster and thus forms a trunk and gives the peculiar shape to the tree, and it is only because the lower boughs have been too much shaded by surrounding vegetation that they have fallen off and left the trunk clear. Now, though the spruce when growing in the open plain takes the pyramidal shape, either we may say to expose the greatest amount of surface to the light and rain, or because the lower branches enjoying the light and the rain remain thrifty, yet when exposed by felling the surrounding forest it makes no attempt to assume the pyramidal condition, either because there are no leaf buds to be developed in its thick bark, or in order to delay the casualty which is certain to destroy it sooner or later by prostrating it and upturning its roots. So perfect are the works of God that naturalists are in the habit of arguing in either way as may be more convenient to the same end. If we add to these facts the supposition that a young tree taken from a forest of tall trees will grow taller when transplanted to the open plain than one from more open fields, we shall have the most approved theory of the origin of varieties. It all of it amounts to nothing but a tendency in the plant by means of growing most where it has most chance to grow, to accommodate itself as far as may be to change of circumstances and a tendency in the race to accommodate itself as much more perfectly as may be to the same conditions.

If a tall tree of any species could be transplanted when fully grown from its region of greatest development to the northern region of its dwarf like phase, the modification required of it to meet these new circumstances would be so great as to kill it outright. If not too much grown the extreme branches that required the greatest circulation of sap would die and fall off and the tree thus as it were assimilate the stunted condition. The same happens whe trees are transplanted into unfavorable conditions, and the modification is not to be regarded as *deterioration* but rather as a beautiful and beneficent provision of nature to preserve the life of the whole body by sacrificing some of the members. The dwarf plants on the outskirts of a flora are not *degenerated*, but rather beautifully adapted to their unfortunate circumstances.

To this explanation of the cause of variations, we must add another idea. The plant has an additional office to perform besides providing for its own welfare, to insure the succession of its species. When it does *more* in one of these directions, it does *less* in the other. While plants are growing rapidly they never form fruit, and those means that encourage the formation of wood, discourage that of fruit. So any one valuable product, as that of seed in grass, is secured at the expense of some other, as that of hay.

What is true of plants in these respects, is also true of animals. We may develope the typical animal in certain different directions, but not equally in all directions. Thus in man as reason is developed, the organs of sense diminish, a fact on which the test of Camper's facial angle is founded. The same is true in dogs; the hound, a large muzzled variety, with broad nostrils, that runs on scent, being the least intelligent of the race.

For like reasons, we cannot breed both speed and strength into the same animal; because speed requires long light muscles, for the muscle, in any case, can contract through only one-third of its length, while strength requires heavy muscles and stout bones.

Again, these heavy muscles and stout bones require a large abdomen for their support, so that they go together. There are no big bellied animals with long legs in nature.

The Shanghai fowl having no wings of consequence, has no breast, as the breast is composed in birds of the great muscles that move the wings. For the same reason, it is under the necessity of using its legs the more in locomotion, so that they get additional development to such extent as to become of no use for fighting purposes, and the breed becomes the emblem of the coward, who runs away from danger rather than the fiery Hotspur who courts it, as represented by the bold little bantam; when they fight, the bantam, in sheer vexation, catches the Shanghai by the tail to keep up with him in his retreat.

So of cattle—the breeds that are best adapted to the butcher, like the Durhams, are slow and heavy moulded, with indistinct muscles, forming "well moulded steaks," while the breeds most fit for draft, like the Devonshires, are light limbed, and quick in movement, with a corresponding development of the nervous system, making them intelligent. For milking purposes, we should look for a breed with a large udder, and as the bulk of the milk is a definite part of that of the food, with a corresponding abdomen. As the milk is intended by nature for the support of the young, the females of such breed will be impatient of separation from the offspring, while the males will be equally disposed at certain seasons to rove. It is not strange then, that such breeds are apt to be breachy.

When the domestic animals escape from the control of man into such circumstances as allow them to subsist independently, they do not as was formerly supposed, revert to a common type, but rather to the type best adapted to their new condition. Thus horses, and dogs, and cattle, and swine running wild in different parts of the earth, though remaining of one species are always of different varieties. Swine escaping into the woods in this state, as they sometimes do, and live a year or two when mast is plenty, breed towards a uniform white color. In some of the tropical parts of this continent they become black, while in those parts inhabited by *peccari* they take a like reddish color.

The southeasterly branches of the head waters of the Delaware river, in this State, rise in a wilderness 100 miles long, by 40 or 50 wide. Bears, wolves, deer and trout are still common in this region. Into this wilderness the farmers living on its border have for a long time been in the habit of driving swine, during both spring and fall, in years when the beech yielded a plentiful crop. The animals locate for themselves a camp, and make nests out of dry leaves, and return to it every night. Under the necessity of using their snouts to find the fruit, by removing the thick layer of leaves—as it is with them in ballad parlance, "root hog or die,"—the muscles of the neck grow thick, and their insertion in the forehead becomes prominent, giving the physiognomy of the animal an ugly, vaulted appearance. The snout at the same time becomes long and prominent, increasing the inside surface for the distribution of the nerves of smell. The body becomes clothed with a thick, soft hair, and the legs so elongated that the animal has very considerable speed, and travels quite conveniently.

Now these are the characteristics of "degeneration," and yet we have seen that every one of them serves a useful purpose. The *fine breeds* of swine, as they are called, in the same circumstances, would perish of starvation, while all that has prevented the native breed from becoming wild under these circumstances, is the occurrence every two or three years of deep snows and few beechnuts. In the same way we might follow up the origin of those peculiarities in domestic animals that are regarded as "degeneration," and we should always find them to originate in adaptation. *There is no such thing as degeneration.* What are your models, O man! that you should compare the works of Eternal Wisdom to them and pronounce judgment!

There is an idea too prevalent in those that have the management of domestic animals, that their condition depends on some occult circumstances, rather than on their food. Those who keep their stock most niggardly are those who look with most expectation for some new and wonderful breed, that, like the fabled chameleon, shall live on air. Drivers are always feeding as much "condition powder," of some sort, as will lie on a dime every night, and credulously looking for its wonderful effects. In the language of a plain, common sense old farmer, to whom I am indebted for the first rudiments of agricultural science: "The best curry comb for a horse is the oats he leaves in his manger; rub his hair with them, and it will always shine."

Buffon asserted that the American climate was inimical to the constitution of man and other European animals. Dr. Knox, of London, has lately reiterated the same idea in connection with his theory of the perpetuity of races only in their original localities; the rankest form the theory of climatal influences has yet taken. He even pays us Americans the compliment to class us with hybrids, and seriously announces to us the fact that we shall continue to exist as a race only as long as we are "propped up by infusion of European blood." Now this is all very interesting to us, for no people in the world desire more than we to know what older nations think of us,—not dreaming in our simplicity that we know more of ourselves than they do.

But, unfortunately for all these theories, we have the evidences which have been recounted in this paper to prove that climate has nothing directly to do with it; that when men and animals inhabit a new country, they are liable for a time to be put to shifts, as the American race were, until they reached the "Genesee country" in their westward progress, living more on rye and maize than is consistent with man's highest physical development. As the race proceed westward these causes are being removed, so that at the present time the American may subsist on the best of food as easily as any man on earth. The continual influx of flour into the eastern states from the great natural wheat growing region of the west, is removing all cause that ever existed for this imputation against any class in this country.

But the conclusion must not be drawn from what has been said, that no advantage is to be derived from the introduction of foreign varieties of stock. As the condition of animals improves as warm and comfortable stables are substituted for the stack yard and hovel of former times, we should by judicious crossing, take immediate advantage of these improvements. The food of domestic animals is now hardly cheap enough any where in this country to allow us to leave them exposed with profit. If that course be once decided on, however, by all means shun fine foreign breeds. But true profit is found now almost universally in fine stock, high feeding, and good care.

UNDER WHAT CIRCUMSTANCES VARIATIONS BECOME PERMANENT.

As we have seen that variations in animals and plants arise out of necessities, and are adaptations to certain ends, so they are permanent only while the pressure of the circumstances that produced them continues to act. Thus, in rich, succulent pastures, the cow, after a few generations, assumes that shape that produces most milk, and the tendency to the production of milk becomes so great in the organization that dry cows may be brought to the pail. Under these circumstances the variety remains permanent as it is driven to the limit line of species by the necessities of condition. *Thus permanent varieties, as they are called, arise out of the law of perpetuity of species.*

The time required to effect these changes in a race, is to be measured by successive generations rather than by years. Thus we have seen degeneration, as it is called, to occur most readily in swine, whose generations in this country may be counted almost or quite as many as their years, our native breed being removed from its European origin some two hundred generations. That of horses and neat cattle is perhaps one hundred—a period that experience has shown to be long enough to produce essential variations. Now, supposing the average generations of man to be periods of thirty years, we should require 6,000 years to cover an extent equal to the existence of swine in America, so that the fact often adverted to, that the negro of the ancient sculptures is recognized by the present peculiarities of the African race, does not disprove the common origin of men.

In the original plan universal dominion was given to no one species, either in the vegetable or animal world, but by multiplicity of forms, adapted to a multiplicity of ends, greater aggregate results were attained. The same law also holds among varieties, each having its origin in its peculiar fitness for some purpose. This is very clear in the case of dogs, horses and horned cattle, and it is curious to notice that in this way Nature points out the *practice of specialties* as the great effective means of civilization.

But there are many causes which produce a variation of form in animated nature of which we are yet ignorant, and which are consequently said to be accidental. Thus, occasionally, an individual is born among northern nations with sandy hair and a very fair skin. When exposed to the rays of the sun, instead of "tanning," or becomming dark, his skin inflames, and even blisters. Though such individuals have always existed among northern nations, yet they have not been lost in the uniform type, but are continually reappearing, marked with all possible distinctness. The same is equally true of the albinos and of the sixfingered families of men, and it is easy to conceive, that if any instinctive family aversion existed against such race in early times, compelling them to associate and intermarry only with each other, a perpetuity of the peculiarity would have ensued. In performing amputations of the lower extremity, surgeons do not always save all they can of the limb; experience has shown that a stump is most useful when the division is made *at certain points;* so it is probable that these accidental variations are disposed to be permanent in certain ways by the same law of adaptation, now not well undersood.

From what has been said we may conclude that,

I. The construction of the different species of animals and plants is such that no one individual can be taken as the type of the race, there being to the original type a margin to allow of variation, and that margin being so wide as to be covered by no one individual form.

II. This variation is produced to meet necessities by the law of development, the exercise of any organ increasing its growth.

III. When the variation occurs it is attended with a change in the chemical composition of the animal or plant, based on a change in the chemical composition of its food.

IV. If the food be defective, or cannot be assimilated, the modification does not occur but the animal dies.

V. These changes are always made in a direction to adapt the subject of them more perfectly to such new conditions as require them.

VI. There is a tendency to reproduce these variations in the progeny.

VII. The variations go further as they are reproduced in the race.

VIII. They stop at the line of species, and never pass that line.

IX. While the pressure of circumstances urges them against that line they are permanent.

X. By crossing they may be carried over the line, but the resulting hybrid is unstable, and always returns, after a few generations to one or other of the parent species.

XI. The limits of modification are widest in those species that can assimilate the most various kinds of food.

XII. Perfection of breed is a relative term, implying different organizations for different purposes.

XIII. As fine breeds are introduced into this country more pains must be taken to protect and feed our cattle well and fittingly, or they will "degenerate" to the same stock.

XIV. Fine varieties, when protected, *do* give a greater product from the same amount of food than the coarse.

Mr. Meigs remarked on the origin of plants and animals. Take one example. We see the oak tree in some places. Were they all there for ages? No. Were some there? Yes. Must not there have been a time when there was but one? Yes. And a time when there was not one there? Yes. Is this true of all the oaks of the world? Yes. Then there was a time when the first oak existed? Yes. But one asks, may there not have been several oaks created at first? There is not an atom of human experience to prove it. For instance—at this moment there are thousands of millions of acres suited to the growth of oak which never had one. Why? Because the creation is so recent that there has not been time by all the agencies for distribution by land, or sea, by man or by animals, to distribute the acorns! The Mosaic account of the creation of seed bearing plants, is infinitely superior to our Darkling synthesis—reading backward philosophically to the first action of God as to our earth, we encounter fables or voids for a long period of mere human history until we stop at the Revelation of our Heavenly father in Genesis, which when profoundly studied, as it has been by hundreds of thousands of good and learned men, contains the *only truth on that mighty subject*—a text which grows steadily more and more dear as *true* science clears away the mists resting on the meanings of Moses. I am ashamed to apply the word *true* to science, but there are more crimes committed in the name of science than there are in the name of Liberty.

If the Almighty had pleased to do afterwards what he did at the beginning—create the oak tree as often as it was wanted. What then was the necessity of making seeds? Genesis I, 11th verse: "And God said, let the earth bring forth grass, the herb (plant) yielding seed—the fruit tree yielding fruit after its kind, whose seed is in itself, upon the earth, and it was so."

Verse 12th: "And the earth brought forth grass and herb (plant) yielding seed after his kind, and the tree yielding fruit, whose seed was in itself after his kind: and God saw that it was good." Third day.

Verse 20th—5th day: "And God said let the waters bring forth *abundantly* the moving creature that hath life, and fowl that may fly above the earth in the open firmament of heaven."

Verse 21st: "And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind, and God saw that it was good."

Sixth day—Man is created.

Seventh—The work being finished—Sabbath.

And it was finished! All following ages can testify that not so much as a single grain of mustard seed, or the most minute insect have ever been produced any other way than that as the great method. The growth of offsets from plants or their roots form no objection whatever to that, because the original is seed.

William Lawton of New Rochelle, was much pleased with Mr. Field's practical illustration of the peculiar growth of the same tree to different circumstances.

Cranberry beans and Mexican white flint corn, given by Messrs. Olcott and Vail, and Lima beans given by Amos Gore of Jersey.

The Secretary remarked, that he supposed the Mexican corn well worth trying, because of the peculiar character of the place where it grew, viz: on the grand lofty plateau of Mexico, about six thousand feet above the level of the sea.

The same subjects were continued.

The Club adjourned at 3 o'clock p. m.

H. MEIGS, *Secretary.*

April 28th, 1857.

Present—Messrs. Daniel C. Robinson, Judge Scoville, Prof. Youmans, Dr. Wellington, Wm. Lawton, of New Rochelle; Adrian Bergen, of Gowanus; the venerable Benjamin Pike, of Jersey; Stacey, Wm. B. Leonard, Dr. Waterbury, Mr. Chambers, Solon Robinson, of the Times; Mr. Barney, Mr. Birdseye, Dr. Poole, of Jersey; Mr. Waring, Jr., Mr. Olcott, Rev. Dr. White, of Staten Island; Dr. Church, Mr. Houghton, of Paterson, Jersey; Judge Livingston, Dr. Waterbury, and others—about 40 in all.

Hon. Robert Swift Livingston in the chair.

Henry Meigs, Secretary.

Mr. Meigs read the following papers translated by him from the last articles received by the steamers:

[Journal De La Societe Imperiale et Centrale D'Horticulture, Napoleon 3d, Protecteur. Paris, February 1857.]

HEATING CONSERVATORIES BY GAS.

Mr. James William Holt, of England, has constructed one which he has used for the last four or five years, and has found it to act perfectly. It is a *thermosiphon* (heat pipe,) in which flows water heated in a cauldron by gas burning under its bottom. The cauldron is of copper, nearly semi circular in form, while the bottom is concave to a perceptible degree. The smoke is taken off by a vertical tube, the lower end of which covers the cauldron so as to take off the escaped heat and smoke.

The other details, such as introduction of water to the cauldron, cleaning it, distributing heat, &c.

Mr. Holt likes it, because it is so readily lighted or extinguished, and amount of flame regulated, far more conveniently managed than common fires.

THE BOTANICAL GARDEN OF ST. PETERSBURGH.

[By the present director, Mr. Ed. Regel.]

This garden is as remarkable for its open air culture as well as its glass conservatories. The open garden contains about thirty acres, and those who first enter it are astonished to find such prosperous vegetation in this latitude, many growing as well as in Germany; but the glasses are incontestably the most remarkable part of this garden. The space they occupy is, from north to south by east and west, 500 feet the first, and 750 feet the second, with four other transverse lines of glass, making in the whole 4000 feet in length of the glass, besides a great number of smaller glasses for ornamental plants. Mons. Regel conducts us first to the palm glasses, five; the middle one of the five is 77 feet high. Here we admire a Strelitzia Augusta, 33 feet high, with leaves from 23 to 33 feet long, reaching the vault above. A cinnamon tree, 50 feet high, the Cinnamomum Reinwardtii. The very rare Copernicia-hospita. We ascended an iron stair case to a gallery, 63 feet high, and had a fine view of the whole garden and adjacent country, with St. Petersburgh and its 1,000 gilded towers and domes. We saw the immense steam apparatus, which keeps summer here throughout the long rigorous Russian winter.

The Secretary read a communication from our president, Mr. Pell, whose farm detains him to-day, viz:

FENCE POSTS.

Robert L. Pell.—Our subject reminds me of the immense amount of capital employed in the United States for the repair and construction of fences, and if it were not for statistical facts, which cannot be doubted, my assertions to-day would appear fabulous; nevertheless it is true that the common fences that divide fields, and form boundaries on highways, have cost the United States 1,350,000,000 of dollars. These unpretending monuments of human industry cause more than one-third of every farmer's indebtedness, and still there appears to be a perfect furor for fences. The pastures and fields are enclosed, and then divided and subdivided into paddocks, gardens, yards for poultry, calves, colts, cattle, &c.; and this is not all, the house must then be surrounded by a post and picket fence, and, finally, the once beautiful farm presents the appearance of a chess board. All those subdivisions are certainly useless; fields are divided into one, three and ten-acre lots, that would be far better if allowed to remain in one parcel, and if you ask the farmer why he does it, his answer will be that it is for the convenience of fall feeding his stock, generally consisting of three cows and a couple of heifers, which plan, whether he have more or less, is erroneous, as a field not fed off will yield far more and better grass for twelve years than it will six if closely fed in the fall of the year; and if your lands are soft, they are nearly ruined by poaching after the first autumn rain, and as the teeth of neat cattle are excessively dull, they very frequently draw up the bulbs of timothy grass, and thus rapidly destroy the meadow. Cattle should never be allowed to leave the barn yard premises at all, but particularly in the fall, and horses are better off in the stables than open fields. I once possessed a horse that was thirty years old, and he never, from the time he was four yours old, ran upon pasture, and I never found it possible to match him in carriage, health or action. Food may be cut and carried to the yards in less time than the stock can be driven home from the pastures; eight acres will afford them food longer than forty acres depastured. They eat their meal in twenty minutes, lie down, secrete milk and form fat, and if our State would make laws for the benefit of the people at large, instead of individuals, cattle would not be permitted to run on the highways, and no fences would be required. Pennsylvania alone would save by such an enactment 100,000,000 of dollars, our State $54,000,000 per annum, and the other States of our Union corresponding sums according to the density of their population. The landscape of the country would be beautiful to behold; there would be no abominable receptacles for snow drifts, to delay our spring plowing, there would be four acres saved out of every hundred, manure could be spread with ease throughout the field, neighbors would be always friends instead of enemies, injurious weeds would find no harbor for their seeds, which are now protected by useless fences, and cannot be destroyed; when I contemplate the quantity of these produced by individual plants, I am almost constrained to curse the fences. For example, a single May weed sheds, October 15, 46,000 seeds.

Burdock,	October 3,	25,000	do
Ox-eye Daisy,	Sept. 20,	16,000	do
Red Poppy,	October 21,	52,000	do
Common Dock,	Sept. 25,	14,000	do
Stinking Chamomile,	Sept. 28,	41,000	do

These are not all fertile, still a large percentage of them vegetate, and are wafted by the wind, over tens of thousands of acres, many are buried in the soil to so great a depth by plowing and otherwise, that atmospheric influence fails, perhaps, for centuries to reach them. At length some enterprising man like our friend Mapes, invents a plow that, with comparatively speaking little exertion, finds its way into this solidified earth, admits the air, and developes the vitality of what is called a new and unknown weed. I have buried varieties of seeds for future generations of men, some thousands of years hence to examine and speculate upon. A few years since a particular friend of mine cleared a tract of land in the Illinois, in the fall of the year, and the following spring purslain covered the whole area of ground in one dense sheet, and what is particularly remarkable, the weed was not known at all in that section of country. The following year another plot of ten acres was cleared, and he anticipated the same result, when, to his amazement, pecan nuts, instead of purslain, covered the ground, and there were no trees of the same character within fifty miles of the spot, and the amount of manure made in a year, with twenty head of stock, occasionally assisted by a load of muck, head lands, straw, &c., would not only pay the whole expense of managing a large farm, but leave a considerable profit for the farmer. I have traveled hundreds of miles in Germany, without ever seeing the sign of a fence; magnificent trees loaded with delicious fruit, mark the line of highways, the distances apart, varieties, &c., being prescribed by law, and inspected at stated periods by public officers to see that there is no failure of compliance by the people with these admirable legal provisions. As there is no country on the globe so thoroughly ruled by public opinion as ours, we have only to make up our minds to render fences unnecessary by the passage of proper laws, and the United States will save annually two hundred and forty millions of dollars.

Still as posts must be used in cities, great waste of material may be prevented by preparing them in such a manner that they will last as long as stone or iron. This is done by changing the sulphuret of iron found in some varieties of coal, into sulphate of the protoxide of iron, in the manner following the vitriolic liquid of the coal is brought in contact with the posts to be preserved, and they must then be exposed to the influence of rain, which dissolves the sulphate of iron, and causes it to enter the pores of the wood, impregnating them with preservative metalic salts, by the process of nature's elements, which under any other circumstances are the most destructive to wood, producing rot by coming in contact with its tannin, and causing it to unite with oxygen, for which it has a great affinity.

Dr. Broucherie, of Paris, charges the sap tubes of posts, telegraph poles, railroad sleepers, etc., with preparations of zinc, iron, and sundry other metals, thus: a cross-cut is made on the prostrate timber to nearly nine-tenths of its diameter, a wedge is then inserted, and a cord is wound round on the cut surface, leaving a shallow chamber in the centre, which is then closed by withdrawing the wedge. A tube is then inserted through an auger hole into this chamber, and to this tube is attached an elastic connecting tube from a reservoir placed some twenty or thirty feet above the level in which the wood lies, and a stream of the saturating fluid, with this pressure, passes into the chamber, presses on the sap in the sap-tubes, expels it at each end of the log, and itself supplies its place. An admirable fluid for this purpose, is a solution composed of sulphate of copper and water, which will render green pine wood capable of resisting decay. Pyroligneous acids may likewise be used advantageously.

R. L. P.

Solon Robinson—I hold in my hand an item of valuable information for farmers upon this subject. It states that James Trimber, of Hillsboro, Ohio, put up some post and board fence in the fall of 1844, the posts of which were oak that was cut the January previous, and sawed 2 by 3 inches at the top, and 2 by 6 inches at the bottom; but in sawing the largest end of the posts were made from the top end of the log, so that when set they stood inverted from the way in which the tree grew. These posts were packed around with limestone; "and," says Mr. T., "they are good and sound now. Posts of the same timber, set at the same time, packed with *dirt*, and without being *inverted*, are three-fourths rotted and worthless. I am now renewing my fences, with inverted posts, and *packing with limestone*, at an additional cost of ten cents per panel; and I am sure that it will save, over the ordinary fence, the price of the fence in fifteen years."

Mr. Lawton wished to know if there was any law to prevent a person from planting trees on his own land, quite up to the line, where the roots and shade will both be injurious.

Another member wished to know who owned the fruit of overhanging limbs.

Solon Robinson answered that question. It is now well settled law, by several judicial decisions, that if a tree growing upon my land overhangs the ground of my neighbor, the fruit belongs to me, and I may enter upon his land for the purpose of gathering it, provided I do not damage beyond what may be necessary in carefully gathering the fruit. At the same time, it is equally good law that my neighbor may cut off all overhanging limbs, and all roots that grow in his ground; but while he permits them to grow, I am to enjoy the benefit.

Judge Livingston, the chairman, confirmed this view of the case.

Adrian Bergen, of Gowanus, Long Island—Mr. Bergen is a hard *working* and *thinking* farmer, whose observations lead to judgments that have the corresponding value.

He said that the division fences were attended with the baneful nuisances of foul weeds and insect enemies of our crops. That one farmer who leaves these foul head lands to grow their weed seeds, scatters them over the clean fields of his neighbors, and thus his lack of knowledge or industry, or both, prove a serious damage to his *betters*, who try to keep their farms and head lands *clean!* And that this weed seed pestilence seemed to demand relief by removing all fences and keeping animals up.

Solon Robinson spoke with energy upon this topic. From his extensive observation throughout the United States, he was compelled to conclude that the weed seed nuisance, from so many dirty head lands was so bad, that we had better burn all our barns than allow it to exist.

Mr. Lawton adverted to the planting of trees on the division lines, which gave rise to the question of the legal rights of the parties as to the shade, roots and fruits of such trees in and over these grounds.

Mr. Bergen had occasion to complain of some of his boundary neighbors, in this, that while their roots and their branches were in and on his land, they denied him the privilege of the fruit, or that of meddling with their trees at all. He had gently stated to them the evil, but they *utterly ignored it!*

Dr. Waterbury said, that whatever had been necessary heretofore in the youth of our nation, the time had now arrived when our twenty-five to thirty millions of men should quit the poor and costly system of fences, hold up all their injurious stock, and leave our lovely landscapes unfenced and unfouled. It is now our duty and for our profit that we should control all our stock and provide for them in inclosed pastures, yards, shelters, barns, &c. Economy in feed and everything demand it.

Mr. Lawton formerly fed his stock with hay uncut, but now he cuts it, and finds a great saving, as all of it is consumed, and moreover, his cows give him more milk. Hay is $20 per ton! We must be economical with it. Add bran occasionally, and some of the roots. Clean up the stalls three times a day. It will pay for the trouble.

A member.—It is a great profit to cut hay short for stock. Mr. Van Houghton, of Paterson, New Jersey, feeds twenty eight head of cows six or seven times a day. Roots in the morning, ground peas, chopt hay. The cows eat it all up. Stable kept clean, so that they eat it on the floor. This is the great secret for milk, and for the health of the animals. The root part of their diet is very important.

Mr. Lawton.—I give turnips, carrots and parsnips.

Dr. Wellington was well satisfied, from his observation, that a man who will give his creature ten carrots a day, will find the advantage so great that next year he will not fail to grow a crop of the carrots.

One of the subjects of the day is liquid manures. I will speak of some experience on that point. I have observed a farmer making his manure yard to hold liquid manures, filling it with all sorts of material from the farm, and directing all the urine of his stock to be absorbed by the materials, and that there might not be too much rain water, he trenched around it so as to carry surplus rain water off from his deposit. He made rich mauures, as his fine crops testified.

Dr. Wellington on one occasion had his attention very strongly drawn to a rich verdure in barren land. It was a narrow strip, and he found it to have been moistened with water running from a dead cow, whose blood, &c., mixed with the water, and thus fertilized the sterile track in which it flowed. And a knoll of barren land rendered rich by the swill wash and the barilla, &c., on it. When the salt ley of the soap factory, near, was first spread over that knoll, it made it entirely barren for about three years. The Bolton lime works show by some of their refuse spread over adjacent land, a fine growth of sod.

Dr. Waterbury.—I have fed stock with roots and some uncut hay, and they consumed the whole.

Mr. Bergen—I have entertained the opinion that the beast should, according to his nature, be allowed to *run the ground!* to use his legs!

Dr. Waterbury—And yet that is a mistake. He is much better off for us and himself when he is properly kept up.

Mr. Bergen—I suppose then that I labor under an old mistaken prejudice. I suppose that the best work done after all is by our heads.

Mr. Lawton—Most farmers talk of the charm of shade trees in pastures to shelter stock from the heat of the sun. Our President Mr. Pell, is a capital practical observer, and he does not believe in that notion; but that the stock love all the sun that a summer provides for them.

Solon Robinson—The southern colored laborers find the heat of the field healthy, so that when one is taken sick they lay him in the hot sun to make him well again.

Mr. Meigs had remarked in Georgia, nearly sixty years ago, that on a very hot morning the colored mothers commonly took their little children to the sunny-side of buildings, where they rubbed their naked bodies all over with a piece of fat pork, so that the little fellows glistened like so many clean polished black glass bottles.

Mr. Van Houghton stated some experiments of his with the artificial and other fertilizers, superphosphate of lime of Prof. Mapes' factory, of which he spoke most favorably, guano, etc., and of his practice of plowing his lands *five or six times* and indeed as often as he could.

Mr. Meigs remarked that three hundred years ago Torello of Italy, broached and practised the doctrine of eight deep plowings a year, and that he found it more productive on one acre than one shallow plowing on eight acres a year.

Mr. Olcott spoke of the practice of a Syracuse farmer whose stock was in fine order by using carrots from February or March till May or June. The effect was to smooth and loosen the hide and establish health, and the abundant proofs of this leave no doubt of the high value, recently proved, of carrots as food for stock, independently of its immense superiority in quantity per acre to oats or any grain whatever.

Dr. Wellington adverted to the decided profit made by a farmer of his acquaintance, who raised five thousand bushels of all sorts of roots per annum, fine crops of them and made money. He is well off at the roots, and crowns too. He has earned and he deserves it.

Rev. Mr. White, of Staten Island—I keep but three horses, which I feed each with two quarts of what is called here "ship-stuff," three pints of oats and two quarts of carrots, chopped. Potatoes seem to me to produce the same effect as the carrots on loosening and smoothing the skin. I always give some hay too.

Dr. Waterbury stated some of his experiments with the chemical manures, according to Liebig, etc. The land which he paid $20 an acre for was advanced to $100 in a few years.

A Member—Town lots, Doctor?

Dr. Waterbury—No sir, mere farm land.

Mr. Lawton distributed a hundred or two of raspberry rooted canes, so hardy that they have not been the least affected by the severe winters in fifteen years. The fruit is red and plenty. Its great value consists in this—that it requires no care in laying it down, covering it with straw, or anything whatever.

Miss Maria Oddie, of New-York, just arrived from a visit to Illinois, presented a number of specimens of the native grapes which annually clothe the prairies of that State. Several of these are of a delicacy of structure so remarkable that we have never seen any so much so. This delicacy surprised members who had formed an idea that the native grapes must necessarily be of strong rank growth, almost like hedges, etc. The Club was highly pleased with them.

Parsnip seeds of first rate quality, raised and presented by the Hon. Joseph Blunt, one of the oldest members of the Institute, were distributed.

Subject for next meeting—"The most profitable crop for the farmer, locality considered."

The Club adjourned to May 5th.

H. MEIGS, *Secretary.*

[illegible]

MECHANICS' CLUB.

Organized March 2, 1854.

