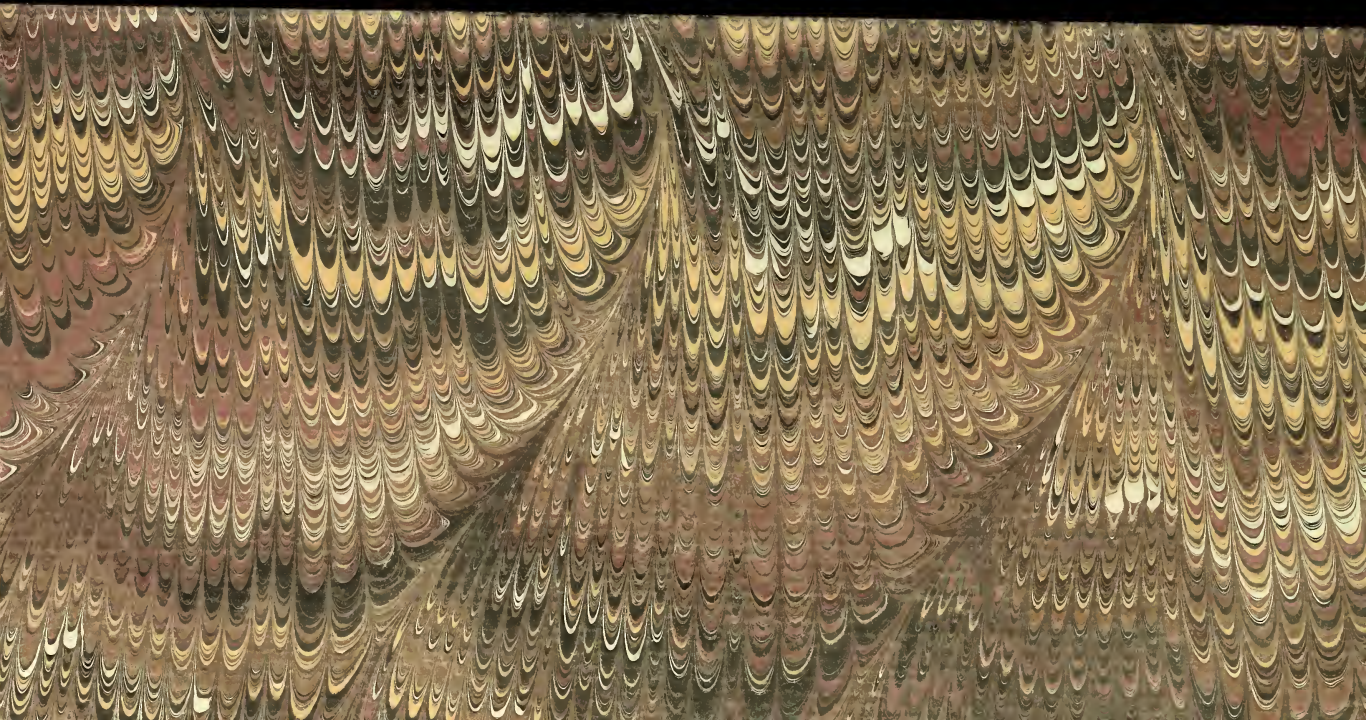

THE

DAILY EXHIBITOR,

PRINTED AT

The Philosophical Society's Exhibition

OF

MODELS, MANUFACTURES, NATURAL HISTORY,
WORKS OF ART, ETC. ETC.,

IN THE

CITY HALL, GLASGOW.

OPENED, DECEMBER 24, 1846. CLOSED, JANUARY 9, 1847.

GLASGOW:
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MDCCCXLVII.

STATISTICS OF THE EXHIBITION,

OPENED on the Evening of December 24th, 1846, by a numerously attended PROMENADE.

DAILY ADMISSION thereafter, on payment, from ten A.M. till eight P.M.

ADMISSION FREE to the WORKING CLASSES on January 1st, 2nd, and 4th, from nine A.M. till six P.M.

Visited during these three Free days by.....54,000 individuals.

CLOSED January 9th.

Total Number of Visitors,.....97,000 ,,

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Daily Exhibitor.

No. 1. GLASGOW, DECEMBER 24, 1846. PRICE ½D.

TO OUR PUBLIC.

ADDRESS INTRODUCTORY.

OF all the arts, sciences, and departments of knowledge, gathered together in this magnificent collection, none is gifted with the power of speech except our own. Our brothers, the Weavers in the one corner, no doubt make a noise with their shuttles, and the Potters in the other make a whiz with their wheels, but their noise, and many other noises conjoined, do not amount to speech; and as for the operations of the Chemists, reckoned so subtle and knowing, they frequently end in vapour and smoke. To us alone has been granted speech—*eye-speech;* and, consequently, by the unanimous suffrage of our brother EXHIBITORS, we (Typography) have been elected to make known to *our Public* the merits of each and all. To make profession of our impartiality, and judging everything by its own merits, would only be copying the phrase of our contemporaries of the Daily Morning and Evening Press. WE say, we shall describe, and make known, only what pleases *us*, and that, too, only in our own peculiar way. We have entered upon our functions unpledged, and shall use *our* privilege untrammelled. One great advantage, by the way, we possess over our contemporaries; we can never be made the subject of recrimination by our dumb fellow-workers. Whatever may be the opinion *of* our sayings and doings, existing in their own private hearts, be they composed of wood or iron, or any other equally callous material, they cannot give them expression. The Chemists may vapour—the Mechanics may beat their drums till they crack our tympanum—and the Naturalists may rustle among their dried leaves, and send forth an odour from their camphorated specimens, with the intent to titillate and irritate the olfactory nerves of our editorial proboscis, in vain! our self-complacency and composure are not to be disturbed. We have, however, one fear, and we mention it now, to warn the parties interested of what they may expect. We dread lest some reckless limmer, destitute of the proper respect due to our editorial dignity, should gibbet us *in propria persona*, to the gaze, in broad gas-light, of those whose shins we may chance to hit. If any such limners of manmaps should be so foolhardy, *The Daily Exhibitor* will exhibit them without remorse, and

"If there's a hole in a' your coats,
I rede you tent it;
A chield's amang you takin' notes,
And, faith, he'll prent it."

ELECTRO-METALLURGY.

(Table D, No. 5.)

This beautiful art, first brought into popular and useful notice, by Spenser, of Liverpool, has for its object the deposition of nearly all the metals from their solutions in acids, &c., by the agency of galvanic electricity. The electric fluid is made to traverse the metallic solution, and the object to be coated, or covered, is attached to one end of the battery. To the other wire from the battery, a plate of the metal which is being deposited is attached, and is hung into the solution. This plate continually and constantly supplies the solution with metal, as the electric fluid takes it from the solution, at the same time that it carries the current of electricity from the solution. In this way, objects in metal, wax, fruit, flowers, &c., are covered, and constitute the exquisitely beautiful arts of electrotype, galvanic plating and gilding (now successfully rivalling the old Sheffield and Birmingham processes of plating and gilding, the latter of which is so deleterious to the health of the workmen), daguerro-electrotype, or the copying of daguerrotypes by electrotype, and a host of useful and ornamental applications, too numerous to detail.

LECTURE ROOM.

The Lecture Room will be devoted to the illustration of various departments of science, particularly Electricity by means of "Armstrong's" Hydro-Electric machine, and Optics by the Oxyhydrogen Microscope, the Polariscope, the Dissolving Views and the Chromatrope.

In these various optical exhibitions, everything novel and gorgeous by which this branch of science is capable of being illustrated, will be introduced. The Microscope, revealing the more minute objects of nature, and laying open the perfection of the Divine workmanship, even in those which are altogether unperceived by the unassisted vision, is a well-known source of enjoyment and instruction. The Polariscope discloses these peculiarities of structure in transparent objects, which even the Microscope, however powerful, cannot discover; and by the brilliance and gorgeousness of the colouring with which it invests them, proves not less interesting to the popular spectator, than from its abstruse nature, and the information it has afforded on the physical properties and probable nature of light, the subject itself has been to the scientific inquirer.

The Dissolving Views are so called in consequence of the imperceptible manner in which they gradually fade from view and replace each other. They consist of a number of views painted in the first style of art, and represented on a surface of 400 feet square.

The Chromatrope, which we believe few of our readers are acquainted with, presents an amazing complication of the most rapid changes of position, figure, and colouring which it is possible to conceive, or rather it is impossible to conceive without witnessing them; and as there will, we doubt not, be very few indeed who will not have the opportunity, we need not dilate upon the subject.

Other experiments will occasionally be introduced, as the Gun Cotton, &c. &c., so as to produce an agreeable mélange of scientific information and recreation.

—o—

Duck-billed Platypus (*Ornithornychus paradoxus*). "Out, hyperbolical fiend!" as Sir Toby Belch would say. An animal, "neither flesh, fowl, nor good red herring." It seems to be a *cross* between the aquatic birds and mammalia. The muzzle or snout is like a duck's bill, as we see; and it is said to lay eggs! The eyes are small, and there is no external ear, so there was little use in its attending on the concerts of Orpheus or the sermons of St. Francis Xavier. The spur on each hind leg has a canal in it similar to that in the poison-fang of venemous serpents. It is, in a word, "no canny." —Inhabits similar localities to our otter, in Australia.—(West Gallery, No. 92.)

Model of the Scott Monument in Princes Street, Edinburgh.—This fine composition is the design, and the model itself the handiwork of the late George M. Kemp. The plan of this national monument is, for the most part, made up of the architectural details of the collegiate church of Melrose Abbey. That monastery (Carthusian) was founded in 1136, but the style of its existing dilapidated church, belongs to a much later period; namely, the end of the 14th or beginning of the 15th century. It is of the Decorated English Gothic, with some slight modifications in it, of the succeeding Florid or Perpendicular style, introduced on occasions of reparation. The monument made up from it is admirable, not only in general effect, but wonderful for the well-compacted combination of many separate features, without the least appearance of overcharging, much less confusion. If ever Melrose Abbey Church, now slowly but surely subsiding into shapeless ruin, should ever come to be restored, or its site occupied by a new edifice modelled on the old, the architect has here all his requisites at hand: he needs neither guess nor invent—he has but to copy and extend, and the thing is done. Fine as this work is, we are sorry to be obliged to remark that there may be seen in it a slight exception to the general character we have given. It is to be found in the upper portion, over the third arch in the ascending series. All the superimposed parts belong to the Gothic of a degenerate time. We are informed, and inclined to believe, that this portion was not Kemp's. Still, upon the whole, it is a fine work, and an honour to the country; though a hundred such memorials, even made of gold instead of stone, would go but a small way towards discharging the heavy obligations we all owe, both individually and as a nation, to the patriotic genius of Walter Scott.

Hydro-Electrical Machine.—A machine of this remarkable kind, for the production of electricity by steam, is to be seen at work in the Lecture Room. "The production of electricity by steam has several advantages over the common method of obtaining it. An electro-steam apparatus is self-acting, which leaves the operator at perfect liberty to attend to results. Its high temperature renders its action independent of dampness in the atmosphere, which so greatly impairs the energy of an electrifying machine; finally, its extreme simplicity secures it from derangement." We give here a description of a hydro-electrical machine of extraordinary size, we believe the largest ever constructed, made by Messrs. Watson & Lambert, Newcastle. The steam-boiler, which is insulated by glass pillars, is constructed upon the locomotive principle, having a fire contained within, and passing through, tubes, which are surrounded by water, into the chimney. There is a glass guage attached for regulating the proper quantity of water in the boiler; also a safety valve to relieve the pressure of the steam above a certain point. There are two hollow metal arms issuing from the upper part of the boiler, to each of which are attached seventy small iron tubes, the ends of which are furnished with proper jets, and by the passage of the steam through these the electricity is produced. There is a junction pipe, fitted with a cock. for the purpose of shutting off one of the arms, and using only one half of the power of the machine; or, by keeping it open, the whole power. The rows of pipes which are fixed to the metal arms, and through which the steam issues, are enclosed or surrounded by a casing or box, for the purpose of holding water for producing a condensation of the steam in its passage through the pipes, previous to its emission from the caps on their extremities. This condenser, as it is called, is supplied with water as it is required, by vessels placed above, having pipes communicating with them; and there are pipes connected with the condensers for collecting and carrying away into the chimney the vapour produced by the water becoming heated, in consequence of the passage of the steam through them. The steam from the jets is blown against four rows of forks placed on framework, and supported by insulated legs. When the machine is in action the positive electricity is rapidly produced, and may be collected at the ball in connexion with the forks, and the negative electricity may be obtained from all parts of the boiler.

Street Sweeping Machine.—"A friend in need is a friend indeed." When was ever city so much in want of a detergent engine as Glasgow has been this winter? There is a class of birds called "waders," but they are the only kind of bipeds equipped by nature for that exercise. Men and women were meant to walk—they do *try* it in Glasgow, and get awfully splashed for their pains. Seriously, it is time something were done to amend our dirty ways. Look at Stirling Road, and many others, after a few hours' rain, We have never been in the Irish Ballina*muck*, but if that interesting place be no cleaner than Glasgow, we wonder the inhabitants don't *swim* out of it. Some things are good, considered by themselves—land, for instance, and water—but they give birth to hateful progeny, be it thick or thin. By the way, the Glasgow mud is changed in its nature since the olden time. There was no "greasy" bird-limy mud *then;* Glasgow mud used to be gritty. Whether this remark be just, or only whim or fancy, may be matter of doubt; but there can be none as to the great want we have of sweepers or sweeping machines. We observed Whitworth's meritorious machine in use, in London, several years ago; the Edinburgh people, who don't stand one quarter as much in need of them, have set some to work long ago. Why, then, don't we? "We pause for a reply."—(No. 67.)

Electrical Clocks.—These, as we see, keep time by alternate attraction and repulsion; the movement is similar (to the eye) to the swing of the pendulum. But the principle of the motive power is utterly different. Here we have the pervading Spirit of the material universe made to minister to the convenience of Man. It is one of the marvels of the day. Two or three years ago, Mr. Bain fixed an electrical clock, with a steeple-size dial to it, in front of the Polytechnic Institution, London. It kept time admirably, as we proved for ourselves; but we remarked that the long hand moved its minute, not by imperceptible advances, but at one stroke. In lectures we there heard, from Professor Bachoffner, we were assured that Time

could easily, and would soon be, *laid on*, as well as water and gas, in all houses of every city, town, and village of the civilized world; that is, there would be a powerful electrical or galvanic apparatus provided in all populous localities, whence wires would run into every dwelling, and even room, conveying the intimation to dials, or some such indicators; so that all should know the time of day or night at any instant; and that thus no misapprehension or mistakes could be committed. The first time-measurer was a shadow thrown by an object in the line of the sun's rays—hence arose the sun-dial. Cock crowings made a poor uncertain shift in the night season; then came clepsydræ or water-clocks; then candle or torch measured the consumption of time, tallow, and temper; afterwards men had hour glasses; latterly, clocks, watches, and chronometers. The latter have been long "at sea;" they will now be confined to it, for electricity is about to supersede all wheels, pinions, weights, and levers. What next?—(No. 1, in Catalogue.)

Walrus (*Trichecus rosmarus*), a marine quadruped, and "no beauty, *any* how," as the Irishman truly said. He seems as if he knew that he ain't captivating, for he is found now only on the icy shores of Spitzbergen and the remotest northern coasts of America. Like many other plain subjects, he is understood to be a good husband and parent; we are assured he will meddle with none unprovoked. He is a good deal hunted for his tusks and the oil that is in him. His teeth are often palmed upon the public for ivory; but that is no imposition of *his*. Upon the whole we are rather partial to this animal, in spite of his teeth.—(West Gallery, No. 89.)

ROYAL INSTITUTION, EDINBURGH.

A Model of this magnificent structure, the effect of which is perhaps seen to greater advantage here than in the actual building, the position of which is much too low. It is from a design by Playfair, and is one of his finest works. The interior accommodations are a large central hall for exhibitions of pictures, and various lesser apartments devoted generally to purposes connected with the arts. As an association, the Royal Institution was established in 1819, and incorporated by royal charter in 1827, for the purpose of encouraging the fine arts in Scotland.

Within the building are the offices of the Board of Trustees—an establishment instituted in the early part of last century for the encouragement of manufactures in Scotland: supported by an annual revenue of between £7000 and £8000, the result of certain endowments from government. It possesses and encourages a school of drawing and design, the first which was instituted in the United Kingdom; and in connection with this academy there is a gallery of casts of the finest sculptures, ancient and modern. It also contains the apartments of the Royal Society of Edinburgh. On the summit of the building, over the pediment, is a colossal figure of Queen Victoria, in a sitting posture.

TO READERS AND CORRESPONDENTS.

The figures at the end of our paragraphs refer to the Numbers in the Catalogue.

P. P.'s *Poetry (?) won't suit our pages. When a man is* in poetry, *he is like a "man in love;" he is sure to bid good bye (for the time) to common sense.*

Carbon's *criticism on the Chemical contributions is not sufficiently saline.*

Scalpel's *paper on Anatomical preparations smells abominably of the shop.*

Poser *poses us with the conundrum, Why are ornithologists like gourmands? We presume it is because they are much given to stuffing!*

☞ *Many of the articles exhibited not having arrived until a late hour, it has been found impracticable to complete the printing of the Catalogue until to-morrow (Friday).*

The Daily Exhibitor.

THURSDAY, Dec. 24, 1846.

Elsewhere we give our "Address Introductory;" here we shall state more definitely the object of this Model Journal—for model we intend it to be—and to have it, as far as very tiny dimensions admit, in all respects complete as any of its contemporaries.

It being quite evident that the Catalogue of the objects exhibited must be as succinct as possible, a very limited amount of information regarding each object can be conveyed therein. The *Daily Exhibitor* will endeavour, as far as its limited space permits, to supply what is wanting. It will give more extended notices of Processes,

Models, Manufactures, objects of Natural History, &c. &c., than can with propriety be inserted in the Catalogue; and will thus, it is hoped, become a source both of information and amusement to those who gratify themselves by visiting this splendid collection.

It is to be regretted that a number of interesting contributions from a distance will probably not be forwarded till after the opening of the Exhibition. As their arrival will form new points of interest, they will not be neglected in succeeding numbers of this Journal.

We invite the co-operation of all in support of the *Daily Exhibitor*. Information regarding any of the objects exhibited, addressed to the Editor, care of Mr. Phimister, and left at the Committee-rooms, will be duly forwarded. Remember, *Qui citò dat bis dat.*

WATT'S MODEL OF THE STEAM ENGINE.

The College authorities have, with great kindness, sent this almost unique historical model for exhibition, and it occupies a conspicuous place on the tables devoted to the illustration of Engineering and Mechanics. What a crowd of interesting associations this model suggests! It at once carries us back to the period in the industrial history of our country, when its manufacturing resources began to be developed; and while this retrospective view is still on our minds, we have only to look around us to see, in miniature, a palpable history of the prodigious progress of the industrial arts since that period.

Watt's model carries us back to the time when Chemistry began to assume the form of a science, and we associate the names of our countrymen—Black—Hope—Thomson—Graham—with the illustrious men of other nations, who have aided in its advancement—its diffusion, as knowledge.

While we look around us in triumph at the present exhibition of the material progress of the nation, since the time when James Watt, a young philosophical instrument-maker, protected and fostered by Black and Anderson, and Young and Adam Smith, the professors in our university, invented what proved to be the very heart of a mighty impulse, we will do well to remember the debt of gratitude we owe to our illustrious predecessors, by the efforts of whose genius, under God's blessing, the BEGINNINGS took place—and to think that it is to this, and not to our superior insight, that we owe the wonderful advancements that have been made.

The Model of the Steam Engine is that which Dr. Anderson, the founder of the "Andersonian Institution," had for illustrating his lectures. It is now probably in as dilapidated a state as when it was sent to James Watt to be repaired; but its interest and historical value depend on its remaining in *statu quo*. The separate condenser was not fitted to this model—and it is curious to think, that after the discovery was made, it was several years before any application of it was made, and not till 1784, that it began to be generally introduced. At the top of Area A, are a number of models of Steam Engines in operation. Each bears indelibly impressed on it one stamp or other of the fertile genius of James Watt—his condenser—his parallel motion—his governor, or his slide valve. Whilst they illustrate in some respects the variety of talent for contrivance and construction which have been expended on this mightiest instrument that man wields, for adapting a power of nature to his purposes.

ICE-BOAT *used in Nova Scotia.*—Our ideas of Ice-boats have hitherto been limited to such as are used for breaking up ice on canals, rivers, harbours, &c. Locomotion upon ice we were aware was performed in divers manners, by means of skates fitted to the feet of human bipeds, and sledges made fast astern of *infra*human quadrupeds, &c. but as to *sailing* upon ice or skates fitted upon boats, these we left out of our reckoning. Excepting in the case of balloons and pigeons, we supposed the speed of 30 miles an hour, nay even a much less speed, to have been first attained by those snorting masses of iron and brass generally known as locomotives, but here *again* we seem to have been at fault. The Ice-boat, of which this is a model, when mounted upon four skates, rigged out with a single sail, and favoured with a good breeze, skims along the ice at the rate of thirty miles an hour, Why, at thirty miles an hour our northern explorers might reach the North Pole and come back again in the time they would cut a channel for a ship through ice ten miles long!

RETROSPECTIVE REVIEW.

JONES'S DIRECTORY; *or Useful Pocket Companion: containing an Alphabetical List of the Names and Places of Abode of the Merchants, Manufacturers, Traders, and Shopkeepers, in and about the City of* GLASGOW. *Compiled as accurately as the time limited would admit.* Glasgow: Printed by John Mennons, Editor of the Glasgow Advertiser. September, MDCCLXXXVII.

NEARLY threescore years "their cloudy wings expand," and throw us backward here, at a bound, among the men and things of bygone Glasgow days. To many this little hand-book of 84 poor pages' length will be as dry as a chip. Not so to us. No cat ever fondled to its whiskers a bunch of valerian more lovingly, than we felt inclined to press to our cheek this welcome windfall of a document, which ought really to be treasured in the city archives. The care of this reposit we respectfully throw upon the able shoulders of BAILIE LIDDELL, the *Atlas*, or chief support, as he may be called—certainly the prime mover—of the present Exhibition. It may some day become a sort of commercial "*Ragman's* Roll," to trace the future pedigrees of our merchant magnates by!

Before proceeding to enter upon a review of this (to us) charming tract, (what a pity it includes no map!) let us revert to what Glasgow *was*. What it *is*, we, most of us, know as much as we care for knowing. It was not *always* a commercial town, but long a collegiate and cathedral city. In 1730, it was thus flatteringly described by the sagacious Captain Burt, author of the "Letters from a Gent. in the North of Scotland:"—"Glasgow is, to outward appearance, the prettiest and *most uniform* town that ever I saw; and, I believe, there is nothing like it in Britain. There is a spacious *carrifour* where stands the Cross; and going round it, you have, by turns, the view of four streets, that in regular angles proceed from thence. The houses of these streets are faced with ashler stone; they are well sashed, all of one model, and piazzas run through them on either side, which 'give a good air to the buildings. There are some [other] handsome streets, but the extreme parts of the town are mean and disagreeable to the eye." He says no more, so we are left in the dark as to Glasgow's population, or other statistics. Was the freedom of the city conferred on Captain Burt? We *trust* it was.

By the Captain's "piazzas," an English misapprehension of the meaning of that Italian term, we are to understand arcades, with corridors between their piers, and the shops set back from them. Most of these have now disappeared. But we can remember when the lines of them were pretty complete, up and down the Saltmarket and High Streets, and the nearer portions of the southern side of the Trongate. Even yet, there are plain traces of them, as far as No. 53 in that street, within door or two of the Laigh Kirk Close. No. is a whole *pend* close, No. 17 a half *pend*. the intervening shops are a few whole and pillars, vying in solidity with those of Egyptian mausoleum. In the Saltmarket, th are some like remains. Lockhart's old hardw shop, though "brought out," still retains primitive make. In the Gallowgate, we h carefully sought, but found no roundhead remnants. In the High Street, however, t case is somewhat different. At the angle of t first "land," opposite the Cross steeple, lo the location of the *Glasgow Courier*, the sh (No. 2) is still nearly of the old type; the n (No. 4) is quite so. It is, like some of the churches, a double-staged place; there being kind of commercial *crypt* below, usually p locked outside. "Fast bind, safe find." B at No. 25, a little way up on the *other* side, the great relic, in full integrity, of old Glasg Here we have three perfect arches, one leadi to a "closs;" the old corridor being preserv between the arches and the shop. Antiquar of Glasgow, what Roman remain can vie in i terest with this? The wares, too, in this Scots mart, are all in keeping with the featu of the place—kirns, caups, luggies; and t sonsy weel-faur'd lassies to recommend ther everything here is refreshing to the wither heart, almost smoke-dried by the fumes of *Reekie*. When last we saw the place, we step in, not to *buy*—for what Scotsman does that he's obliged?—seemingly to cheapen wares, b really to ask questions. One ½ lb. butter stam of quaint device, took our fancy. In the cent were two hearts transfixed, of the tradition gingerbread *snap* configuration, and around the ran the motto, "*I love you dearly.*" Who w dare to say *now*, thought we, that "Fine wor butter no parsnips?"

But in our haste to arrive at this *bon bouche* of a shop, and to relate the foregoi incident, we have left behind us many remar able traces of the arcaded shops and passag on the opposite side of the High Street. St into any of them, or the conjoined *closses*, a you will plainly see that the old doors of inte communication have been walled or timber up; in the latter case being covered with d cayed plates of rusty sheet-iron. But beyo these few "lands," there is no further exta arcading in the High Street. We are, therefo cut short in our researches, and we sigh out "Sic transit gloria mundi."

In no town of Britain, or the Continent, th we have visited, do we meet with this exa feature of old Glasgow. Chester in Englan and Berne in Switzerland (the latter partic larly), come the nearest. The fact is, the go old towns are *spoiled* nearly everywhere.

Having thus far exerted our privilege of r viewers, of saying what *we* think fit first, v now proceed to deal with the work which is t subject of this article. And first of its prol gomena, or preliminary matters. These a

posed of lists of Glasgow dignitaries for tember in the year of grace 1787.

n page 1, we have the "Magistrates and er office-bearers." At the top is "John del, Esq. Lord Provost." At page 62 *infra*, find he dwelt in "Queen's Street, 1st house t side." This was indeed Glasgow's "Far t," with the exception of a few straggling llings and offices in and about Jamaica eet. There was, also, a conglomeration of same about (a now) almost unknown local- called "Horn's Court, by St. Enoch are." But bating these two exceptions, all yet *wilderness* onward to Anderston.

mong the other officials, the only noteworthy ie is John Orr, Esq. of Barrowfield, Town rk, &c. &c.

n pages 2 and 3, the "Members of the des and Merchant Houses." All well wn on 'Change, no doubt, but few of them is. In page 3, the Guildry.—P. 4, *Chamber Commerce*, and *Clyde Marine Society*.—P. 5, *mittee of Forth and Clyde Navigation;* also t of the *Monkland Canal;* likewise the ndertakers, &c. for Building the large dge of the Great Canal across the Kelvin." . 6, List of *Members of the West Indian b;* also the *Members of the Golf Club*. The e concludes with the "names of the Com- tee for the Management of the Tontine." t now all but deserted and gaunt establish- it was *worth* the managing then. We won- what hook-nosed William (or his fat horse) lks of the "ongoings" hereabout, and the *oings* westward of later days. He still pre- es his equanimity indeed, as well as the er its equinimity; but the first indignantly is his back, the other its tail, on all such enerations, and looks steadily eastward— olden quarter of Hope.

t pages 7, 8, we have the office-bearers of different Banks in Glasgow, in this order: . *Glasgow Arms Bank.* 2. *Ship Bank,* obert Carrick, Cashier." Then *young* Robin rick. 3. Thistle Bank. 4. Merchant Bank. Royal Bank. "D. Scott Moncrieff, Esq. id Dale, Esq. Cashiers." 6. Thomson's nk. 7. Paisley Bank.

n pages 8, 9, is an interesting list: "The ncellor, Rectors, Professors, and other ce-bearers in the University of Glasgow." is headed by "the Right Hon. Marquis of ham," as Chancellor, and "Robert Graham, q. of Gartmore, Rector." Running the eye n the roll, the first great *nomen clarum* we ve at is that of "JOHN ANDERSON, Natu- Philosophy." Next "John Miller, Law:" Miller; not his far inferior son, who *pro- ed* Mathematics. Skipping two of the ob- re, whose venerated name do we arrive at? r. THOMAS REID, Moral Philosophy." only two other names, of any general ac- nt, are those of "William Richardson, manity. John Young, Greek."

t the end of the list of professors, the com- r adds the following sentence:—"The above professors' lodgings are all in the old and new Courts, and front of the College." Ah, Mr. Jones! their lodgings have long been (like thine own) in a far larger mansion, the old-new general Earth.