May 14, 1856.

The first meeting of the season was held on Wednesday the 14th day of May, 1856.

Present—Messrs. Backus, Leonard, Tillman, Larned, Godwin, Chambers, Creamer, Demorest, Brower, Dr. Smith, Crossley, Rowley, Breisach, DuHamel, Counsellor of the Russian Empire, Hiram Dixon, and others—34 members in all.

The regular chairman, Samuel D. Backus, presided. Henry Meigs, Secretary.

The minutes of the last meeting were read and approved.

The Secretary called the attention of the Club to the very large glass plates recently imported from Lancashire, England, now at the store of Roosevelt & Son, 94 Maiden Lane. These plates are 149 by 86 inches, and are three-eighths of an inch thick. Some are now in Lancashire 200 by 140, polished, and weigh 2,000 lbs. These plates remind me of the grand mirror plates made more than a century ago by the Kings of Spain, at St. Ildephonso, near Madrid. They were made for the Royal Palace, and for presents to friendly monarchs. They are said to have been spotless, and weighed each about three thousand pounds, and cost immense sums of money.

Mr. Leonard introduced Mr. Crossley of Boston, who exhibited and explained his new patent printing machine for carpets. A beautiful brass model of the large one, which when in operation, prints any desired design on the carpet by vertical force, so as to avoid all the imperfection to which roller printing is liable. The cloth being brought regularly under the print block by an endless chain drawing the bed plate under the print blocks with unerring certainty. The working machine can print four thousand yards of carpeting per day. It also prints house paper as well as cloth.

Mr. J. Demorest of 375 Broadway, introduced his new patent portable Magic Summer stove, and put it in operatiou. A hollow metal ring containing a quart of alcohol, supports above it entirely distinct from it, a series of circular tin ovens. At the bottom is a small metal covered cup whose sides are perforated in many places. A small pipe from the alcohol below is introduced to the bottom of this cup, the stream regulated or shut off at pleasure by a cock. The cup contains a quantity of fine wire so closely pressed together as to resemble the sponge. A semicircle of metal provided with similar wire sponge, being first saturated with alcohol (having a stout wire handle to it) is lighted by a match, then applied around the bottom of the cup, this heat soon causes the alcohol to fill the sponge in the cup, which now burns the gas of the alcohol, producing neither smoke, soot or smell, nor does any very sensible heat radiate from its outside, while a pure and strong heat exists within. Sad iron heating, steak cooking, bread baking, water boiling, all proceed at once in the ovens over oven. The cost of boiling one gallon of water is proved to be but one cent. The circular reservoir of alcohol under all is so entirely separate that it receives no heat during the cooking, and cannot explode. A small stove costs six dollars—large one twelve dollars. Demorest's object is to produce neat, perfect cooking on one's table in summer, and when fuel and cooks are wanting. Common gas of our streets will answer as well as alcohol.

Secretary Leonard called on Mr. J. Sampson to explain Fuller's new patent faucet, in which the effect of turning the lever to cause the tap, armed with gutta percha, India rubber, or other similar body, to secure the perfect stoppage of the stream. This invention is of Middletown, Massachusetts.

The Chairman called up the stated subject—"The steam fire engine."

Mr. Larned, with model parts and by drawings explained the machine fully. The great aim of the inventor is to produce a fire engine as portable as the common hand engine, with far greater effect. That this is effected by lightening the structure in parts while all the strength required is retained in those essential to strength. Mr. Larned traced to its origin the plan of such an engine, and showed the improvement now made to be so flattering that soon it will be seen that steam power will be made to conquer conflagrations.

The hand engines now weigh some four or five thousand pounds, and the steam fire engine about six thousand pounds.

Mr. Leonard moved a continuance of this question. Carried.

Mr. Tillman adverted to recent discoveries very interesting to arts, such as Wohler and Deville's successful developments of the new, beautiful, light, durable, silvery, ductile metal, aluminium, &c.

The Club adjourned to May 28th, at 7½ o'clock p. m.

H. MEIGS, *Secretary.*

May 28*th*, 1856.

Present—Messrs. Butler, Prof. Nash, of Vermont, John G. Bell, Leonard, Chambers, Disturnell, Backus, Anderson, Rowley, Breisach, Stetson, Creamer, and others—30 members in all.

Samuel D. Backus, the Chairman, presiding. Henry Meigs, Secretary.

Minutes of last meeting read and approved.

The Secretary said that as some very interesting developments relative to electric motive force are now expected, he would refer to the first discoveries in electricity briefly. It was pleasant to himself, and would be to others, to refresh memory with such beginnings, as do the first steps of Columbus in trying to find the great land we live in.

ELECTRICITY.

A word derived from the Greek word ηλιος, the sun, because of the color, Ηλεκτωρ.

The father of electrical knowledge seems to be Dr. William Gilbert, an English physician; in 1600, he wrote a book, *De Magnete*, containing several electrical experiments. Francis Bacon added but little to Gilbert's discoveries. About 1670 Boyle engaged in the study of it, and said that the fluid passed through vacuum. (Now denied.) Otto Guericke, a cotemporary of Boyle's, used a globe of sulphur, whirled on its axis in the same way with our modern glass globes, and by that sulphurous globe obtained vastly more electricity than had ever before been produced. Otto discovered electric repulsion, and the fact that a feather repelled from an electric always presented the same face to it, as the moon does to the earth.

In February, 1729, Stephen Gray discovered the distinction between conductors and non-conductors of electricity. Soon after Gray, Du Fay discovered positive and negative electricity, called vitreous and resinous. The capital discovery of the Leyden phial was accidentally made in 1745. Then the study began to be general. The discoverer was Van Kleist, dean of the cathedral in Camin. The name of Leyden phial was given by Mr. Cunæus, a native of Leyden, who made many experiments with Kleist's jar. Cunæus happened to hold his glass vessel in one hand, and with the other trying to disengage the conductor, in an experiment to charge water with electricity, was surprised by a sudden shock in his arms and breast. The philosophers were greatly excited by this, and Muschenbrœck, repeating the experiment, told Reaumur that he felt struck in his arms, shoulder, and breast, so that he lost his breath, was two days before he recovered from the blow and the terror, and that he would not take another shock for the whole kingdom of France. Next came Franklin, who in 1750 first "eripuit cœlo fulmen," &c. His theory was demonstrated in 1752, on the 10th of May, during a thunder storm, by Messrs. Dalibard and Delor, at Marly la ville, five or six leagues from Paris, by a rod. Dr. Franklin tried the experiment about a month afterwards in Philadelphia, with a kite made of a silk handkerchief and two cross sticks. Afraid of ridicule, he told nobody but his son what he was doing. He got under a shed to shelter them from the storm. It was some time after he got his kite up before he found any results. He at last succeeded. After that he erected an iron rod, insulated, and from that drew the real lightning down, and with it repeated all the electrical experiments, thus demonstrating the identity of the two. On the 5th of August, 1753, Professor Richman, of St. Petersburgh, Russia, while trying the experiment on lightning drawn into his room, while Solokow, an engraver, was there, Mr. Solokow saw a globe of blue fire as large as his fist, jump (from the instrument, which was about one foot distant,) to Mr. Richman's head, and he was instantly dead, and Solokow much hurt. When Richman was struck, Solokow says a steam or vapor arose which entirely benumbed him, and made him sink to the ground, so that he did not hear the clap of thunder which followed the blow, although it was a very loud one.

Franklin is deemed to be the first discoverer of the two electricities, the positive and the negative, or *plus* and *minus*, as they were called, notwithstanding Du Fay.

Mr. Secretary Leonard requested Mr. W. B. Davis to explain his newly invented *life raft*. Mr. W. B. Davis exhibited a model, and explained the nature of his life raft. It is an oblong ring of buoyant material, with a stout network stretched across, transforming it into an extremely "leaky" boat. Any water thrown on board would escape at once through this bottom, and if overturned in a surf, the crew could scramble at once upon the other side, and be "this side up." The chief novelty of this invention however, consists in the material of the buoyant ring aforesaid, which is made by binding together with copper wires slender slips of rattan or white oak, and covering the whole with prepared cloth. The ring, as we have termed it, is slightly pointed at each end, and is made to row like an ordinary boat. The interior of the ring was asserted to be, or might be divided into eight tight compartments, so that accident to several portions of the covering would not destroy its usefulness. The first full-sized structure under this patent is now being built for the Gloucester Ferry Company at Philadelphia. It is eighteen feet long by seven wide, is to support 6,000 pounds, and to weigh only 200 pounds.

William Tinsley exhibited his new patent sound board for piano-fortes. It has the novelty of a swelled surface under the bridge, somewhat violin like. Mr. Tinsley claims for it an improved tone, softer and sweeter.

Mr. Rowley remarked upon an invention of a Russian gentleman, Mr. Ruferschuelts, of a cheap preventive and curative of boiler incrustations. One gallon per day of his preventive in a locomotive boiler will prevent all incrustations, and do no harm to the boiler. Can be obtained at the office of the Compound Solvent Company, 289 Broadway.

The Chairman called up the regular subject, viz:

THE STEAM FIRE ENGINE.

Mr. Larned, by request, resumed his explanation of the steam fire engine.

A large working model of Phillips' patent wind engine was exhibited, and explained by Mr. W. B. Leonard, the inventor being out of the city. The machine is a windmill, in general appearance like those usually employed, but appears to be more perfectly self-regulating than any before introduced, inasmuch as the provision, not only against gales of wind but sudden gusts, is practically perfect. The vanes are made capable of "feathering," or turning edge to the wind, and two agencies are employed for this purpose: first, the vanes are hung so that when the centrifugal force generated by their revolution is sufficient to overcome a stiff spring, that force alone throws them more or less into a feathering position, and, second, a perpendicular board is presented flatwise, in such manner that when acted on by a sudden gust, it will at once yield, and commence a feathering motion by means of suitable connections to all the vanes.

Mr. Creamer said that he had tried his inventive power on this subject. He liked the Larned boiler much, and considered it to be a safe one.

Mr. Lee—I am concerned with Mr. Larned in this engine. The rotary pump is superior to the reciprocating one.

Mr. Creamer—What is the cost of your engine?

Mr. Lee—$6,500, but we are not ready yet, and cannot state what we can make them for, but probably much less than that.

Mr. Larned—The hand-engine power is rarely great for more than a few minutes at one time. When the men exert their greatest strength they throw the water as far as we do. There is a great difference between the theoretical and the practical delivery of water from the pipe nozzle, in some cases nearly thirty per cent.

James S. Burnham—I am a working man, consequently, the few disjointed remarks which I may make at this time, will savor more of the shop than of the school room; they will not, perhaps, be scientific; if they are practical, it will please me better. You will excuse me then, if I discard speculative theories and have to do with facts. First, then, it is a fact that steam is used in all places for pumping water, (where a large quantity is required,) except for extinguishing fires. Why is this? Is it because steam cannot just as well throw water on a burning building as out of a mine? Certainly this is not the reason. Is it because steam engines, when combined with water engines, are too unwieldly for practical purposes? No, not necessarily so, but they are almost always made too large to be useful; not because mechanics know no better, but they want, if possible, to meet the expectation of the multitude, who think that there is no limit, or if there is, there ought to be none, to the distance a stream of water will go when thrown by steam. A machine can undoubtedly be constructed that will throw a stream of water across this island; but it would puzzle the wildest theorist to build a boiler, even with figures, capable of doing this work, and yet light enough to be drawn easily by two horses. But all will agree that such a machine is not wanted—neither do we want a machine large enough to concentrate to one point *all* the water that can be had in the vicinity of a fire. I need not try to prove this assertion, it is a self evident fact. What then is the use of building engines so large as to render them useless, and then try to reduce the weight, and keep the machine of the same capacity, by building a light, untried, unsafe kind of boiler. When this vague theorizing on light boilers, this aiming at *useless* impossibilities is at an end, then I venture to predict, will steam fire engines, of practical dimensions, be universally adopted.

Allow me to describe a practical steam fire engine: its weight is the same as that of a first class hand engine, from forty to fifty hundred; the boiler is a plain, old fashioned, well tried tubular boiler, which will raise steam from cold water in fifteen or twenty minutes. The engine and pumps are also of the well tried kind, conveniently arranged, so that one man can easily manage the whole machine; the box is so arranged that wood enough can be carried to last one hour, and also a sufficient supply of hose. The engineer always rides, and gets up steam while going to fires. The size of the box, (which is set on wheels in the usual manner,) is four feet by eleven. Such an engine will throw water as far, or farther, than it is usually thrown by hand, and four times the quantity for the first half hour, because it works continually.

William Tinsley, of 41 Franklin street, presented a sound board for piano fortes, upon the principle of the violin, which is calculated to sustain the pressure of the bridge, and preserve its elasticity many years longer than the common flat sound board.

The device consists in raising an arch under the bridge. The arch is short in its span under the upper springs, and follows the course of the bridge, at different distances, diverging until it is broad under the lower bass. The arch is of equal elevation throughout, and is cut to a counter concavity on the under side; the quantity of wood being graduated according to the pressure on different parts. Mr. Tinsley's sound board has been successfully tested.

Mr. Larned spoke of the lower part of this city as being chiefly occupied with large and lofty buildings, for storage purposes, and few dwellings comparatively, and, therefore, a small proportion of firemen to work hand engines; that in such locations, he thought the steam power would be found best, because of its power to throw large streams and continuously.

Mr. Butler desired to know the horizontal distance to which hand engines can throw water.

Mr. Larned—209 feet; and to throw it further, a much greater power is required.

A discussion ensued relative to the peculiar form of pipe and nozzle best adapted to pass water in the most compact form.

Mr. Lee supposed the best was the smoothest; that a spiral motion which water acquires by passing through hose and pipe, might be controlled by giving to the pipe a figure other than cylindrical, viz., a triangular one.

Chairman—The best plan is that which satisfies the public.

Mr. Lee—A fire engine ought to be powerful enough to throw upon a conflagration all the water to be got at that station from the Croton water pipes.

Chairman—Some novelties in the valuable subject of locks may be interesting at the next meeting. That subject is adopted.

The Club adjourned.

H. MEIGS, *Secretary.*

June 11, 1856.

Present—Messrs S. D. Backus, Stetson, Serrell, Creamer, Butler, Breisach, Burton, I. K. Fisher, Lee, Larned, Dr. Smith, and others, with two ladies, about thirty in all.

Chairman, S. D. Backus, presided. H. Meigs, Secretary.

Mr. Gardner R. Lillibridge exhibited a handsome brass model of his patent ice cutting machine, made to operate with great comparative efficiency for channels for shipping and for summer use of the people.

Monsieur Bernard Joaquin Lamoth. The chairman read his paper on iron cars, and the author exhibited and explained his model. The Club was pleased with the very clear and logical essay of the learned doctor, and Mr. E. Serrell moved that it be a subject for the next meeting.

Mr. Stetson remarked that as locks were assigned for consideration this evening, and Mr. Butler who proposed it was suddenly called to Chicago, it be postponed to the next meeting.

Mr. James A. Clark exhibited and explained his model of a coal cart, whose frame is so contrived as to contain, as part of it, a platform scale, by meahs whereof a coal buyer can prove the weight *at its being brought to his door.* Mr. Clark thought that it was of great importance that our citizens should all have the power in their own hands to avoid the losses they sustain in short weight of so very important an article of necessity.

Mr. William Delany, introduced to the Club by Dr. Burras, exhibited two models in wood and one in polished brass, of his railroad trucks invented by Mr. Delany. These are so contrived that on curves they run with uninterrupted velocity without any danger of deraillement—running off the rail—and the performance on the right line is just as good as other common trucks, and with the special advantage of the same safety as on the curves, because the wheels assume an angular position precisely according to the greater or less radius of the curve as far as the angle of 45°, or more if necessary. And the wheels are as strong as common wheels, and from their angular position are a great deal less liable to failure. Mr. Delany then placed the brass model truck upon a small rail four feet long with semi-circular curves at the ends, and by varying the inclination of this railway alternately, as the truck approached either curve, it was found instantly to adopt the angle of its wheels to the velocity, and turn the curves almost like a ball in a sling. The novel scene caused every member of the club to unite in deep and loud applause.

The Chairman called up the regular subject "Locks," and Mr. W. Reynolds exhibited the lock of Mr. Linus Yale, Jr., late of Newport, N. Y. The one exhibited costs $250. Mr. Reynolds took it apart and explained its construction fully. The peculiar character of it consists in its being constructed without *springs*, and not materially injured by rust, besides its peculiar key, its incapability of being loaded with powder so as to do it any injury whatever. It was explained as not being capable of being picked because of the displacement of the parts by its own key, so as to be inaccessible to any known pick lock process, even that of Hobbs.

Mr. Meigs—Denon has engraved an Egyptian lock made of wood of very clumsy construction, and such were the locks of the Greeks and Romans, or at least similar. Bars or bolts suspended by chains were drawn backwards or forwards by means of a hook or key, or raised out of a latch and let fall, or a bolt cogged was caught in one of the teeth and drawn back by the key. Sometimes they used a box with a pin, which box received a bar which was confined by the pin. A key in the form of a ice (called Balanagra,) disengaged the pin and the bar turned or fell aside. Wooden locks still exist in the Highlands, so artfully made and notched at unequal distances that they can only be opened with the wooden key belonging to them. Probably these were the locks of the Celts. In the British towns occupied by the Romans we find metallic locks and keys. Before the use of locks and keys they fastened their doors with knots, according to fancy, and they were difficult to open to those not in the secret. The Roman locks on *Scrinia*, *i. e.* book cases, boxes, trunks, etc., resembled our modern trunk locks. The pessulus versatilis or turning latch, box locks, chain-locks or padlocks were in use as far back as 1381. Gate locks, the speldolum or crook by which a chain was let into the lock and the vertevella, are not explained. The lock and key of Taillebois castle was vast and substantial. It was in the form of a fetter lock; that is "cadenas de chaine," or a chain lock. Our old church door and chest locks explain it. On opening a small antique brass ring lock, the letters on each ring were placed together thus E. R. C. O. Nares mentions one marked with the letters A. M. E. N., which being placed so as to form the word Amen, would open, otherwise not. On chamber doors they used two locks, one of which was called the privy lock.

Teftoft, the celebrated Marquis of Worcester, in about 1650, two hundred years ago, to whose original plan we refer much of our steam engine, gave the following suggestion; an escutcheon shall be placed before the lock with these properties:

1. The owner, though a woman, may, with her delicate hand, vary the ways of coming to open the lock *ten millions of times* beyond the knowledge of the smith who made it, or of me who invented it.

2. If a stranger open it it setteth an alarm agoing which the stranger cannot stop from running out, and besides, though there should be no one in hearing, yet it catcheth his hand as a trap doth a fox, and though far from maiming him, yet it leaveth such a mark behind it as will discover him if suspected. The escutcheon, or lock, will plainly show what money he hath taken out of the box, to a farthing, and how many times he opened it since the owner has been at it.

Mr. Marshall applied these ideas to a padlock, for which invention the Society of Arts voted him a reward of ten guineas. In 1784 the society gave a silver medal to Taylor, of Petworth, for improvements on the latch or spring bolts of common locks.

Bramah's improved lock was registered in 1784.

Bullock's drawback lock, for house doors, came next.

Stansbury, of America, made a lock of great merit. A flat circular plate turned on the centre pin by the key, which also commands certain steel pins to arrest the plate.

Nicholson's lock had more than 6,000 combinations. It requires no key. It contains four wheels, by which the combinations may be increased nearly 60,000 times.

Somerford was rewarded for his improved lock, by the Society of Arts.

Extracts by H. Meigs.

ELECTRICITY—TELEGRAPHIC COMMUNICATION.

In 1747 a committee of the Royal Society of London conducted a series of experiments on the transmission of electricity considerable distances. They began by placing a wire across Westminster bridge, and found a return circuit through the *water of the river*. This was found on the 14th and 18th of July, 1747. One end of the wire was held in contact with the coating of a charged jar, and by a person who held it in one hand, and with the other put an iron rod into the river's edge. On the opposite side of the river a gentleman held a wire which was capable of being put in contact with the bridge wire, and at the same time, with the other hand, could dip an iron rod into the river. The shock was very sensible to all in contact with the wire, and some alcohol was inflamed by the electricity after it had passed through the water!

The next experiment was at the New river at Stoke Newington, on the 24th of July, 1847, at two places, at one of which the distance by land was 800 feet, and by water 2,000 feet. The other, distance by land 2,800 feet, and by water 8,000 feet. In this experiment the shock felt by the operators was as strong when the rod was placed on the land, twenty feet from the river, as when placed in the river. This occasioned a doubt whether the circuit was through the water; experiment showed that the circuit was as perfect through the grassy meadow as through the water. Subsequently it was found that the electricity had not, in this case, been conveyed by the water of the river, which was two miles in length, but by land, where the distance was only one mile, in which case the electric fluid must have passed the New river twice, and gone through gravel pits and a large stubble field.

On the 28th of July, 1747, they repeated the experiment at the same place, with the following variation of circumstances: The iron wire was, in its whole length, supported by *dry* sticks, and the observers stood upon original electrics; the effect that they felt the shock much more sensibly than when the conducting wire had lain upon the ground, and the observers stood upon it also.

That instead of dipping their rods into the water, they ran them into the ground each side of the river, 150 feet distant from the water; the shock was smart through the 500 feet.

Their next object was to try whether the electric fluid could be conveyed through dry land, and at the same time to carry it through water to a greater distance than they had done before. They tried this experiment at Highbury Barn, beyond Islington, on the 5th of August, 1747. Their stations were somewhat more than one mile apart by land, and two miles by water. The electric fluid made the circuit of the water when both the wires and observers were supported upon original electrics, and the rods dipped in the waters of the river. Both observers felt the shock when one of them was in a dry gravelly pit, about 300 yards (1,500 feet) nearer the machine than the former station, and 100 yards distant from the river; the conclusion was, that dry gravelly ground had conducted the electricity as strongly as water.

The last experiment made by them was to try whether the electric fluid could be carried twice the distance they had done, and through perfectly dry ground, and they also tried to establish the relative velocities of electricity and sound! They tried the experiment on Shooter's Hill, on the 14th of August, 1747, at a time when (as it happened) no shower of rain had fallen for five successive weeks. The wire communicating with the iron rod which made the discharge was 6,732 feet in length, supported on *baked sticks*, as was also the wire which communicated with the coating of the phial, which was 3,868 feet long. The observers were distant from each other two miles. The result of this experiment was a demonstration that the circuit performed by the electric fluid was four miles, (viz:) two miles of wire and two miles of dry ground. A gun was discharged at the instant of the explosion, and the observers had stop watches in their hands to note the moment when they felt the shock of the electric fluid. But as far as their experiments went, the motion of the electric fluid was instantaneous through a wire of 12,274 feet.

[Philosophical Transactions of the Royal Society of London, 1783.)

A communication in Italian on the subject of electricity, "Del mode di render sensibilissima la pin debole Elettricità sia Naturale, sia Artificiale. By Mr. Alexander Volta, Prof. of Exper'l Philosophy in Como, &c., &c.; communicated by the Right Hon. George Earl Cowper, F. R. S." Read March 14th, 1782.

In the appendix Volta says, "I have at last succeeded in obtaining distinct signs of electricity from the simple evaporation of water, and from various chemical fermentations. Knowing these facts to be no less interesting than new, I esteem it not inopportune to give a faithful account of my experiments. The first of these were made in Paris, in company with two Physical Illuminati, members of the Royal Academy of Sciences, Messrs. Lavoisier and De La Place.

He called his apparatus for showing this electricity *a volta*. He was born of a noble family in 1745. In 1769 he addressed Beccaria "De vi attractiva ignis electrici ac phenominis independentibus." In 1801 Napoleon invited him to Paris where he exhibited his discoveries to the members of the National Institute. He died in 1826.

ARTS OF THE ANCIENTS.

They made as good and sometimes (as the Wootz and the Damascus,) better steel than is made in 1854. They knew how to give to copper a hardness almost equal to steel. That we have lost.

The obelisks of porphyry, made by ancient Egypt, are covered by vast numbers of inscriptions. Yet we have no tools of steel that can do it, nor do we know of any other mode of cutting such inscriptions, except by emery dust or diamond dust.

Aristotle said that wrought iron itself may be cast so as to be made into a liquid and then to harden again, and steel is made thus. The scoria of the iron settles to the bottom and the steel remains above; and after being melted several times, it is at each melting defecated, (got rid of spurious matter,) it becomes steel. There is much waste in this process.

Agricola of Saxony, 1494, gave the following account of making steel:

"Make choice of iron which is apt to melt and is yet hard, which can easily be wrought with the hammer, for although iron which is made of vitriolic ore may melt, yet it is soft, or fragile, eager. Let a parcel of such iron be heated red hot and cut into small pieces and mixed with a sort of stone which melts easily, then set in the forge or hearth a crucible a foot and an half broad and a foot deep; fill this dish with good charcoal and compass the dish about with loose stones, which may keep in the mixture of stone and pieces of iron put thereon.

"As soon as the coal is thoroughly kindled and the dish is red hot, give the blast and put on little by little on the mixture of iron and stone.

"When melted, put into the middle of it three or four or more pieces of iron and boil them then five or six hours with a sharp fire; stir the melted iron often that the pieces of iron may imbibe the smaller particles of the melted iron, which particles consume and thin the more gross particles of iron pieces, and are as it were a ferment to them, and make them tender.

"Now take out one of the pieces and put it under the great hammer, draw it out into a bar and then, hot as it is, forthwith plunge it into cold water. Thus tempered, work it on the anvil and break it, then examine the fragments and judge whether it looks like iron, in any part of it, or is wholly condensed into steel.

"Then work up all the pieces into bars, add a little fresh matter and give it the blast, and which will refresh and strengthen the remainder and make yet purer the pieces of iron again put into the dish; and as soon as each piece is red hot, beat it into a bar and while hot plunge it into cold water; and thus iron is made into steel which is much harder and whiter than iron."

Pliny, about 1800 years ago, says that there were two ways to manage iron for cutting purpose. One was to make steel of it and the other to harden or temper thin tools, such as their pick axes and anvils.

MAGNETISM—1731.

[Transactions Royal Society, London.]

The whole globe of the earth is one great magnet, having four magnetic poles or points of attraction near each pole of the equator, and that in those parts of the world which lie near adjacent to any of these magnetic poles the needle is governed thereby; the nearest pole being always predominant over the more remote.

The pole at present nearest to us is near the meridian of the Land's end, and not above seven degrees from the pole arctic. By this pole the variations are discovered.

Mr. Stetson remarked in reference to La Mothe's iron car. The peculiar advantages of it—in the event of collision no splinters, so destructive in the crushing of cars of wood ; the general softness because of the elasticity of all its parts, being of thin wrought iron strips rivetted together for sufficient stability, and superiority in lightness—being nearly fifty per cent lighter than our wooden cars, which weigh about six thousand pounds each.

Mr. Creamer—They are much lighter, but objection is made that they are hotter in summer and colder in winter than the wooden cars.

Railroad companies you all know are averse to any important changes in their system; and for very strong reasons—that of the heavy loss they would sustain by a change. It is therefore very natural that such companies should be what is called difficult.

Mr. Fisher gave his reasons for approving Dr. La Mothe's plan, and the very great saving of cost on United States railroads in freight, amounting to many millions of dollars.

Tiftoft, Marquis of Worcester, in the middle of the 17th century—200 years ago—was undoubtedly inventor of the steam engine. His account of it (published in 1663,) although by no means fit to give us any distinct notions of its structure and operation, is exact as far as it goes, and agrees precisely with what we now know of the steam engine. It is number sixty-eight of his Century of Inventions. He says: "This admirable method, which I propose of raising water by the force of fire, has no bounds if the vessels be strong enough; for I have taken a cannon and having filled it full of water and shut up its muzzle and touch-hole, and exposed it to heat for 24 hours, when it burst with a great explosion. Having afterwards discovered a method of fortifying vessels internally, and combined them in such a way that they filled and acted alternately, I have made the water spout in a stream uninterrupted forty feet high. One vessel of rarified water raised forty of cold water. The person who conducted the operation had nothing to do but to turn two cocks; so that one vessel of water being consumed, another begins to force and then to fill itself with cold water, and so on in succession."

The subject of "Locks" was ordered to be continued at the next meeting of the Club, on the second Wednesday of June.

The Club adjourned.

H. MEIGS, *Secretary.*

June 25, 1856.

Present—Messrs Tillman, Butler, Leonard, Stetson, Chambers, Breisach, Porter, Fisher, Lamothe, Paige, and others.

The Chairman, S. D. Backus, being absent, the Club elected Mr. Tillman, chairman, *pro tem.* Henry Meigs, Secretary.

The minutes of the last meeting were read and approved.

Mr. Secretary Leonard introduced Mr. Page to the Club. Mr. Page exhibited his model window sash fastenings. He had endeavored to improve on old methods, had actually contrived forty-eight methods, all of which he deemed comparative failures; but he now presented one which he gladly exposed to mechanical criticism. The upper and lower sashes are governed by a touch so as to remain arrested at any point of opening desired. The

Club was pleased with it, as likely to rid us of an everlasting plague in lifting or lowering our window sashes. The operation is concealed within the wood of the window frames.

Mr. Breisach, introduced by Mr. Secretary Leonard, exhibited and explained a model of an apparatus for making gas from wood.

Mr. G. W. Albaugh exhibited and explained his model of a new corn planter, to be drawn by a horse, drilling, dropping the corn as desired, covering, and finally passing a small roller over the whole to compress the soil over the grain.

The Chairman called up the regular subject "Locks."

Mr. Butler read the following paper on locks.

"There is no doubt that locks or fastenings of some kinds have been in use from the earliest ages, as it is reasonable to suppose that all who lived in doors would require some kind of fastening more or less secure. There may have been some exceptions in ancient times as there is said to be now, and perhaps some nations found no use for security against the covetousness or curiosity of their neighbors. This might have been the effect of rigid laws or of ceremonial customs, as it is well known that the entrance of a house was approached with a great deal of ceremony, such for instance as the changing of dress, cleansing of the body, etc., and perhaps the idea was more general at that time that the threshold of a man's door should not be passed for the purpose of injuring him or his property.

There are some nations who protect their property, both in doors and out by performing certain ceremonies over it which is then considered safe, while other things not under the influence of the charm may disappear. It might perhaps be well for others if similar influences could be brought to bear on the minds of men, as we have no *taboo* sufficiently strong to protect property even in very refined society.

Among other nations we find that a sign or mark placed on the door or near it is sufficient, or as we might say, a simple notice of not at home, will keep out intruders, as for instance the application of a seal of gum or clay, or a stick placed against the door. This may answer, from the fact that they have a high moral regard for the rights of others, as perhaps it is used to indicate by their removal that the door has been opened.