Next in order (pp. 9, 10), come "the Reverend Ministers of Glasgow." Nineteen gowns in all, of whom only about four are worthy of special mention. These are, 1. "Robert Balfour, East or Outer church." 2. "Alex. Rankine, Ramshorn church," author of a now forgotten "History of France:" a dull compilation, which fell dead-born from the press. 3. "Thomas Bell, Relief Meeting House, Dove Hill." This good man, author of many excellent published sermons, was as much beloved, and respected, in and out of his own communion, as the first on our list was in *his* (Established) church, and in all others. Thomas Bell was the father of James Bell, the geographer. 4. "Dr. William Lockhart, St. Andrew's church," the charge of which he first took in the previous year, 1784. This gentleman we at first mistook for Dr. John Lockhart, minister of the Blackfriars' or College church; to which charge he was not ordained till 1796. The latter was father of the celebrated John Gibson Lockhart, son-in-law, literary executor, and memorialist of Sir WALTER SCOTT—a trifold distinction—any third part of which is equal to a patent of the highest nobility.

At pp. 10, 11, we find "the Faculty of Physicians and Surgeons in Glasgow." Twenty-one gentlemen long. No salient name presents itself among the former but that of "Dr. Robert Cleghorn, Spreul's Land;" among the latter the Scrutons, John and William.

At page 11, also, we have the list of Sheriffs, Commissaries, and Justices of the Peace. The latter are headed by "Sir John Stewart of Castlemilk, Bart." Running the eye down, we find in p. 12, "Robert Dreghorn, Esq. of Ruchhill" (otherwheres "of Roughill." This man, one of the old Glasgow *characters* (a leading one) was the *Bob Dragon* of our young days. More of him by and by.

At pp. 12—14 we find the black list of the Faculty of Procurators of Glasgow," headed by John Orr as Dean. It is 52 gentlemen long.

The Custom-house staff (*two strong*) we find, appropriately enough, located near the Broomielaw; but "where, and oh where," readers dear, do ye think was the Excise Office? Why, in the Old Vennal! If there was a little *vennality* in that office, it was not to be wondered at. The chief officials were 2: the supervisors 2; under whom 40 excisemen—the exact number of the "Thieves" concealed in Ali Baba's casks.

We now arrive (p. 16) at "The Post Office, Princes Street." Staff, 5 strong: viz., 1 postmaster, 1 head, 1 under clerk, and 2 letter carriers! The same force as Paisley has now.

When we first knew the P. O. it was in the centre land of the Old P. O. Court, No. 114, Trongate. It was long afterwards in Upper Nelson Street. Dugald Bannatyne, for several years P.M. was in 1787 a member of the Mer-

chants' House and engaged in general business. —— Third door to the right of the O. P. O. C. was, in our youth, (at No. 108) the entry to Finlay's, carver and gilder. The view of the prints in the window, and the change, or shiftings of subjects, on Monday morning, formed one of our great *look-forwards to*. Mr. Finlay's (senior) name does not appear in the Directory. In our boyish days he was a soldier in the *private* corps (*not* the Volunteers) commanded by great-bodied and large-hearted Samuel Hunter; Robert Chapman, printer (whose office was over Henderson's Tavern, S.E. corner Candleriggs), was another member of the same social corps. We have met the party more than once, "*plunking* the kirk," on the banks of the Kelvin and other *then* retired haunts.—But we digress.

The next pages, 16—18, contain the official lists of Wilson's, Hutchesons', and other charities; which it will be a charity to our readers to pass over. Foot of p. 18 we have two *Stamp-masters*, one for linen only. Next come the *Dominies*. Of English teachers there are 7; Latin, 4. Among the latter "John Hall, in Ramsay's land, Prince's Street," *vulgo* Gibson's Wynd. Who didn't know, or know *of*, "Humphy Ha'?" *We* "knew him well, and every truant knew." The Editor of the *Quarterly* had his first humanities from him; but that was before our time. Hall was a good, pains-taking, severe teacher. His name had, even within college walls (*cum privilegio*), been treated with respect by Professor Richardson; the latter as ripe a Latin scholar as Young was a perfect Grecian. Hall was, though a little man, a great oddity.

"Teachers of Writing, *&c.*" What amount of *et cetera* may be here comprehended, we pretend not to determine; but one heavy item would be a sufficiency of flogging; an exercise much in fashion, at least, with pedagogues in *our* time. The number of these gentlemen, of ill-defined functions, was 7.—Teacher of French, 1.—Teachers of Vocal Music (all precentors) 5; of Instrumental, 4, including the "ringer of the Town's Music Bells."—Teachers of Dancing, 5. Contumeliously placed at the bottom of the list is our own "*toe tormentor*," "William [better known as *Mushy*] Frazer, in M'Nair's hall, King Street."—Teachers of Fencing, 2. One of them had apartments in the College; perhaps his courses were as well attended as those of Jardine, the Logical professor of fence verbal.

At pp. 20, 21, we have the "Collectors, Clerks, and Officers of the 14 Incorporations." (By the way, we forgot to notice the Deacons, but they are all set down.) To them succeed the "Water Engines" and stations, 5 in all.—P. 12, Messengers at Arms; 14 in Glasgow, 1 in Greenock.—Prison-keeper, 1; Turnkey, 1.—Beadles of churches, and other small fry.

At pp. 23, 24, "Town's Officers and Sergeants," 18 in all.

In pp. 24 26, are contained the "Departures and Arrivals of the different Stage-coaches." 1. *London*, "A Diligence sets off from James Buchanan's, Saracen's Head Inn (Gallowgate), upon Sundays, Tuesdays, and Thursdays, at 12 o'clock at night. Arrives upon Saturdays, Mondays and Wednesdays, at 9 o'clock at night. —2. *Edinburgh*, six conveyances, by 3 routes. Time (professedly) taken, in one case, 6 hours. —3. *Stirling*, "A fly" twice a-week.—4. *Ayr*, "A diligence" every lawful day.—5. *Greenock*, Two "flys." But they don't fly fast. Time taken, 6 hours.—6. *Dumbarton*, Coach thrice a-week. Time taken, 4 hours.—7. *Hamilton*, Coach thrice a-week. Also two "carrivans."—8. *Paisley*, A coach and stages several times a-day.

These are all the conveyances mentioned. But the trees may have been planted by this time, out of which the planking has since been cut to frame the Anderston, Partick, Po'kshaws, Shettleston, &c. &c. &c. present conveyances *pro omnibus*.*

And now have we carefully traversed the approaches, and arrived at the main body of our work, as *un* civil engineer would say.

(*To be continued in our next.*)

* No intimation is given by Jones of the fares of these conveyances; but for the information of the curious we subjoin the rates on several roads ten years afterwards, viz., 1796-7, extracted from Mennons' *Glasgow Almanack*.

Glasgow to *Carlisle*, £1 18 0. Thence to *Manchester, viâ* Kendal, Lancaster and Preston, £2 2 0. *Carlisle* to *London*, £5 5 0.

Glasgow to *Kilmarnock*, 7s. to *Ayr*, 3s. 6d. more. Do. to *Edinburgh* (three routes), 10s. 12s. 13s. (Afterwards charges much higher.) Do. to *Greenock*, 6s. 6d. Do. to *Stirling*, 6s. Do. to *Perth*, £1 3s. Do. to *Paisley*, 1s. and 1s. 3d. Do. to *Hamilton*, 1s. 6d. (All these augmented subsequently.)

To the foregoing fares, add an imposition of at least 25 per cent. for Drivers and Guards of such slow coaches. Count, too, the cost of living on the road, with sharking innkeepers' charges and trickery. These calculations made, fall to and *rail*.

JOHN ALSTON, ESQ.

The portrait by Graham and the bust by Fillans, of our late friend and universally-esteemed citizen, have with great taste been procured for this exhibition. If we mistake not, the bust was executed at the request of the inmates of the Asylum for the Blind, to whose intellect he opened up a new world by his works printed in raised character, and who, not being able to see the features of their benefactor, wished to *feel* them. We have not referred to these objects by our usual reference Numbers, being persuaded that the benevolent face of Mr. Alston does not require to be catalogued.

Glasgow: Printed for the Proprietors, by W. G. Blackie, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Thursday, December 24th, 1847.

Daily Exhibitor.

No. 2. GLASGOW, DECEMBER 26, 1846. Price ½d.

JACQUARD LOOM.

Area A. Nos. 1, 2.

The Jacquard loom, first invented in 1800 by M. Jacquard, a straw-hat maker of Lyons, is justly reckoned one of the most ingenious of modern inventions. It enables the weaver to produce varieties of pattern which cannot be accomplished by the ordinary modes of harness-weaving. By means of it the most complicated designs can be woven with nearly the same facility as the plainest fabrics. Jacquard's personal story is interesting and instructive, and has fortunately been well preserved in all the simplicity of the artizan's own diction, by Dr. Bowring, in his well known little work entitled "Minor Morals." We give the substance of the narrative. M. Jacquard happened during the peace of Amiens to meet with a few other artizans at the house of a friend, to discuss politics over an old newspaper, which contained a translated extract from an English paper, stating that a premium was offered by a Society in London for the application of machinery to the manufacturing of nets. Jacquard, after long meditation and perseverance, succeeded in solving the problem. He made a machine and worked a net by it. The net was shown about for a few days as a curiosity. But having succeeded, the interest was at an end and he soon entirely forgot the matter. After the lapse of a few months, he was not a little surprised by a summons from the Prefect of Lyons to appear at the Prefectal Palace. In those days it was necessary to have both firmness of nerve and a good conscience to contemplate such a summons without trepidation; and when the Prefect began to compliment him on his proficiency in the mechanical arts, the mystery of the summons grew still deeper. Jacquard could not comprehend his meaning, and he was scarcely relieved even when the machine-worked net was produced. "I have the emperor's orders" said the Prefect, "to send the machine by which this net was produced immediately to Paris." Jacquard could not understand what the emperor could want with a net machine; but believing that he had been guilty of no treason in making a net, he pleaded for time to make a new machine, as the original one had been made to serve for fire-wood soon after it had accomplished the inventor's purpose. The second machine was completed and shown to the Prefect, who, to the straw-hat maker's surprise, was highly delighted with its performance, and dismissed the inventor with the assurance that he would hear from him. He did hear from him very soon after, and in a way not a little perplexing. It was to order him immediately to Paris with the machine. It was vain for Jacquard to plead innocence of any evil design; the command was peremptory. A carriage was in waiting, and in a few minutes, without being allowed to see his family, he was off at full gallop towards Paris. When he reached the first station he opened the door and found himself a prisoner, escorted by a strong military force. Things were so managed in those days and he submitted to his fate with the best humour possible.

He reached Paris, a distance of 150 leagues, and was immediately escorted to the Conservatory, where he was met by Napoleon and his Minister Carnot. He was ill prepared for this hasty introduction, and as little for Carnot's abrupt question.—"What, Sir! are you the man that can do what Omnipotence cannot—tie a knot on a string on the stretch?" But his reception from the emperor in some measure dissipated his embarrassment. He spoke to him with kindness, encouraged him to proceed with his mechanical contrivance, with the assurance that he would be both protected and rewarded. In the meantime he was ordered to make a net-producing machine at the Conservatory, under the inspection of the emperor.

He completed his task to satisfaction; and was taken to see a loom which had been constructed at a cost of upwards of 20,000 francs, for the purpose of weaving a superb shawl for the Empress Josephine. The mechanism was new to him, and at first he was overwhelmed by its complexness; but as he began to be familiarized

with its details, he conceived it possible that the purpose might be accomplished more simply and with more facility of execution. After much persevering study he produced the Jacquard loom. The Emperor expressed much satisfaction at the result, complimented him highly, decorated him with the insignia of the Legion of Honour, and sent him back to his native town with a pension of 1000 crowns a year.

But on his return to Lyons his reception was of a very different kind. When he endeavoured to introduce his machine, the workmen broke out into open revolt. He was every where denounced as an enemy to the people, as the man who had been scheming the destruction of their trade and the starvation of themselves and their families. Three plots were laid to assassinate him, and twice he had great difficulty in escaping with his life. So strong was the tide of prejudice and indignation, that his machine was ordered to be openly destroyed by the authorities. It was broken in pieces in the great square of the city. Here was a shipwreck of his golden hopes; but conscious of the integrity of his purpose he did not despair. A very few years served to dissipate the delusion of his townsmen. The silk-trade, in consequence of the successful competition, principally of our Paisley and Spitalfields weavers, began to decline in France, and Lyons felt the depression more severely than any other town. This state of things had become desperate, when a few of the more intelligent manufacturers began to think of the man whose discovery had been denounced: it might after all bring relief and could not possibly do harm. They had the courage to make the experiment and it succeeded. Silks of greater beauty than had ever before been produced, were manufactured at a lower cost. Prosperity dawned and soon began to shine, and within a very short period the machine which had been devoted to destruction, and its inventor treated with ignominy, was in general use, giving labour to thousands of those very men who only a few years before had denounced it as a diabolical scheme for their ruin and starvation. Jacquard could now enjoy his honours and pension with a good conscience; he felt that he had earned them; and no man ever enjoyed prosperity with a better grace. He died only a few months ago at his native place, in a good old age and full of honour.

POTTERS AT WORK.

(Area A.)

That the ancients had attained to the greatest perfection in the Potter's art the remains of antiquity sufficiently testify. The art is a very ancient one, and the labours of the potter are frequently alluded to in the Scriptures,—potters' vessels furnishing many beautiful similes, more especially in relation to human life, and the ease with which it may be destroyed. The pitchers in which Gideon and his men concealed their lamps are the first earthenware vessels noticed in history. In the Book of Jeremiah (xviii. 2–6.) mention is made of the potter and his wheel, and a description given of the process, which must render this department of the Exhibition doubly interesting. No one who attentively looks at the process, as carried on within this Hall, can fail to recognize the truth of the description given by the inspired writer. Even the marring of the vessel in the hand of the potter, and the reconstruction of the lump of clay into another vessel, may here be seen in actual reality.

Having premised so much on the history of the art, we add a few words on the practice of it. In the different kinds of earthenware, the different degrees of beauty and costliness depend upon the quality of the raw material used, and upon the labour and skill expended in the operation. The cheapest products of the art are those made of common clay, similar to that of which bricks are formed, and which, from the iron it contains, usually turns red in burning. Next to this is the common crockery ware, formed of the purer and whiter clays, in which iron exists only in minute quantities. Procelain, which is the most beautiful and expensive of all, is formed only from argillaceous minerals of extreme delicacy, united with siliceous earths, capable of communicating to them a semi-transparency, by means of its vitrification.

Though the various kinds of pottery and porcelain differ from each other in the details of their manufacture, yet there are certain general principles and processes which are common to them all. The first belongs to the preparation of the clay, and consists in dividing and washing it, till it acquires the requisite fineness. The quality of the clay requires the intermixture

of a certain proportion of siliceous earth, the effect of which is to increase its firmness, and render it less liable to shrink and crack, on exposure to heat. In common clay, a sufficient quantity of sand exists in a state of natural mixture, to answer this purpose. But in the finer kinds, an artificial admixture of silica is necessary. The paste which is thus formed is thoroughly beaten and kneaded to render it ductile, and to drive out the air. It is then ready to receive its form. The form of the vessel intended to be made is given to the clay, either by turning it on a wheel or by casting it in a mould. When dry, it is transferred to the oven or furnace, and there burnt till it acquires a sufficient degree of hardness for use. Since, however, the clay is still porous, and, of course, penetrable to water, it is necessary to glaze it. This is done by covering the surface with some vitrifiable substance, and exposing it a second time to heat, until this substance is converted into a coating of glass.

Stone ware may be formed of the clays which are used for other vessels, by applying to them a greater degree of heat, which increases their strength and solidity. These vessels afford the material of their own glazing by the vitrification of their surface. When the furnace in which they are burnt has arrived at its greatest heat, a quantity of muriate of soda, or common salt, is thrown into the body of the kiln. The salt arises in vapour and envelopes the hot ware, and by the combination of its alkali with the siliceous particles on the surface of the ware, a perfect vitrification is produced. *White ware* is made of white clay, or of clay containing so little oxide of iron that it does not turn red in burning, but improves its whiteness in the furnace.

The names given in the catalogue to the different workmen who are at work in the exhibition, sufficiently explain the nature of their operations.

Model of Stephenson's Patent Locomotive. — Stephenson's is now a great engineering name. The father made the famous primal locomotive "Rocket," which went up so high in the public estimation, and did not "come down like the stick." We leave to others, more skilled than we in engineering matters, to point out the merits of this new patent one.—(Table B., No. 59.)

THE PENGUIN.

(Table E. Nos. 70, 71.)

The Penguin, or rather Pinguin, belongs to a genus of birds *(Aptenodytes)* exclusively found in the antarctic or southern polar seas. The water is their natural element, and when found ashore it is either to lay eggs, or hatch them. In the latter the male faithfully assists. The legs being so short, its motion on land are slow and ungainly; and even on the water they move with a kind of *squattering* but rapid step; to fly over it they cannot. The name Pinguin (from *pinguis*, fat) is given to them from the thick layer of fat found between their flesh and feathers, which, like the blubber of the whale, protects the animal from the rigours of the climate they are confined to. We are indebted to this creature, and its congeners, for much of the guano which now fertilises our land.

When the earlier explorers of the antarctic seas first lighted on these gentle animals, they were so unconscious of coming harm, that they would allow themselves to be knocked down with a stick. They have since grown a little wary, but by no means yet enough for their own general safety. Captain Crozier, of *"H. M. S. Terror"* perhaps raised little of that uneasy feeling within the comely breasts of these two fine specimens, when death came upon them through his people.

The mere existence of such a heedless kind of creatures in any nook of the terrestrial creation, however remote, plainly points to a time which was the "golden age" of animals, now become a dim tradition in the minds of beasts and birds alike, —a time when they had it "all their own way" over every part of the earth. In those days Man, that Great *Seizer*, or Perpetual Dictator, had not come to lord it among them, in his usual favourite tyrannical way. Adding mockery to wrong, we find him prating (very philosophically too) of the *Règne Animal;* as if that reign had not ceased almost the moment he appeared! The vulgar, too, babble about the lion's being "the king of beasts." Why, Man long since superseded that sovereign in *his* regality! This is something like *Stephano* in Shakspeare's "Tempest," who patronizingly says to *Trinculo*, "I'll make you king of this enchanted island, but I'll be viceroy *over* you." And then, the preposterous tyrant man, grown *blasé* in his op-

pressions, indites, or causes indite, such absurdities as this—

"The beasts that roam over the plain
My form with indifference see;
They're so unacquainted with man,
Their *tameness* is *shocking* to me."

Ay, poor fellow! no doubt it is; but how much more "shocking" must your *un*tameness be to *them?* If the abused animals were privileged to quote Shakspeare as we have done, they would use the significantly blundering speech of one of his absurd personages thus:—"Small was our love at the beginning; and it pleased God to *decrease* it on better acquaintance."

But let us turn (indignantly) from men, to their yet uncorrupt children. And we think we hear some prattler saying, while looking at the comely Penguins, "Why, I've got a picture of 'Mr. Nobody,' but this is Mr. All Body!" An older joker, of the incurable stamp, we think we also hear saying, first pointing out the almost legless feet of the creatures, "No wonder the Penguins are silly birds, for, don't you see, they've very little *understanding?*" "The more like you then," they might retort.

THE EDITOR'S LETTER BOX.

—o—

Non-Content writes that he has seen our Exhibition, and though "well enough in its way," he says the Model Department is by no means complete; and in proof of this assertion says, he had searched there in vain for a Model Speech; and had turned over all the "Specimens," both cut and dried, but in vain. He is not far wrong: this *is* a want, and he who rightly removes it will confer a great boon on the speechmaking world, which is widening more and more every day. We used to be able to count our orators, it would be more easy now to make a census of the *listeners*, awake or asleep. The articles most likely to be wanted are Model laudations. Now if any friend, blether-gifted, would send us a standard public-hall eulogy, or a normal social board complimentary oration, we will take him to our heart of hearts. In the case of oration social, we expect the "yarn" sent to be of two strands; *i. e.* that it include the complimenter's speech and the complimentee's response. The public discourse furnished we expect to be equally bistultiform.

Charley Commonplace is another complainant as to the deficiency of Models. He lately got up a "supper and presentation," in honour of Mr. Blank Blank, and wishes us to get up a draft of the important proceedings for a public journal. We have, therefore, for his and the general use, extracted one which we think perfectly *en règle*, in all points. We took it from the *Caw-me-caw-thee Chronicle*: "——— *se'nnight* * (April 1), a party of admirers of Mr. ——— met that gentleman at supper in the Humming Bug Tavern. After ample justice had been done to the viands, and many loyal and appropriate, &c. Mr. ——— presented to our worthy guest and illustrious townsman a handsome Horn; it having been known to his numerous friends, attached and *de*tached (for many could not attend, but all the absent apologized) that Mr. ——— had lately had his old shoes newly soled and heeled; and that from the *take in* (not of the cobbler, but the shoes) they rather pinched him; and they thought that such a seasonable present as *the* present would not be unwelcome. Mr. ——— in returning thanks, said, "Words could not express, &c. delicate attentions, &c. expressed as it had been by his eloquent friend, Mr. &c."... "The festive scene.... the viands.... the landlord.... the waiter who showed the party in and was yet to help them out.... kept up to a late hour.... all departed highly gratified."

* The se'nnight here (paradoxical as it may seem) was *first* written "*last.*" This change was necessitated by a delay in the public appearance of the paragraph, which the parties interested in it could not account for in any way creditable to the editor of the C. C. He actually seemed to *dodge* in the matter to an extent that made "the judicious" think he meant to *kep* the story of the unicorn, (anglice, keep it) from entering his bounds altogether. The "judicious" were wrong here as we happen to know. The real fact was (for the truth *must* be told) the precious article had slipped, somehow, into the office *Limbo*, or "may stand over" department, and had to be fished up from one of its lowest depths; for in that great ocean, as in t'other, it is *there* the finest pearls are always found. It *looked* ill, though, that the anxious parties had to make 13½ calls (the latter a very vulgar-fractious *fasten* upon the editor at his own stair foot) before such a perfect Model narration as the above could find its way to an expectant public.

TO READERS AND CORRESPONDENTS.

Our space being limited, it were well that all contributions, previous to being sent in, receive a few strokes of the steam-hammer.

The Daily Exhibitor.

SATURDAY, Dec. 26, 1846.

—o—

We congratulate *our* public on the auspicious opening of this splendid Exhibition. The pleasure depicted upon every countenance while surveying the rich products of mind united to skilful hands, and the beautiful works of nature which load the tables and adorn the walls, gave sure indication that not in vain has so much expense been incurred and labour expended. Those

upon whom devolved the great labour of collecting and arranging the numerous objects will, we feel assured, consider themselves amply rewarded if by this means they have contributed to the enjoyment and instruction of their fellow-citizens. It is easy now to predict that they will have ample evidence that their labours are appreciated, in the numbers who will avail themselves of this opportunity of inspecting a series of objects which cannot be seen upon any other year. This may be said to be a first trial. We hope it will not be the last. We hope it will induce the formation of a nucleus, at least, of a permanent collection. What city so competent as Glasgow to form and maintain a collection of models. Were some public-spirited individual to make such a collection his hobby, he would get abundant support. Might not the Town Council for instance, in the improvements they are making connected with the Bazaar, provide a Hall sufficient for such a purpose. Such a Hall entering from Candleriggs, or from Ingram Street, or from both, might be built over the extended market-place, in the same manner as the present City Hall; and if once an exhibition were properly established in it, there can be no doubt but it would pay.

PATENT WIRE ROPE MACHINE.

BY R. S. NEWALL AND CO.

At the head of Table B, No. 58 in the Catalogue, is an exquisitely-finished model of the machine used by Messrs R. S. Newall & Co. of Gateshead-on-Tyne in the manufacture of their patent metallic wire ropes.

These ropes, in a useful form, are of German origin, but their manufacture has been greatly improved in every respect since their introduction into this country in 1840. Their use has been confined hitherto principally to pit ropes in the coal districts, and to railway ropes on inclines worked by stationary engines, of which, in the county of Durham alone, there are nearly 100 miles furnished with these ropes constantly at work. Their stiffness is only apparent in short specimens; for numerous exact experiments have proved that their *rigidity* is less for the same strength of rope, and on the same sized pulley, than that of hempen ropes of the best manufacture. They are also much lighter, and somewhat cheaper, than hemp ropes, whilst they generally last two to three times longer, at the same work. They can be easily spliced when occasion requires.

The machine appears, at first, a maze of wheel work; but the machinist will easily discover that it is in reality a series of very simple combinations. The great end to be accomplished was to prevent the individual wires being twisted in themselves, and to ensure that the wires were laid *symmetrically* round a *hempen* or other soft *core*. This the machine, given here in model, perfectly accomplishes. There are numerous specimens of the work of the large machine on the table. One gigantic rope, fit for the standing rigging of a man of war, but made as one of the suspending ropes of a wire-rope bridge, deserves to be noticed more particularly. The model is on a scale of one-twelfth of the natural size.

Argus Pheasant (*Argus giganteus*). This superb bird has been by some considered as belonging to the *Phasianidæ;* by others to the *Pavonidæ*, or peacocks. Temminck has made it a genus *per se*. The descriptions in ornithologies were long indistinct and confused, from the early specimens sent to Europe being imperfect. Here we have two noble individuals. "The Argus pheasant is a native of Sumatra, probably some others of the Indian islands, but principally of Malacca." . . . . "The wings, from their unwieldy size, almost entirely deprive the bird of flight, but help it to run fast, aiding like sails." . . . It is a singular as well as beautiful bird; will not thrive in confinement, and we believe has never been brought alive to this country. Habits, incubation, and breeding, almost unknown. — (West Gallery, Nos. 84. and 85.)

Ball of Hair found in the Stomach of a Camel.—*An extraordinary instance of Capillary Attraction.* Such balls are formed in camels' stomachs we suppose in a similar manner as they are formed in cows, by licking themselves and their young.