One step in advance of this was the use of strings or cords attached to the door and tied in curious and difficult knots, this plan no doubt was in use to some extent, as we find that Homer describes an ancient treasury protected in this way. Another mode of security was to place heavy bodies as obstructions against the doors, which was done at the sepulchre of Christ. This of course would require the door to open outward, or perhaps swing on pivots placed in the centre, which was the fashion in Pompeii and other ancient cities. The former plan would require ingenuity to enter, the latter physical force.

There is do doubt that locks with keys were in use four thousand years ago, as the figure of them, sculptured on stone, has been found in ruins of tombs in Egypt, which date back as far. The Bible mentions the use of a lock and key that must date thirteen hundred years before Christ, and there have been found in Pompeii doors of marble with the remnants of some kind of a lock attached. Writers on the subject of locks divide them into two kinds, each separate and distinct in principle.

1. Warded locks, as those made with fixed obstacles to a false key, called wards, which are intended to prevent the use of any instrument but the true key.

2. Locks that are made with moveable obstacles to the motion of the bolt. These obstacles being required to take certain positions in the lock before the bolt can be moved. This is the principle upon which our best locks are now constructed.

The oldest plan of lock that we have any knowledge of is the Egyptian, which is of the moveable obstacle order, and has no doubt been in use for thousands of years, and is still used in Egypt and in some parts of Asia, and is almost exactly like the kind that is figured on the ancient tombs, showing that it has not been improved in principle or workmanship, and yet been in use one hundred and twenty generations. These locks are made of wood as well as the keys, and are generally placed on the outside of the door, and the custom is to carry the key in the girdle with the knife or arms, and it is generally larger than either of them.

We have no knowledge that locks with moveable obstacles were known in Europe more than about 200 years ago. Moveable obstacles were first used in the shape of tumblers in the wards and lock as an auxiliary; but there is no doubt that the lock with fixed obstacles or wards has been in use since the Christian era. Some of the keys that were turned on the Apostles, it is said, are kept in churches in Europe, and we find in old books illustrations of the warded keys with all their intricate cuts and notches. There was great ingenuity and skill displayed in making the keys in all imaginable shapes and the lock to match with the wards. These locks have long been rejected, except for common purposes, as it is not necessary to have the key cut in the shape of the wards, but formed so that it clears them and reaches the bolt, which is called a skeleton key.

The first improvement on the simple tumbler was made by Barron, and by him patented in England in 1778. This consisted in arranging one tumbler or more so that they had to be raised to an exact height, neither more or less, to allow the bolt to pass. This of course required the key to be graded to the length to effect it, and could also be used with the wards. This certainly was a great improvement, as it not only increased the security when one tumbler was used, but admitted the use of any number of tumblers. This improvement in the tumbler seems to have given a new start to lock making.

Some six or eight years after Barron's patent, Bramah's lock was introduced, which also might be classed as a box of moveable obstacles, and with that exception it was an entirely new idea, as in this case the ends of the tumblers were acted upon by the key and pushed *in*, instead of being pushed *up*. It was this kind of lock that Mr. Hobbs picked in England in 1851. The lock had sixteen moveable bits, and it required a pressure of thirty pounds to push in the key. Thirty days were allowed to pick it, and Mr. Hobbs accomplished it in sixteen days, being in the room about one-third of the time with the lock. This test certainly proves the principle to be a good one, for we must consider that the key was not used to lock or unlock it whilst he was at work on it, which would not be the case when in use.

This was picked by proving, or feeling, or as some call it the tentative process trying. This operation requires a sensitive finger, or fine sense of touch and feeling with the finger, and no doubt if we should take 100 men who understood the lock as well as Mr. Hobbs does, there would not be ten who could feel out the position of the slides, and be guided by their operations, and probably not five who would have the patience to work sixteen days to accomplish it. After this Bramah lock, Chubb attached to the Barron tumblers a detective which was intended to be thrown out of place if a false key was applied. This is considered by some as a guide to pick the lock, but it has done good service in England. There are a good many in use in the United States.

But it must be admitted that where great security is needed, a lock with a fixed key, that always remains as it came from the maker's hand, is liable to be imitated, or a duplicate kept by the maker, who would then control the lock. This is an advantage that is seldom taken, and goes far to establish the claim of the lock-makers to a high degree of honesty, when we take into consideration the temptations they meet with.

Keys that could be taken to pieces were made in England years ago, and afterwards locks were made so that they could be taken apart and changed. This was a great improvement, as it allowed a new lock to be made as often as the changes lasted, with very little trouble, and no doubt a lock that can be changed by hand is sufficiently convenient for ordinary purposes, as you have great advantages at the expense of a little time spent in changing the lock and key. This has been accomplished in a great many forms in locks with keys, also in compensating locks without keys.

Considering the advantages of changing a lock, it must be admitted that there is greater advantage in a lock that is self-changing, or one that will change without the necessity of taking it apart. This was accomplished first in the United States, and at the time admitted to be an improvement over all others. In this case there was but one set of tumblers used, and the change was made by first changing the form of the key, and in the act of locking the tumblers were thrown on to the bolt, so that they ceased to act as tumblers.

Soon after another improvement was made which required two sets of tumblers, and two keys to operate them, one of them changeable, and from that improvements were made so that one key only was used to operate the bolt and change the lock, and from time to time new permutating locks have been introduced, until there are now in use some eight or ten varieties, some of them very ingenious and secure.

No doubt there is still chance for improvement both in regard to security and simplicity, and there is no doubt that open and fair discussion upon the merits of locks, and the means used to pick them, would be a public benefit, and produce a thorough change in lock-making.

It is said that the plan was suggested years ago that has since been used, to open some of the best English locks, and the advantages of smoking or painting the tumblers to get impressions has long been known, and yet by this operation one of our best bank locks is now opened, proving that those who use the lock should know the means the burglar employs, and then use their judgment in selecting such as give the best security. I want to bring to the notice of the Club the rotary lock, designed to be used on stores and dwelling houses. It is free from the objections found in locks now in use for that purpose, and has the following advantages:

1. A steel key that will not get clogged with dirt from the pocket, and so small that it requires 60 to weigh a pound, and will admit of the use of one even one-third less in weight.

2. A large bolt that turns on a centre and grips on to the joint of the door, and is so arranged that it is impossible to crush it back with the burglar's jimmey.

3. Its security against the operations of the lock-pick, being impossible to open it with probes or picks, in the time that a burglar would have access to the lock when on the door. And its arrangement is such that no impression or copy of the inside work of the lock can be taken at any time, whether locked or unlocked.

The key cannot be left in the lock, and is so small that there is no inconvenience in keeping it in the pocket when not in use, which prevents the burglar from taking impressions either from the lock or key.

4. There can be millions of keys made, and with proper care there need not be two locks alike.

5. The door is opened from the outside by simply pushing in the key without turning. On the inside of the door it is opened by pulling the knob without turning.

It is considered by good judges as being the best lock for dwelling houses ever introduced. There are in use in this and other cities, several hundred of them, and in no case have they failed to give the very best satisfaction.

In making a calculation on the weight of keys in use in this city, we may safely assume that there are 250,000 keys of front doors carried in the pockets daily; taking the average of the old style of keys, we find they weigh about six to the pound, which would give over 41,500 pounds of metal that the citizens of this enlightened city carry in their pockets; and if we could calculate the number of miles traveled, we would find that the amount of power expended for that purpose is very great, besides the great destruction of pockets, buttons, &c.

With the key that is used for the rotary lock, that weighs 60 to the pound, the weight would not be one-tenth as much; and if used in place of the 250,000 mentioned, would effect a saving of about 25 cart loads of metal, at the rate of 1,500 lbs. per load.

Mr. Meigs was always very fond of looking back to the sources of our knowledge, and examining all the countless trials, guesses and experiments made by our contriving race before we attain our grand object. He reminded the Club of the extraordinary efforts of one man of more recent note, and that is Mr. Tiftoft, Marquis of Worcester, 200 years ago. The number 68 of his Century of Inventions, is his invention of an Escutcheon lock, "Which the delicate hand of a lady would lock and unlock, and which she could vary in *ten millions of combinations*—beyond the knowledge of the smith who made it, or of me who have invented it. If a stranger openeth it it setteth an alarm agoing which he cannot stop; and if no one should be within hearing, it will catch his hand like a trap as a trap doth a fox, and though far from maiming him, yet leaveth a mark as will discover him; and the lock will show what money he hath taken out of the box to a farthing, and how many times he hath opened it since the owner hath been at it."

Stansbury, of the United States, made a lock of great merit many years ago. A flat circular steel plate turned on its centre pin by the key, which also commanded certain steel pins to arrest and secure the plate from moving until the key is used.

Mr. Butler exhibited a door of full size with his lock affixed. Its operation was tried and the lock examined and criticised and remained an object of great merit.

Mr. Meigs deemed it proper to say, that our inventors should not confine their views to the narrow limit of banks and treasuries, but remember the millions of chambers and closets, &c. which are used by the whole people to secure their several little treasures; and who are willing to pay the scientific lock-smith well for furnishing them each a lock *of confidence.*

Question adopted for the next meeting "steam boilers."

The Club adjourned.

H. MEIGS, *Secretary.*

July 8th, 1856.

Present—Messrs. Backus, Breisach, Butler, Birdseye, Akin, of Berkshire, Tioga Co., N. Y., Montgomery, Stetson, Tillman, Lowe, Leonard, Veeder, Chambers, Larned, and others—40 members in all.

Samuel D. Backus in the Chair. Henry Meigs, Secretary.

The minutes of the last meeting were read and approved.

The Secretary read the following extracts from the works of science received by the Institute by the last steamers from Europe, (viz:)

[Practical Mechanics' Journal. London, June, 1856.]

LIGHTNING PROJECTILES.

Mr. Andrew Smith has been successful in developing the electric fluid so as to have now invented *lightning projectiles.* Experimental analysis has shown that the essential ingredient in a flash of lightning is water, or rather the gases which form it, as hydrogen and oxygen, into which water is decomposed by electricity. If the water be entire when the electric contact takes place, it is then resolved into those gases; if the gases are separate, then they become resolved into water, or sometimes hail, and frequently snow.

Faraday says that the atoms of water, (viz:) hydrogen and oxygen, are held in combination by an amount of electricity equal to a considerable thunder cloud. Mr. Andrew Smith has found the means of producing at will this electric flash, and the means of control and direction of its immense power. Electric caloric and aqueous vapor are the essentials. It may be described as the generation of a gas of a most highly refined or sublimated quality, producing intensely elastic power, effected by the decomposition of water—such is lightning itself. In the combination accomplishing the process, caloric, at a temperature effecting the fusion of electric metals, is one and a principal ingredient. One application of this potent agent is to the projection of heavy missiles. Mr. Smith is able to do this with a power, rapidity and accuracy which has not been accomplished by gunpowder. The guns used are of wrought iron, longer than common guns. The generating apparatus is contained in the compass of the carriage of an ordinary "ship's gun," or battering cannon. The gun is loaded at the breech. The weight of it, with the generating apparatus, is greater than that of common guns, but need not exceed the weight of our common cannons. Sixty balls are discharged per minute, with precision and effect.

[Journal of the Society of Arts. London, April 18th, 1856.]

Boydell's Traction Steam Engine, for agricultural purposes, is a great success. It is a horizontal machine, on wheels, with a man to steer in front, and an engineer behind. Two cylinders, $6\frac{1}{2}$ by 10, are worked at 60 pounds pressure per inch, with quick movement, and are estimated at sixteen horse power. 20 pounds of steam go to move the machine, and 40 pounds for traction. The machine can turn as easily as a common wagon, and does not mind a deep furrow or a side hill. It ascends an acclivity of one in three; our common stairs are but one in two. It advances, or stops instantaneously, or backs. It will act in threshing, milling, &c. It weighs nine tons. It made less impression on tilled land than horses do. The wide, endless railway belonging to it enables it to do this, and without clogging. This machine *walked* from Camdentown to Acton, having in tow its four wheel wagon, with coals, four heavy iron plows, and water enough for four hours' work. When on the soft turnip field, (after a night's rain,) it drew after it plows, scarifiers, &c., with perfect ease, and then walked home again to Camden town. It can move anywhere, draw corn to market, bring home manure, and do the cultivation work of the farm. Mr. Boydell has expended nearly £10,000, ($50,000,) in accomplishing his object.

P. S. In walking home it was met by a wagon loaded with grain, drawn by six horses. The horses swerved at sight of it, and drew the wagon into a soft place, from which seven horses could not haul it out. The traction engineer hooked on to it and drew it out with ease.

[Journal of the Society of Arts, London, April 11, 1856.]

Seventeenth ordinary meeting.

James Wilson spoke at length of the manufacture of articles from steel, particularly cutlery.

The angle of the cutting edge of a razor or pen-knife is from fifteen to twenty-five degrees; of scissors about eighty. Blades of steel are welded to iron, called bolsters. You see the mark of the union in table knives, &c., &c. Cutlery of cast iron abounds. Scissors are used by the vine keepers to cut off bunches of grapes, &c. Good steel ones soon fail from the rust caused by the acid! So that scissors cast from the poorest pig iron are made and sold at wholesale for *seventy-five cents a gross.*

An attempt to make razors on the same plan rather failed, for the Razor Grinders' Union passed a noble resolution, "that they would not grind such rubbish."

New materials for handles are in demand. The better ivories and stag-horns are very dear, and scarce too. Various woods—

cocoa, ebony, rose, partridge and snake woods for pen knives, (spring knives,) a new and cheap article is wanted.

Forks of steel for digging gardens, &c., lately introduced, were at first rejected by the laborers, who said they were only fit to toss straw; but now they find that they can do more work with them by twenty-five per cent, and with less fatigue, for they penetrate the ground easily; and as this steel fork weighs two pounds less than the old digger, and as he lifts it so often in a day's work, it is found that he actually lifts *several tons less.*

Messrs. Spear & Jackson sent for inspection table knives and forks at forty-five cents for the dozen knives and dozen forks; wrought razors at thirty-seven cents the dozen.

GREAT DIFFERENCES IN THE PRICE OF IRON.

Common cast iron from £4 to £6 per ton; the best Lowmoor £18 per ton; best Swedish, always used in Sheffield for best manufactures £36 per ton. Steel made in Sheffield, ranges from £20 to £80 per ton. This is used for sword blades. The Paris cutlers at the exhibition of Paris, were asked what steel they used? They replied, for our best articles we use *Huntsman's*—that is the oldest name in Sheffield! That was Swedish iron converted by that house into steel. They said that the Crystal Palace of 1851, had caused great advances in their manufacture of steel. In Austria, part of Prussia, Belgium, natural steel was now obtained. The Styrian steel is a natural steel—is something like Swedish iron, a very fine production, and was extensively made into scythes and other agricultural tools, in Austria.

Some said that Sheffield was falling off in her manufactures! That is not true—for her population of 24,000 upon a total of 138,000 since 1851 to 1856.

Steel was exhibited, made in Australia.

Mr. Wilson remarked that he held in his hand a knife marked "J. Rodgers & Sons' patent, Sheffield," and another knife marked "Rodgers Cutlers to Her Majesty." Would not one half of you be deceived? Not one of these articles was made by that firm!

Mr. Aikins of Berkshire, Tioga county, New-York, was introduced by Mr. Secretary Leonard, to exhibit his new patent lock. He opened it and fully explained its character. He has placed one on a safe, in this city, and given notice in the public newspapers that a thousand dollars in that safe may be had by Messrs. Hobbs, Yale, or any body else who can pick it. The common door lock is made for two dollars. Its make is very simple, but its permutations are beyond the reach of figures.

Mr. Secretary Leonard requested Mr. J. Payne Lowe to explain Singer's new sewing machine.

Mr. Lowe said that since the premium was awarded by the Institute in 1851 to this machine, the shape of the eccentric piece of metal governing the vertical motion of the needle has been altered, in consequence of which thick leather and fine cambric may be sewn. An additional spring for regulating the upper tension has been added, which prevents the thread from being slack at any time while the machine is in motion. An indentation has been made on the shuttle, the object of which is to prevent great pressure on its surface, and consequently the friction between its bottom part and the plate over which it passes is lessened. There has also been made an alteration in the configuration of the bobbin. It now turns on the peripherics of its wheels, and will last many times longer than when made according to the old method. All parts of the machine are strong, and consequently durable. The gearing is so arranged that by a continuous motion of the feet the machine will be free from all intermitting impulses. The needle having an up-and-down motion, is not so likely to strike against the throat as it would be if carried by an arm traveling in a curved line. The yielding pressure is so arranged as to permit cloth having much inequality of surface to pass readily. The tension of the under thread is regulated by holes on the shuttle. There are five ways of threading it. The upper tension is regulated by friction over a polished wire, and can be altered at the will of the operator, even while the machine is in motion. The sewing done by this machine is stronger than that done by hand, for the tensions may be so arranged as to give any degree of tightness, and to cause the stitches to interlock in either the upper or lower piece of cloth, thus preventing any liability of the threads cutting each other.

Linen or cotton thread may be used for the under thread, and silk for the upper. The under thread will not show on the surface of the goods. The length of the stitch is altered by turning a thumb-screw. By making the stitch long, adjusting the feed wheel, and running the machine quickly, that kind of sewing known as "gathering" may be performed with great facility.

ANCIENT COACH-MAKING.

The Roman Emperor Commodus, had carriages so contrived that at his pleasure any part of it was made to admit light or air, or exclude both. And these coaches were so many odometers, so that he could see at a moment the distance traveled; also chronometers, showing the exact time.

The Emperor Publius Helvius Pertinax had all these, as well as the rest of his matters, sold at public auction in A. D. 194.

Mr. Backus called Mr. Larned to the Chair, and invited Mr. Montgomery to speak on the subject for this meeting, (viz :)

STEAM BOILERS.

Mr. Montgomery said that he had hoped that this subject would have been deferred until next September, when his models, &c., necessary for clear demonstration of his ideas, would be ready.

But the Club urged him to say something now. He said he would endeavor to say, as well as he could under these circumstances if the Club would pardon his inefficiency.

On the regular subject of boilers, which had been assigned for this evening, Mr. James Montgomery, the inventor of the Montgomery patent boiler, promised what it would seem must prove an interesting paper, illustrated by models and large diagrams, at the first meeting of the Club in September. Being urged to speak, without preparation he gave a brief history of boilers, extending back to the days when John Fitch bolted down planks to form a strong, steamtight cover on a common potash kettle. The first improvement was the long "plain cylinder" boiler, now in common use for factories; the next the "return-flued," now common on the western river boats; then the "fire-box" boiler, used on our river and ocean steamers, with the fire entirely inclosed within the shell of the boiler, and requiring no brickwork; the next the "locomotive" boiler, being the same, with many small tubes, instead of a few large flues—an invention, by the way, which he ascribed to John Fitch, an American, about the year 1780, instead of to either the Napiers of England, or the illustrious Frenchmen who had claimed its discovery at a much later date. Whoever the really first inventor, it was plain that, but for the great demand for a very light and efficient boiler, induced by the increase of railroads about the year 1830, the invention would probably have been long since abandoned as impracticable, while it is now, on the contrary, universally employed on railroads wherever tracks are laid, and to a great extent on steamers and in factories.

The "Cornish" boiler was considered too cumbrous for general use, and no more economical than many cheaper and more compact species. The "wagon top," and other almost obsolete varieties, were briefly and correctly alluded to, and many valuable but well known facts in regard to the foaming or priming of boilers, his statement with regard to the high steam carried in racing on western rivers, etc., were received with marked interest by the audience. The remarks were not continuous, but interspersed by various short suggestions and criticisms by the members, some of which we have engrafted in this hasty sketch. Some very well timed observations were made on the qualities of iron and methods of flanging in boiler making, and on the great need still remaining of improvements in insuring the proper amount of water, etc., and in ascertaining the exact condition of a boiler in regard to corrosion. "Short" iron, which would not bend well to join flanges, was the best able to resist the action of acids, and should always be used for boilers employed in sugar mills, where the water is scarce, and liable to become strongly affected by the acidified juices of the cane. He recommended making all the angles in such cases by riveting to angle iron instead of bending the sheets.

Mr. Breisach continued his description of the wood gas invention. Gas from wood distilled in Pettenkoffer's apparatus was not only equally permanent on account of the perfect union of the carbon with the hydrogen, and more valuable on account of its containing no sulphur, and consequently inducing no headache, but was produced economically in quantities nearly or quite equal to that from coal, pound for pound. We failed to learn with any considerable accuracy the final cost of the products, on account partly of the great difference in the character of woods, all kinds of which can be used without difficulty, but understood that in general 2,000 lbs. or about a cord of hard wood produced from 80,000 to 90,000 feet of gas, about equal to that from a ton of good cannel coal, while the full original value of the wood would be retained in the charcoal, which is of a very superior quality, in addition to which is produced, incidentally, a large quantity of pyroligneous acid, from which, if desired, very superior acetic acid or vinegar can be manufactured. Altogether he made out a good case for wood gas, and it would appear to be deserving of attention in other quarters than the solitary concern in Philadelphia, which is now said to be adopting it.

Mr. Wm. H. Akins of Speedsville, this State, exhibited a very admirable specimen of a lock, just patented, and which now covers the sum of $1,000 in the reading-room of Lovejoy's Hotel, said sum being the lawful prize of any one who shall withdraw the bolt. It was dissected before the audience, and appears to be a species of combination lock, or one in which the whole secret consists in rightly arranging certain discs by means of a dial or dials outside. No key is employed, unless such name be given to a simple square stump, inserted to obtain a better hold on the parts, and instead of (as usual with locks of this class) presenting several dials outside to be set in certain different positions, corresponding to numbers treasured in the memory of the owner, only one or two dials are shown, which, by being turned alternately backward and forward to certain extents, indirectly arrange the position of several sets of discs inside. An admirably simple yet efficient means is adopted to prevent the possibility of picking by feeling, or what is known as the tentative process, and the lock is made susceptible of some billions of changes, so as to be made substantially a new and different lock every day, if desired. Although evidently a very cheaply-made lock, there would appear to exist but a small chance for a profitable investment of time in the picking operation proposed, and its powder-proof secureness must be undoubted, there being absolutely no opening from the outside to the interior of the lock in any possible position.

Mr. Geo. W. Barney, of this city, had on exhibition a full-sized working specimen of Wright's folding machine for packing woven goods. The common method of folding by hand is in this invention supplanted by a modest-looking frame, supporting a curved top, across which the cloth is folded very rapidly and with perfect accuracy, by the aid of a cross-piece attached to levers, projecting upward from a shaft below. The cloth is held at each end by a peculiar species of clamp, which holds tightly all it gets, and receives each new fold of cloth as readily as a "short-boy" takes an appointment in the custom-house. The machine is very beautiful in the accuracy and perfection of its working, and will we presume be extensively used in all the varieties of our large cloth manufactories. We should presume that the goods would be measured in this way with considerably greater accuracy than with the old process of stretching across by hand between hooks. It is one of the steps by which machinery is continually superseding the imperfect results of mere hand-labor, and driving the laborer to the necessity of cultivating his mental faculties to avoid being completely run over.

Mr. Veeder remarked, on the recent explosion of a boiler at Albany, and its remarkable power. The boiler was a new one.

Mr. Tillman, after saying that several of us are connected with the great Fair at the Crystal Palace, and want all our time to attend to that, moved that when the Club adjourns it do adjourn to the second Wednesday in September next. Carried unanimously.

Mr. Stetson desired Mr. Montgomery to state what degree of heat in the water he used to test boilers?

Mr. Montgomery explained, and stated as one of the phenomena of water, that it remained entirely inert when heated red hot.

Mr. Meigs recalled the celebrated experiments of the second Perkins, in London, a half century ago; that is heating water red hot, or rather white hot, in cylinders, the water being there confined under pressure.

Mr. Tillman—We can hardly overrate the inestimable importance to mankind of a perfect understanding of steam boilers by those who construct them and those who use them.

The subject of steam boilers was ordered to be continued at the next meeting. The Club then adjourned to the second Wednesday of December next, at 7½ P. M.

H. MEIGS, *Secretary.*

December 10, 1856.

Present—Messrs. Charles H. Haswell, Tillman, Larned, Lee, Creamer, Dr. Smith, J. K. Fisher, Clark, and others,—37 in all.

Charles H. Haswell, U. S. Engineer, in the chair. Henry Meigs, Secretary.

The Secretary remarked that he had extracts from the most recent learned articles on mechanics, from Europe and home, which he introduced to the club, as well to stimulate American mind as to instruct. It is a duty to provide for such an unexampled, keen, and bold-thinking creature matter for consumption; for the inventions of the old world can not only be beaten here, but we are daily drawn upon for the products of our mechanical genius. Yet, the *drawer* seldom admits that he received the funds from *U. S.*

He then read the following extracts and translations he had made since the last meeting of the club, viz :

Dr. Newton mentions a process for the solution of silex, by M. Hardinge, at Mount Washington. He effected the solution by first calcining, then into cold water—then grinding. He adds small quantities of some alkaline—perhaps salt, potash—then into boiler, intense heat; then becomes as clear as water. By a little alcohol—but he uses something analogous or having affinity for water, and the water disappears in a minute, and becomes pulp; put into moulds and dried, it soldifies; is like glass. Bricks are cheap(!) Cover walls &c., and color it as you please; cast into figures; mould it, &c.

IRON AND STEEL.

The great question as to making iron and steel is more agitated now than it has ever been since man first obtained it for his use.

Indefatigable efforts are made to improve this most precious metal. The last remarkable stir about it is Bessemer's, of England, who was believed generally to be the first to introduce powerful streams of atmospheric air into the molten iron.

It was soon found that an American, Martien, had invented that method, and obtained a patent for it some three years before. Knowing that Mr. John D. Ward, one of our members had devoted much time to the subject of iron, I called on him for his opinion, which he gave, (viz:) on the new giant cannon.

My opinion of Bessemer's patent plan for manufacturing ordnance is—that in the first place, it will be found nearly, if not quite impossible to reduce it to practice. In the second place, if guns *can* be manufactured in the manner described by him, they will be no better, if as good as those made from the best kinds of cast iron, (the Greenwood iron used at West Point, in making guns for the U. States, possesses a tensile strength of 32,000 pounds per square inch, and often more, or nearly three-fourths the average strength of wrought iron, and probably more than Bessemer's best specimens.) And, in the third place, if guns can be fabricated upon his plan, the cost will be many times as much as those made in the ordinary way. This will be in consequence of an expensive preparation of material, the employment of heavy and expensive machinery, requiring great power to work it, and the use of numerous parts and expensive fitting. And finally, the piece being composed of numerous parts, each will be liable to failure.

Great excitement has recently prevailed in England relative to Bessemer's plan of making iron and steel, by what may be termed boiling them by atmospheric air. But a damper has fallen from Newark, New Jersey, upon Bessemer, for J. G. Martien, of the city of Newark, in the State of New Jersey, had some time ago obtained a patent for a method so like Bessemer's that all observers are convinced of the originality being with Martien, or some other American, even before him.

Martien's plan is by application of blasts of air, or steam, or vapor of water to melted iron, to completely search and penetrate it perfectly before its congelation. Instead of allowing the melted iron to run from the blast furnace in the ordinary gutter, or channel, to the beds, or moulds, or to refinery or puddling furnaces, in the usual way, Martien employs channels, or gutters, so arranged that numerous streams of air, or of steam, or of vapor of water, shall be forced into and through the melted iron as it flows from the blast furnace.

The common process of refining the iron by using the refinery furnace, is done with. Where persons still prefer remelting for refining, then Martien's process is still used, as the melted iron flows from the furnace to the moulds. This gutter, or channel, may be made of any suitable material, but cast iron is best, the bottom part being hollow, in order to receive steam, or air, or both. This gutter, or channel, is perforated with numerous holes, which should be inclined, so that the streams of air or steam may be forced through the melted iron as it flows, in an oblique direction, but preferably forced into the iron in the direction in which it runs. However, it may be forced in sideways, from below or opposite to the flow. When hot blast or cold blast are used, it is best to connect the hollow bottom of the gutter, with the air pipes used for supplying the blast, and when steam is employed, the hollow bottom of the gutter is connected with the boiler used. By these means the air or steam introduced into the hollow bottom of the gutter, below the melted iron will be forced through it in numerous streams. The gutter may be covered over for any part of its length, and so arranged that heat may be applied to it, and so of the moulds or beds, that heat may be applied to the iron after leaving the furnace. The iron so purified may be allowed to cool in the moulds, or it may be run into a reverberatory or suitable furnace, to be highly heated therein, and it may be puddled in the usual way.

Martien is aware that it has been heretofore proposed to use streams of steam in puddling, and refinery furnaces, in such manner as to come in contact with the surface of the melted iron, and it has been also proposed to introduce steam below it when puddling. But Martien claims the purifying of iron from a blast or a refinery furnace, while still melted.

DECIMAL WEIGHTS AND MEASURES.

THE FRENCH METRICAL SYSTEM.

The London Mechanics' Magazine of October, 1856, contains a valuable article on this subject, worthy of our attention.

Habituated to the idea that in the revolution France has achieved a perfection in her weights and measures, by referring as a basis of infinite accuracy to the metre, or *one ten millionth* part of the arc of the meridian from the equator to the pole.

The plan of a natural standard originated with the never to be forgotten Talleyrand, Bishop of Autun, in 1790. He recommended to the academy the length of the second's pendulum as a standard, but the academy preferred the metre, and the national assembly adopted it. England has been most pleased with Talleyrand's plan These natural standards look exceedingly well on paper, highly philosophical, work nicely in scientific calculations. But there are other folks in the world besides the philosophers, and other calculations besides dynamical and geodetical. A national system of weights and measures ought to suit the greatest number of people.

The pendulum standard of England is in length 39 inches and $\frac{1393}{10000}$. The French standard, the metre is 39 inches and $\frac{37079}{100000}$ in length. These cannot serve for a mechanic's rule, nor is there any thing so important as the foot rule. The sun never sets on this rule! By means of its slide it is a perfect gauge for measuring the depth of holes and the internal diameters of cylinders within its range. It is a ready and good calculating machine, easily learned—placed by the side of a metre it is as superior to it in utility as a locomotive is to a wheelbarrow. What would Fairbairn, Maudslay, Penn or Whitworth say if they saw one of their mechanics take a French metre out of his pocket, unfold it, place it on the nearest clear surface to straighten its ten decimetres, then call upon another hand to help use it and then proceed to fold up the nine jointed snake-like monster and put it into any of his pockets? Would they call it a time saving instrument? They would prefer the old rule with all its faults, and they are not little ones; but give it four-eighths of an inch more length so as to make it contain one hundred instead of ninety-six eighths, thus making it decimal, and you have a rule nearly perfect, fit to be the fundamental unit of a system of measures and of weights. The advocates for a natural standard say that if lost it is readily recovered.

Cassini and La Hire brought before the French academy the question of ancient measures. Cassini tried to find out the Roman road measures, from the distances given by Roman writers of certain well known places, but the roads had undergone change, and it was uncertain from what point they were measured.

La Hire tried to find the measure of a Roman foot from two on the sepulchres of two architects and from the measures of certain Roman ruins; but these things had decayed. If you could compel all the mechanics in France to use the metre for one week you would have more valuable time lost than all the savans would save in a century!

Besides a standard measure from an arc or degree measuring, a favorite of the French, has been attended with difficulties and doubts. They measured an arc and then disputed its accuracy, they re measured it, prolonged it and still doubted it. The earth at one measurement was a prolate, then an oblate spheroid. Delambre shows in the Connaissance des Temps, in 1823, page 241, that the meridian is not forty millions of metres but 40,002,892 metres, and to-morrow another calculation would vary from this. See the difference in the measurement of a degree on the earth's surface, conducted by the greatest mathematicians at Royal expense:

Fernel, ...	Toises,	56,746
Snell, ...	"	51,766
Norwood, ...	"	57,412
Picard, ...	"	57,060
The two Cassinis, ...	"	57,097
Jacques Cassini, ...	"	56,960
Maupertius and two others, ...	"	57,422
Swarsberg, ...	"	57,196
Rosenberger, ...	"	57,405
Boguer, ...	"	57,646
La Condamine, ...	"	57,649
Delambre, ...	"	56,739
La Caille, ...	"	57,034
Mason and Dixon, ...	"	56,888
French metrical system, ...	"	57,008

The metre has not, as far as we know, been adopted out of France, although thirty years have elapsed. Before trying to force it on England, we ought to know what *doctoring* it has been subjected to—all through the unfortunate choice of a natural standard.

[Memoires De La Societe Imperiale Des Sciences Naturelle De Cherbourg. 1855.

Extracts translated by H. Meigs.

FIXED OILS.

Fixed oils, like the greater part of fatty bodies, are very nearly alike in their composition. One or two per cent of oxygen and carbon, and a few thousandths of hydrogen, sometimes more and sometimes less, constitute the greatest difference in two oils of very different properties, and often diametrically opposite to each other. So that chemical analysis of the most minute character is powerless to show the alterations which these oils undergo. It is only by judicious and close study of their physical properties, by observing the effects produced on them by certain re-actives or by comparatives, by good typical specimens that we can arrive at their degrees of priority.

Among the physical properties of oils, we particularly insist on their specific gravities. But as these differences are very minute, it is essential to have an instrument of very great sensibility to measure them. The hydrostatic balance has been rejected, and unless we can have one possessing the precision and sensibility of the balances used by chemists in their quantitive analyses, and an observer able and experienced, we shall commit serious mistakes.

Mons. Lefebvre, of Amiens, has furnished a cold oleometer. It resembles the areometer, (measures density of fluids,) only that the graduation is so calculated that the specific gravities of the oils *are read on the scale*, as they are at 15 degrees Centigrade =57 degrees *Fahrenheit, as unity.*

The specific gravities of fixed oils are inferior to water, but, with one single exception, are nearly all comprised within 0.900 and 1.000. Hence it would be useless to figure the first decimal on the oleometer scale. For example: Suppose the level of liquid to be at division 34, we must conclude that the specific gravity is 0.934, at the temperature of the period of observation.

A description of the instrument follows:

The fixed oils all possess a more or less active affinity for oxygen, which they absorb when exposed to the air by disengaging the carbonic acid. They then begin to thicken, and at last finish by becoming solid, so as not even to soil paper. This result occurs rapidly when the oil is spread thin; it becomes, as it were, resinified, and represents a hard, solid varnish. This absorption of oxygen is accompanied by disengagement of heat, like all chemical reactions, and in certain circumstances may become intense enough to give spontaneous inflammation to bodies oiled. Terrible conflagrations have been caused by it, especially in spinning mills. Rags used to clean oiled machinery, &c., never should be laid by in heaps. Some oils always retain their unctuous qualities, yet thicken by exposure to the air.

Hence the distinction between *fixed* oils and *drying* oils. Fixed oils are extracted from both animal and vegetable bodies. Animal from the fat, vegetable chiefly from the seeds. Here follow descriptions of vegetable oils, such as linseed, colza, olive, &c. Olive oil is the least dry of oils. Virgin olive oil has a fine, clear, yellowish color, transparent, limpid, and the odor of the fruit, quite agreeable taste, and its specific gravity is 0.917.

The olive oil is adulterated with oil of poppy, sesame, and arachis.

The specific gravity of pure filtered whale oil is from 0.9155 to 0.9302, in thirty samples examined.

These gravities are perfectly proved.

[Journal of the Society of Arts, London, April 25, 1856.]

PHOTOGALVANOGRAPHY, OR ENGRAVING BY LIGHT AND LIGHTNING.

A paper was read from Herr Paul Pretsch, late manager of the Imperial Printing office, Vienna.

"Having been for many years engaged as manager of the Imperial Printing office, at Vienna, soon after the introduction of photography, I felt the importance of this beautiful art in re-producing and imitating most of the wonderful productions of nature and art. I was entrusted with the power to establish photography at the office, and gained a prize medal at the exhibition of 1851. I entertained the idea that I could by photography obtain a plate from which we might print with common printers' ink. Many learned men believed in its importance and possibility. Dr. Berres in Vienna, was one of the first to make important investigations. He executed prints from etched daguerreotypes, of great merit. He used a solution of gum arabic and nitric acid. There was about that time a process which gave very perfect but faint results; it consisted in the use of bichromate of potass with the addition of aqua-regia, fixed by washing with ammonia. W. R. Grove of London, used the daguerreotype plate as the *anode* in a decomposing trough filled with diluted muriatic acid, and as the *cathode*, a platinum plate—both plates being connected with a single cell galvanic battery.

"Mr. Fizeau of Paris, etched his daguerreotype plates, by covering them with a mixture of nitric, muriatic and nitrous acids, or with a mixture of nitric acid and nitrate of potass and chloride of sodium, repeating this process several times, cleaning his plate each time with caustic ammonia—the faint etched lines or tints were afterwards filled with printers' ink capable of drying rapidly. The whole surface of the plate was then gilt, the dried ink removed and the plate etched with nitric acid. All these investigators have used daguerreotypes upon silvered copper, or real silver plates. All of these artists were struck with the minuteness and beauty of the details, but complained of the faintness of the etched parts, and confessed that no printers' ink could enable them to re-produce the beauty of all the parts visible upon the plate. These plates were done ten years ago in Vienna.

Note.—Anode, the entrance of electricity into substances. Cathode, its exit.

MULTIPLICATION OF BOOKS AND ENGRAVINGS.

Mr. Charles Knight, in his report to the Board of Trade on class 26, drawing, printing, &c., at the Paris Exhibition of 1855, says:

"I will endeavor to take a rapid view of the new appliances, as shown in the French Exhibition, which afford the probability of ultimate extension of the copying processes, as belonging to books and engravings, as well as those which, originating in imperfect attempts to produce curiosities, have already formed, or are forming branches of commerce.

"In type founding, machinery has been introduced instead of the common mode of casting each letter in a separate matrix. In the great French foundries of Plon and of Laboulage, as well as in others, many ingenious applications are to be seen. In our own London foundries of Caslon, Figgins, and Bezley, as well as in our provincial foundries, we have the most beautiful, as well as the most useful modern founts."

It is in the adaptation of it to particular classes of printing that we find the practical good sense of our type founders, as in most other trades. A type of a different character is required for a newspaper than for a book—a type compact, not too fine, very enduring. This quality of sustaining great and constant wear has been accomplished, in types faced with copper, or other metal, by the galvanic process. But this beautiful discovery of electrotyping is producing results which stereotyping has never attained.

A cast from type metal, of a wood cut especially, cannot have the sharpness of the original. An electrotype rather adds to the sharpness than diminishes it. The rapidity of the process is also most remarkable in skillful hands. The wood cuts of the Illustrated News, and of other illustrated papers, are thus duplicated, so as to meet the large demand in a limited time. The large plate of the Austrian types of all languages, thus produced by the galvanic process, was noticed in the Palace Jury Report of 1851. The same description of plate, with the Calmuck characters added, measuring 540 square inches, was exhibited in 1855. But the Austrian printing office shows new activity in connection with the capabilities of electrotyping. One of these new processes is called "stilographic." A plain surface is covered with a preparation somewhat like the waxen tablets upon which the ancients wrote. It is composed of two parts of shell-lac and one part of stearine. On this material the draughtsman makes his design with a style. This forms a matrix, from which an electrotype is taken in relief; and from this another plate is taken, which answers the purpose of an incised copper, (engraved plate,) and is worked at the roller-press. It furnishes a readier mode to the artist than the etching process, but it is scarcely so effective.

The art called "nature-printing," (in German called "naturselbstdruck,") had not made sufficient advances to be exhibited in 1851. The Austrian printing office in 1855 showed to what beautiful and useful purposes it might be applied. The identical reproduction of any natural object—a plant, a feather—by taking its impression on a sheet of lead by an application of cylindrical force, and then producing a galvanic plate which will give impressions of the form, and giving also the colors by separate impressions of the similarly colored parts, is an onward step in printing which has already taken a commercial shape in England. The admirable plates of Ferns, now published by Messrs. Bradbury & Evans, are quite equal to the Austrian examples."

Note.—The American Institute received from the Honorable Charles F. Loosey, consul general of Austria, copies of those magnificent nature-printings, including the great work, "Naturselbstdruck."

James K. Fisher, civil engineer, observed that the London editor was mistaken in the idea that the French metre was little used, if at all, out of France, for he knew it to be used extensively in Lombardy and some other parts of Italy.

Mr. Tillman said that the whole subject demands great attention, and desired that it may be thoroughly discussed by this Club. Let it be kept before us.

Mr. Creamer did not think the difference between the pendulum and the metre standards as of much importance; but he much preferred the decimal plan.

The Chairman was of opinion that this question was of importance. We want a proper standard!

Mr. Creamer moved that the committee for selection of questions be now appointed for the season. Nominations were made and the following members were unanimously elected, viz: William B. Leonard, James K. Fisher and S. D. Tillman.

STEAM BOILERS.

Members requested Mr. C. H. Haswell, the Chairman, to give his views of their construction, and also the causes of their explosion. He called Mr. Tillman to the chair and took the floor. He proceeded to illustrate by drawings upon the black board, the general form of the steam boilers used almost universally on our great western waters.

In consequence of the frequency of fire occurring on board of steam vessels of all descriptions, I deem it proper to address you upon the subject, for the purpose of inviting your attention thereto, and at the same time submit to your consideration the following recital of the principal causes therefor, and also some observations regarding the proper measures which, in my opinion, should be resorted to, to arrest or remove them.

Neglect of Security and Provisions against Fire on the part of the Constructors and Owners of Steam Vessels.

BOILERS.

1. *Boilers with external furnaces*, alike to the ordinary cylindrical boiler of the western and southern waters, are supported by iron standards; the sides of the furnaces and the bottoms of the lower flues being constructed with brick work and mortar beds, and in the construction of this work care is given more to the general confinement of the fire and flame for the economy of fuel than it is to guard the vessel from being fired. When boilers of this description are used, even on land, it is impracticable to keep the brick work and bedding permanently free from fissures, whereby fire or sparks may pass out and ignite any inflammable material they come in contact with; how much more difficult then must it be to keep brick work free from fissures, when it is subjected to the workings and concussions of a steam vessel.

2. *Boilers with internal furnaces*, alike to the ordinary marine boilers, are frequently constructed without water bottoms, hence, when the fittings of the legs to the bed of the boiler is imperfect, either by neglect in the workmanship, or may become so by the effects of rust, an opening is exposed, whereby fire or sparks may pass out, as in the case just recited.

3. *Boilers, the furnaces of which are fitted with blowers, to afford an artificial draft.*—In this case the pressure of air within the furnace, flues, and pipe, being superior to the external atmosphere, any fissure or hole in any part of the external face of the furnace, the fitting of the legs of the boiler to its bed, (when there is no water-bottom,) the fitting of the man-hole doors or

flue-stoppers, and the fitting of the smoke pipe to the chimney, becomes a ready vent to fire or sparks which are driven out with great velocity, when the blast is high, and which falling upon or adhering to any inflammable material they may come in contact with, the risk of igniting it is incurred thereby.

Coverings and protection to boilers.—It is very rare to find that the boilers of any of the lake, river, or sound steam vessels, are covered with felt, (of hair,) for the double purpose of protecting the wood work around them from fire, and for the economy of fuel. This very effective precaution against fire, is scarcely known amongst the class of steamers referred to, whilst its use in the sea-going service is almost universal, the utility of it being recognized in restricting radiation of heat from the boiler to the engine room and cabins of the vessel, and in its economy of fuel: although at this time there are many owners of steamships, who pertinaciously refuse to resort to this means of effecting economy of fuel, comfort to the passengers and crew, and of reducing the risk by fire, merely because it involves an immediate expenditure of money, and because the engineers of the vessel, in common with a large majority of the profession, always oppose any means calculated to save life, property and fuel; consequently, they do not urge upon the owners of their vessel the propriety and necessity of this provision.

As a security against fire from being communicated by an over-heated boiler, a covering of felt is of the first importance, for the reason, that immediately upon its being burned, the peculiar odor of its combustion is readily recognized, the engineer and firemen upon duty at once know that the felt around the boiler is being burned; their attention is forthwith drawn to the circumstance, and if it has arisen from an over-heated boiler, or from fire being communicated through a hole or fissure, it is readily discovered, and remedial measures resorted to.

Covering and protection to wood work around boilers.—In our lake, river and sound steamers, it is very rare to meet with any covering as a protection from heat or fire to the wood work contiguous to a boiler; the neglect of this essential point is so general, as almost to be deserving of being classed as universal; and as the occurrence of fire, originating around a boiler, is not restricted to one cause, but may arise from so great a number, it is difficult to account for the continual neglect of proper precautions upon this point.

The cases in which the wood work around a boiler is exposed to being fired, are,

1. When the water in the boiler has been allowed to fall below the flues, the shell and steam drum or chimney, as the case may be, become sufficiently heated by radiation from the superheated steam within, to effect ignition of wood work immediately exposed to it.

2. When water has been allowed to fall bèlow the flues, as just referred to, and the occurrence is discoverd, it is customary, immediately to haul the fires from out of the furnaces into the fire room, and when the wood work immediately over and around the fire room is not properly protected, fire is likely to communicate to it, and fires from this cause have frequently occurred.

3. When blowers are used, the fire or sparks that may be blown out through fissures in the furnace doors, ash pits, flue holes, chimney connexions, &c., will readily ignite wood already at a high temperature and quite charred, from having been before exposed to such temperature.

Chimney Jackets and Rooms.—In single decked steamers, when the boiler is below, and the steam chimney is above the main deck, or when the boiler is on the main deck or upon the wheel guards, it is customary in many cases, to cover the chimney or chimneys, as the case may be, with a wooden casing, set off from it but a few inches, and in others to cover it with a sheet iron jacket, in most cases imperfectly made, and in all, insufficiently fitted. In steam vessels with two or more decks, the boiler or boilers being in the hold, the steam chimney and the base of the smoke pipe are commonly enclosed in wood work alone, which is in some cases set at a proper distance from the chimney, to avoid the risk of it being fired by sparks or the continued radiation of heat from it, but the purpose of this space is very frequently negatived, by its being used for the storage of swabs, buckets, brooms, &c., &c.

This wood work, however, is very seldom properly protected, in many cases no protection at all is attempted; in some a coat of whitewash is laid on, and in others a lining of tin, zinc, or iron, in which the laps of the sheets are laid downwards, as if they were there placed to shed rain or water falling from above, instead of fire arising from below. The tin, and even the zinc, unless well nailed, are too light, and their expansion at high temperatures too great for this purpose: the consequence is, that when subjected to the heat of the smoke pipe, they wrinkle and spring to such a degree, as not only to admit any sparks that may arise up from below, to pass between their laps and under them to the wood, but the sparks are liable to be arrested there by the inequalities of the surfaces, where they are exposed to a draft of air which readily effects an ignition of the wood, and when this is discovered, the presence of these sheets prevents the immediate application of water to the fire underneath them, and before they can be removed, the flame has passed through the joints or crevices of the light wood work around the chimney and boiler, and the whole is in full combustion.

In other cases this wood work around the steam chimney or drum, is placed close to it, precluding the proper circulation of air, and not affording the necessary room wherewith to cover the wood with any material, or even to whitewash it, and when fire is communicated to this work, fitted by its character and position for ready combustion, it is in the most favorable condition therefor, and when ignited it requires but an instant for it to be developed, beyond the control of the means usually found in steam vessels.

Deck loads.—It is a common occurrence for the main deck of our Coast, Lake, Sound and River steamers to be so encumbered with freight, that not only is a great risk incurred from fire being communicated to the freight when combustible, but in the occurrence of fire, the presence of this freight is an obstruction to the means necessary to be resorted to, to extinguish it.

Store and Tool rooms.—These are other and prolific sources of fire on board of steam vessels, rendered so by their being appropriated to the storing of oils, paints, turpentine, (the latter frequently in packages of glass,) wiping stuff, either of loose hemp or cotton waste, packing yarn, cotton wick, matches, &c., &c., which in a large majority of cases are not properly stowed, but from the carelessness of those who visit these rooms, articles alike to the above recited, are scattered about and constantly exposed to be ignited by the upsetting or falling down of a lamp or candle. In steamers with two decks, the boiler or boilers being below, it is by no means unusual to find a part of the space immediately over the boilers allotted to a store room for the engineer's department, for the reason that being unsuited by its high temperature for ordinary purposes it is not objectionable on that account as an engineer's store room, added to which, it is declared to be very convenient to the engine room, and the propriety of the location is thus confirmed; the result of which practice is, that upon the upsetting of an oil can, or the breaking of a glass vessel containing spirits of turpentine or paint oil, the top and sides of the boiler beneath are flooded with an element of combustion, which rarely if ever fails to cause the destruction of the vessel.

Pumps.—In the construction of an engine for a steam vessel, it is usual to attach an ordinary lifting pump, of a capacity calculated to free the vessel from the drips and vents of water from the engine and boiler, and from the ordinary leaks of the hull. This is also arranged so as to be worked by hand when the engine to which it is attached is not in operation, and it is usual also to connect to the feed pumps of the boiler an air vessel by which it may be made to project water, and thus be used as a fire engine, and until the introduction of the independent steam fire engine and bilge pump of H. R. Worthington, within the last ten years, no other means were depended upon to free a steam vessel from water, or furnished it to arrest a fire.

With these details, then, of the numerous causes of fire on board of steam vessels, and of the imperfect means to prevent or arrest them, I now proceed to recapitulate the several causes here referred to, and to suggest such measures as, in my opinion, should be resorted to by the owners of steam vessels at this time, and builders of them hereafter, by which this class of disasters may, to a great extent, be averted.

Neglect of security against fire.

1. *Boilers with external furnaces* should be supported by iron standards alone. The sheet or plate iron, as the case may be, which encloses the masonry, should be accurately fitted in its joints, and under no circumstances should the wood work around the boilers be allowed to be within one foot of them, their upper surfaces being well covered with felting of hair, and the under side of the wood work, immediately over them, sheathed with zinc or sheet iron, the nails securing which to be in squares not more than one and a half inches apart, and the laps of the sheets to be secured at every half inch.

2. *Boilers with internal furnaces* should have water bottoms, in order to guard fire from being communicated to their beds through openings therein, and when a natural draft is used for combustion, the exhaustion within the furnaces, flues and pipe is such as to cause a current of air to lead into and through any apertures opening to them, and hence fire or sparks are prevented from being emitted through any of the ordinary openings or joints about a boiler; but where a blower is used, the conditions are entirely different. The pressure of air within the furnaces, flues, &c., is so great, that fire, sparks, and even small pieces of

ignited coal will be forced through any openings that may exist, and as it is impracticable to construct a boiler without a number of insecure openings, such as those of the furnaces, ash pits and flue doors, smoke-pipe joints, &c., fire is constantly being forced out through them, and a great number of steamers have been destroyed from this cause, added to which, the momentary firing of them from this cause is a matter of so very frequent occurrence, that if the public at large were fully aware of the risk of life they incurred in traveling in steamers where blowers are used, the abandonment of all such vessels would be so universal that the owners of them would be compelled to remove this risk forthwith, their interest in this inducing their attention thereto more effectually than any law that might be enacted to reach them. So opposed to all propriety is the use of blowers, and so essentially necessary to the requirements of personal safety is the abandonment of them, that I question if a jury, composed of intelligent persons, with the facts fully before them, could be found throughout the entire country, that would not decide that a vessel in which they were used was unsuited to carry passengers, even on a river or sound, and unseaworthy on a lake or the ocean.

3. *Covering and protection to boilers.*—All boilers should be covered with a hair felting, both for the purpose of indicating when they are unduly heated, and as a means of preventing the radiation of heat from the boiler to the wood work around it. So well established are the advantages of felting boilers, both for the economy of fuel, security against fire, and comfort to a crew, with all engineers—and I wish to be understood as not using this term to include mere drivers of engines—that in some of the Atlantic, and in all naval steamers, the felting of twice and thrice the ordinary thickness is used, added to which are fitted over it coverings of canvass and sheet lead.

Neglect of Protection to Wood Work around Boilers, their Chimneys and Smoke Pipes.

1. *Protection to wood work around boilers.*—The wood work immediately around a boiler, its steam chimney or drum, should be set off from it as far as may be practicable, consistent with the capacity of the vessel; thus, when a boiler is in the hold of a single decked vessel, it is not practicable to afford much space between its top and the under side of the deck beams above it without making a break in the deck, a measure not always consistent with the requirements of the vessel; neither is it desirable when the boilers are upon the guards of a steamer to construct a

covering to them of a sufficient height to secure it from being fired by radiation of heat from the boiler. Neither is it imperatively necessary that there should be any great distance between a boiler and its surrounding wood work; one foot is a desirable distance, and even more would be preferable, but when blowers are not used, and a boiler is properly covered, the wood work around it, if properly protected, may be set within six inches of it with safety, and all wood work about a boiler, as well as the top and sides of the fire rooms, should be covered with sheet iron or zinc, secured in the manner already detailed, with the further precaution of placing the laps of the sheets upwards. When a metal covering is not used, several coats of thick whitewash, stiffened with a little glue, will answer a good purpose ; in fact, I think this preferable to coverings of tin or zinc, as they are usually put on.

2. *Protection to wood work around steam chimneys and smoke pipes.*—Chimney rooms should be afforded a space sufficient to admit of the passage of a man around the chimney, and should be without any floor, so as to furnish a free communication for the escape upwards of the heated air around from a boiler, and also to admit of the introduction of a hose pipe, in the event of the wood work around it being ignited. Whenever a smoke pipe passes through a deck, however light its character, there should be an open space around it to admit of a current of air to pass through it, and between this space and the wood work there should be a metalic boxing containing water to guard the wood from ignition.

Want of Provisions against Fire.

Pumps.—Where security from fire is imperfect, a greater regard to the provisions against it should be had; this requirement, however, is not observed, and the disregard to the safety of human life, and the interests of the underwriters, which so generally exists, is observable in the want of provisions against fire, as in the other points referred to.

All steam vessels should be provided with an independent steam fire engine and pump combined, and all sea-going steamers of magnitude should be provided with two, and an independent boiler to work them; fitted to these pumps there should be a sufficiency of hose, in good order, to lead to any part of the decks or hold; added to which, there should be the proper number of hand fire pumps upon the upper deck of the vessel, with hose sufficient in length to reach to any part of the vessel, forward or aft, according as the pumps may be located forward or aft, and which hose should be so fitted as to be capable of being attached to the hose of the engine pumps. Further, the provisions of the U. S. Law of 1852, regarding the carrying of fire buckets and axes should be rigidly enforced, and a non compliance therewith should be held to be a forfeiture on the part of the owners of a vessel that was burned to any claim for loss on the underwriters.

As many owners of steam vessels will think this suggestion of even one independent steam pump and a boiler, a requirement altogether unnecessary, and imposing too great a burthen upon them; they will be surprised to learn that I can support my views by a reference to the fact that most of the sea steamers belonging to this port are fitted with pumps of this character, and that many have two of them, and an independent boiler to operate them; further, that rarely does a month pass without the occurrence of a steam vessel upon the coast or ocean being saved from burning or sinking, solely by the use of these pumps, and under circumstances too, when the ordinary engine and ship's pumps prove totally inadeqate to meet the requirements of the case.

If the provisions against fire on board of steam vessels—both as to the means of subduing it, and the proper organization of the officers and crew in the event of fire—were such as to give confidence to the public, there would not, upon its occurrence, exist that want of reliance in the ability to arrest it which is so fatal to the chance of subduing it. When the officers of a vessel are aware of their insufficient means to arrest a fire, and the crew are without that observance of obedience and restraint which is due to discipline and a reliance in their officers, there can be little combination of efforts, and when the inflammable character of a steam vessel is considered, it will be admitted that it is not from the labors of one or a few individuals that success is to be anticipated. It requires a high order of even compulsory discipline for a crew to continue at their posts, with a knowledge that passengers are not only cutting off their means of safety by the occupation of the boats, but terror-stricken and frenzied, they are probably destroying that very means by their confused and ill-directed labors.

So long as the captains of steam vessels do not exhibit to the public that the provisions for personal safety and discipline on board of their vessels is generally adequate to the demand upon them, so long will their labors, and that of their officers, be rendered impotent, for the crew and passengers, judging of the present by the occurrences of the past, will look for such safety as that which their selfishness will direct, and their own resources will effect for them.

Store Rooms.

Engineers' store rooms—Should be located away from the fire room or boilers; all inflammable and combustible materials like to turpentine, paints, oil, and tallow, should be kept in metal tanks, securely fastened to the deck, and both they and wiping-stuff, spun-yarn, etc., should be stored in a room other than a tool room or work shop, the location of which should be such that it not only could be readily reached in the event of its being on fire, but it should be so located as to receive sufficient light into it to set aside the use of artificial light, except at night, and then it should be lighted by a fixed light without the room, but shedding its rays into it, alike to the manner in which the magazines on board of vessels of war are lighted.

Lights.—Instead of the universal neglect to give to engine and fire rooms a sufficient light whereby the operations thereof may be conducted without the use of hand lamps, there should be fixed lights of a construction and character suited to give full light to all parts of these rooms; thus setting aside the risk of firing a vessel by the upsetting of a lamp, etc.

Improvidence of Captains and Engineers.

Although this is the last cause to which I shall ask your attention, yet it is by no means the least worthy of reference; on the contrary, I consider that if a large majority of these officers better discharged their duties to their employers and to themselves, there would be but little occasion for me to have addressed you this communication.

Captains.—Captains of steam vessels in the superintendence of their construction and equipment, should pay that attention to the requirements of security and provisions against fire, which, if they are not all qualified for the position, their experience and observation will show them to be necessary. The interests of the owners of steam vessels require full attention to these points, their contract with the public, in a moral view, demands it.

Engineers.—As the security against fire on board of a steam vessel is more immediately under the supervision of the engineer than that of any other person, and as he is, or ought to be, better acquainted with the risks therefrom, a strict requirement should be demanded from him, both by the owner and commander of a steam vessel, as to the resort on his part to every practicable security against fire, and every available provision for it if it should occur.

Upon an engineer entering upon duty on board of a steam vessel, it is his first care to advise himself fully as to the security and provisions against fire, and the means to free the vessel from water in the case of her leakage or being bilged, and if she is not properly secured and provided he should forthwith report this condition of affairs to the captain, and if he or her owner assumes the responsibility of not noticing this report, the engineer has discharged his duty, and he must abide events; if, however, it should happen that human life should be sacrificed by inattention to his report, and the case should come fairly before the public, I am of the opinion that like reports of engineers would receive better attention for the future. If engineers had adopted this course they not only would have effected a just attention to their representations, but they would have saved many lives, both of the public at large and of their own profession.

Unfortunately, however, engineers as a class are the last persons not only to assume this position, but to acknowledge its propriety; for instead of guarding against the dangers which they are best advised of, they appear to consider the exhibition of an indifference to them a point of honor. In corroboration of this, I could present many relations, clearly exhibiting that it is not through the providence of engineers that the public and the underwriters are to look for safety.

Not only has it required ten years of labor and importunity to introduce the independent steam fire and bilge pump into a bare majority of steam vessels, even with the support and repeated exhibitions of it having saved both vessels and crew, but from the almost united resistance of engineers, it is likely to require a longer period than this to introduce the practice of felting boilers, and protecting the wood work around them.

In fact, the disregard of the owners of steam vessels, and the neglect of the trust confided to the captains as well as engineers, in not directing and requiring the proper precautions against fire, is almost universal, notwithstanding vessels and lives without number have been lost in consequence of this neglect, altogether inexcusable and without a justification upon any one point, or under any combination of circumstances.

With them, the non-occurrence of a fire where the security is imperfect is assumed to be conclusive as to the sufficiency of the security from its occurrence at any subsequent period, and if it has so occurred that a boat indifferently secured and provided against fire has run for a period without ever being fired, it would be found very difficult to induce either her owner, captain or engineer, to adopt any change having in view any improvement in her security against fire.

As the proportional loss of steam vessels by fire is greater with us than with any other nation, it is not amiss, as a measure of apology for us, that the cause of it should be referred to here, with the view of showing how this blot upon our fame has arisen.

Upon the first introduction of steam navigation in this country it was confined to rivers, bays, and the shores of Long Island sound, and if a fire occurred, reliance for security of life was had more upon the facility with which the vessel could be run ashore, and the passengers and crew escape thereto, than the probability of subduing it by provisions for the purpose.

Had our first essays occurred at sea, and been restricted thereto like those of the English, we would have commenced with a better observance of the requirements of security from fire, but unfortunately the burning of a steamer upon a river does not present itself to the feelings of the public, like to a similar occcurrence at sea, from the losses and horrors that usually attend it, it is universally conceded to be the terror of the ocean.

My purpose in submitting these view to you, as has already been stated, is that of inviting your attention to this subject. If you should see fit to submit this letter to the public, it may be the means of arresting the attention of the owners and officers of steam vessels to the responsibilities of their positions, and should it cause them to reflect upon the nature of their duties, both to the public and themselves, I cannot doubt but that some good may be effected thereby; if so, the interests of all and my object will be well accomplished.

Mr. Meigs remarked that he was on a committee of the Institute with Professor Renwick and others and found the operation in his opinion far more difficult of control and very dangerous.

Mr. Lee asked the chairman what form of boiler had been found most liable to explosion? That according to his own observation tubular boilers were the least liable. He had never heard of one of them being exploded. He had tried many experiments with them, heated them red hot without any danger.

Mr. Clark thought that the less water there was over the flues the more rapid the formation of steam.

Chairman—But it is best to have more water, for on an average more steam and more uniformity in its heat are derived from a full supply of water, because it becomes necessary to put in cool water at frequent intervals where the first supply is small.