Three Rugs, from Messrs. M'Farlane & Co., Glasgow.—If determined "priggers" want a *rug*, now's the time. "Paisley bodies," we address this particularly to *you*. —(Nos. 161 to 163.)

RETROSPECTIVE REVIEW.

Jones's Glasgow Directory for 1787.

Table D.—*Antiquities.*

(Second Notice.)

We have now arrived at the general list of names in this little Directory. Jones's was not the first, for John Tait got one up in 1783. The whole general alphabetical list of miscellaneous names in the one now under notice comprises only about one thousand in all; though, indeed, many of them are repeated elsewhere, as members of firms or functionaries of some kind. The qualification "merchant" abounds, but many so called were merely retail traders. Of "manufacturers" there is not over a hundred; and a score or two, even of these, we find located in Anderston. The names of all the country gentlemen of the environs, and some even of more distant localities (Spiers of Elderslie, for one), also help to swell the weak catalogue; as do likewise those of several manufacturers and traders in Paisley and Greenock. The whole city addresses fall within a radius of from 1 to 2 furlongs from the Cross: The Trongate, Stockwell, Gallowgate, Saltmarket, High Street, &c.—the latter line prolonged up the "Bell of the Brae," &c. and sending laterals along the Rotten Row and down the Drygate.

The population of Glasgow, two years previously to 1787, was not quite 46,000; and even that number was probably made up of fragmentary parts; people living at the Green Head were possibly included, for the trading names of such remote localities are comprised in the present list.

Our present purpose, however, is not to enter into statistical particulars, for which we have had neither time nor space allowed us in the *D. Ex.* We shall then confine ourselves to the more pleasant task of copying out names of such parties as we know something remarkable about, and attach to each a *notandum:* thus making of a list, otherwise dry, a kind of *catalogue raisonné,* which may chance to be interesting to surviving "old stagers," like ourselves, of Glasgow within the 18th century.

And before doing so, we wish to observe, in general, that there is a kind of familiar way of indicating localities in this old Directory, which is now and then not a little amusing. There is far more *bonhomie* in that, than in the curt and commercial brevity of the Directory of the current year. We shall note the points adverted to as they occur. To do things in an orderly manner, we recommence where we left off, namely, at p. 26, and go straight on to p. 74. The remaining leaves are merely the same single names, repeated in "copartneries."

Adam, John, mason and architect, Adam's Court, Argyle Street.—Qu. One of the London "Adelphi?"

Alston, John (and 6 others).—This name belongs to several of the early respectables of Glasgow.

Allan, Richard, jun. keeps a callender, Lang's Closs.—We hope the callender also kept him.

Anderson, John, rum merchant, cellar east side Stockwell. "Rum merchant" occurs several times in the Directory, and seems to have been a title acknowledged in those days; as will also be the observation we now make upon it in *these* days, that there are some very *rum* merchants in Glasgow yet.

Baird, John, Esq. north side Trongate, near the Guard.—In general, indications of *lands* and courts, &c. are given rather than Nos.; from which we conclude that the numbers were often either absent or not very consecutive: a wee *reel ral,* like.—"The Guard" often does duty in other places as an indicator. According to a drawing of the early Trongate, in the present Exhibition (No. 74, Area F.), what we take to be the Guard is a protrusive edifice diagonally placed north-westward of the Tron Church steeple.

Birral, Robert, qualifier of tobacco, Gallowgate.—This was a mysterious craft! The only qualification *we* would give tobacco, is this—that its use begins in folly with all, and ends in poverty with the many; befittingly commencing in smoke, it terminates in ashes, the middle state being a hateful stench.

Black, John, linen printer, Trongate.—There are several *linen* printers.

Blair, Mrs. toyshop, No. 154, Gallowgate. Ah, what wouldn't we give for a peep at the toys then in request, old fool that we are! Was the *de'il-in-the-box,* the *killie-bill,* the *tumlin' tam,* or the *peckin' bird* (with the bullet at his tail), yet invented?

Bogle, Wm., Capt. 56th regt. of foot, Queen Street.—We remember seeing his military funeral—an early reminiscence—set out from a house in St. Enoch square, close to Surgeon's Hall. His led horse looked *so* sorrowful! was the thought of our tender juvenile mind. Such a coarse abomination as a *horse* laugh, we were then unused to; we have heard a good many since, at things yet more serious.

Brown, John, master of work, corner of Prince's Street.—A civic functionary?

Brydie, Hugh, change-keeper, sign of the huntsman, foot of Jamaica Street.—"Change-keepers" are common in the Directory of 1787; there's not one in that of 1846. Another puzzle. "Nous avons *changé* tout cela."

Campbell, John, Esq. of Clathick, west side of Virginia Street.—We see, by the *Glasgow Almanack* for 1785, that this landed gentleman was provost of the city in that year. And on looking over the lists of provosts for the Scots Burghs in the last century, we find they are generally men of title, or belong to the rank of country gentry; not merchants, or even burgesses in the true sense of the term. This use-and-wont system came to us from the times of that organized anarchy called the feudal system. Upon the boyish plan of "keep the corby frae the craw," one noble (which in those days was a synonym for public oppressor), generally the

most proximate, was bought off, as it were, from the general gang, he undertaking to protect "the common guid" of a municipality from the depredations of others of his own prideful class. Even after the patronizing system had become weak among us, and after it got its final brain-blow by the abolition of "heritable jurisdictions" in 1747, the use-and-wont in the *brughs* continued, to a very considerable extent, of taking the provost from the landlord ranks. What was thus adopted in pressing self-defence, would be continued meekly by the inert regard for routine; occasionally dashed, perhaps, with *loadying* landlord-worship. In fact, the very term "lord," adopted to distinguish the chief's of our great municipalities, points out the custom "in such cases made and" followed, if not absolutely *provided*.

Chalmers, Alexander, incle manufacturer, Dovehill.—The inkle factories *we* remember, were near Shuttle Street. We could then only get a peep into them, each being a kind of "secret work." The Scots had no *incle-ing* how tape was made till Dutch workmen were wheedled to come over.

Coats, *seven;* 3 are merchants, 2 yarn do., 1 mfr., 1 drysalter.

Corbet, James, jun. Esq., Tolcross.—This gentleman, afterwards a colonel of the *Yowes* Volunteers, was the "plane-soled Corbet" of the many Almost every public man had a nickname, then. The colonel's feet *were* of the plantigrade kind.

Coubrough, Archibald, bookseller, and circulating library, No. 17, High Street.—We rather think old Bauldy's library was the oldest in Glasgow; the *books* in it very certainly were. Still, we would wish to speak respectfully of them and their owner, as from his shelves we had our own first miscellaneous *cram*. It was so convenient, too, to hire tomes of a man so *doited* as not to know, latterly, whether you had kept a book 3 days or 3 months!

Craig, John, youngest, architect to H.R.H. Prince of Wales.—We did not know that the then unworthy darling of his father's people had an architect in Glasgow. Was it Craig who planned the Brighton absurdity? He must have been a *bright un*, whoever he was.

Crum, John, cotton and spirit dealer.—The latter found it needful, we suppose, to make the former then heavy article "go off with *spirit*."

Dale, David, merchant, west side Charlotte Street. His cotton twist wareroom, High Street, above No. 18.—This time-honoured name occurs four times in the Directory, in as many capacities. One of the earliest things we can remember, is seeing his funeral. Liberal *awmous* was given to about a hundred beggars, clustered about the doors of the house of mourning. We think his house was the furthest down, to the right, next the now rusty gate of the Green.

Delf-field Warehouse, Broomielaw.—The delf or delft house was a pottery beyond the then short quay, on the Glasgow side of the Clyde. We remember it, from picking up near it, outcast broken potsherds, called *wallies*. The Broomielaw was then a "caller herrin'" haven. A few *argosies*, indeed, of from 30 to 40 tons, went to Oban, Tobermory, Balachulish, and some few other foreign ports. Then there were the Greenock flyboats, which were well provisioned, and sea-stocked for an occasional long voyage of 24 hours' distance, and sometimes nearly 24 hours' duration.

Dreghorn, Robert, Esq., of Rough-hill. This was one of the Glasgow *gouls* of our youthful days. "Bob *Dragon*" was in reality a miserly old debauchee. His person was spare, even skinny; and his face was deeply pitted with the small-pox; in short, he was *very* ugly, yet he was a great respectable woman ogler, and low woman seducer. Unlike Thomson's "round, fat, oily man of God," as to his person, he was like him in one of his habitudes; it was amusing to our elders to see, when "comely damsel chanced to trippen by," how Bob's *one* eye (for he belonged to the Monoculi) would glow like a coal. Terrible things were reported of the doings in his house, Clyde Street (still standing, but now degraded into a broker's warehouse). Dreghorn, like some other misers, had an occasional fit of liberality, and would do a kind thing in *caprice*; but *avarice* was his prevailing passion. However evil his life was (and we believe, after all, it was far from being so bad as we, in our inexperience, were made to believe), its ending was not that of "the good man."

Duncan, James, bookseller, facing the Guard, Trongate.—The founder of a highly respectable family, now reduced to scanty proportions, by deaths and other causes. Andrew Duncan, the eldest son, was long in company with his father, and afterwards advantageously known to the world as the University printer. John, his brother, his unthrift brother, was yet inventor of the Tambouring machine, and a contributor to the Ed. edit. Enc. Brit. Probably many old Glasgonians may remember his *sentinelling* walks for hours daily—great-coated, buttoned up to the throat, and *seedy*—along the flags of the Tontine piazzas, the urchins making an occasional use of his tall person as a pillar to dodge round. The marks of his footsteps must still be there, like those of Bonnivard in Chillon Castle dungeon.

Dunlops.—Ten of the name, which still designates many Glasgow respectables.

Durie, Thomas, innkeeper, the sign of the Black Bull, north side, Argyle Street.—Very particular direction. 'Tis a wonder the Westport Well was not made to do duty here; but it was probably so crowded with gangs of women, waiting their turn for *gangs* of water, that it was hid from the describer's view. Water *was* water in those days. The hostelry of the Black Bull was erected by, and belonged to, the Glasgow Highland Society.

Ewings. Eight.—Some of that Glasgow name have risen high since.

Edmund, David, dealer in Scots manufac-

tures, Saltmarket.—The mention of *Scots* wares is often recurring.

Findlays. Six.—Another thriving Glasgow name.

Fife, ——, umbrella maker, Trongate, above No. 55. The only one of this calling indicated in the book: note, too, that no dealer in other goods sold umbrellas then. In fact, they were only beginning to be used. Parties who bore them were often hooted at. The chairmen, especially, showed a virtuous dislike of them: in the latter they had a redoubtable foe, who found, like the beleaguered Viennese of old, ready auxiliaries in the *poles*.

Geddes, John, manager of the flint and bottle glass work, Broomielaw.—All old Glasguensians must remember the ugly brick cone, which sent out its fumes at the S.E. corner of Jamaica Street for many a day. Geddes was rather "bottle-nosed" himself latterly. He was popularly called "Pat-fit nose," when colonel of the Verreville volunteer heroes. The latter were trivially known as "The Sweeps." Geddes rode a coal-black Arabian horse, on review days.

Glasgow, Alexander, manufacturer in *Anderston*.—This seems odd; but it is made nearly *even*, by there being ten Andersons, traders in Glasgow. [We can't expect puns to be always done to a *t*.]

Glens. Two. Both dealers in "Russia goods."

Gray, Hon. Fran., 2d flat, Wilson's land, Saltmarket.—Who could *he* be?

Gray, Robert, jeweller and silversmith, Trongate, No. 87.—A respectable name, "*et nullus error*."

Hamilton, Alexander, tobacconist, Stockwell. Ditto, *ditto*.

Herbertson, John, thread manufacturer, Rottenrow.—We hope the thread and the street were not made to match.

Hill, John, stays along with his father, James Hill.—A fact which would never have reached us, but for the old Glasgow Directory; Jones states it with the solemnity due to its *great* importance.

Hoods. Two. Both coopers.—We remember the men. One was a *Shaker*.

Hogg, Silby, & Co., muslin manufacturers, Bell's Wynd.—Only two makers of that article designated.

Ingles, John, linen draper, 1st shop next the Laigh Church, Trongate, No. 24.—When we knew that gentlemanly Tory draper, of the old school, he was located at No. 82, on the opposite side: a low-browed shop, and a mercer's still. His sister, indeed, who had been many years his assistant, quarrelled with him some forty years agone, and dared to set up an opposition trade at 24. He was an old bachelor; she an old maid, of the real "aunt Dinah" stamp. With what prudish dignity she walked on the Trongate flags, when she deigned to use them! We admired her high-heeled shoes, long waist (*short* were the fashion then), and cork *rump* (that *was* the name). There is nothing new under the sun, not even *bustles*. Absurd fashion-followers die, but absurd fashions never.

Jones, Nathaniel, keeper of the servant's register office, 2nd stair, left hand, Presbyterian Closs, Saltmarket.—Worthy author of *the Book*, and (indirectly) of this article upon it, you needn't be so *very* particular in the address. Did not every stone of the city "prate of *your* whereabouts?"

King, John, flesher, corner of *Bullock* lane, Bridgegate.—The "unities of *trade* and place" are well preserved here.

Lapsley, William, grocer and spirit dealer, Argyle Street.—His widow we knew of. She long kept an old-fashioned, cozy, comfortable tavern, in Virginia Street, opposite the Black Bull stable entry. The house is still a tavern, and was frequented, by gentle Sandy Rodger, till within a short time of his death.

Lockhart, James, hardware merchant, Saltmarket, No. 97.—A shop well known, to town and country. Things good, and therefore *cheap*, though not always *low-priced*. The terms are *not* synonymous; "quite t'other."

Lumsden, James, engraver, 2nd flat, Craig's Land, head of the Old Wynd. A name of fame, especially among the rising generation of those and *our* early days. The old gentleman (and a fine looking genteel old man he was) had retired from business with "flying" (no, steady) *colours*, when we used to see him. His name was associated in the youthful mind, with sources of enjoyment, "New'r gifts," holiday presents, small prints, and *picter byukes* of every description. What a goodly array he had! Why *every* thing in that line was by "James Lumsden & Son." The latter, in the days we write of, had his house of business in an establishment, up a court in Dunlop Street, with an iron-gated garden. What great ideas we had, as we used to peep through that iron *grille*, of the "Paradise of Dainty Devices" within. The "Crooked Family," the "Bloody Battles (by sea and land) of the Rats and Cats," &c. &c. &c. Oh! *what* a treasury, thought we. Old James Lumsden had, at least, two other sons, besides the ex-Provost: George, a bookseller;* and Lachlan, a lawyer.

* We are here brought to a sudden "pull up." A youthful experience, in which George Lumsden's name is indirectly involved, will head our next and concluding notice.

"The course of true love never does run smooth," neither does that of Science or Art. Circumstances incident to a young Journal have caused the Publication of No. 2 of the Daily Exhibitor to be delayed a day beyond its time; an irregularity we hope to avoid in future.

Glasgow: Printed for the Proprietors, by W. G. Blackie, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, *City Hall*.—Saturday, December 26th. 1846

Daily Exhibitor.

No. 3. GLASGOW, DECEMBER 28, 1846. Price ½d.

THE IRON MANUFACTURE.

(Table D.)

This extensive manufacture is excellently illustrated by specimens of the raw materials and produce, in all their various stages in the processes, from Mr. Murray of Monkland. A few words descriptive of these materials and processes, may not be uninteresting to the visitor, especially when he is told that this manufacture has been the foundation stone of the commercial prosperity of our city. Glasgow, standing in the midst of a coal, iron, and clay field of great extent, is surrounded with the furnaces and works, for the elaboration of these materials for the production of the Iron. The strata or layers of earth containing these materials are, by a beautiful and wise provision of the Creator, always associated with each other; thus we find layers of coal, then clay, then ironstone, then clay and coal again, in vast beds, which are easily excavated and brought to the surface. After the ironstone or ore has been excavated, it is submitted to the process of "calcining;" this is merely burning or "roasting" in order to free it from the carbonic acid and drive off the moisture. It is the peculiar property of "blackband" ironstone, that it contains coal in itself of quantity sufficient for the "roasting;" the others require coal to be added. The roasted ore is then thrown into the blast furnace with certain proportions of coal and lime. The carbon of the coal at the high temperature of the furnace reacts on the iron oxide, and with the acid of lime, which acts as a flux, reduces it to the metallic state, and the almost pure metal being much heavier than the other materials, falls to the "hearth" of the furnace, or in other words, to the bottom of the large crucible commonly called the blast furnace. The slag, composed of the lime and the impurities previously combined with the ironstone, floats on the surface of the fused metal.

The fusion is kept up by the heat of the burning coal, and the reducing action is much quickened by the immense volumes of air forced into the furnace by the aid of a steam engine. This air in its passage to the furnace is heated to a high temperature. This constitutes the notable improvement of the *hot blast*, the invention of Mr. Nelson our townsman, and which has effected so much for the iron manufactures of Scotland.

Every 12 hours, and sometimes oftener, the furnace is "tapped," and all the melted iron lying at the bottom of the furnace is run off into moulds, where it is allowed to cool; these moulds or castings constitute the "pig iron" of commerce. The slag, or the impurities of the iron stone and the lime, is allowed to run off as it accumulates, by a hole at a higher level.

The pig iron in this state is fit for all the purposes of the foundry, or for being cast into various forms, but it is not perfectly pure, and contains a proportion of carbon, and is quite unfit for the purposes of the blacksmith, to suit which it must be made "*malleable*." This operation is a most important one. The process is as follows:—

The pig iron is melted in a small open furnace called a "refinery;" coke is the fuel used, and the fire is urged by the blast from a steam engine. The melted metal is run off into moulds and formed into thick plates, a great deal of slag being driven off by the operation, and the iron is then much better adapted to the next operation, which is that of "puddling" or of converting the cast iron (for refined metal is still of this nature) into malleable. The puddling furnace is of the reverberatory kind; that is, the material to be melted, instead of being mixed with the fuel, is placed in a separate compartment, and the flame is passed over the surface. Three to four cwt. of the refined metal is put into the puddling furnace at a time, and when melted it is stirred constantly about with iron rods and exposed to the action of the hot air; by this process it is gradually deprived of its carbon and some earthy constituents, and thus rendered malleable. The workmen then divide the

mass into large rough balls of from 12 to 18 in. diameter; these are taken and beaten under a large hammer or subjected to the operation of some other powerful machine driven by an engine, which at the same time squeezes out the scoria and compresses the soft porous mass into a compact form, usually of 15 in. long and 4 or 5 in. square or round. The process just described is called "*Shingling.*" The bloom, still red hot, is then taken to large rollers or cylinders, driven by a steam engine, when it is rolled into flat bars of dimensions varying according to the size of the bar into which the iron is to be finished. These flat bars are then cut into short lengths, and piled on one another, forming a sort of faggot, which is taken to a reheating furnace and brought to a welding heat, after which it is again rolled out by other rollers into the wished for form. The iron is then finished and is the merchant bar iron of commerce. In this way the highest degree of purity, toughness, and elasticity may be obtained, and iron suitable for the manufacture of the most delicate instruments or gigantic machines obtained. The object of the whole of these processes is to separate the iron from its various states of combination. 1st. To free it from carbonic acid, 2nd. from oxygen, and 3d. from carbon; when these are finally accomplished the iron may be practically said to be pure. To form steel it requires to be again united with a small quantity of carbon; this communicates to the iron greater elasticity, brittleness, and infusibility, and suits it for the manufacture of all cutting instruments, &c. In conclusion we may add one or two statistical facts in connection with this manufacture, to show its rapid growth not only in improvements, but in importance. In

		Tons, cwt. qr.			
1829	1 Ton of iron required	8	1	1	of coal.
1830	„	5	3	1	„
1833	„	2	5	1	„

From the first to the last period, the yield of iron was doubled from the same furnace, and trebled from the same put. The quantity of limestone has also been vastly decreased, and also here a great saving effected, but the greatest results are from the increased yields, almost double, of the furnaces. These great advances are due to the introduction of the hot blast, which indeed has created an almost total revolution in the whole manufacture, has given it an impetus in this district, which has expanded it from a comparatively trifling extent into a gigantic and staple manufacture. In proof of this we have only to look back to a few years ago, when very few furnaces were in operation. So late as 1822, there were only 22 furnaces in Scotland producing 24,500 tons, which is about 21 tons of metal from each per week; compare that with the following, which shows the returns for the years 1845—6, when we have 95 furnaces, yielding a produce of 642,200 tons per annum—or about 26 fold in as many years; this shows about 130 tons of metal from each per week, or 6½ fold increase for each.

It will thus be seen how enormously this manufacture has increased in production. The quantities of materials are also much decreased; thus three-fourths less coal and one-half less limestone is now sufficient in every point of view; the savings are enormous, and the resulting benefits to all our arts and manufactures enormous.

DISSOLVING VIEWS AND CHROMATROPE.

This pleasing exhibition is dependent on that very familiar optical instrument, the Magic Lantern. The construction of the lantern, in its ordinary and popular form, is too well known to need description; but we may be allowed to refer briefly to its elementary principles and properties, in order to render intelligible our explanation of those improvements in the instrument which have rendered it more extensively useful. The purpose for which the lantern was first designed, was to cast highly magnified images of small paintings on glass, *through* a transparent screen, or *upon* a whitened wall; these paintings being either grotesque devices to excite laughter, or diagrams, figures of animals, &c. &c., to cultivate the juvenile mind through the eye. The lantern is so contrived as to emit no light except through an aperture in front, not larger than the disc of glass on which the painting is drawn. The painting is placed across this opening, and all parts of the disc being made opaque save those occupied by the figure, the only light that escapes from the lantern is that which passes through the picture. This light, bearing the colours and outlines of the painting, traverses a sliding tube and passes into the apartment through a double convex lens (a powerful magnifying glass), and diverges and spreads till it reaches the

screen, where it forms an image whose diameter is to that of the painting as the respective distance of the lens from each. The lantern with one lens was, we believe, the original construction. A second lens was afterwards added, to concentrate the light upon the picture and give greater brilliancy to the image. This additional glass, named a *bull's eye*, is plano-convex and very thick, being nearly half a sphere. It was first placed with its *circular* side towards the light, and between it and the painting; but it was afterwards thought a better arrangement to have the painting next the light, and the *plane* side of the lens exposed to the front of the picture. To understand the use of this second lens, the reader must be made aware, that a lamp does not send out light in *parallel*, but in *diverging* rays; hence the light falling upon the picture diverges after transmission, and is not all carried to the lens at the end of the tube, unless by the intervention of this *bull's eye* its rays be caught up immediately and brought from divergence into parallelism, when they *all* proceed to the second lens, and after passage through it, form an image upon the wall or screen of great brilliancy. It must, notwithstanding, be very obvious that the lantern thus improved was far from being a perfect instrument; for the light of an ordinary lamp, however much concentrated, is greatly attenuated when it diverges from a lens of (say) two inches diameter, to form an image of four feet in diameter. Many contrivances were added to the instrument to overcome this defect. Reflectors were placed behind the lamp, and for the ordinary lamp one on the Argand principle was substituted. These additional appliances merely rendered the instrument more satisfactory as an amusing optical recreation; but they did not admit of its being used as an illustration to a large assembly of persons, or as a means of exhibiting microscopic phenomena. The image could not be thrown large enough in the one case, and there was too much indistinctness of outline to render it available in the other. Two great defects had yet to be overcome; insufficiency of light, and want of *definition*.

Optical constructions have, in late years, received a large share of attention; and the Magic Lantern has been converted into an instrument named the *Oxy-hydrogen Microscope*, similar to the lantern in principle, but much more extensive in its use. The lamp is now superseded by small cones of lime, which are ignited with oxy-hydrogen gas, and yield a light of amazing intensity. And the lenses of the old instrument are exchanged for a combination of achromatic glasses, whose effect is to give a sharp, well-defined outline of the objects. This new instrument is the medium employed for exhibiting the *Dissolving Views and the Chromatrope*.

The exhibition in the City Hall is rather unfavourably circumstanced, having too little length of room to render its exhibition fully effective. The magical effect of the *Dissolving Views* cannot be brought out unless a transparent screen be interposed between the spectators and the operator. In the present case, there is of necessity a little intrusive and extraneous light to mar the illusion; and moreover the spectators *will* turn their attention from the scene to the operator, in the hope of discovering his secret. Let us not, however, be understood as casting the least reproach on the operator; his exhibition is still very pleasing, though under other circumstances it would better fulfil its design. We need not tell those who have visited the Hall, that two lanterns, or microscopes, are employed on the Dissolving Views, since they must have observed the two tubes. The mystery of the *dissolution* is simply this; one view is exhibited for a brief interval, and whilst the aperture of the other instrument is closed; then, another view is placed in this last instrument, and on opening the aperture, without drawing out the tube to its focus, a misty light is thrown over the former view; lastly, by gradually withdrawing the first view from its focus, and as gradually advancing the second view, the first fades away and the second appears, until, at length, the aperture of the first instrument is closed, and the second view in all its brilliancy takes place of the one previously shown. Care is requisite to incline the *axes* of the tubes so that the one picture may fall accurately on the other; and great delicacy of operating is necessary to make the illusion of the change effective. Of the *Chromatrope* it is sufficient to say, that its effects are produced by movable diagrams, and that the illusion consists in the varied intersections of straight and curved lines in motion.

Electricity, Table D.—Amongst the very interesting things exhibited under this head, we will now notice what is usually termed the "Shocking Machine;" a few minutes will be spent here both profitably and amusingly. This Machine obtains its peculiar power from the Galvanic Battery. The Electric fluid travels along a thin copper wire (covered with cotton thread, to prevent contact) which is coiled many times round a *hollow drum of wood*. This is called the coil; the Battery electricity travels along this wire. As yet, however, the machine has no power of shocking. This power is communicated to it by passing a piece of soft Iron of any sort, or a bundle of wire fastened together, into the hollow drum at the extremities. As this is introduced so is the force generated, and in proportion to the length introduced, is the power of this machine. In this way shocks of any degree of power may be given or obtained, suited either to the delicate nerves of our dear lady friends, or to the more robust and herculean frames of the lords of creation. The *shocking* effect produced is due to the Electricity travelling through the wires; this Electricity is more properly termed Electro-Magnetic Electricity or Electro-Magnetism, for the iron bundle of the coil becomes a Magnet by the induction or power of the Electricity which is travelling through the copper wire. But we will not trouble the visitor with more explanations of the workings of a power whose *effects* we can only see and feel, but not see or feel itself,—and to describe which more fully would neither be understood, nor appreciated, unless by *savans*. The same power produces the beautiful *aurora borealis*, which charms us during the winter nights, by its beautiful panoramic exhibition, and may not unaptly be termed *nature's dissolving views*. It is amusing to wait beside this interesting machine, and watch the various shades of feeling and expression manifested towards it—fear, wonder, delight, and pain, as the passer-by first looks at, and then tries it. It has occurred to us that it might be made to indicate the strengths of our muscular and nervous systems. We have also thought of an interesting little trick which might be performed by some of our young friends, for example, by a distracted swain enraged at the enfuriating treatment of his coquettish sweetheart, by inducing her to catch *one* of the handles of the machine, slyly taking hold of the *other* with one hand himself, and then to steal a kiss; the effect would be *magical*. Only try it; we are sure that in such a case it would be truly useful, and we only wish the scheme the patronage it deserves; a more effectual plan of *smoothing* down could not, we conceive, be devised.