Mr. Fisher had experimented on the foaming in boilers.

Mr. Creamer thought that great attention should be paid to the safety valves which seldom are properly proportioned in rise and efficiency to their boilers.

The club ordered the subject of "Steam Boilers" continued at the next meeting.

H. MEIGS, *Secretary.*

January 14, 1857.

Present—Messrs. Haswell, Prest. Pell, Leonard, Tillman, Dr. Smith, Butler, Godwin and others—24 in all.

Mr. Haswell, the Chairman, presided.

Mr. Meigs the Secretary remarked that our rules admit miscellaneous matter for the first hour, but the members may at any time take up the regular subject or any other appropriate to the club. That our plan is to bring before our clubs all that is new and interesting in the world of knowledge. By steamers we receive immediately all European and oriental discoveries. We take now some lessons on iron ores. They have cost great labor. We will lay them before us in our searches after iron in our great country.

IRON.

It is desirable that all that is known of this noblest metal of all given us and in profusion, by our Creator, should be made known, if possible, to all men. As an aid to engineers, we have thought fit to put into a narrow comprehensive space the various ores of it, viz:

1. *Meteoric Iron.*—Prof. Pallas mentions a mass which fell in Siberia weighing 1,600 pounds. A mass fell in the Punjaub, India, and was found red hot. It was by order of the Emperor forged into a sabre, a dagger and a knife. The workmen found it too little and added one-third part of common iron to it before it would work well. Nickel is always a constituent of the meteoric iron in small proportions.

Bousingault analysed some masses at Santa Rosa, on the road from Pamplona to Bogota, S. America. One mass of this meteoric iron was found on the hill of Tocavita, about a quarter of a league from Santa Rosa. We saw the cavity whence it was taken lat. 5 deg. 40 min. north, long. west of Paris 75 deg. 40 min; height above the sea 2744 metres. The weight of this mass was 1580 pounds. The nickel in it was only $\frac{75}{100}$ of one per cent. Mr. John's analysis of meteoric iron gives us:

	Pallas.	Elbogen.	Humboldt.
Iron,	90.0	87.5	91.5
Nickel,	7.5	8.75	6.5
Cobalt,	2.5	1.85	2.0
Chromium,	trace,	none,	trace.

It contains some impurities, especially sulphur and phosphorus. To conquer these, sal ammoniac is put in, and the salt, because the hydrogen of the sal ammoniac, at a certain heat, unites with the sulphur, and they pass off together. The supposed amount of sulphur in the iron decides the quantity of the salt and sal ammoniac. If rotten bloom iron is in the crucible, a larger proportion is added. The yellow prussiate of potash and the charcoal furnish the carbon. Steel is pure iron, with the addition of a small amount of carbon in perfect combination of the two. The boiling iron in the crucible probably gets its carbon not so much from the charcoal as from the cyanogen of the prussiate of potash, one of whose two parts of carbon, uniting with the phosphorus present, bursts into flame, and the other part, freed from all engagements, hastens to embrace the iron. Prussian blue, or the red prussiate, would yield just as much of the carbon and make just as good steel, but it is more expensive, while the yellow prussiate is very cheap. The manganese serves merely to form the scoriæ—the air tight cover to the melted mass in the crucible. Brick dust does as well, or anything which would as perfectly *seal up this chemical marriage from prying eyes!* and even from the *curious atmosphere*. After three hours, the metal was poured into moulds, flowing as freely as cream or molasses from the lips of the crucible in summer.

In the Province of Bahia, in Brazil, is a mass of meteoric iron, 7 feet long, four feet wide, and two feet thick. Weight about 14,000 lbs.

1. *Magnetic Iron.*—Most of the ores of Sweden are of this family. The magnet belongs to it. Rinman says that these all give red short iron, which is remedied by another melting.

There is also iron magnetic sand.

2. *Specular Iron.*—Primitive form, rhomboidal, gives excellent malleable iron.

3. *Brown Hematite.*—Wrought iron from it, very valuable.

4. *Hepatic Iron.*—Brownish black. Becomes magnetic when heated. Gives to borax an olive green color.

5. *Brown Scaly Ore.*—Gives to borax a greenish yellow color.

6. *Brown Iron Ochre.*—Nearly the same.

7. *Red Hematite.*—Gives excellent cast and malleable iron.

8. *Compact Red Iron Stone.*—Color internally purplish gray.

9. *Red Ochre Stone.*—Blood red. Melts more easily than any other, and makes excellent malleable iron.

10. *Red Scaly Iron Ore.*—Color, brownish red to dark steel-gray. Friable, consists of semi-metalic, shining scaly parts, which are somewhat translucent, and which soil strongly.

11. *Upland Argillaceus Iron Ore.*—Color, steel, redish or yellowish gray, or yellowish and dark nut brown, or dark brick red, or dark ochre yellow. The celebrated foundries of Carron, in Scotland, are principally founded on this kind of ore. Its color is partly light and partly bluish gray. Some samples are a light or whitish purple externally, but of a dark ochre yellow internally. It is found in masses apparently slaty, and also in nodules, in an adjacent coal mine, of which, in some places, it forms the roof.

12. *Scalpiform or Columnæ Iron Ore.*—Color, dark brownish red. It is formed of columns adhering to each other, but easily separated, commonly incurvated, and with a rough surface, brittle.

13. *Nodular, or Kidney-formed.*—Color, externally yellowish brown, internally lighter color. Often contains a kernel colored mostly ochre yellow.

14. *Pisiform, or Granular Iron Ore, Pea-shaped.*—Color generally brown, or dark yellowish, and blackish brown. It is found in roundish grains, of the sizes of peas and nuts. Is like oolitic, near Mount Cenis.

15. *Bog Ore, Meadow or Conchoidal Bog Ore.*—Color, blackish brown; massive, and tuberous, glistening, fracture small conchoidal. Streak yellowish gray, soft.

16. *Swamp or Bog Ore.*—Color, dark nut brown, sometimes nearly black. Found in amorphous (shapeless,) lumps or grains, mostly corroded and mixed with sand.

17. *Iron Mica, or Plumbaginous Ore.*—Color, bright iron gray, sometimes bluish gray, or nearly black. Found in amorphous masses, or disseminated or crystalized, generally in thin, minute, hexahedral (six-sided,) lamellæ (plates or sheets,) and in botryoidal (bunch of grapes like,) groups.

18. *Blue Martial Earth.*—After exposure to the air for some time, it becomes a deep blue, seldom of a smalt blue. Generally found in bogs, sometimes in secondary stratified mountains, always some feet deep. Sometimes found white, or brown, or green in its native beds; sometimes in large masses or lumps. Heated on red hot coal it inflames and leaves a red powder which is somewhat magnetic. Before a blow-pipe it instantly becomes reddish brown, and melts into a black lead.

19. *Green Martial Earth.*—Light or dark canary green, passing into olive green, or yellow. Friable, seldom indurated. It is rare.

20. *Common Pyrites.*—Color, bronze yellow, sometimes gold yellow.

21. *Striated Pyrites.*—Like the former when fresh broken, but soon tarnishes, passing into variegations resembling the colors of the peacock's tail.

22. *Capillary Pyrites.*—Color, generally steel gray. Found in hexangular or octangular acicular (sharp like prickles,) crystals, either parallel or diverging from a common centre, or capillary and woolly, or interwoven.

23. *Magnetic Pyrites.*—Color, between tombac brown and brass yellow. Found disseminated and massive.

24. *Calcareous or Sparry Iron Ore.*—Yellowish gray, passing into yellowish brown.

25. *Cube Ore.*—Color, olive green.

ROLLING METALS.

Rollers in common use are cast solid in cast iron chilling cylinders, and thus the crystallization of the axle is rendered brittle by the chilling process. To prevent this, Messrs. Stanley, Bellamy & Booth, first cast the axle of tough metal, and when cold, cast upon it a shell of harder metal, finer texture, as thick as required. The cold axle chills this outer coat. It may be cast in the open sand. To prevent any fracture in the exterior coating, the axle is made smaller in diameter in the middle—this figure causes it to adapt the metal cast upon it without any fracture.

The iron masters of England, are suffering from the effect produced in the United States—from their sending over here such immense quantities of trash by the title of iron!

ULTRAMARINE.

This splendid blue, hitherto very costly, is now manufactured by tons weight, at the city of Nuremberg, in Bavaria. Messrs. Zeltner and Heyne now have a factory of this color which covers several acres of ground. They have two stores—one of which is 300 feet in length, and holds from 300,000 to 400,000 pounds weight of ultramarine. This color undergoes eighty different processes before it is ready for use. It is now applied to coloring cloth, woolens, tapestry, paper, sealing waxes, besides its use by artists.

Ultramarine originally made from the Lapis Lazuli, is a very beautiful and very permanent blue. The Lapis is found in masses or nodules; they are composed chiefly of silica and alumina with about 20 per cent of soda, and some peculiar combination of sulphur, to which it probably owes its color—it is often sprinkled with yellow pyrites. We have it chiefly from Persia, China and Russia.

It is now prepared in France and Nuremberg, of equal beauty to the Lazulite, and at a very moderate price. Mr. Gmelin of Tubingen, considers the sulphuret of Sodium to be the coloring principle, both of the Lapis Lazuli and of this artificial color. The latter is made by adding freshly precipitated silica and alumina mixed with sulphur to a solution of caustic soda; the mixture is then evaporated to dryness; the residue is then placed in covered crucibles and exposed to a white heat, by which, when the air is partially admitted to it, a dark blue mass is obtained. This is then reduced to an impalpable powder, silica 36, alumina 36, soda 4, and sulphur 3.

Mr. Tillman read the following letter from Mr. B. H. Wright, in relation to the cause of steam boilers exploding.

ROME, N. Y., *Dec.* 11, 1856.

Dear Sir: In conversation with you a short time ago I stated to you, verbally, my own views as to the cause of boiler explosions, and as we considered the subject one of the greatest practical importance, I gave you a partial promise that I would put my thoughts on paper, to the end that my theory may be publicly commented on and controverted if erroneous. I have never seen this theory advanced any where, and the like you stated on your part; your acknowledged scientific attainment and research lead me, therefore, to the belief that I may confer a benefit in thus giving publicity to my views through you.

I have for some time believed that the assumed cause of the explosion of steam boilers, or more correctly, evaporators, has been, and still continues, a source of mischief. Public opinion seems to have settled down quietly into the belief that the water becoming low in the boiler, a portion of the latter above the surface of the water becomes heated to redness, so that by renewed supply of water this rises and covers this superheated surface, is instantaneously *decomposed*, generating an explosive gas which rends the boiler. Not such is my opinion. Explosion takes place in this way: solid bodies absorb heat and increase in temperature. Water, under ordinary circumstances, does not. Under pressure it does so slowly, and to a limited degree, and so far refuses to convert itself into vapor, holding itself in readiness to do at once, in any sudden change of circumstances, then it becomes an auxiliary in explosions.

Steam, however, does readily absorb heat; and while the steam escapes freely, either by use or sufferance, danger is avoided. If this uniform issue is checked, the fire being still in force, additional temperature must ensue somewhere, and this goes, in the main, to the steam. So soon as the issue of steam ceases, the water assumes a state of comparative quietude, and the more as the pressure above it increases. In this state I can conceive the particles of steam to be held in suspension throughout the water itself. I said that the water is in a state of rest, and for the reason that it has attained a temperature throughout of at least 202°, and the specific gravity become uniform. Philosophy tells us that as the temperature of steam increases, its previous latent heat becomes sensible heat. Here the natural equilibrium has been again destroyed, and is preparing an infinity of force for reaction whenever the inflexible law belonging to lesser temperature comes into action. The commotion that takes place on the opening of the supply pipe brings the superheated steam in contact with the water, for which it has an extraordinary affinity, and instantaneously an immense quantity of steam is generated, which no shell or covering can resist.

Much reliance is placed on the safety-valve, as it is supposed that this will give issue to the steam at a fixed pressure within the limit of safety. But temperature and pressure do not increase in like ratio, in other words the former temperature will have very materially increased, without indication of much increase of the latter; then there is the difference between static and dynamic forces; a quiet pressure is a very different thing from one to which velocity has been imparted.

Explosions then result ordinarily, not denying that the heating to redness may be an auxiliary, from the instantaneous absorption of the excess of heat pervading the water and steam chambers. There does not appear to be a totally safe relief except through radiation and drawing of the fire, for commotion or excitement of the water should be most cautiously avoided. To open the supply pipe is most dangerous.

I think I hear you inquire for some evidence of the truth or plausibility of my theory; I aver that this establishes it: lead low temperature steam through a pipe into a bucket of cold water, the latter will be dispersed throughout the room. Wait for high temperature steam, and repeat the experiment. No water will be seen, for the excess of temperature has converted it instantaneously to vapor. This experiment appears to me conclusive, inasmuch that it is contrary to the assumption that an increase of pressure should simply have expelled the water with more force.

The prudent engineer will regard a thermometer as an indispensable appendage to a boiler, will see that his safety valve is in perfect order, and, on no account, attempt to restrain the steam if undue temperature is shown. Explosions do and will take place, even whilst the steam issues from the safety-valve, nevertheless threatened ones may be prevented by close observation and precautionary measures adopted on fair warning.

I have given you my ideas upon the thesis suggested, and leave you to incite opposition thereto in any way you may think proper. Truth will be elicited or confirmed through discussion, enlightened by experimental observation.

Very sincerely your friend,

B. H. WRIGHT.

Mr. John D. Ward, of Jersey City—As the idea is held, and taught by many, that a steam boiler cannot explode so long as it is supplied with the quantity of water required to keep all parts covered therewith which are exposed to the direct action of the fire, so that no part can become unduly heated, the writer begs leave to offer some remarks respecting explosions generally, and inquire whether the above stated opinion is really well founded, or warranted by the ordinary condition of things as they appear in a steam boiler while at work. It appears to be taken for granted by the advocates of this opinion, that explosions of steam boilers have generally, if not always, been preceded by a deficiency of water; in consequence of which some portion of the metal has been highly heated and of course weakened, which weakening was the immediate cause of disruption at the overheated part, with the pressure previously existing; or, that while in that state the part has been suddenly covered with water, and that instantly converted into steam to such an extent, as when combined with that previously formed its force becomes irresistible. That an explosion may occur under the circumstances first mentioned, is probable, especially if the heating should be carried to a high degree, as the strength of the metal usually employed in the construction of boilers, and especially copper, is rapidly diminished by raising the temperature much above that which it attains while producing steam of the elastic force now commonly used for working a steam engine. The danger in this case would arise not from any increase of pressure caused by the overheated metal, but solely from the diminished ability of the overheated part to sustain the pressure previously existing.

This being the State of things, that is, some portion of a boiler or flue becoming overheated in consequence of a deficiency of water, it is contended that to commence supplying the boiler with water, is to incur the risk of an explosion, because the water sent in under such circumstances, will be suddenly, in fact, instantaneously, converted into steam of great elastic force.

The writer once heard the master of a steamboat, who now commands one of the vessels in the Collins line, remark to a person with whom he was conversing upon the subject of explosions, that it was "dangerous, very dangerous indeed, to turn the feed into a boiler suddenly."

This opinion deserves an examination; if it is well founded it ought to be known to all engineers, and should guide their practice in managing the water supply to their boilers; if it is unfounded or fallacious, its fallacy should be shown, in order that it may no longer be relied upon as accounting for results with which it may have little if any connection.

The quantity of water required to be evaporated to furnish steam for working an ordinary steam engine, is about one cubic foot and a quarter per hour for the power of each horse; and it is not common in any other than locomotive boilers to allow a smaller proportion of water surface than two and a half square feet per horse power of the engines to which they are applied, (some engines have as much as six square feet,) but taking two and a half which is probably the minimum allowance, the depth evaporated per hour will be six inches. In other words, if a steam engine furnished with a boiler in which the water surface was two and a half square feet for the power of each horse, should be worked one hour without using the feed pump, the surface of the water in the boiler would be found lowered six inches. The feed pump is generally made somewhat larger than is necessary, if constantly worked, and all things in perfect order, to replace the quantity of water evaporated; this is in order to provide, when necessary, for the waste caused by leaks in the boiler, in the pipes, valves, and other parts of the engine.

If this extra capacity of the pump should be such as to enable it to deliver two and a half cubic feet per hour for the power of each horse, instead of the one and a quarter cubic foot required to furnish the steam necessary for the engine, the depth of water in the boiler, if the pump should be kept constantly at work, would be increased six inches per hour.

A pump of the proportions assumed, that is, one which would send into the boiler such quantity of water that only one half could be evaporated, and sent out again in the form of steam, would if worked at the rate of twenty-five strokes per minute, raise the surface of the water at the rate of $\frac{1}{4000}$ of an inch per stroke, or $\frac{1}{10}$ of an inch per minute, or at about the same rate that the extremity of the minute hand moves in a common sized watch; and the feed pipe is, or always ought to be attached to the boiler in such situation that the entering current will not ripple or disturb the surface. And here the question naturally presents itself: can the introduction of cold water at such a rate and under such circumstances be productive of additional danger? It is believed that the answer must be decidedly in the negative; and that next to withdrawing or extinguishing the fire and putting a stop to the introduction of steam, the safest course to be pursued when a boiler becomes overheated, is to put in requisition the whole power of the feeding apparatus, and in that way slowly and regularly cool down the overheated part. This course is certainly, for a time, attended with more danger than the other, not because cold water is introduced for this lowers the temperature of the whole mass and diminishes the rate at which steam can be produced from it, but because the weakness caused by the previous overheating continues until the slowly rising water reaches and cools the weakened part, and thus restores it to something near its original strength. Should a boiler be overheated while the engine was at rest and the safety valve closed, it would probably be attended with danger either to raise the valve or start the engine, as the ebullition of the water caused by either proceeding would bring it suddenly into contact with the heated metal and steam would be generated with dangerous rapidity, but this differs from the case under consideration.

With regard to the opinion that a boiler cannot explode which contains the proper quantity of water the writer offers no remarks of his own, but refers the club to the report of the "committee on explosions of the Franklin Institute." The conclusion at which they arrived, after concluding the most extensive and reliable set of experiments yet made in the premises, will be found in the journal of the Frankin Institute, Vol. XVIII page 221, and is as follows: "That a gradual increase of pressure can produce all the effects of the most violent explosions may be inferred from the cases on record, attributed with probability to this cause; and was proved *conclusively* by the direct experiments of this committee. In these latter, cylinders of copper and iron were violently torn asunder, the parts thrown from their places, scattering the materials of the temporary furnaces over which they were heated, and the fire, to considerable distances. There are also cases well made out in which a weak place in a boiler has acted as a safety valve, but such fortunate circumstances are not always to be looked for, and better methods having been devised of effecting the same object than to imitate them by the use of their plates. The idea stated to be current, namely, that a boiler does not explode if duly supplied with water, *is wholly untenable*, and *highly mischievous* in its tendency."

With regard to the *means* of preventing the explosion of steam boilers, it must be admitted by all honest and intelligent engineers, who have had any experience in the matter, not only that none of the numerous devices which have been proposed as specified remedies for the danger, are at all likely to accomplish the purpose for which they were designed, but that the idea of rendering a boiler safe under great pressure, by attaching any kind of apparatus to the outside, or placing detective machinery within, is entirely fallacious. None of the apparatus proposed, whether fusible metal plates, or plugs, or flacets, or steam whistles, or an indefinite increase of the number of safety-valves, or the most elaborate modifications of feeding pumps, or machinery, or even acts of Congress, can add one iota to the strength of a boiler, or postpone for a moment the rupture of the metal when subjected by the pressure of steam to a strain which exceeds the ultimate limit of its strength, and it should be borne in mind that this limit, in a steam boiler, whether used or not, is daily and hourly diminishing.

The best known means for lessening the danger of explosion, which is an inevitable attendant upon the use of all boilers subjected to a pressure of steam are, first, to secure *good materials* and *workmanship* in their construction, and see that they have the proper forms for strength; and next, to be well assured of the *integrity*, intelligence, practical skill, and sound judgment and experience of those entrusted with their management. When these are wanting, no boiler can be safely worked, though furnished with all the safety apparatus ever invented; and with them, a properly proportioned and well fitted safety valve and proper gauge cocks are all that are needed to secure the greatest degree of safety which the use of a steam boiler admits; though convenience and economy in working will require the addition of a correct steam gauge, this will add nothing to the safety.

R. L. Pell remarked—Since the days of Watt there has been no very important improvement made in the steam engine, though a multitude of forms have been introduced. Sundry metals have been proposed for the construction of boilers, among them copper, the advantages of which over iron are not sufficiently great to warrant the difference in price.

Iron, then, may be considered the best material for that purpose, sheet iron a quarter of an inch thick, is generally sufficient for a high tension of steam, say from 125 to 150 pounds to the square inch. I would not use thinner iron than this, as it would be apt to leak and cause oxidation, and consequent explosions, which almost invariably occur at the instant the engine starts, caused by the instantaneous generation of steam by the sudden motion given to the water. Thin iron plates cannot be rivetted as well as thicker ones, and generally speaking the rivets are made too small, and consequently the boiler plates are not as strongly put together as they should be. If the iron made use of for boilers is good in quality, no change can be produced by wear; it will continue good to the last. It has been proposed as a preventive to boiler explosions; that a pipe leading from a cistern of cold water, should pass through the boiler, whilst the stop cock that opens the passage is kept closed by a chain within the boiler, and in which chain one link is made of fusible metal, capable of being fused at that temperature above which the boiler is exposed to the danger of explosion.

An alloy, composed of one part lead, three tin, and five of bismuth, will fuse at the ordinary temperature of boiling water; and alloys of the same metals, in different proportions, will fuse at temperatures from 300 to 400 degrees. When we extinguish the fires under a boiler, the steam will immediately condense, and form a vacuum, and were it not for the safety valve opening inward, and balanced by a weight to keep it closed until relieved from the pressure of the pent up steam, the atmosphere would have a strong tendency to crush it inward. Engineers now express an opinion adverse to the use of fusible safety plugs, and they are consequently generally abandoned.

I am inclined to believe that nearly all the explosions of boilers that so frequently occur, may be attributed to the use of bad iron for boiler plates; therefore, it is incumbent upon boiler makers to purchase their plates from those manufacturers only, who have established their credit as being well informed judges of the quality of iron. Only those who prepare the sheets can know, and they cannot always be relied on, for an iron will sometimes resist shearing, punching, forging and riveting, remarkably well, and still be entirely unsuitable for a boiler. To know iron well, the manufacturer must have his eye upon it from the ore to the forge. The best boiler iron is manufactured from ores obtained from the Missouri iron mountain, parts of New-Jersey and Eastern Pennsylvania. But even they are often destroyed on the furnace by hot blast, which will not resist heat, and is, therefore, not suitable, though it may be fibrous, and even tenacious in the sheet, but it always becomes exceedingly brittle when much heated, and then cooled suddenly. The test for proving iron, is to make it red hot, and thrust it into cold water; if, after this treatment, it remains tenacious, it is good, if not, it is unfit for the plates of boilers, and should on no account be used.

I would not place confidence in any wrought iron; the fibres and tenacity of which are not retained after being subjected to intense heat, and then suddenly cooled.

If boiler manufacturers would only govern themselves by this simple rule, sorrow and misfortune would not be so often carried into thousands of happy homes, by the sacrifice of lives caused by the explosion of boilers.

If the iron is of good quality, and the plates thoroughly rivetted with larger rivets than are generally used, the safety valve reliable, the boiler not overtasked, and the water invariably kept a few inches above the flue, and the steam and water always kept in constant motion, under the superintendance of a careful fireman and judicious engineer, accidents would rarely occur.

Many suppose that high pressure alone is the cause of explosion ; this cannot be ; for a cylindrical boiler, made of quarter inch iron, is in every case sufficiently strong to resist any pressure usually practiced. I have known boilers to explode by a pressure very far below the strength of quarter-inch plates, by suddenly generating a large quantity of steam. A high tension of steam cannot explode a boiler, unless it is driven beyond the strength of the iron. You may always feel safe if the steam is permitted to escape gradually. A very large load of gunpowder will not burst a cannon if it is burned gradually, but a small quantity would if ignited suddenly.

These explosions generally occur when the boiler has been at rest for a few minutes; the steam is then rapidly taken from it; when set in motion, the hot surface is covered with particles of water, thrown in the form of spray, this by expansion forms a quantity of steam, which, while endeavoring to make its escape will burst a boiler of very great strength, in spite of safety valves or fusible metal. The accumulation of heat must be prevented by not overloading the boiler, and by never entirely closing the safety valve, when the engine is resting. This small quantity of steam constantly escaping will keep the water in the boiler always in motion, and prevent damage. Low water in a boiler is dangerous.

Incrustation in a boiler diminishes the capacity, wastes fuel, and eventually destroys it. It is caused by substances precipitated by water, all of which contain to a greater or less degree carbonate of lime, sulphate of lime with other alkaline earths; also salts of the oxides of lead, manganese, and iron, which are precipitated and cover the interior of the boiler. It is very difficult to find a perfect remedy against this great evil: lumps of charcoal thrown in the boiler prevent the formation to a certain extent, by condensing the substances within its pores. Potatoes, Indian meal, clay free from sand, a small portion of molasses renewed every two months, soda or potash, 100 grains monthly in a boiler 17 feet long.

Boilers may be made by crossing the joints and double rivetting, that will bear 34,000 pounds to the square inch. Flat surfaces in boilers are not so objectionable as has been supposed, but may be made by staying the strongest part of the construction.

Sufficient care is not generally taken in the preparation of the bottoms of boilers, which should be in the form of an anchor, and kept entirely free from incrustation.

When a want of water occurs in a boiler, and the flues are red hot, the fire must be at once extinguished, and the engine kept in motion, without on any account touching the safety valve, as by so doing the steam would escape quickly, set the water in ebullition and cause it to fall like rain on the red hot surface, and immediately expand into volumes of steam, or its constituent gases, and thus produce an explosion.

Boilers are certainly dangerous, as terrible accidents have occurred when there was neither steam nor water in the boiler, or in fact fuel underneath, the previous heat having decomposed water into gases, which exploded on the introduction of a candle.

I think a valve might be arranged in such a manner as to admit air in sufficient quantity to choke the condenser of the engine, shut off the water and throttle valves and open the blow valves. If this were accomplished, the fly wheel would make but one revolution instead of five as is now the case.

The effect of a boiler is not much influenced by its form. The size always governs the quantity of steam it is to make, that is the surface brought to bear the influence of the fire. The cylindrical boiler, by the use of two pounds of coal will produce seven pounds of steam. No other form of boiler probably will make more steam from that quantity of coal. The great advantage that the tubular boiler has over all others is that it requires less space. To produce steam for a two horse power, twenty-four square feet of boiler surface should be exposed to the gases or heat issuing from the furnace. A very high heat in the gases must be disadvantageous if we desire to economise fuel, at all events it should be expended about midway of the boiler, so that when it passes into the flue its temperature may be about equal to the metal of the boiler, as the heat conducted away in the gas is the principal loss. This matter should be well considered when the boilers are set, and likewise the form and length of the flues. The size of the grate is of immense importance, as it is well known that combustion can be perfect only under peculiar conditions. As fuel can only be used to great advantage when burned under a very high temperature, sufficient in fact to generate carbonic acid gas, which requires intense heat, if combustion is imperfect, as it must be at a low heat, a very large part of the fuel is necessarily changed into carbonic oxide, which certainly does not afford as much liberated heat as carbonic acid by one-half. The furnace must, therefore, be so arranged under the boiler as to produce combustion under intense heat. Non-conductors should be used as lining for the fire boxes, such as brick, and these should be light colored, as black substances above the fire prevent the formation of carbonic acid. Fuel should be so used that twice as much air as is required for combustion should pass through the fire. To accomplish this there must be enough heat to convert all the fuel burnt into carbonic acid gas. If carbonic oxide is formed, more coal is consumed and less heat given out.

The condition requisite for ebullition is that bubbles of air shall present on their outward surfaces the coherent requisite for immediate evaporation. As it is well known that deaerated water would not boil, but when it reached a certain point would be instantly converted into steam. This is one of the principal causes of explosion. When the engine stops, the pump being worked by it necessarily stops, the water boils on and the air from the bubbles escapes, and becomes incorporated with the steam, evaporation ceases except on the top, remote from the heating surface, and the water becomes much hotter than the steam indicates. The engineer then puts the engine in motion and consequently the pump, which forces water into this heated mass, causing a tension of steam that nothing can withstand, and a terrible explosion is the result.

When the steamship Atlantic, belonging to the Collins line of steamers, was lying at the Novelty Works completing her engines I examined her boilers very carefully, and found they were novel in their form, being tubular in a vertical instead of horizontal position. The tubes used are constructed of iron and appeared to me to be about four feet long and three inches in diameter, placed in two tiers, one above the other, over two rows of fire places, which vastly increased the boiler surface. The current of heated air in this case is, I think horizontal, at all events it should be so. This plan of a boiler seems to me saves fuel, and is not liable to explosion. I would recommend this arrangement of tubes for locomotives as well as stationary and marine boilers. Nearly all the boilers that I have examined were very deficient in room for steam, which induces the water to accompany the steam as it rises, causing of course waste of fuel and loss of power. This is always the case in the boilers of locomotives, and in fact in all cylindrical boilers arranged with horizontal flues.

The Chairman took the floor and Mr. Pell the chair.

Mr. Haswell illustrated upon the black board as he spoke of the operation of water heat and steam in boilers, their condition, &c.

Dr. Smith remarked upon the importance of some of the papers now before the Club, and their value to the public. They ought to be published extensively.

A member thought that such papers should be preserved in a manuscript library.

President Pell took the floor and illustrated by drawings on the black board the boilers of the new Collins steamer Adriatic, with suitable remarks.

A member complained of the limited number of members of this Club, and the necessity of extensive notice being given.

Dr. Smith spoke of the very small number of persons at any time assembled in scientific societies, and the high importance of the press in publishing their results.

Mr. Meigs said that the Royal Society of London, and the National Institute, whose transactions embraced the world, held their meetings in spaces no greater than this room, and Faraday, whose name is known wherever lightning is seen and thunder heard! gave his late lectures at the British Institute, in the heart of that London, to an audience that would not half fill this room. Sir, the Republic of Letters is exceedingly aristocratic, and John Baptist Say, one of the best writers on political economy, made the remark that his beloved France boasted of her science as being at the head of the world; and yet all that science is due in any age to so very small and select a body of men that they could all assemble comfortably in any one of the smallest rooms in Paris. But the power of the press reaches wherever lightning flashes or steam "whirls the rapid car" or urges the monster steamer.

Subject for next meeting—"General construction of steam boilers."

Adjourned to January 28th, at 7½ o'clock p. m.

H. MEIGS, *Secretary.*

January 28, 1857.

Present—Messrs. Leonard, Larned, Butler, Storms, Roosevelt, Hawley and others—25 members in all.

The regular chairman Mr. Haswell being absent.

James K. Fisher in the chair. Henry Meigs, Secretary.

The Secretary said that since the last meeting of this Club, the Institute has received several important works from Europe. Russian Mineralogy, translated from the Russian language into German, by H. A. G. Von Pott; the latest numbers of the Journal of the London Society of Arts, published weekly and containing select articles of general usefulness in arts and sciences; also the monthly numbers of several societies of learned and industrious men in France and elsewhere, patronised by the Emperor. He had selected some for the Farmers' Club, and others for this.

We moreover have the pleasure to say that these highly valuable works come to our table gratis from Europe, and we have the pleasure of returning to them copies of our volumes of Transactions on the same liberal enlightened plan. For the Republic of Letters embraces all nations and times, and their learning should circulate every where as free goods!

MR. MEIGS ON TESTING STEAM BOILERS BEFORE USED IN SEA OR LAND SERVICE.

The explosive force so often developed in steam boilers resembles generally that of gunpowder. Let the theory of its cause be what it may—it is not the result, in all cases, of gradually increasing power of steam, for it has been found that when that has become superheated as in Frost's stame, and long before that in Perkins' cylinder, under pressure it is *flame quiescent.* Perkins made it red hot, &c., &c.

Now the expansive power of gunpowder appears to be more under our control. But experience has demonstrated the indispensible necessity of proof of even a gun before it is put into army or navy, or sporting service.

Hydraulic pressure is used in our steam boilers and is no proof of capability of steam boilers or of cannon. Our Prof. Mapes, in experimenting on hydraulic pressure, found that in a properly cast cylinder of iron, several inches thick, the water was forced through the pores of the iron, and yet the cylinder did not explode. All the hydraulic power conceivable cannot act like some of our steam boilers, be driven through walls across the Ohio, or thrown up 100 feet in the air, as in a low pressure boiler some years ago, &c., &c. I therefore propose that no boiler be allowed for public service without having been fully tested by steam proof to at least double the pressure ever to be actually used. And as in gun proof, the time of service of every steam boiler shall be limited as in the cannon. For it has been determined by experience that a cannon gradually becomes less strong by every discharge. So that as a common rule, the cannon which has been discharged a thousand times, is no longer safe.

No other test can be found for boilers than steam itself, nor for cannon than powder. Because every plate in any boiler has unquestionably a different character, and while one pure plate might bear perfectly 500 pounds per square inch another would burst at 100 pounds. And besides the wear of plates depends on their position in the boiler and flues *as to heat*, some plates nearest the hottest parts being very much more and sooner worn than others. We ought to have had, by this time, as good data to determine the length of time boilers can be used as we have of cannon. Experience has decided in the artillery service of England, France, etc., that a cannon may be safely discharged about one thousand times only.

The successive strains upon the metal by discharges, like so many percussions then have injured the cohesion of the atoms of the metal, as is seen by using heavy hammers on large pieces of cast iron. We therefore recommend a test of steam boilers by steam of a pressure of at least twice the number of pounds per square inch even to be used in practice, and at certain periods in the use of the boiler, the first test to be *repeated*, thus the safe use of boilers may be reduced to figures as in the case of cannon. Any expense incurred by severe testing of steam boilers will be saved a thousand times in avoiding the enormous loss of property and life caused by their explosions.

[The Journal of the Society of Arts and of the Institutions in Union, Nov. 1856.]

This excellent society publishes weekly such papers as result from about *three hundred* societies in union in England. They send us their Journal gratis.—H. Meigs.

BROWN LIME,

Is found in several places in Wales. Constantly used by engineers as a hydraulic cement. It is a very impure limestone, containing much clay, to which it owes its peculiar properties. All limestone contains more or less clay (alumina), and it is this skeleton of alumina which forms the rotten stone of commerce, after all the calcareous matter has been removed. This removal is effected by nature by means of some as yet unexplained chemical action, by which the *hard*, *heavy limestone* is converted into a substance as *light as cork!* resembling in color and appearance the brown powder of a ripe puff ball.

The rotten stone occurs in large masses on the outskirts of the limestone band in the Brecon hills, and may be there seen in all stages of transformation. One of the best places for seeing it, with which I am acquainted, is about two miles from the Lamb and Flag inn, near Ystradgynlais in the Swansea valley. It is there collected in quantity for exportation to London, and the principal dealer lives close to the Lamb and Flag.

STEEL MADE BY A NEW PROCESS IN THREE HOURS FROM PIG IRON.

A number of scientific gentlemen were called to witness the operation, the discovery of Captain Uchatius, engineer in chief of the Imperial Arsenal at Vienna. It was done at the Albion engine works of Messrs. Rennie & Sons, in Holland street, Blackfriars road, in the presence of numerous spectators, on Saturday last the 11th of October, 1856. The mode of operation was read by Mr. Charles Lenz, the partner of Capt. Uchatius. He stated the usual methods of England and probably of all the world in making steel, that is to convert say Swedish or Russian bar iron, by a lengthy, uncertain and costly process, into first blister steel, then melt that down in crucibles and cast it into ingots for the manufacture of the bar steel of commerce. Capt Uchatius took East India pig iron (now cheap,) and in a *few hours* converted it into fine steel, whereas the common process requires *several weeks!* English pig iron is as good as India. The well known fact that cast iron surrounded by any oxygenised materials and subjected to a cementing heat for a given time, would yield up a part of its carbon, which would combine with the oxygen driven off from the surrounding materials, forming carbonic oxide or carbonic acid gas. If this process is interrupted before completion, a partially decarbonised iron would result, the surface of which would have been converted into a pure steel, while the inner parts remain unchanged. In order, therefore, to expedite the conversion into steel, the pig iron is first reduced to grains by running it melted from the cupola (a blast furnace sometimes,) into cold water agitated by mechanical means. This granulated pig iron was then mixed with a proper proportion of pulverised oxygen yielding materials of a very cheap kind, such for instance as spathose ore (sparry iron,) adding if requisite a small quantity of manganese. This mixture is put into common crucibles and subjected to heat in a cast steel blast furnace of the ordinary construction. The cast steel thus obtained is increased about six per cent by the conversion of the iron contained in the spathose ore. The melting and casting are done as usual in steel making. The finer the pig iron is granulated the *softer* the steel made of it. The softer sorts of welding cast steel might be obtained by adding good wrought iron in small pieces, and the harder kinds by adding charcoal to the mixture.

Mr. Lenz said that crude iron can be converted into steel ingots in the incredibly short time of *two hours!* He then, from a crucible, run melted iron into a vessel of water, when it was instantaneously converted into shot like particles, to these (twenty-four pounds weight of these) he mixed in six pounds of crushed ore and peroxide of manganese, in the proportion of four pounds of ore to two pounds of the peroxide of manganese and a small quantity of fire clay. While this was in the furnace the company present saw the process of hammering an ingot of the new steel into a bar, and although the steam hammer was not adapted for steel, nevertheless the bar steel produced under it was pronounced to be of excellent quality, and tools made of it by Messrs Rennie were tried and found to possess the qualities of fine English cast steel. After the crucible had been in the furnace two hours and three quarters, some defect in the blast having somewhat retarded the melting, its contents were poured into an iron mould, from which when cooled was taken an ingot of steel weighing twenty-five pounds, being one pound more than the iron used. On examination by the persons present it was believed to be fine steel.

The Club then adjourned.

H. MEIGS, *Secretary.*

February 11, 1857.

Present, Messrs. Storms, Tillman, Pell, Chambers, Haswell, Godwin, Fisher, Wright, and others—29 members.

Mr. Haswell in the chair. Henry Meigs, Secretary.

The secretary observed that the club exists for the purpose of increasing knowledge in every department of mechanics, by collecting all that is useful, and as far as may be, stimulating genius to new discoveries. We therefore employ, by our rules, the first hour in miscellaneous matters.

I lay on the table two articles:

VENEER CARVING ON WOOD, AND PRINTING CLOTH BY PHOTOGRAPH.

New Veneering.—The veneers are prepared in a way not stated, and then placed between dies moderately heated, and subjected to sufficient pressure. One of the surfaces of the wood takes the pattern in relief, and gives it the appearance of elaborate wood carving. The depressions caused by the dies on the opposite side of the veneer, are filled up with a suitable plastic substance, which, when dry, completes the embossed veneer for attachment by glue or otherwise, to the wood. This veneer will neither split nor collapse, and the relievo are so solid that they bear rubbing and cleaning like carved wood.

Mr. R. Smith, of London, uses the chemical action of light to print cloth, by first steeping it, (wool, silk, flax, or cotton,) in a chemical solution; dry them in the dark; then the pattern being protected by pieces of paper darkened, or some other suitable material, attached to a plate of glass, when the desired effect is produced, which will be in from two minutes to twenty minutes, according to circumstances. The cloth is then removed in order to have the fixing operation performed uron it, while another portion of the cloth is being *photo-printed.* This is easily done by simple mechanical arrangement, and a number of photographic machines may work side by side at the same time.

Will some ingenious mechanic look into the last new mode of engraving for bank notes, invented in France? A machine, by exceedingly small wheels, produces two hundred thousand different combinations of microscopic lines, imitative of the kaleidoscopic figures, in lines, perfect and distinct, and incapable of imitation.

AN ENTIRELY NEW MECHANICAL POWER FOR MOTORS.

Mr. C. Butler-Clough, Llwyn Offa, Fluit, has invented an improvement in enlongating and contracting metal bars or rods, to obtain motive power.

The invention relates to the application and use of *tubular* bars or rods of metal. Such bars or rods are employed under circumstances wherein great strains are wanted to act in very limited extent, as for instance, in bringing walls of buildings to a vertical condition. Heat being used to *expand and lengthen* these bars, when nuts are screwed on the ends, and by contraction in cooling, the walls are forced into position—an irresistible force, that is, a force equal to the tenacity of the metal. (A bar of Swedish *malleable* iron of one inch square, sustains 36 tons. One of steel, 67 tons.) Mr. Clough's invention consists in the rapid but uniform expansion and contraction of metal tubes, bars, or rods, by a suitable use of heat and cold.

NEW STATIONARY POWER.

By H. Meigs.

Let a very large vessel, perhaps in the form of a scow, be placed in a dock where the tide acts freely. Let her lifting power, by the rising of tide, be applied to apparatus of sufficient strength in her centre, and her weight on the fall of the tide. The power, although slow, may be of course applied so as to produce very rapid movements of machinery of moderate power. The vessel will then rise and fall by tides four times a day. Take each rise and fall at six feet, and we have a motive power of the tonnage of the vessel at the rate of two feet per hour, constant. The deck of the vessel may be covered with suitable buildings for the desired manufacturing purposes, and in proportion to the tonnage of the boat will be the power obtained. The factory, then, without steam, fall of water, wind, or any other force, by gravity and buoyancy, would perform its part as long as the boat will last and the tides continue. This power of course, will be vastly more important in high tide locations.

Extracts from works recently received by the American Institute.

RAILROAD BRAKES.

A French engineer, *Mon. Cundot*, has made a new brake. He makes his brakes act upon the *rails in series*, instead of the wheels. It is said he stops a train moving nearly forty miles an hour in the space of 440 feet, without perceptible shock to the passengers. We shall probably hear more of it soon, if it has these valuable properties.

The *incalculable value* of a perfect system of brakes, is now every where admitted. When we found that we had in point of speed out-flown the swiftest birds, it instantly became a *life question*, how to *stop that arrow?*

We have good ground for believing, that if that can be properly done, it will issue from American brains.

CALCULATING MACHINES.

It is singular that the *exact sciences* may be *mechanically* served, from the most simple original notation to the vast extent of numbers, ten places of figures.

The Paris Moniteur says, "Mr. Thomas, of Colmar, has lately made his finished improvements in his calculating machine, which he calls his *Arithmometer* (measurer of numbers,) on which he has worked thirty years and more. In the seventeenth century, *Leibnitz*, the transcendental philosopher, *Pascal*, tried to make such a machine, but failed. Later, *Diderot* tried it, and also failed. Thomas' Arithmometer is used without any trouble, and there is no possibility of error in addition, subtraction, multiplication and division; also for extraction of square, involution, resolution of triangles, &c. A multiplication of eight figures by eight, is done in *eighteen seconds.* Division of sixteen figures by eight is done in *twenty-four seconds.* The square root of sixteen figures in one minute and a quarter, and *the calculation proved.*

The working of the machine is very simple. To raise or to lower a nut screw, turn a winch a few times, and by means of a button to slide off a metal plate from left to right, or from right to left, is the whole secret. It is quite portable, and already in use in many great financial establishments, with much economy of time. This discovery is of great importance, so much so, that as yet we cannot measure the amount.

Mr. Tillman had no idea of the profitable use of contraction and expansion of metal as motive power. Nor would the alternate lifting and falling of a vessel in dock, by tide, yield a power of any worth.

The Chairman announced the regular subject, (viz:) "Steam," and "the Construction of Steam Boilers."

Mr. Wm. Mt. Storm read the following paper:

THE CHEMISTRY OF STEAM.

We must, to render the investigation of this subject of any value or avail, first bring to a focus what light we may upon the *darkest* points of our subject in our efforts to advance in the knowledge of any general law or laws to be observed in the *general* construction of steam boilers; for, as to the rest, we need little further enlightenment to enable us to draw clear and definite lines for the boundaries of our subject.

Of practical every day facts and effects, we have a large capital; while of the fundamental causes, which are the keys to unlock the secret of the existence of many of those facts and effects, we labor under a greater shade of ignorance in what most concerns us than almost any other class of professionists. This, however denied, is as true as it is mortifying.

In direct return to our subject: we must bear in mind that it is not in *itself* that the steam boiler interests us, for it is only an instrument we employ, as a "necessary evil" in a sense, to accomplish the only end we have in view, viz: the cheap and rapid generation, and ready and safe control of steam as a motive agent,—leaving out of consideration its importance as a chemical agent to the artizan as contra-distinguished from the mechanic. The *application* of steam relates to the steam engine, not properly to the boiler, and would be merely incidental to the present subject.

The chemist would scarcely be so bold, not to say absurd, as to design an apparatus for forming a given neutral salt, without first making himself master of the laws governing the affinity of the alkali, and the acid that combined to form it, and had learned the chemical equivalents of each; in other words, until he had analyzed it. Let us then at least attempt to analyze steam before we assume to decide what should or should not be fixed conditions in the general construction of steam boilers.

Therefore, it is indispensable that we consider as preliminary the question: what is steam? Strange as it may seem, it is a question few engineers have asked themselves. Even the more able minds in that field have devoted their attention too exclusively to its dynamics, ignoring or not appreciating, and not appreciating because not sufficiently investigating, its chemistry.

It is thus that a heterogenous mass of facts has been accumulated, upon which a varied fashion has been established, rather than a solid system, such as an exact science would aspire to, governed by, and based upon, some fixed and guiding laws, upon which its phenomena and correct practice would unfailingly depend.

In regard to this comparatively neglected field, the chemistry of steam, I assert that it is susceptible of the clearest proof that all its phenomena, whether useful or detrimental, are fundamentally of an electrical nature, and controlled by electrical laws, from the condensation or vaporization of a drop of dew to the explosion of a steam boiler, or the formation of an iceberg.

I would say, as it were in parenthesis, that I have spent several years, and some thousands of dollars, in experimental study of the fundamental laws of electricity, principally in regard to their relation to meteorology, and to steam as a motive agent, and from scores of reasons and experiments, I have become convinced that during the process of forming steam, the water takes up what we recognize by the term heat, so long as its increment may be noted by the thermometer, but at the instant a particle of water at the boiling point flies into elastic vapor at the same temperature, it takes up what would be more properly expressed as *combined electricity*, than by the usual term of latent heat; a term in itself, in some respects, paradoxical. In either case the development of this electricity arising from the combustion in the furnace, and due probably to the greatly less specific electricity (hitherto, I believe, unrecognized,) of the products than of the elements of combustion; of carbonic acid, than of the *oxygen* and the combustible.

Steam, at the atmospheric pressure, for instance, instead of being water combined with 212 degrees or nominal units of sensible heat, added to 990 "latent," may be more truly described as water impressed with 212 degrees of temperature, and combined with 990 equivalents of electricity.

Every body has a specific electricity, the equivalent of, and identical with, what is now termed its specific heat, which means simply the quantity of heat converted by any means into the condition called latent, while that body is being elevated to any given temperature, which is only an attendant condition, and this latent heat, so called, is in truth combined electricity, the attending temperature, by its very presence, as it were, causing the given body to have a stronger affinity for, and power to receive and convert this electricity into a latent "specific," or combined condition; in other words, it simply renders its specific heat, i. e. its specific electricity, greater, while its "capacity," other things equal, is less than the ratio of the increment of temperature, and the electricity becoming combined or specific, is thus prevented from being sensible to the electrometer any more than the supposed latent heat is to the thermometer.

It may not be altogether irrelevant to remark, that combined, latent, integral, or specific electricity (these being equivalent terms), never develops magnetic effects or polarity, as does electricity, which we may properly term superficial (as distinguished from *combined*), whether static or dynamic, and *vice versa*, magnetism produces electrical effects. Their separation is in many respects but more confusing, although in every case one or the other may be considered a primary, and the other a secondary or induced condition, the magnetic or the electrical, and their relative antecedence has a most important influence normally upon the structure of all bodies, for, in case of the former, the body, as a whole, will be crystalline or fibrous, as wood, ice, or asbestos, and in case of the latter, homogeneous in organization, or what may be considered an aggregation of spheroidal atoms, as oil, water or vapor, whether these atoms be solid or vesicular, or the fibres in the other case be solid or tubular.

Latent heat, combined electricity, is the cause of all expansion in homogeneous bodies. Its conversion to that condition and their expansion being always simultaneous and inseparable, and one cannot occur without the other.

Steam, for instance, is a homogeneous body, and in its expansion, the total amount of the dynamic effect it has exerted, whether usefully realized or not, is exactly measured by the number of degrees of temperature it has lost in so doing, for that is the measure of the amount of heat it has converted into the latent condition, whether it be called in that condition heat or electricity.

The same laws apply to gases as well as steam or other simple vapors; in fact gases generally are but the vapors of some liquids known or unknown to the chemist, but, that to exist in the liquid form may or may not require the attendant conditions of greater pressure and lesser temperatures than those of the atmosphere, or than any yet produced by art.

Why electricity can become latent during the expansion of bodies, whether solid or aeriform like steam, is as hard a question to solve as why heat should become so under the same circumstances, if we accept of the heat theory. It is quite possible that in either case, if it were practicable to separate and insulate a single atom of steam by itself, we would find its electricity sensible to a correspondingly delicate electrometer.

That immense quantities of electricity are developed from steam, whatever be the source of that electricity, is already well known, and has been for several years past, and a boiler specially adapted to that purpose is referred to by Noad of about four horse power, which gave flashes of lightning over twenty inches in length, and at the rate of about 200 per minute, the steam issuing from it at a pressure of about sixty pounds per square inch.

Faraday tried a series of experiments on a very small scale that, superficially examined, would indicate that the electricity developed from the steam was due to friction upon the nozzles from which it issued, and he so decided, which dictum having gone forth to the world, the world is satisfied.

I believe it will yet prove to be but one of the many instances where erroneous opinion has been taken for granted as fact, and shows how prone the human mind is to believe by habit and from hearsay. If each thinker should ask himself, do I know this? he would be startled to see how little he knew of his own positive knowledge, however much from authorities; and high authorities having promulgated error, more than any others dislike to recant.

Unbiassed ignorance is respect-worthy compared to this, for it stands upon neutral ground and is open to conviction, while accepted and maintained error is the most fatal of barriers to the approach of truth, putting a throttle on the independent investigator, under penalty of being considered a conceited innovator because a rebel against those czars of science, the men of reputation.

The supposition that the intense flashes of lightning developed from effluent steam are produced by its friction upon a few little issue nozzles, is most improbable. It is evident that we cannot manufacture electricity, therefore it must be developed from somewhere, that we may accumulate it at particular points, and no power is adequate to compel this accumulation of a fluid whose pre-eminent property is repulsion but the power of electricity itself. Whether we are awake to it or not, just as fire is necessary to kindle fire, so it is only by electrical agency that we ever do or can develop and accumulate it, and I believe it to have been specific or combined somewhere or it could not have been developed.

I would suggest here as a probable law, that in every method of developing electricity not induced by the presence of other already electrized or magnetized bodies, the amount developed, whether positive or negative, will be proportional to the amount of oxygen concentrated or diffused, whether chemically or mechanically, but particularly the former, and however the connexion may be disguised, I think we will always find such the case if we search to the fountain head.

Now let us see how all this, bearing upon the theory of specific electricity, relates to steam. I will call attention to the fact, that just as certain as electricity in motion, but conducted, (not absolutely free,) produces magnetism, so wherever electricity is in motion, but un-conducted, it produces light and fire.

We place water in a boiler and coal on the grate, but the oxygen of the air and the carbon of the fuel have little or no affinity while cold, and nothing occurs. In common language, we must light the fire, in chemical language, we must bring a portion of the combustible, or the supporter, or both, at some limited point of contact, to a state of incandescence, or a temperature of about 800 degrees Farenheit.

At this point, the chemical affinity, which combustion simply is, becomes intense, heat is developed and communicated to other surrounding points, affinity and combustion are spread through the mass, temperature, light and electricity, whether identical or not, are set free.

Electricity unconducted and in motion, always attendant upon which are light and fire, as before pointed out, is then developed, its quantity being as the difference between the specific electricity of the products of combustion and that of the elements of combustion, proportioned also, almost, if not entirely, to the oxygen consumed, as in the same case the heat will be.

As heat,—temperature,—was necessary to bring about the affinity that produced combustion between the oxygen and the carbon, so was temperature necessary to produce a similar affinity for electricity on the part of the water, to cause it to absorb it and take the vapor form; and let it be observed, as circumstantial evidence of what forces are at work in this case, that there is no medium state between the existence of the water as a liquid and its existence in the vapor form. The change is instantaneous with each particle considered by itself.

How is it that the water, in being brought to the boiling point, expands by heat, as we commonly consider it, only about 1-30 of its volume, and having received this heat but slowly, water being but a poor heat conductor, at this point at once expands many hundred fold, and has suddenly become capable of taking up, in an instant, many times as much more heat than it had received during all this previous time? I leave the question for advocates of the "latent heat" theory to answer.

This, at least, would be fair proof that the heat at this point of becoming latent is converted to something else, and this, contrary to what might first appear, involves, if true, something more than a mere change of terms, latent heat or latent electricity, because, although equivalent in effect, our minds are aroused to a very different understanding of what we have to deal with in the generation and safe control of steam, and can bring to bear all those laws so familiar to us relating to electricity, both as aid and protection from accident, which would not be deemed applicable if we considered it simply as heat rendered inert, and therefore incapable of exerting any sudden and uncontrolable force. For although it is now generally admitted that heat and electricity are but different phenomena of the same cause, and that they are also sometimes if not always convertible, yet it is well known that heat and electricity are universally recognized as agents, possessed of very different properties, and controlled by very different artificial means.

If we assume that it was electricity that the water took up in this latent form, then, warm water being a good conductor, as a particle of water flew into steam every neighboring atom would supply its quota, and the inconsistency is removed.

In lieu of the electricity of effluent steam being derived from friction, as Faraday assumed, I consider the friction as only the means of its transference, while condensation is the means of its development, and the "latent heat," so termed, its source.

The electrical theory of steam has its bearing on our subject in the most direct manner, for, taking electrical laws as our guide, and not solely what are familiar to us as laws of heat simply, we shall be directed in our course to the adaptation of the proper means for its more rapid and cheap generation, and its more ready and safe control.

As passing proofs of the soundness of the theory of specific electricities, and its reference here to the assumption that the latent something of steam is latent or combined electricity, I would offer as proof: First, that wherever electricity is developed from steam no other equivalent for the latent heat can be found. Second, that a charge of electricity, of moderate intensity, passed through water at the boiling point, flashes it instantly into vapor, and herein, doubtless, lies the secret of steam boiler explosions, as distinguished from simply bursting asunder from an over pressure.

Again, place two like vessels equally filled with water under equal conditions of temperature, and so forth, one being insulated and the other being provided with a good conductor from the water to the earth; in equal times, a far greater amount of water will have disappeared from the latter than from the former, and since in this, as in most other cases, the affinity increases with the temperature, there would be a still greater difference if the water in each vessel could be kept warm by some means not in connexion with it, such as a reflector, for instance.

In conclusion, I will remark that the laws which apply to vaporization will equally apply, by their inversion, to condensation.

As the absorption of electricity into the latent form, whether it be directly or by the conversion of heat, is the cause of vaporization and expansion in steam, so would the drawing off, so to speak, of this electricity, could it be effected, produce its sudden liquefaction and condensation.

Such means, for instance, as a brush of wire on the end of a conductor negatively electrized by the action elsewhere of steam itself, may yet be applied in the progress of knowledge, in lieu of a jet of cold water, in the condenser of a steam engine.

Mr. Storms illustrated his views as to the vertical tubular boiler upon the black board.

President Pell remarked: In the construction of cylindrical boilers, the joints universally run parallel to the axis of the boiler, and in perpendicular planes; or as it may be otherwise expressed, at right angles to the length.

This I am led to think is wrong, as they are without a shadow of a doubt, subjected to a much greater strain than if they ran round. I would therefore suggest the abandonment of longitudinal jointing, as it is necessarily weak, and apt to burst under a high pressure. Let the plates extend around the boiler, as a vine creeps up a tree, forming a screw. You perceive the jointing will then be oblique to the strain, and will not probably require more rivets or work than in the present disposition of plates, and will bear a high tension of steam, say 300 lbs. to the square inch.

Mr. Pell illustrated on the blackboard his views of the form of the boiler, of plates spirally wrought into a boiler.

On motion of Mr. Pell, the thanks of the club were unanimously voted to Mr. Storms for the interesting paper and remarks he had made.

On motion, ordered, that "The construction of steam boilers" be continued as the question for the next meeting.

The Club then adjourned.

H. MEIGS, *Secretary.*

February 25*th*, 1857.

Present—Alderman Haswell, the chairman; President Pell, Mr. Tillman, Mr. Fisher, Mr. Butler, Dr. Turner, Mr. Salter, Mr. Hedges, Mr. Chambers, and others.—nearly twenty members in all.

Mr. Secretary Leonard necessarily absent examining his mills, on the breaking up of this severe winter.

Mr. Haswell in the chair. Henry Meigs, secretary.

The Secretary read the following papers translated and prepared by him from the latest articles received by the American Institute, from Europe and elsewhere, (viz:

POLARIZATION OF HEAT LIGHTNING.

Mons. Fleury presented the following extract relative to heat lightning, from a letter from the perpetual secretary, Mons. Liais, viz:

"I have made experiments on the polarization of heat lightning, and hitherto have found no trace of polarization; but its absence may be attributed to the feebleness of the light of these lightnings; for I have found it in brilliant flashes in a heavy thunder storm, reflected the atmosphere. These brilliant flashes gave evident signs of polarization, but those less brilliant did not (on account of their instantaniety,) permit me to see, except with great difficulty,) the difference of the tints. And secondly, I have proven that the light of a very bright flash of lightning, reflected by a cloud, is not polarized. That there is no polarization except when the reflections are made by the air.

RUHMKORFF'S ELECTRIC MACHINE.

Experiments.—Take a varnished board, wet your finger and rub it on the board so as to form a very thin layer of moisture. Apply the two rheophores (conductors,) at points on this thin stratum of water, three or five inches apart. If the conditions of semi-conductibility are good, the sparks will form more or less zigzags. This experiment is not always successful, on account of the imperfection of the very thin layer of water on the board. The water must be as thin as possible, and the varnished surface perfectly unbroken. At the first flashes, the zigzag sparks are violet colored. As the thin stratum of water evaporates, the sparks become whiter, and sometimes even bluish. When the stratum of water becomes interrupted, the spark terminates in a ball of lightning of a red color, so that when you wish to produce ball lightning you must have the water stratum a little thicker, and the varnish surface interrupted.

ALUMINUM.

This new metal on account of its lightness is used in decorating military standards in France, making a difference of two and three-quarter pounds in the weight of a standard, in the eagle, etc., at the summit. Musical instruments are formed of it, it being more sonorous than bronze, superior gongs, bells, etc. Its cost, compared with silver, is in weight 300 to 225, so that an article made of it of the same size would be only worth 75, while its like of silver would be 225. A fork and spoon, for instance, will cost 16 and the silver one 50.

W. Y. Stewart of Glasgow, has patented moulding metals by employing a core-bar on which the core surface is formed for producing the interior of the pipe or hollow casting. Core bars of this kind may be filled up with screw or other mechanical action upon the bar themselves.

ANNEALING CAST IRON SHAFTS AND ANCHORS.

S. Fisher of Birmingham, has patented this. He makes *muffles* suited to the form of the article to be annealed; he uses fire brick. This kind of muffle will last for numerous annealings.

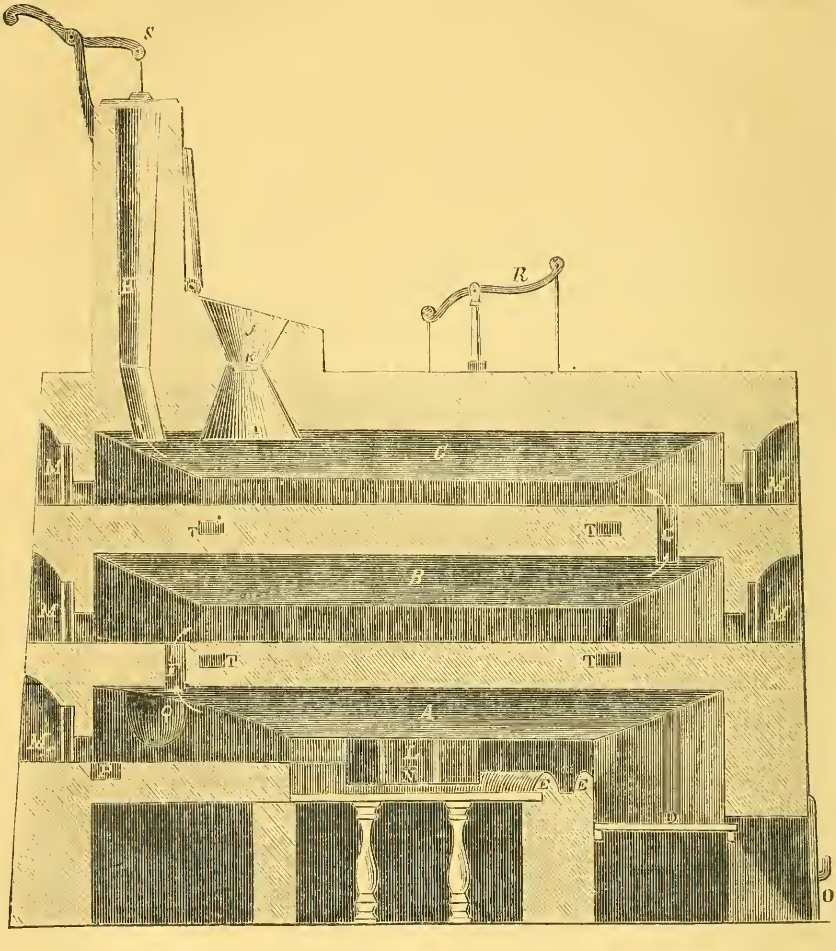
DIAMONDS PRODUCED FROM CARBON.