TO READERS AND CORRESPONDENTS.

Sapwood *is informed that the* pith *of the wire ropes is not medullary but fibrous, and that the ropes themselves are not exogens but* twinogens.

Isoceles Triangle *has evidently not passed the pons asinorum.*

The Daily Exhibitor.

MONDAY, Dec. 28, 1846.

The Exhibition is progressing gloriously in public favour, like a gallant ship sailing before a favouring wind, with tide and currents all propitious. *We* are like a little boat attached to it. "*We* share the triumph and partake the gale." We fear we begin to grow "ower vogie," though. Still the indulgence in a little self-complacency ought not to be denied us, seeing that we are the first of all the Scots Press which has attained the dignity of being a *Daily Paper*. Think of that, good readers.

In throwing out the hints contained in our last Number about a permanent Exhibition, we did not say one word about ourselves, a pitch of modesty to which we could scarcely have been suspected to have attained! Were such a permanent collection once formed, we do not say our services would not be advantageous; we leave that to others to judge of, and merely throw out the suggestion for the consideration of all concerned, that when the time arrives we may not be overlooked, which from our Tom Thumb dimensions we might readily be. A permanent Exhibition, such as the present, with a daily exponent of its wonders attached, would be a conjunction hitherto unparalleled. We take no little credit to ourselves for the idea.

TABLE OF ANTIQUITIES.

Autograph letters, 1, 2, 3. These are from three eminent men; we place them in the order of the merit of the writers.

1. Robert Burns.—["Mauchline, 1788,"]—The thoughts which arise on seeing this page, we cannot express. Our friend and fellow townsman, the late Thomas Campbell, shall do it for us:—

"Farewell, high chief of Scottish song!
That couldst alternately impart
Wisdom and rapture in thy page,
And brand each vice with satire strong,
Whose lines are mottoes of the heart,
Whose truths electrify the sage.

Nor skill'd one flame alone to fan:
His country's high-soul'd peasantry
What patriot-pride he taught! how much
To weigh the inborn worth of man!
And rustic life and poverty
Grow beautiful beneath his touch."

We quote the letter writer's *own* words now:—

"A king can mak' a belted knight,
A duke, a lord, and a' that."

Ay, Robin, he can; but we'll tell thee, Robin, what's "aboon his might:" he canna ENNOBLE A WHOLE PEOPLE, as *thou* hast done.

"We'll a' be proud o'Robin," the ploughman "lad that lived in Kyle."

Said he not sooth, that older Ayrshire rhymer, in summing up an account of the great staples of his native soil—

"*Kyle* for A MAN,
Carrick for a koo, [*cow*.
Cunningham for butter and cheese,
Galloway for woo'." [*wool*.

2. Lord Nelson. [Date, 1804.]—Written the year before his death, which took place in the narrow cockpit of

"That ship the *Victory* named,
That ship for victory famed,"

on the 21st Oct., 1805. We think we see the narrow corner *now*, where his aspiring spirit left its poor shattered clay tenement behind. But his peculiar work was *finished;* he had gathered in the full harvest; none succeeded to him but gleaners. We are no admirers of "heroes" generally; but if an exception *can* ever be made in favour of an individual of a *bad lot*, our exception would be Horatio Nelson. He was *not* a mere fighting *tar*, of coarse instincts, as *Tait* pretends; he was a man of SUPERIOR MIND. Let those who do not know this, go and inform themselves. But what is better, that mind was pure, as rock-crystal, from any taint of selfishness, or flaw of envy. And as for his PATRIOTISM, he loved his country, even as (ay, better than) his own soul, alas!

This short but characteristically kind letter, gives evidence of its being written with the left hand—the only hand *left* the writer to use.

3. Benjamin Franklin. [Date, 1788.]—This is another manner of man, in all respects. He had virtues which the other wanted; and some vices (no! peculiarities) which Nelson was free of. Franklin, though full of uncommon talent and of rare sagacity, was a hard-minded selfish man. Our own gentle Thomson (poets are double vaticinators) must have had him in his eye, when peopling his *Castle of Indolence*:—

"'A penny saved, is a penny got:'
Firm to this scoundrel maxim keepeth he."

Poor Richard was not lower in his estate, than was his author in some of the inner regions of his mind.

CAPERCAILZIE, or *Cock of the Woods*.—This splendid bird was once plentiful in Scotland, but is now no longer to be found there in a state of nature. It is by far the most magnificent of the grouse tribe, and must have been a truly worthy tenant of those splendid primeval forests which once overspread our country. The male is nearly three feet in length, and attains a weight of about fifteen pounds; black, brown, green, and white, are his predominating colours; and from the hook of his bill, the strength of his limbs, and majesty of deportment, he might rather be supposed to be a bird of prey than even the chief of the grouse family of gallinæ. The numbers of the capercailzie naturally decreased in Scotland with the woods which gave them shelter, and it is now about sixty years since the last native individual of the species ever seen in this country was shot in the neighbourhood of Inverness. They are now most plentiful in the forests of Northern Europe, and some parts of Northern Asia, where they feed on the young shoots and cones of the pine, the catkins of the birch, and berries of the juniper which form the underwood. Several attempts have been made, with what success we have not learned, to restore this beautiful animal to our country. The Marquis of Breadalbane, to whom we are indebted for the specimen in the exhibition, has done much to further this desirable end.—(Table E., No. 39.)

RETROSPECTIVE REVIEW.

Jones's Glasgow Directory for 1787.

Table D.—*Antiquities.*

(Third and Concluding Notice.)

The Lumsdens *(Continued).*

George Lumsden was a bookseller, and his shop was that now occupied by Macleod, 20, Argyle Street. It was then remarkable for the neatness and beauty of its interior; and still more so for having been the first in Glasgow which was lighted with gas, by means of a private apparatus. Some forty years ago, we used to be terribly puzzled with an inscription in gilt letters, on one of its book-cases. It ran thus:—"A book the stealing hour secures, and marks it down for wisdom." We could not, for the little life of us, make out what the words meant. Some one whom we applied to in our distress, said it was merely a warning set up against *book stealing!* We were at first satisfied with this explanation; but, on reconsideration, irksome doubts began to vex us. By and by, the gas being mismanaged, the shop was set on fire by it; its whole contents were consumed, and with it the unlucky lettered plank. The tallow chandlers and oilmen considering the "new light" a rank heresy, looked upon the disaster as a just judgment; and even *we* were something of the same *wicked* opinion, for a different reason. Children *dislike* what perplexes them. We had already been *bothered* with a pictorial puzzle of Lumsden senior's publishing; it was a print of three monkeys on *ass*-back, with the words, "Seven we together make; count us well, and don't mistake." We found out the trick of this, though we thereby had "to make a *beast* of ourselves." But the *other* "pons asinorum" we could not get over at all; and had to wait for a solution till of age to read (and relish) Cowper. [Gentle reader, pardon us for reciting this puerile story.]

Mennons, John, printer of the *Glasgow Advertiser* (published *every* Monday evening) Saltmarket, No. 22. Here we are assured that Glasgow rejoiced in its one paper published *every* week! John published a "Glasgow Almanac," also. That for A.D. 1785 is now lying beside us. Mennons, Senior, was a man who made a fortune in the muck-worm way, and lost most of it after he retired from trade, in unprosperous mining speculations. He had to resume trade for his support, and that of his family. One daughter became a compos*itress*, another a press*woman*. The oldest son (now dead, also), was editor, then became proprietor, of the *Greenock Advertiser*.

Monteith,—Seven, including "Henry Monteith & Co. Anderston."

Moodie, Alex. hair-dresser to the Bull, Trongate.—When the *Bull* (or its gentlemen visitors) wanted no farther dressing *(powdering)*, Mr. Moodie being a ruined man, took to living upon others' wrecked fortunes, by setting up as an auctioneer, and a very respectable one he made. His "vendue rooms" were opposite the Tontine.

M'Auslan & Ouston, in Co. seed merchants, shop Trongate.—A respectable house, still, in part, extant. We remember seeing Colonel Cadogan eat a quantity of new strawberries in their shop (on the south side Trongate then) a short time before he was killed at Vittoria. Had he lived, he would have been called to the peerage, (perhaps) by the style and title of "Lord Gallowgate!"

M'Donald, Angus, dealer in silver-plate, hard ware, and toys, shop Trongate, Nos. 80 and 105.—No mention is made here of quack medicines, a kind of soft ware (ware for the *soft*), which Angus (and a proud Highlander he was) disdained not to deal in.

M'Goun's, Andrew, book, music, and stationary shop, head Stockwell.—The only warehouse of the kind observable. M'Goun had afterwards a large warehouse in Wilson street; but he had competitors then.

M'Intosh, George, merchant; "his dwelling house is near the Secret Work, near the foot of the Drygate."—The arcana of this early establishment have ceased to be *secret* works long ago; not to mention, that it seems odd thus to publicly point out a place meant to be "secret."

M'Ilhose, James, heritor, north side Gallowgate.—A man whose calling was easy then, and kills no one who follows it (or rather lets follow him) even now.

Naper and Dun, in Co. watch-makers, head of Stockwell.—Was known as Dun's only, in our time. It was an old-fashioned shop, up a few steps. The locality (much altered) is now a hat shop, under the *Examiner* Office.

Niven, David, printer, Saltmarket.—This name was reproduced afterwards as "Niven, Napier, and Khull's;" then that copartnery split up, and each traded on his own bottom, or joined his flag to others'. We could say a good deal about all of them, had we room, and patient readers. Niven was connected with booksellers of that name. It is extant in Glasgow bibliopolisim yet.

Paton, Captain Archibald, opposite the Exchange.—This was the "ultimus *caudarum*," the last Glasgow wearer of hair-powder and pigtails. When we knew him, he was a collector of cess, and lived in Silvercraig's Land, Saltmarket, opposite East Bridgegate. This respectable edifice was once the temporary lodging of Oliver Cromwell; and upon its wall was cut the mark of the great Clyde flood, March 12, 1782. It was a fine hale building, one of the olden time, and looked much like a French nobleman's old Paris hotel. What harm had it done to cause its demolition? It had survived its second century, and might have seen its fourth, if fairly dealt by.

Pollocks, sen. and jun.—The last hair-dressers in Glasgow of the old school. No one presumed to make a toupee or perruque after

em. The younger Pollock (an old man when e knew him), lived in the Laigh Kirk Closs. here we saw him, when the evil days of atural hair came upon him, often solemnly ake the dust out of his own wig against the egeneracy of the times. He despaired, drooped, d died. How many fat "Glasgow magi- rates" *he* had *pouthered* in his day!

Riddel, John, surgeon, lodges with his mo- er, Princes Street.—A dutiful son, and, no oubt, a great comfort to the old lady; who ways, as a matter of course, "knew when he as out."

Robertson, James and Matthew, printers id booksellers, east side, Saltmarket, No. 17.— Ha, are you there, old Truepenny!" as Ham- t says. Our earliest library was made up of e Saltmarket literature. "Penny histories," ere they called: each tract was of 24 duodeci- o pages. The serious department contained, *ter alia*, "The Seven Champions," "Life of Vallace and Bruce," &c.: the comic division, Leper the Tailor," "Lothian Tam," "The Vife of Beith," "George Buchanan's Tricks," *m multis aliis;* which Latin words mean re, "wi' mony ither lees."

Smith, William, tobacco and cotton twist erchant, Lee's Closs.—These incongruous ma- rials, if ever they became textile together, ould, no doubt, take the fig-leaf apron form. ne thing is plain; from this and a preceding ct, cotton was not, as yet, thought fit to go one.

Stevenson, Mrs., dealer in sundry vegetables, , High Street.—A rather showy periphrasis r *kale-wife*.

Sturrock, John, beef*stake* house, Laigh Kirk loss.—Sturrock was evidently one who had "a ake in the country."

Tait, Peter, printer and bookseller.—The under of the old *Glasgow Journal*, second lasgow paper in order of time, and long pub- hed conjointly with the *Herald*.

Tassie, William, glover and breeches maker, ridgegate.—His shop well-known to hand-ball ayers. They supplied the worsted: the latter ways was the wreck of a knitted (not woven) ocking.

Taylor, William, D.D. (the principal), Mrs. awson's Land, Bell of the Brae.—No man of ly principle would live *there* now. The locality now called High Street. It ought to have en named *Highest* Street, if it was right to ange the name at all.

Walker, Charles, grocer, Gallowgate Bridge. -This gentleman was colonel of the "Gro- rs'" (*alias* "Sugaralli") corps of volunteers. e was the hero of one of BLIND ALICK'S merous patriotic pindarics, two of the halting es of which we remember:

"The gallant Charlie Walker,
Makes Bonyparty tremble like a Quawker!"

ertainly the honest, pacific-looking *douce* gro- r had the look of a quaker, dressed in mourn- g square-cut. Judging by appearances (in s window) he was a *Glass*ite. The shop is No. 87, and is a grocer's still. Walker himself looked anything but a military hero. He was an honest man, and that's something better.

Wilson, Alexander, type-founder, College.— The Wilsons may be called the premier family of our city. From the year 1740 to 1834, when their establishment was removed (unhappily) to London, their foundry was one of the most distinguished in Europe. Within the last few months, they have been *rouped*, "stick and stow." We remember the father of the present hapless *Marrall* Wilson. He was a gentleman of the antique mould. He wore a broad-skirted maroon coat, a cocked hat, hand ruffles, and carried a gold-headed cane.—Reader, if you would wish to ruminate on the vicissitudes of commercial fortune, do as we have done lately: visit a dilapidated mass of buildings in the inner right hand corner of the College Open. Passing the door of a town lying-in hospital, you will arrive at another, a little below, with a small grated opening in it. Peep through, and you will see in to a circular-shaped ruin, once the great metal melting house of the Wilsons, but now a huge cavity of rubbish. Over it hangs a ragged roof, which it is a marvel does not fall in, at the first rough visiting of the winds. This roof is a curiosity in its way. Being circular and many-ribbed, and the web-like connections between each of the ribs having receded a good deal, it has all the appearance of a "shocking bad" umbrella; such a one as French *Robert Maccaire*, or English *Newman Noggs* had in use. The small knob-like lucarne at the apex completes the resemblance. In the East the umbrella, or parasol, is the emblem of power and dignity; *here*, where we now stand, no "Emblem" in Francis Quarles would typify half so well the material wreck of a ruined family as this significant tile and timber overhanging canopy does.