Mon. Despretz has been occupied a long time in studying the properties of carbon, and at last resolved to try the experiment of subjecting pure carbon to a very prolonged stream of the electricity of induction. He fixed at the positive pole of the circuit occupying the lower ball of the electric egg a piece of sugar candy, which, as every body knows, represents carbon in its purest condition. To receive the sublimation of this carbon, he adapted to the upper ball a hook of very fine platinum wire, he then made as perfect a vacuum in the egg as he could, and then allowed the current between the carbon and the platinum wires to continue for a month. He perceived, at the end of a month, that the wires were covered with a black dust, among which he distinguished some crystalizations. What would be their nature? What a question to be answered! For, as every one knows crystalized carbon is diamond! Among these crystals some were black, others much smaller were perfectly translucent and octohedrous. They were tried by Mon. Gaudin, a very distinguished lapidary, who found in them all the properties of the diamond. They burned without any residuum—polished rubies quickly.

[Journal of Arts, November, 1856.]

STENOGRAPHIC MACHINE.

Thomas Almgill states his experiments. I endeavor to transfer to paper by means of thin slips of plane tree, one attached to my chin, one to each of my lips and for my tongue, these all secured to their places by means of slightly elastic thread passed around my head to keep them in position when acted on by the organs of speech. To each of these pieces I had jointed long pieces, about eight inches each and not quite so thick as a pen holder. That, of course, for the tongue, at its extremity, was made much thinner so as to work with as little obstruction as possible. About half way or at four inches from the mouth these small rods worked through jointed sockets freely fixed in suitable bearings and connected at their ends to the ends of four other longer rods, about eighteen inches in length, and placed at right angles to the smaller set, the ends of each being connected by joints. These joints are loose. At fifteen inches from these joints are four universals fastened in proper frame work, in which these longer rods are securely fixed. To the unattached ends of these latter rods are the *pointers* or *tracers*, which trace the motions made in the articulation of speech. None of these natural motions are straight, but each word forms a combination of curves proportioned in their size to the vehemence or lowness of the utterance of words. The tracers are placed in sockets to which are attached small helical springs, from each of these tracers is a small wire fastened to a string, by which the speaker lifts the pencils from the paper at the termination of each word or syllable. The pointers must have small adjusting springs to keep them in position before and after using. The head is to be kept steady in speaking so as to give regularity to the written or traced lines. The method of trial which I adopted was extremely simple, consisting of two slides or guides for the carriage on which was fastened the tracing paper, a long screw, a spur-wheel, catch and handle. At each word or syllable I moved a tooth, and although the motions were not well defined from the loose construction of the machine, they were sufficiently satisfactory to establish a



ALTER'S PROCESS FOR MAKING MALLEABLE IRON, Direct from the Ore.

belief that if a machine was perfectly constructed and regularity given to the motion of the carriage by further mechanical arrangement, the pointers being so adjusted as to give clear room for the movement of each tracer, I think that a practiced eye will readily read my *vocalagraph*. The chief difficulty is obtaining the motions of the tongue. To obtain them correctly may be an insuperable difficulty, yet they may be obtained with sufficient accuracy to give a varied form to the expression of each word, which is all that is required. Walker, in his observations on the Greek and Latin accent, says: "But 'till the human voice, which is the same in all ages and nations, is more studied and better understood, and till a '*notation of speaking sounds is adopted*,' I despair of conveying my ideas on this subject with sufficient clearness." He afterwards expresses his conviction that the ancients had a notation of speaking sounds.

Dr. Turner introduced Mr. M. S. Salter, of No. 372 Fourth avenue, New-York.

The Chairman requested Mr. Salter to state his patent method of making malleable iron directly from the ore.

Dr. Turner submitted a paper containing an account of it, which was read, (viz:)

The nature of the invention is the working of malleable iron direct from the ore, and consists in expelling the impurities of the ore by exposing it to a moderate heat during the first stages of the process, and in then gradually increasing the temperature; agitation is kept up throughout the operation. The whole process is effected by one fire, and by a single furnace, of peculiar construction, a side elevation of which is shown in our engraving.

The furnace contains three chambers, A B C, arranged one above the other, the heat of the lower chamber passing into that next above, and so on.

The fire-place, or grate for fuel, D, is at one end of the lower chamber, from which it is partly separated by a double wall, E, raised to a convenient height, and over which walls a space is allowed for the passage of the draft.

The draft passes horizontally, in a reverberatory manner, along the entire length of the lower chamber, A, in the roof of which, at F, there is an opening into the middle chamber, B; it passes in the same manner through B, and thence through the opening, G, finally escaping by chimney H.

The ores with the necessary materials for their reduction, are introduced into the upper chamber, C, through an opening in the roof; they are first suspended in the hopper-shaped receptacle, J, which is provided with a slide valve, or shutter, K. The ores are then, at suitable intervals of time, removed to the draft opening, G, through which they are thrown down to the middle chamber, B; they are next thrown down openings F. into the lower chamber, A; next they are removed to the lower chamber to the finishing basin, L, near the fire, D, where the effects of the heat are completed, and whence they are taken out, in the metallic state, ready for the hammer.

Through the sides of all the chambers, openings, M, are made, through which the ores and materials may be frequently agitated by suitable instruments, and moved along from one end of the several chambers to the other, and finally through N, the metal may be molded and taken out from the furnace. The ashes are removed at O.

There are also openings for the blast, for the fuel, and for the letting off of any liquid matters which may accumulate in the finishing furnace. Through the floor of the lower chamber there is an opening, P, in the end opposite the fire, through which may fall the cinders and ashes, and other solid materials carried along thither by the draft. For the same purpose other suitable receptacles are provided in the other chambers.

To prevent any undue accumulation of heat in the middle and upper chambers, or to prevent the introduction to said chambers of cold air, or air charged with oxygen, coming through openings in the lower chamber, flues, Q, are made to lead from the lower chamber upwards, directly through the top of the furnace. These flues are ordinarily kept closed by dampers, R, and when they are opened the draft is prevented from pursuing its ordinary passage by a damper, S, on the top of the chimney.

To prevent the too violent effects of the heat, openings, T, are made in sides and ends of the furnace, for the introduction of cold air between the roofs and floors of the chambers. The floors of the several chambers may be either horizontal or inclined.

The lower chamber, A, is raised up from the ground for the convenience of working, for the easy flowing away of liquid impurities, and for the falling down of ashes and cinders. This process is alleged to afford the following advantages :—

1. The gradual heating of the ores with the necessary materials for their reduction as they are moved nearer to the fire from chamber to chamber, and from one end of a chamber to the other.

2. Opportunity is afforded for the frequent agitation of the ores and materials, by which agitation the impurities are freely allowed

to escape, the materials are properly mixed, and become, in turn, equally exposed to the heat and to the draft.

3. The draft is unconfined, and moves freely and rapidly for carrying off the impurities.

4. The atmospheric air is deprived, for the most part, of its oxygen by the fuel of the fire-place, and, therefore, while passing rapidly through the ores, it does not oxydize the metal, and does not consume the carbon, which is consequently allowed freely to extract the oxygen from the ores. By the gradual heating and freedom of draft and frequent agitation, an opportunity is afforded for the free escape of impurities in their natural order, beginning with the more volatile, and ending with the more fixed. Such escape of gaseous products is more difficult while a mass of solid materials, from which they are generated, remains at rest.

5. The agitation may be carried on at different temperatures, so that the objects which it cannot effect at one degree of heat it will at another. This is the purpose of the three several chambers, of which the upper is the heating and vaporizing, the middle the mixing, and the lower the reducing and finishing chamber.

It is alleged that the ores can be reduced to metals of more than ordinary purity by the above-mentioned means. The ores of iron may be reduced to wrought or malleable iron without first carbonizing the iron. They may be reduced also to a carbonized state, either as steel, or as cast or pig iron ; this may be done by having less agitation, and adding an excess of carbon.

The necessary materials for the reduction of the ores may be introduced at different temperatures, and at different stages of reduction, according as their presence may be needed. For example, when lime is required for separating silica from iron ore, such lime need not be introduced at the beginning of the process, when the temperature is low, for at such temperature it cannot act upon the silica, and its presence would certainly interfere with the free expulsion of other impurities. It may, therefore, be introduced partly in the middle, and partly in the lower chamber, as needed.

The carbonic acid gas evolved from the limestone or shells introduced in the lower chamber, tends to protect the carbon and ores and impurities from the residuum of free oxygen left in the draft.

It is claimed that this process yields a greater percentage of metal from any given amount of ore than is obtained by other furnaces heretofore used. The ores, and the necessary materials for their reduction are, through the whole process, completely under control, subject to such various treatment as they may require at different stages of reduction, and opportunities are afforded for the escape of impurities without their combining with and carrying off the metals.

Another advantage claimed is, that ores may be reduced by the use of anthracite coal alone, both as fuel and as the deoxydizing agent, the impurities of that coal, such as sulphur, are expelled at a low temperature before such coal acts on the ore, and consequently, before the metals still in the ore can be affected by such impurities. It is also alleged, that there is a saving of coal to a large amount, both as fuel and a deoxydizing agent; this is effected as a deoxydizing agent, because no more coal is used than is necessary to extract the oxygen from the ores, none entering into the iron, and also from the rapidity of the operation, very little being carried off by the draft. The saving of coal, as fuel is effected partly by the various facilities already enumerated, for the expulsion of impurities, partly by the prevention of the escape of heat, one chamber being compacted upon another, and partly by the long continuous range of the draft, to the whole force of which the ores are exposed by their position, agitation and falling. Owing to the freedom of draft, there is no mechanical pressure by said draft upon the ores, therefore it cannot, by the force of such pressure, prevent the chemical decomposition of the ores, nor carry away the pulverized particles of ores and carbon.

We are informed that this process has been thoroughly tested, and found to succeed far beyond expectation.

It is alleged to be so cheap and expeditious as to render the expense of producing malleable iron of the best quality less than that of pig iron made in the common blast furnaces. If this is so, it certainly is a remarkable invention, and will give a wonderful impetus to the manufacturing and industrial industry of this country. Patented November 20th, 1849. For further information, address the patentee, as above.

THE MANUFACTURE OF IRON.

From time immemorial the manufacture of iron has been conducted with but little change in the methods; these may be divided into two heads. First, the production from the ore of pig or cast iron, by smelting in blast furnaces. Second, the conversion of pig iron into a malleable state in small low furnaces, termed re fineries, or by puddling in furnaces.

In the first process, the ore, (an oxide of iron,) is deoxydized, by being burned with some carbona ceoussubstance, such as charcoal, coke, or anthracite. After burning a certain period, the ore is wholly deprived of its oxygen, and has become soft or wrought iron; it is at this point that it is desirable to arrest the process, but in the common furnace the materials are shut up from view for about twelve hours, and there are no means for ascertaining when the deoxydization has been completed exactly. As a consequence, the metal is kept at a high heat in contact with the carbon, after the oxygen has been driven off, and the result is a union of an excess of carbon with the metal, which is converted into a carburet—pig iron. This product is indeed more useful, compact, and portable than the ore, but it requires to undergo another expensive process before it is converted into wrought iron. Mr. Salter's invention for making wrought iron direct from the ore in open chambers, is designed to enable the smelter to arrest the reducing process at the point where the deoxydization of the ore has been completed, and before an injurious excess of carbon has been absorbed by the metal. By this method but one process is required, and wrought iron is thus produced, it is stated, at the same cost as pig iron; the latter is worth only $35 per ton; the wrought iron from $85 to $90.

Dr. Turner reminded members that Mr. Salter's method was examined and approved at a Fair of the American Institute, several years ago, and a silver medal given to him on that account.

Mr. Tillman, with Mr. Salter's aid, drew the plan of the furnace on the black board.

It is formed of three horizontal chambers, one over the other, of suitable dimensions for management, especially to enable the man to reach its length with a suitable implement for moving the ore, as required by circumstances, from the upper chamber to the second, and finally to the lower, where it is found to be malleable iron.

For the better knowledge of it, we refer to the drawing and description annexed, from the Scientific American.

Mr. Tillman.—Salter's method is very superior to Martien's and Bessemer's. It will necessarily supersede them.

Dr. Turner read a note from Thomas C. Willis, a venerable iron master, highly approving Salter's method.

He read a note from Marcus L. Ward, of Jersey, strongly approving it, and laying before the Club a wrought iron implement made directly from the furnace. Mr. Ward took the iron himself from the furnace. That Mr. Salter discontinued his operation for want of capital. That it is the best of all known methods.

Mr. Tillman remarked upon the article read this evening on aluminum, that he believed that silicon bore the same relation to aluminum, that carbon does to iron.

The chairman announced the question for the next meeting to be, "The best method of conducting steam from the boiler to the piston."

The club adjourned. H. MEIGS, *Secretary.*

March 11, 1857.

Present—Messrs. Fisher, Montgomery, Tillman, Creamer, Hedger, Butler, Storms, Dr. Turner, W. S. Salter, Godwin, and others, twenty-eight in all.

The regular Chairman, Alderman Haswell, being absent on duty at the City Hall, Mr. Tillman was elected *pro tem.*

Mr. Meigs, the Secretary, read the following article taken from the London Artizan of February 1, 1857, viz:

GAS.

"Gas in many American towns, costs $15 a head of the population; very few less than $10. A sum greatly beyond the cost in England. Of thirty-six gas works in America, the cost to the consumer ranges from two dollars to seven dollars per 1,000 cubic feet. The lowest charges are in Philadelphia and Pittsburgh, the highest in Auburn, in New-York. The Philadelphia works are the largest in America, the length of main being 120 miles and the annual gas 250 millions of cubic feet. The Manhattan Gas Company in the city of New-York, have 170 miles of mains and make 300 millions of cubic feet per annum. Boston fifty miles of main and 135,000,000 of gas per annum. Most of the American gas works charge from three dollars to nearly five dollars a 1,000 feet. The prices of labor in their gas works is excessive as well as the materials. A ton of coal yields about fifty-two bushels of coke, and requires twenty-seven bushels to carbonise it. A great contrast to the London works, where a ton of coal produces thirty-six bushels of coke, and requires but twelve bushels to carbonise it. The commonest labor in the retort house is about $1,25 per day. The cost, in America, of a public lamp is from about $16 to $30 per annum. In London, from $10 to $23. In Auburn, New-York, they make their gas from rosin. Labor in America costs about twenty-seven cents per thousand cubic feet of gas. In London from *eleven to fifteen cents.*

Mr. Newell of Boston, exhibited his new patent safety lamp for burning fluids, etc., made on the plan of Sir Humphrey Davy's lamp for safety in mines. The fluids are guarded by wire gauze, both in the cans and the lamps, so that an explosion is not possible so long as these lamps are perfectly sound. Mr. Newell set fire to the lamp wicks and then poured from the can the burning fluid into the burning lamp. A small flame momentarily plays on the nose of the can. Newell's wire gauze is made of copper wire properly electrotyped by silver to prevent corrosion from the acid of the fluid. He exhibited the can emptied of all the fluid except the very small portion adhering to its interior. A cork was put into the top of the can, a small aperture made near the bottom, a flame touched to the hole, and the admixture of air with the very small portion of fluid caused an explosion as quick or quicker than gunpowder, driving the cork out violently.

A letter from Prof. Benjamin Silliman, sen., of Yale College, was read, expressing entire confidence in this safety lamp.

The Chairman called up the regular question "The best method of conducting steam from the boiler to the piston."

Mr. Fisher who had promised to prepare a paper on the subject now read it, and illustrated by drawings on the black board, viz:

"The subject now under discussion, the distribution of steam, is one that was once but little understood before the necessities of locomotives pressed it upon the attention of engineers, and, after ten years' submission to the old rules, awakened them to think for themselves, and to adopt their valve gear to the peculiar service it had to perform. The first innovation was not, theoretically, calculated to stagger the ancient faith, and reconcile them to new practice; but practical trials, carefully observed, proved that a gain was effected, and thus opened their minds to a candid review of the old and new theories. And in aid of this practical evidence, they had the influence of an error into which they had fallen, respecting the duty of locomotives, or the work done by a given quantity of fuel, which, as they computed, did not exceed six or seven million pounds lifted a foot high by eighty-four pounds of fuel, which was but one-eighteenth of what the best Cornish engines were reported to have done.

"This error arose from an assumption that the resistance to rolling was constant at all speeds, and amounted to eight pounds per ton, including collisions, flange friction, and the sliding of the wheels which occurs when they run upon unequal diameters. But it is now well known that, at the speed of passenger trains at that time, these resistances could not have been less than eighteen pounds per ton, and probably were much more. So great a deficiency as they made out, required to be accounted for; and, for a time, the resistance of the blast-pipe was deemed a sufficient explanation. But there were some who did not believe that more than half the power could be expended in the blast. They got up another theory, which was stated by Mr. Vigrolles, in a lecture, something in this way: 'The speed we now give to the pistons, is four or five times greater than that heretofore given in stationary and marine engines, and, consequently, the steam cannot follow with sufficient rapidity, the piston runs away from it; the steam that gets in has to be rammed in, as it were, by the superior pressure in the boiler; and the pressure in the cylinder, as the effect proves, is scarcely half what is shown by the gauge upon the boiler.' To remedy this evil, they naturally proposed to enlarge the openings through which the steam had to pass on its way to the cylinder; and to accomplish this, they advanced the eccentric, so as to open the port a little earlier than had been the custom. There was a perceptible improvement; it was agreed that the steam got in with less ramming, and the piston started under a good head of steam. The lead was increased and experimented upon, until it was found by trial that three-eighths gave the best results on passenger engines. And this practice continued from '34 to '39; the valve worked with a lead, but had only one-sixteenth lap.

At this time, '39, it began to be suspected that the back pressure was in some measure lessened by the lead; and, to test this theory, a valve was made with three-eighths lap, so as to prevent the admission of steam before the commencement of the stroke, and yet to release it at the usual time. It also cut off the steam a little before the end of the stroke, and this gave some advantage from expansion. The result was highly satisfactory, and the lap was increased to one-half, five-eights, and three-fourths, and finally to one inch, and each successive increase showed a marked improvement; and in consequence of these trials, they settled, for some years, upon the lap and travel which cut off the steam at 0.78 of the stroke, and released it 0.95.

Of course it was well known that stationary engines, especially the Cornish pumping engines, expanded steam to a much greater extent, and derived great advantage from it; but the apparatus by which they did it, was deemed too complicated and loose for locomotives. But new devices were tried with some success; separate cut off valves were got up, but never were much adopted in England, owing to the *taste* for simplicity which prevailed, although they have been much used in this country and in France.

In 1840, the link motion was introduced, which, by its simplicity and elegance, rapidly obtained favor, and came into use. This gave a variable expansion, which greatly increased the economy effected by the previous improvements. But the distribution effected by the link is not generally conceded to be all that is desirable; it is objected that it releases the steam too early when it cuts off early; that it shuts the exhaust too soon, and thus causes compression; that it does not cut off early enough, without carrying these faults to excess; and that it wire-draws the steam too much whenever it cuts off at an early period. Mr. Septimus Norris speaks of it as a good means of reversing, but not as a good expedient for cutting off. Mr. Bates, of the New London and Willimantic railroad, has got up a supplementary valve to relieve the engine from the compression that attends the link. Mr. Corlies has constructed a valve movement, as different as possible from it, to avoid its compression, its early release, and to give a wider opening to the ports; and others, less known, have labored to produce something better.

The theory of these reformers is, that the steam should not be admitted until the stroke commences; the port should then open suddenly to its full width. When the time for cutting off arrives, the port should be suddenly closed; and at the end of the stroke, the exhaust port should be suddenly opened to its full width, and the quicker these movements take place the better, provided there be no concussion in the valve gear. The link party, which is ably represented by Mr. D. H. Clark, reply that these defects of the link are not without compensation, and not in themselves so great as many deem them; the admission is amply sufficient when the cut off is late; and when it is early, the wire-draw is but slightly objectionable, because not much power is wanted; as to the premature release, it occurs only at high speeds, when the steam has not time to lose much pressure before the end of the stroke, as the diagrams show, and the compression helps to make steam for the next stroke, and cushions the piston, and arrests its motion gently, which is desirable whenever the joints are loose. This last argument, however, is seldom adduced. Clark does not adduce it, and I do not find much authority for the opinion that the joints, when properly keyed up, required such means to prevent them from beating.

I am of opinion that the link is the best motion yet introduced, for engines that run at high speed; but I still think the objections against it are well founded, and that if a valve could be moved suddenly, and yet smoothly, and by an apparatus as simple as the link, it would be a great improvement. And in this opinion I am sustained by many of the American locomotive builders of this time, who still reject the link on account of its wiredrawing and compression, and resort to separate cut-off valves, to cause movements, and other means to obtain quick and full openings, even at the sacrifice of simplicity, and sometimes of smooth action. I confess that I may be biased in this opinion. I have invented a link valve motion, which is concentrated in its action, and yet smooth. Many of the members of this Club have seen my plan exhibited in a rude model, and constructed on my experimental steam carriage, for variable expansion; but I have a simpler form of it, for half-stroke, which will soon be applied in a case in which a half-stroke movement is preferable to any other. As the rules of the Club encourage me to make known my plan, by its means, I will avail myself of this occasion to describe it, and to compare its action with that of the link, as constructed by Rogers; and I expect to show that the expansion can be carried as far with this half-stroke movement, as it can be carried with the link on the Rogers engine; and that it can do heavy work better than a movement that cuts off later than half-stroke, provided the pressure of steam is sufficient.

The apparatus consists of two rockshafts, which receive motion from the crossheads. They are placed one over the other. Each shaft has an arm which gives the lead and cut-off to the valve of its own engine, and another arm which gives the main movement to the valve of the other engine. Converting links from these arms are joined to the ends of a lever, the middle of which is jointed to the valve stem. If the motion given to the rock shafts be slow, like the eccentric motion, the effect will be to give the same series of motions that are given by the common link; but if the arms by which they receive motion from the crosshead be slotted, and fitted with slide blocks, so that at the middle of their movement they have a short leverage, the movement will be concentrated—it will be slow at both ends, and rapid in the middle, and the valve stem lever will divide it into two steps; the first carrying the lip of the valve over the port, cutting off, and giving the linear advance usually given by the angular advance of the eccentrics, equal to the lap and lead; the other step, derived from the shaft moved by the opposite engine, giving the train movement; and the exhaust, of course, has whatever lead may be deemed best—I put it seven-eighths open at the end of the stroke. But in proportion as the motion is concentrated, by lengthening the slot, and running the side-block near to the shaft, the commencement of the exhaust is delayed, and thus premature release and compression are avoided, and the motion for a half-stroke cut-off, is so rapid that the exhaust is wide open when the crank pin is an eighth of an inch past the dead point, and remains wide open until almost the end of the stroke.

Between these two extreme movements, the one so concentrated that it cannot be much varied from half-stroke, and the other simply like the eccentric link motion, we may obtain any degree of concentration required for the service of the engine. If the angular motion of the rockshafts be within 60° the link may be forged in the rockshaft, and the radius link be sustained by a hanger, as in the stationary link motion, as it is inaptly called. But if more concentration is required, and therefore more angular motion is given, the link must be separated from the rockshaft, so that its angular motion may not be inconveniently great; or a different means of moving its slide-block must be used. I believe means may be devised to slide the block to any extent, however great the angular motion; and that the two rockshafts, with a reversing gear not much more cumbrous than that now in use, will give any series of motions between these extremes, the variability of expansion being greater as the angular motion is less.

In a steam carriage it will be expedient to place the pumps near the boiler, remote from the crossheads, to avoid danger of freezing, and so keep them within sight and reach of the steersman. In this case rockshafts with slight angular motion, (if sliding joints are used,) will be required to work them, and from the pump rockshafts we can take the motion of the cut-off end of the lever. In this case we may give an extremely quick motion to the main end, making the release and admission rapid, and the cut-off slow, but variable from nothing to full stroke. This motion would cut off quicker than the common link for all admissions less than half stroke, but slower in all admissions greater than half stroke; and the openings to steam would in all admissions be more ample than those of the common link. This is the movement I shall use on steam carriages that are to run on hilly roads, because it gives a delicate means of retarding. When descending a hill it will admit steam in reverse for the last inch or quarter inch of the stroke, or for any extent required to restrain the speed.

By a gear somewhat more complex I have made a cut off variable from nothing to full stroke, with concentrated movements at both ends of the lever. This gives the most perfect power of retarding, by admitting steam in reverse for any portion of the stroke. I do not propose this for locomotives, which should not adopt anything that may be of doubtful stability; but for steam carriages, that would suffer but little from a derangement on the road, and that should be made as light as possible. I consider this the one to be ultimately adopted. It moves the valve by two steps, each as quick as is desired; it retains the steam until the last, and yet has the exhaust wide open at the end of the stroke; it admits steam just when the crank has passed the space in which its leverage is insufficient to overcome the friction on the journals; it then opens the port widely in an instant, however short the admission; and it cuts off suddenly, without wire moving. And its movements, with equal fitting of joints, is smoother than those of a common eccentric, because whatever looseness exists is closed up while the motion is too slow to produce concussion. It will cost considerably more than the simpler apparatus; but it will save steam, weight of boiler, water and fuel; and every pound saved is equal to saving 150 tons carried one mile, equal to ten dollars at least.

A comparison of the simplest form of this, the half stroke cut off, with the distribution of the link, will show that it is worthy of the attention of locomotive builders.

Taking the 6th notch of Agers' link motion, in which the admission is about 51 of the stroke, we find the steam released at 19.25 inches, or 2.75 inches before the end of the stroke, and the steam expanded to 1.73 times its initial volume. The steam port, which in full gear opens $1\frac{1}{4}$ inches, in this notch opens only 9.16ths. If I set my slide block in the link so as to give the same proportion of opening, I shall cut off a little earlier three half strokes; and, as I do not release the steam until very near the end of the stroke, I shall expand the steam to at least double its initial volume. But I deem it better to give a wider opening, three-fourths of the width of the steam port, and this admits steam during .52 of the stroke, and expands it to 1.92 of its initial volume. Now the work done by the steam during its expansion to 1.73 is .55 of its initial work; and the work alone during its expansion to 1.92 is .65 of its initial work; or the effect is as 1.55 to 1.65, or upwards of 6 per cent greater with my cut-off than with the link at half stroke, besides the advantage of a wider and more sudden opening.

The notch of the link admits steam during .43 of the stroke, and expands it to 1.97 of its initial volume, and opens the port three-eighths of an inch, or .03 of its full width. If I open my steam port to half its full width I cut off at exactly half stroke, and expand to double the initial volume, and get an effect slightly greater than the link in this notch, besides the advantage of a more sudden and full opening, and a cut-off that avoids wire-drawing.

The 8th notch admits steam during .36 of the stroke, the opening being five-sixteenths, or a quarter of the port, and the release at $17\frac{3}{4}$ inches in a 22 inch stroke; the steam is therefore expanded to 2.27 times its initial volume, and the work done during expansion is .32 of the initial work; making the total work 1.82, which is 7 per cent more than the effect of expanding to just double the initial volume. But when we allow for the wire-drawing of this throttled admission it will appear probable that this advantage is more than balanced by it.

There is no notch for a shorter admission; showing that Rogers did not deem it useful to provide for an earlier cut-off by the valve. But of course the throttle, or regulating valve, will produce a partial expansion, if there be separate passages for steam to the two steam chests. This effect will be greater in the case of a port that is widely opened and closed suddenly, than in the case of a narrow and gradual opening and closing.

Wherever this notch is used, the work is light; we may therefore, in the half-stroke movement contract the throttle; in which case the pressure in the steam chest will fluctuate; being admitted all the time, and let out only half the time, it will be greatest a little after the beginning of the stroke, and least at the moment of suppression; and the dimension of pressure between these points is the effect of expansion, and the piston receives that effect. The piston starts under a relatively high pressure, with a full opening, and no wire-drawing at the port; but the narrow opening of the link so wire-draws the steam that the pressure upon the piston is very much less than that in the steam chest, as the indicator diagrams show; and this difference is so great, and so clearly attributable to the narrow opening, that I confidently expect a more effective expansion with this half stroke cut-off than is obtained by the link in the shortest admission which was deemed useful in this instance of it.

Let us now consider the necessity of an admission *later* than half-stroke. I have often heard engineers say that they want full stroke when they ascend a heavy grade, or start a train; and I do not remember to have met with one who was not of that opinion. And, if the pressure is too low to work expansively, it requires no acuteness to see the necessity of it; but if there be an adequate pressure, an engine can draw a heavier train when cutting off at half-stroke than when working with any larger admission; because the combined power of the engines is more equable at this point than at a later point of cutting off, as may be seen by a calculation of the leverage of the cranks, multiplied by the pressure on the pistons. In working at half stroke with 100 lbs. pressure, the combined power varies from 100 when one crank is at the dead point, to 113 when both are at 45°; but in working at full stroke, with the pressure necessary for the same total power, the combined power varies from 85 when the crank is at the dead point, to 119 when both are at 45°. Now, the tractive power of an engine, when in good order, is limited by the adhesion of the wheels; and therefore the engine that with a given total power, has a tendency of 113 to slip its wheels, will draw more than one which, with the same total power, has a tendency of 119 to slip its wheels.

This equability is desirable in other cases, especially where it is inconvenient to use heavy fly-wheels to equalize the power; and it is to such a case that this valve piston is about to be applied.

In favor of good distribution, I may add, that Mr. Corliss has of late years been to several establishments that had engines by builders of high reputation, and proposed to furnish them with new engines, take away their old ones, and accept half the saving of fuel for three years, as payment for the exchange; and they have, in most cases paid large sums to compound for the half of the saving. The boilers have not been altered in the least, it being the policy of Corliss to demonstrate that the engine alone effected the saving. And this it did, solely by the superior distribution of steam, the chief excellence of which consists in the quick cut-off, variable by the governor—that is, variable to suit the exigencies of the work. The saving is effected by the principle of expansion, carried out boldly and vigorously, without flinching from complexities that are greater than ever were proposed to the English locomotive engineers. His maxim is, efficiency first, then simplicity. Their maxim is, simplicity and elegance first, then efficiency. Ii is, however, but just to add, that a break-down on a railway is a matter to be avoided at a great sacrifice and if a valve motion is likely to occasion it, it is prudent to forego its advantages.

I will now reply to the clinching argument of the link men, namely the indicator diagrams, which, as they think, show that the premature release is of very little consequence. The line falls very gently from the point of release, rounding the diagram a little, but showing that the pressure still continues effective until the end of the stroke, and that what is called the last kick of the steam has force, even after the port is considerably opened. The steam cannot escape instantaneously, they say; it has to squeeze out, something as it had to be "rammed in," twenty years ago.

If we look at the other end of the diagram taken at high speed we see a serpentine line, produced by the momentum of the piston and spring of the indicator, and the reaction of the spring. This vibration is considerable, although the spring is at the time exerting an elastic force that balances a pressure of 60 pounds of steam; but at the time of release the elastic force exerted by it is equal to only 25 or 30 pounds; and the inertia of the indicator piston and its attachments is therefore far less speedily overpowered. The pressure of steam must fall much faster than the piston of the indicator can be driven after it by a spring so nearly unbent, and the fortieth of a second is not time enough for these ports to be driven down, even if the exhaust were absolutely instantaneous. I think that a careful attention to this point will lead to the conclusion that the indicator should not be so implicitly relied upon, in these private details, however useful it may be as a general test of the condition of an engine's packing and valve gear. It is safer to calculate, from the known laws that govern steam, what it will do when a port is open half an inch or more; how long it will be in losing its pressure, that is, in escaping. Such a calculation will show that the effect of steam is very slight after the exhaust begins to open, much less than the indicator diagram leads some to suppose; and it will appear that whatever advantage is gained from the pressure due to the difficulty of forcing steam through an exhaust port, with its relatively wide opening, is more than balanced by the deficiency of pressure due to the difficulty of its getting in through the narrow opening of the steam port.

The objection to compression is met by the advocates of the link by saying, that the power expended in compressing the steam remains in the steam compressed, and is used in the succeeding stroke, and therefore is not lost, and that it occurs only in the short admissions, when little power is required. This is a fair reply to those who suppose that the power is lost; but it is the work of the boiler to make steam, and of the engine to expend it to the utmost, when its work is light. For the engine to make steam at one end while it wastes it at the other is idling, and we may say that Corliss' engines prove that the effect of expansion may be carried much farther than any engines with common valve motions carry it.

The effect of the improvements made since the opening of the Liverpool railway has been to reduce the consumption of fuel from forty-nine to fifteen pounds per mile, chiefly by increasing the lap and travel of the valve, and the subsequent introduction of variable expansion gear and improved proportions, have reduced the consumption so much farther that the best engines have worked at twenty miles per hour with one pound per ton per mile, against eight pounds at twelve miles per hour, consumed by the best engines in 1833. Should all this improvement discourage or encourage us? The known powers of steam, and the actual performances of the best stationary engines, show that there is room for more improvement, and the directors of railways having failed to make the dividends they promised, are now modestly asking the engineers to reduce the consumption and cost of fuel; to burn coal, to heat feed water, dry steam—to do what they like. The time has been when the financial men took but little advice from the designers of engines, and gave them much advice, in such wise that they dare not refuse it; but their conceit is staggered by the steady diminution of the traffic receipts, consequent on the increase of competing lines, and the prospect that railways, like highways, will cease to be profitable, and finally become a tax upon the land they improve. The engineers of England and this country are now really encouraged to make improvements, to save fuel, to save wear of the track, repairs, &c., and the key to all this is that economical distribution of steam which will relieve the blast-pipe from contraction, the fire from violent forcing, the boiler from rapid burning, and the whole from ponderous weight, that damages the track and calls for more power, more forcing, and so on, until the whole is worn and torn, so that instead of dividends there are new bonds, and other evidences of ruin.

The Chairman alluded to the difficulty of this question as verified in the case of the great steamship Adriatic, whose error will prove very costly.

Mr. Fisher offered a paper on the dynamometer, invented by William B. Leonard, corresponding secretary and agent of this Institute, which was read by the Secretary of the Club, (viz :)

This dynamometer may be applied to sea steamers, or to locomotives, to as great if not greater benefit than to stationary engines, by which the power of steam expended, and fuel used, would be daily known. This dynamometer is simple in construction, easily applied to the cylinder of any description of engines, with the registering dial which may be located in the office of the engineer, or cabins of vessels, showing on its face at all times the amount of steam that has been used, as also the power at the time being. If the variation of power used is too great, the cause will naturally be looked for, and may be found in the neglect of the firemen in applying fuel to the boilers, derangement of parts of the engine, want of lubrication. The latter is often found on railroads to the great detriment of the running gear, as well as the loss of power.

Mr. Fisher proceeded by drawings on the black board to illustrate its power to measure and register powers—steam, railroad, land carriages, &c., and the great advantages resulting from accurate knowledge of the several powers used.

Mr. Butler mentioned the great importance of trials of power recently on the Erie railroad, and that they would have been far better done by Leonard's dynamometer.

Mr. Fisher described it at length.

Mr. Storms, by request of the Chairman, applied his illustrations of the action of steam on piston valves, &c.

President Pell was requested to continue his remarks from last meeting, on the construction of steam boilers. He had accidentally left at home a paper which he had prepared on that subject.

Mr. Pell made the following observations on steam.

If you would have an admirable condenser, perforate the cylinder, fasten one end of a pipe in it, pass it through the side of the vessel into the water, and let it encircle the ship, and enter a proper receptacle on the opposite side, which should be partially open, to permit steam that has not been condensed by the cool ocean to pass off.

If you wish to superheat your steam, form a circle of upright boilers, and adapt a furnace to each.

To prevent explosion, place a fusible metal plug in a pipe at the level in the boiler, below which you do not desire the water should fall, and let this pipe connect with the principal flue, the moment the water falls sufficiently to expose the pipe to intense heat, it will melt the plug, and the steam will rush through and put the fires out. When you take into consideration the fact that if you have a pressure of 100 pounds to the square inch, there will be an amount equivalent to 14,000 pounds pressure on all the internal parts of the boiler exposed to the effects of steam, it will be allowed that no precaution should be neglected to save life and property exposed to this terrible agent. We all know that the joints are far weaker than the solid plates, as the latter will stand 70,000 pounds to the inch, when the former will not bear 35,000 pounds; plates put on spirally, and double riveted, may bear 50,000 pounds or more, being much stronger. A great saving of fuel may be made by keeping your boiler well covered with metal, such as copper, or iron, wrapped around it in such a manner as to permit a free circulation of radiated heat to circulate between the loose wrapper and the boiler. It is far better to pump partially heated water into the boiler than cold, as there is much less strain. Steam should never be allowed to escape in the atmosphere, but rather be returned into the suction pipe and condensed. As many varieties of stone coal form clinker in the furnace, which can only be removed by putting out the fires, I would recommend that orifices be left at the sides of the furnaces, above the clinker formations, each plugged with an iron bar, that at proper intervals might be pushed through to support the fire, while the others are being removed and cleaned. This would prevent all delay, and render it unnecessary to stop the engine.

Smoke should never be permitted to escape, as it carries much valuable gas with it; all of which by a simple arrangement, that I could invent in five minutes, might be saved for the purpose of increasing power.

A law should be passed making it incumbent upon railroad companies, to use coal instead of wood, the waste of which latter material on railroad locomotives is immense, for example: the Hudson River company burned last year nearly 75,000 cords, by equalizing temperature, we may burn coal, get rid of smoke, save trouble and expense, and secure speed. They should also do away with the use of that rotten, breaking, cracking, inelastic substance known as gum, for springs, and use the steel elliptic, which gives a steady delightful swing to the car, instead of the short sea sick motion of the India rubber.

Some scientific gentlemen should invent an improvement in the construction of steam engine governors, which are of little service now in case of accident. Suppose for instance the gearing gives way, what is the consequence? the throttle valve is immediately opened to its fullest extent, and the steam is thrown in full force upon the engine, it becomes uncontrolled by the engineer, doing much damage to the machinery before it can be stopped.

Cannot some arrangement be made, whereby the engineer may pack his piston, without removing the cylinder head, and going through various other performances.

The present arrangement of slide valves on the steam chest is bad, from the fact that they are not well balanced, and consequently do not work steam tight.

When there are two engines in a vessel, can any arrangement be made, whereby the power can be transmitted equally for driving two shafts with uniform speed, of course supposing an equal resistance to each?

Formerly a jacket was made use of to encircle the cylinder with steam. Why was it abandoned? Why do the English now give preference to the single horizontal cylinder engine, instead of the double vertical cylinder engine? Formerly the wear of the piston upon the lower side of the cylinder of the horizontal engine was unequal; that is not the case now, as they are precisely made.

Why may not steam be used as a brake on railroad locomotives, by some arrangement in the cylinder, supplying it above or below, on the exhausted side, or vice versa—thus suspending the movement at once?

An engine has been invented by Beaumont, for producing heat sufficient to generate steam, capable of application to practical purposes by friction. The construction thus: a boiler is made, traversed by a conical tube of copper, 30 inches diameter at the top, 35 inches at the bottom, inside of which a cone of wood of the same shape is fitted, enveloped in a padding of hemp. An oil vessel keeps the hemp continually lubricated, and the wooden cone is so constructed as to press steadily against the inside of the copper, and to rotate rapidly by means of a crank turned by power. The whole of the boiler outside of the copper is filled with water.

Thus constructed, the machine with four hundred revolutions a minute, makes four hundred litres (or quarts) of water boil in about three hours, by the mere effect of the friction of the oiled tow against the copper. When once the boiling point is reached, it may be maintained for any length of time, or as long as the movement is continued.

Mr. Tillman had paid sufficient attention to this friction theory. Count Mumford, you know, attempted it, but I have entirely given it up, long ago.

Mr. Butler had looked at the friction project, but deemed it of little if any practical value.

Chairman.—The question of irregular wear on lower sides of pistons in horizontal cylinders has been examined. I believe experience has decided that the piston is as well in them as in vertical cylinders. The proper packing prevents any material difference. Water packing was mentioned and described by drawing, also, on the blackboard. Steam jackets have been extensively used to lessen radiation of heat from steam appartus, but that was an error, for the radiation is increased instead of lessened by the larger surface about it.

Mr. Hedger, of New-York, had devoted much time to the condensing apparatus, and thought that he had invented a better method—that is, by a double condensation, and in higher engines.

Mr. Meigs hoped that inventors would never let the new idea escape until duly secured to them by law. For they are watched both here and in Europe, and when the idea is worth stealing it is always stolen, or borrowed, without any compensation, in either money or fame.

About ten years ago, conversations were held in the Repository of this Institute, upon the plan of constructing vessels of a thousand feet keel, in order to cover about three waves, and thus never pitch. To have chapel, vegetable garden, a convenient railway all around her for hand cars, to exercise the feeble and invalid, ball room, libraries, printing press, &c. The ride would be about half a mile in circuit. The propelling power to be ten or a dozen paddle wheels, of which as many might be used at a time or not; and if one should be damaged, it may be repaired, or a new spare one, (always ready) applied. That such a vessel would, on account of her great mass, be almost as little moved by Atlantic storms as an island. That her speed might be at least twenty miles an hour, &c.

It was remarked then, that on the return of the next steamer but one, this *large idea* would have then been grown in England! And it was so. And now the celebrated Great Eastern is to appear next May on our waters—the *great* dream realized.

The subject for the next meeting was proposed by Mr. Leonard, of the committee on questions.

"Mechanical means of relief for the travel of Broadway."

The club then adjourned.

H. MEIGS, *Secretary.*

March 25, 1857.

Present—Messrs. Haskell, Tillman, Godwin, Chambers, Leonard, Haswell, Butler, and others, thirty in all.

Alderman Haswell in the chair. Mr. Haskell was appointed Secretary, *pro tem.*

Mr. Redding exhibited and explained Wolcott's scale, patented April 15, 1856. The improvement and novelty of this scale, consists in the graduation of the poize by means of a screw. It was examined by members, who were pleased with it.

Mr. Godwin offered the following resolution, viz:

"*Resolved*, That a standing committee of three members of the American Institute be appointed by the chairman of the Mechanics' Club of the American Institute, to whom all papers read before the said Club, and all minutes of the meetings shall be referred to them to select such matter to be sent to the committee of arts and sciences, as may be deemed by them worthy to be sent to Albany, to be printed in the Annual Report of the Transactions of the American Institute."

On motion, the resolution was laid on the table until the next meeting of the Club.

The regular subject being now in order. Mr. Tillman offered a paper thereon, which was read by Mr. Haskell, viz:

Mr. Tillman thought the best method of relieving Broadway would be to increase the facilities for passage not through it, but through streets parallel to it, by using pavement superior to that in Broadway, and extending at least two of these streets so as to connect with Union Square and the Battery. By extending West Broadway, southward, via College Place, until it intersects Greenwich-street, and northward by widening Laurens-street and connecting it with University Place, a magnificent avenue would be opened from Union Square to the Battery, for the accommodation of the western side of the city. It would be superior in grade and pavement to Broadway, and be fairly entitled to the name of Wideway. The eastern portion of the city would be benefited by continuing the Bowery extension until it meets Water street, south of Fulton street. This would form a grand "east avenue," connecting the South ferry with Union Square. Another minor improvement would be to extend Elm street to Chamber street, by cutting through a single block. All these improvements can now be made for a cost far less than at any future time.

Wm. B. Leonard submitted the following paper, viz:

"Among the many schemes for the relief of Broadway, none appears to be free from objections. The plan suggested by the Mayor, cutting away the sidewalks and deranging the entrances to saloons and cellars, would encounter many difficulties. A rail or double track in the middle of Broadway, I am convinced, would not relieve the carriage way; and parallel avenues would be objectionable, as the distance from Broadway would expose those who are doing business in Broadway in bad weather, besides opening these avenues would be attended with great cost and sacrifice of property.

The only feasible plan to accomplish this desirable improvement, in my opinion, is to widen the carriage way three feet on each side of Broadway, place a rail on the curb stone for one wheel of a car, and lay a flat rail four feet from this first named rail, the face of which to be level with the pavement of the street. The rail connected with the curb to have its upper edge convex, on which the wheels of the cars being concave, will run and be retained on the track. These wheels are to have a rib projecting from the surface of the rim of the wheels which enter an open groove in a flat rail on the cross streets. This groove or slit is to be made so that dust will pass through the rail into a gutter below.

On this rail track, which is to extend from the Bowling Green, (or Whitehall street,) as far up Broadway or Fourth avenue as may be expedient, on the east side, and a like track on the west side to the place of beginning, with properly conducted cars on such rail tracks, would, in my opinion, give the relief to Broadway and accommodate the public, with less cost and less sacrifice of property than any other plan that has been suggested.

The three feet taken from the sidewalk would not interfere with vaults or cellar-ways, and would afford great convenience in entering and leaving the cars, and would, no doubt, equalize the value of property on both sides of Broadway. In order to carry out this arrangement, private carriages should be required to pass into the cross streets, instead of standing in front of stores in Broadway, and should only be allowed to stop on the track to allow persons to enter or leave their carriage. Drays or carts would be allowed only to discharge or load in front of stores. A question to be considered would be, the capacity of the cars and the motive power; if by animals, I think one horse, or mule, to haul a car with twelve seats, would be most advisable.

Allowing the track to be four feet wide, we take only one foot on each side of Broadway out of the carriage-way; this space being now filled with rubbish, and the three feet on the sidewalk unoccupied, except by lamps, trees, and in some cases openings to vaults; the operations in omnibuses, carriages, carts, and of *pedestrians*, would not be disturbed, and you would have conveyances in the cars for as great a number of individuals as are now carried in omnibuses.

J. K. Fisher remarked, that if other avenues, or wide streets, should be opened parallel with Broadway, they would tend to great increase of the value of the property there, and diminish the value of the Broadway property. He was not satisfied with our stone pavements—he preferred the iron to all methods known. He preferred some mechanical power to that of animal, it was cleaner, takes less space.

The Chairman stated, that as to sidewalks, where our law authorizes the breadth to be seven feet, many are eight feet, and many of them more than that. The committee of the common council propose widening Broadway three feet and three inches, leaving the sidewalks five feet wide; to take the sidewalk in front of the City Hall park for a carriage-way, take three feet from the walk in front of St. Paul's church, place the hydrants in the side streets, remove gas posts, etc., and affix the gas lanthorns to the walls of the buildings, so as to project over the sidewalk.

The same subject was ordered to be continued at the next meeting, and the club adjourned.

H. MEIGS, *Secretary.*

April 8, 1857.

Present—Messrs. Tillman, Fisher, Dr. Smith, Roberts, of Philadelphia (colored), Mons. Auguste D'Ourville, of Philadelphia, Harvey, Butler, Godwin and others—26 members.

The regular chairman, Mr. Haswell, being absent, Mr. Tillman was appointed chairman *pro tem.* Henry Meigs, Secretary.

Mons. D'Ourville exhibited a corn planting machine, patented by Messrs. Jeffers, Sparks & Jeffers, of Philadelphia, which is drawn by one horse, and guided by a man holding plough handles behind. The machine drops as many grains of corn, of any size, and at any distance desired. It can plant twenty acres in a day. It will cost about $25. It is peculiarly suited to our vast prairies.

Aaron Roberts, of Philadelphia (a colored man), exhibited and explained a machine for aiding in throwing water upon fires which men cannot approach. It is a metallic telescope, whose several parts are readily hoisted by means of a winch to the suitable height, carrying up within it the hose, from whence a more full and solid stream is thrown upon the fire, the pipe being managed by means of suitable chains by two firemen, one on each side. The Franklin Institute has certified the utility of this machine.

Dr. Smith introduced Mr. Ellinger, who exhibited a hollow crucifix of wood, carved richly with the Savior on the cross and other figures. The work is attributed to the celebrated Benvenuto Cellini. The hollow contained relics of several saints.

SUBMARINE ELECTRIC CABLE.

Mr. Meigs—The experiments of Franklin, in 1752, were the conduction of the electric fluid above water across the Schuylkill and back, but never under water. In 1746 and 1747 the Royal Society of London tried several interesting experiments. They passed a single wire over London bridge, and took the ends to the water's edge, and found that the electric fluid which was carried over the bridge by the wire *returned through the water*. They extended several thousand feet of wire above moist meadow-land, and found the return circuit was by the land. They stretched wire above land on the banks of the Thames, at a bend or two of water; wire over the land in three or four places, and interrupted by the water in line. A part of the land was very dry gravel, but they found the return circuit was good through the land and water. They did not try conduction under water.

In October, 1842, at the fair of the Institute, Professor Morse exhibited his insulated electric cable, laid *under water* from the Battery to Governor's island, nearly one mile, and also to Mr. Colt's submarine magazine, attached to the bottom of a brig lying a proper distance from the Battery, and blew her up with it. The American Institute awarded him its greatest premium for this experiment—a gold medal—the first reward his genius had gained for him.

Ten years ago the world was startled at the idea of the fluid leaving a wire on one side of water and going directly to another wire on the opposite side of the water. Now we know little about the rationale of the transmission of electricity, light, &c., but the theory of propagation by wavy impulses is applied to light, and by some to electricity. That the material in both cases is present, and is only sensible to sight or feeling when put in motion as the extending wave on water, &c. And by experiment we know that the propagation of sound through water is four times the velocity of sound through air, and, therefore, if the impulse given could be extended as far as those of light and lightning, we could send a sound from New-York to Liverpool through the ocean in one hour, i. e. sound 1,140 feet per second, gives 4,400 for the velocity by water, which exceeds three thousand miles.

The American Franklin "*eripuit cœlo fulmen*," &c. The American Morse made the *fulmen* go by sea.

ELECTRO MAGNET.

The mass of iron is of little importance compared with the surface, and amount of wire around it, so that *it is best to make them hollow*, for the sake of greater lightness and convenience. The increase of power has a limit—that is, the size of the wire and number of coils around the helix. The hollow magnet must, however, have considerable thickness, never less than *one quarter* of the radius of the cylinders.

Mr. Chairman called up the regular subject, and requested Mr. Fisher to present his views of the mechanical means to relieve the travel in Broadway.

Mr. Fisher complied, as follows:

I wish to say a few words upon two plans which were brought forward at our last meeting—that of Mr. Leonard, and that which I understand to be the plan of the public authorities, which the chairman mentioned.

The plan of a railroad with an edge rail upon the edge of the side-walk, with a wheel so formed that only this rail will be needed to guide the car, and a flat rail for the outer wheel, will have the great advantage that it will offer no obstruction to ordinary vehicles. But I prefer the plan which I have often mentioned as the best for a railroad on the ground, if any be laid, which I have not recommended. This plan is to have both rails flat, and flush with the pavement, and laid on the *middle* of the street. All vehicles would be benefited by this; and there would be no necessity for that worst of all vehicles, the city car. But it would be incomparably better to make the *whole* surface of iron; and to avoid the excessive roughness which many deem necessary for iron pavements. I am satisfied, from having seen thousands of horses run on stones as smooth as our side-walks, that on a level, they could run on smooth iron, and that on inclines much less roughness than is supposed would be needed. The forms of paving proposed by Mr. Nowlan and Mr. Tillman are sufficiently rough for any inclines in this city; and yet they are so designed that a wheel of two inches width would not at any time go below the level of the upper surfaces.

While I am on this point I will offer a suggestion, hoping it will be considered and discussed, and, if approved, that it will be mentioned where it may be acted upon. There is considerable travel across the Park, not only of vehicles that are allowed, but far more that are not allowed; and judging by the practice in European cities, this will continue and increase, and before long be sanctioned by the government, and will be found beneficial. But for the present this part of the Park may be fairly regarded as suitable for experiments in paving; and I suggest that it be used for that purpose, and that several kinds of pavement be laid there, for trial by those who choose to ride across. I believe the butchers' boys will test them thoroughly, at all speeds above six miles per hour.

I would call attention to the side-walk in front of Bowen & McNamee's new building. As a side-walk, I think it too rough: it will take thousands of dollars' worth of shoes to wear it smooth. But it is very like the pavements in Naples, when they are new; the blocks are a little larger, but the roughening is about the same in form and degree, and the hardness is nearly the same as that of the hard lava used in Naples. If this be laid on the level, it will be found that when it becomes smooth the horses will not slip upon it; its *level* surface will produce no tendency to slip. But the inclined sides of rounded stones tend to make them slip, as any one may see who watches the feet of horses as he rides along Broadway. There is a slip of an inch or two at almost every step, which, though not dangerous, is very fatiguing to the horse; but on the smooth pavement of Naples there is no slipping at all, except on the violent hills of that city, or upon the pavements that have lost their level. It is my opinion that this is the pavement for private streets, being cheaper than iron, and tolerably cleanly.

But several forms of iron should be tried, as this material is the best and cheapest for all concerned, where the traffic is great. I would especially recommend that Nowlan's should be tried, at the public expense; he is not able to try it himself. And I would earnestly advise that no paving should be tried that has through perforations, to allow water to go downwards, and mud to work upwards. And I hope that a piece of smooth iron will be tried; and if it is, I predict that it will be found that the notion that horses will slip upon it will follow the old notion that the wheels of locomotives and steam carriages would fly round, and the vehicles not advance. Such effects may be produced: I have seen the four drivers of a locomotive slip, when only her tender was attached; but a stupid boy performed the feat; I have also seen an engine draw 87 times the weight upon drivers, up a six feet grade, without slipping. So a horse, stung with the whip, may suddenly exert his power, and slip: but a horse well trained and carefully driven will keep his feet as well as a man can do; and the load, equal to twice his own weight, will be less likely to cause slipping than the ordinary loads of locomotives.

The plan of the government, to widen the street by removing part of the stoops and areas, is good so far as it goes; but I think it should go to the wall at once; it must do so within twelve years; and, at least, it should decree the removal now, if it allows some years' time to effect it.

The other part of the plan, that of converting the Russ into a Belgian pavement, I think is injudicious. Happily, however, it could not be made strictly Belgian, unless you destroy the admirable concrete foundation: if altered in the way proposed, it would be much better than the Belgian; and much better than it now is, or has been for years, if cement, instead of loose dirt, were laid between the concrete and the stones, to level the inequalities. But it would cost a great deal; and, as I believe, a much better pavement may be found by the trials I suggest, I think we should wait for such trials, and make an alteration that will give longer satisfaction than the Russ job has given, the next time we tear up and obstruct this thoroughfare.

I now will add a little to the view I presented at our last meeting. When the ultimate pavement is found, there will be no more dirt: the merchants will then admit wagons into their stores, and the side-walks will no more be obstructed by boxes. Until it suits their convenience to load inside they will not do it; but when cleanly and light vehicles, without the nuisance of animal power, are in use, they will prefer to load and unload inside, and then they will do it. They will then object to the practice of dealers in furniture who keep their wares on the side-walk; and, as a great majority will be against them, they will reform, for the sake of respectability. If a few brave public opinion, their votes will be of little consequence, and they will be dealt with according to law.

The result of these items of reform will be, a street 16 feet wider, unencumbered with boxes, standing carts, bureaus and apple-benches, with vehicles carrying 2½ times the present loads, and running at double the present average speed, even if not allowed to increase the maximum speed; a fifth of the number of passenger vehicles, a third of the number of goods vehicles, and no unlawful obstructions. The street would then accommodate thrice the present traffic. And this is the relief wanted. Diversion of the traffic into lateral avenues is not wanted until all this has been attained, and the traffic increased more than threefold.

Finally, I would suggest the trial of a piece of smooth iron walk, in the Park. It would wear shoes far less than stone, and make no dirt.

The subject for the next meeting, "Traction of Carriages."

The Club then adjourned.

H. MEIGS, *Secretary*.

April 22, 1857.

Present—Messrs. Tillman, Haskell, Fisher, Brundage, Anderson, Cogswell, Godwin, Sibley and others—16 members in all.

The regular chairman Mr. Haswell being absent, Mr. Haskell was chosen chairman. Henry Meigs, Secretary.

Mr. Brundage exhibited and explained the horse shoe nail machine, (model) patented by him.

The Club examined it carefully, and the nails made by it, and it was referred to a committee. The machine imitates the manual operation of hammering with accuracy; the nails appear to be more exactly and evenly hammered than hand made nails.

The subject of Traction was called up.

Mr. S. D. Tillman introduced the subject "Traction" by giving a brief account of the general state of the roads of this country before the introduction of the railroad. The first improvements in the art of locomotion in this country, were confined to the construction of vehicles. Carriages were made with higher wheels and with more effective springs. Then an attempt was made to remove impediments to the smooth running of wheels. Many experiments were made with pounded and flat stones, but it was not until the introduction of the railroad that the problem of best means, locomotion was solved. Having a perfectly smooth and solid track, only wide enough for the wheel, which is kept upon it by a flanch; this kind of road must be the most economical as well as the best. But when carriages cannot run in one continuous line and animal power is used for moving them, a road must be smooth in every direction, and yet give the animals when upon it a good foothold

The Russ pavement, so called, in Broadway, is the best road for the carriage and the worst for the horses drawing it. The Belgium pavement is better because stones are laid down at right angles to the road way, so that the corks of a horse shoe can enter between them; but in course of time these stones become rounded like cobble stones, which form the worst of pavements. Iron seems to be the only material which can be used to secure all the requisites alluded to. Several kinds of iron pavements have been invented, but none introduced as yet seem to fulfil all the required conditions. I believe a perfect kind of pavement has been made of iron, and I hope to demonstrate its practicability in this city within a few months.

Mr. Fisher was requested to give his views on roadways, and he explained fully the effect of travel on various roads, from those of earth only to plates of iron. He showed that small square blocks, however hard as flint, (like our Belgian pavement,) soon become by wear as round on their upper side as our cobble stones are naturally. That the more smooth the surface the less is the traction power required; that a horse or a wheel, by their gravity adhere to level and smooth surface with a power usually of about 33 per cent of their weight.

That when railroads were first proposed the objection was very generally made that the wheels of iron would slip on iron rails, and could not ascend even a moderate grade, but would require some contrivance to aid the ascent. Iron legs were proposed to take the ground and propel the engine upwards and stay its descent. Practice has long since demonstrated the error of that idea. Smooth wheels ascend considerably high grades with heavy trains easily. But if there should be a difficulty for the horse's foot on perfectly smooth plates, then it is perfectly easy to cast the plates with such crevices for the horse's corks as are wanted, and moreover there is no difficulty in laying smooth plates for the wheel tracks while the horse path is creviced. But the time is not far distant when the horse will not be wanted in our city for passengers use—machinery far better will be applied. And with iron pavement we shall be relieved from the dirt, dust and mud, because the abrasion of iron makes neither, while that of the stones makes much—more by far than is apparent at first view.

Mr. Tillman was not satisfied with this iron pavement.

Mr. Sibley had observed the great difficulty of traction by horses on plates of iron at large iron works in Wales; that often the horse could scarcely stand on his feet. He was utterly opposed to such roads.

Mr. Meigs adverted to the ancient condition of our roads. In 1805, he left Courtland street in a special coach and four horses at 9 o'clock a. m., for Philadelphia, detained by stormy weather an hour and an half at the ferry—six inside passengers. The clever poetical satirist Fessenden one, who beguiled the weather by his wit. We arrived after sundown within two miles of Brunswick, where we were stuck fast in mud, heavy rain, gale. We had to sit up to windward to prevent the coach from being blown over! After a while the driver left to search for a house to get a lanthorn to enable him to fix his harness. We got out and had a dreary walk to the house. On the morning of the third day we reached Philadelphia.

In 1813, when our roads were cut up by the numerous wagons transporting goods, on account of the trade by sea being cut off by our enemy, England, I traveled to Baltimore in a mail coach, and all the passengers had to walk a third of the way, even down hill in places the coach was axle deep in mud and the roadsides strewed with the ruins of wheels and the dead horses. On my return a middle aged French gentleman with us was terribly annoyed by this sort of experience, he became enraged, he appealed to us all on the execrable roads of America. In a fury of oaths he swore that if we would go with him to France he would show us that we could travel all over France with a full *plate of soup in our hands and not spill one drop!*

Mr. Tillman described the miseries of road travel of a more recent period, distinguished for overset coaches and carriages, and *tortoise* velocity. He said that we must have two more Broadways at least.

Mr. Meigs repeated his former remark that Broadway and the Bowery had been justly likened to the Mississippi and the Ohio. Their confluence was at the lower end of the Park. The island being long and narrow, these were its natural arteries. That if the breadth of both was doubled, and their pavements perfect, they would be impassable; because nearly all travel would then flow into it from the side streams to see the fine sights, to travel easier, etc., would draw every cart and even wheelbarrow and every person into them, and there is no help for it. It is extremely doubtful whether two more Broadways would relieve the main artery of its tide of life and labor.

Mr. Tillman and Mr. Fisher, of the committee on questions, gave for next meeting the subject of "Steamships."

At half-past 10 o'clock P. M., the Club adjourned.

H. MEIGS, *Secretary.*

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