Among the names and addresses, there are those of several "chaise setters." It is more usual to have *bone setters* now for sufferers from chaise *cowps*. But, we remember, it was quite usual in ancient days to anoint the weapon, not the wound it made: a lucky non-interference with our all-healing and "I-don't-like-to-be-disturbed" mother, Nature.

Some general notion of the character of the central Glasgow streets in 1787 may be gathered from a consideration of the callings and status of those who dwelt in or about them. All of them have lost caste since then. The eastern Trongate was, then, what Buchanan and Queen Streets are now. Neilson Street has sadly come down in rank. The High Street was of mixed character. When those two huge pretentious buildings were run up opposite the College, we do not know. They were standing as early as *we* had the intelligent use of our eyes. *That* speculation never paid. Duke Street and George Street were, within our ken, in a very rudimentary state. In the Candleriggs (in 1787) were sugar-houses, "soaperies," and *surgeons*. In our early time *there* were located the vegetable

market, the police-office and the guard house, the two latter in one building, the greens market contiguous—all on the lower or S.W. side. In Bell's Wynd was a meat market; and the two greater ones—the Beef and the Mutton—in King Street, were then in their palmiest days. The marketing system in household economics, like that of fairs for districts, is entirely changed now-a-days.

In conclusion, we would observe, that the Glasgow of 1787 gave small promise of ever becoming that of 1847. Its trades, and crafts, and callings, were at the former epoch merely such as supply domestic or local wants. Great traders were few, manufacturers fewer. The mineral wealth in its neighbourhood was as yet little known and less disturbed; its port was almost null. It had no advantages in richness of surrounding lands; most of those to the north, many to the eastward, and not a little to the south, were either bleak moor or bogs. In no respect was the district a "land of promise." What race but that of Scotland could here have realised such magnificent results, from means so unlikely, as we have done?—*Esto perpetua.*

"Let Glasgow Flourish." A. B.

A TURNING LATHE,

MADE BY JOHN SMEATON.

(Table B—No. 6.)

John Smeaton, the son of a country attorney at Austhorpe, near Leeds, at the early age of 14 years, had arrived at such skill in the use of tools, that he had constructed for himself a lathe for *rose engine turning*, besides many small lathes for his friends. The lathe sent to this exhibition by Mr. Robert Napier, is probably one of those mentioned in a memoir of Smeaton, by his friend Mr. Holmes, in the Annual Register for 1793.

Smeaton, though regularly bred for the law, became a mathematical instrument maker, and, with his friend Mr. Hindlay, of York, occupies a conspicuous place in the history of the improvement of astronomical instruments. He became a fellow of the Royal Society, and contributed many valuable papers to its transactions; but his great fame arises from the genius and skill he displayed as a civil engineer. Smeaton, and Brindley, and Watt, were the fathers of civil engineering. While Smeaton was occupied in studying the means of erecting a durable lighthouse on the Eddystone rock, to guide our merchant and other ships through this dangerous part of the channel, Brindley was busied in planning the Bridgewater canals, and Watt was perfecting his idea of the separate condenser for the steam-engine. Is not this a remarkable concurrence of circumstances? At nearly the same time, the thoughts of these three illustrious men were turned to separate objects, which have each, in its own direction, been developed in the brief period since 1765, so as to have become the characteristics of the age in which we live.

Smeaton finished the Eddystone lighthouse as it now stands, "the light of nations," in October, 1759. It has not only the merit of utility, but of beauty, strength, and originality. Upon its model have been constructed the Bell Rock and Skerryvore light-houses, in situations equally difficult, by Messrs Stevenson, of Edinburgh.

Smeaton's field of engineering extended afterwards throughout Great Britain. Inland navigation, in drainage, the improvement of water machinery, of the steam-engine, were subjects on which his fertile genius was occupied in the way of business; while the science of astronomy, in his observations at Austhorpe, occupied the leisure of this truly accomplished man.

WATT'S PORTRAIT.

Area F. No 56.

In Westminster Abbey is the following inscription composed by Lord Brougham:

Not to perpetuate a name
which must endure while the peaceful arts flourish,
but to shew
that mankind have learned to honor those
who best deserve their gratitude;
The King,
his ministers, and many of the nobles
and commoners of the Realm,
raised this Monument to
JAMES WATT.
Who, directing the force of an original genius,
Early exercised in Philosophical research,
to the improvement of the Steam Engine,
enlarged the resources of his country,
increased the power of man,
and rose to an eminent place
among the illustrious followers of Science,
and the real benefactors of the world.
Born at Greenock, 1736.
Died at Heathfield in Staffordshire, 1819.

Bust of Berzelius.—On the chemical table is a bust of the celebrated Swedish chemist *Berzelius*, attached to which is a label stating that it is *Executed in Berlin Porcelain.* "Ah!" said a police officer, "he's a braw chap that *to be hang'd.*"

Glasgow: Printed for the Proprietors, by W. G Blackie, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, *City Hall.*—Monday December 28th, 1846.

Daily Exhibitor.

No. 4. GLASGOW, DECEMBER 29, 1846. PRICE ½D.

MR. BAIN'S ELECTRIC CLOCK.

MR. BAIN obtains the electricity by which his Clocks are moved from the earth. He buries a quantity of coke in the ground, and at the distance of a few feet he buries one or more plates of zinc. These two elements, with the intervening soil, form a Galvanic Battery, from which a uniform current of electricity of very low tension is obtained. It is the constancy of this current, which renders it available as a motive power for time-keepers. The current is led from the coke and the zinc by means of copper wires, the two ends of which terminate in the upper part of the Clock.

To obtain motion from this current Mr. Bain forms a pendulum of fir rod, and instead of the ordinary bob, he employs a coil or bobbin of copper wire, the wire being covered with cotton thread. In the centre of this bobbin is a hole upwards of an inch in diameter, through which is passed a case containing two sets of bar magnets, having their similar poles placed opposite each other, with a small interval between them. The coil has freedom of motion along the case containing the magnets; and when the pendulum is at rest, the coil stands over the adjacent similar poles of the magnets. From the coil proceed two wires up the back of the pendulum and terminate in brass plates, which are insulated from each other, and on opposite sides of the wooden pendulum rod. To each of these plates a spring is attached, by which the pendulum is hung and permitted to vibrate. One of these springs, it will be observed, is in metallic communication with the one end of the coil, and the other with the other. A wire is carried from one spring along the inside of the clock case, and through an aperture in its side, where a binding screw is provided, by means of which it can be permanently connected with one of the elements of the battery (say the coke) buried in the earth. From the second spring, a wire also is led down the inside of the clock case, on the opposite side from that occupied by the wire going to the coke. When this second wire has descended to nearly opposite the middle of the pendulum rod, it is bent across horizontally and terminates in a projecting brass plate, fixed to the back of the clock case, which may be compared to the buttress of a bridge. Another similar brass plate or buttress is fixed into the case, on the other side of the pendulum rod, about three inches distant from the first buttress, and from the second one a wire is carried through the side of the clock case, to the second or zinc plate of the buried battery. A space exists between the two buttresses, across or through which the pendulum rod moves in the course of its vibrations; and unless a metallic bridge be made to connect what we have called the buttresses, the electric current from the coke to the zinc cannot pass, or the pendulum move. To secure continuous vibration of the pendulum, however, it is necessary that the electric current should be alternately cut off and let on. To bring about this result, a disc of wood is placed on one of the buttresses, with a wire passing through it, so as to touch the brass of the buttress at the bottom of the disc, while at the top it ends in a grooved gold plate. On the opposite buttress is a disc of wood similarly perforated by a wire, touching the brass below, and ending in a gold stud above. This stud rises through a semicircular plate of agate, polished and grooved, which covers one half of the disc. A polished steel bridge, supported on two gold points, is laid across between the buttresses, so that the one point shall be in the grooved golden plate in the one buttress, and the other point in the grooved agate plate on the other buttress. When the pendulum moves, it carries the bridge, by means of a brass edge, attached to the pendulum, which can touch it, first to the one side, and then to the other. The gold points, by which the bridge is supported, are thus moved along the grooved surfaces on the discs, so that one of the points alternately touches the gold stud on the agate, and is pushed off it, when the point and the stud touch each other, the current passes across the bridge —the opposite end of which is permanently

connected with one end of the battery, by its metallic communication with the grooved gold plates in which it moves. When the current passes, the coil in the bob of the pendulum becomes a magnet, and moves away to the one side, impelled by the permanent bar magnets attached to the clock case. But in so doing it pushes the gold point of the bridge off the gold stud in the agate. The current is immediately cut off and the pendulum losing magnetism falls back, to its original position by its own weight. In falling back, however, it carries back the bridge with it, so as again to make the gold point touch the gold stud. Again it becomes a magnet and moves off a second time; again it pushes off the point from the stud, ceases to be a magnet, and returns by its own weight, always as it returns bringing back the bridge, letting the current pass and making itself anew a magnet. The clock thus possesses in itself the means of maintaining constant alternate motion in opposite directions, and is therefore a perfect automaton.

EDIBLE BIRDS' NEST.

(Table E., No 60.)

The Chinese are so fond of these nests, making of them a favourite *dinner course*, that specimens of them are rather rare in this country, especially in an entire state. Considerable diversity of opinion exists as to the substance of which these nests are composed. According to some, they are formed of a sort of froth of the sea or of the spawn of fish, which is strongly aromatic; some pretend that it is a kind of gum called Calambone; but the most generally received opinion now, which, however, has by no means been satisfactorily established, is, that they are composed of a kind of seaware. The commercial history of these nests is much better understood than their composition. We extract the following interesting account from Crawford's Indian Archipelago:—"The best nests are those obtained in deep, damp caves, and such as are taken before the birds have laid their eggs. The coarsest are those obtained after the young have been fledged. The finest nests are the whitest; that is, those taken before the nest has been rendered impure by the food and fæces of the young birds. The best are white, and the inferior dark-coloured, streaked with blood, or intermixed with feathers. It may be remarked, however, that some of the natives describe the purer nests as the dwelling of the cock-bird, and always so designate them in commerce. Birds' nests are collected twice a-year; and, if regularly collected, and no unusual injury be offered to the caverns, will produce very equally, the quantity being very little, if at all, improved by the caves being left altogether unmolested for a year or two. Some of the caverns are extremely difficult of access, and the nests can only be collected by persons accustomed from their youth to the office. The most remarkable and productive caves in Java are those of Karang-bolang, in the province of Baglen, on the south coast of the island. There the caves are only to be approached by a perpendicular descent of many hundred feet, by ladders of bamboo and ratan, over a sea rolling violently against the rocks. When the mouth of the cavern is attained, the perilous office of taking the nests must often be performed with torch-light, by penetrating into recesses of the rock, when the slightest trip would be instantly fatal to the adventurers, who see nothing below them but the turbulent surf making its way into the chasms of the rock. The only preparation which the birds' nests undergo is that of simple drying, without direct exposure to the sun, after which they are packed in small boxes, usually of a picul, (about 135 pounds.) They are assorted for the Chinese market into three kinds, according to their qualities, distinguished into first or best, second, and third qualities. Caverns that are regularly managed will afford, in 100 parts, 53 3-10th parts of those of the first quality, 35 parts of those of the second, 11 7–10th parts of those of the third. The common prices for birds' nests at Canton are, for the first sort, 3,500 Spanish dollars the picul, or £5. 18s. 1½d. per pound; for the second, 2,800 Spanish dollars per picul; and, for the third, no more than 1,600 Spanish dollars. In the Chinese markets a still nicer classification of the edible nests is often made than in the island. The whole are frequently divided into three great classes, under the commercial appellation of Paskat, Chikat, and Tung-tung, each of which, according to quality, is subdivided into three inferior orders, and we have consequently, prices varying from 1200 Spanish dollars per picul to 4,200. These last, therefore, are more valuable

than their weight of silver. Of the quantity of birds' nests exported from the Indian islands, although we cannot state the exact amount, we have data for hazarding some probable conjectures respecting it. From Java there are exported about 200 piculs, or 27,000 lbs., the greater part of which is of the first quality. The greatest quantity is from the Suluk archipelagoes, and consists of 530 piculs. From Macassar there are sent about 30 piculs of the fine kind. These data will enable us to offer some conjectures respecting the whole quantity; for the edible swallows' nests being universally and almost equally diffused from Junk, Ceylon, to New Guinea, and the whole produce going to one market, and only by one conveyance, the junks, it is probable that the average quantity taken by each vessel is not less than the sum taken from the ports just mentioned. Taking the quantity sent from Batavia as the estimate, we know that this is conveyed by 5,300 tons of shipping, and, therefore, the whole quantity will be 1,818 piculs, or 242,400 lbs., as the whole quantity of Chinese shipping is 30,000 tons. In the archipelago, at the prices already quoted, this property is worth 1,263,519 Spanish dollars, or £284,290. The value of this immense property to the country which produces it, rests upon the capricious wants of a single people. From its nature, it necessarily follows that it is claimed as the exclusive property of the sovereign, and everywhere forms a valuable branch of his income, or of the revenue of the state. This value, however, is, of course, not equal; and depends upon the situation and the circumstances connected with the caverns in which the nests are found. Being often in remote and sequestered situations, in a country so lawless, a property so valuable and exposed is subject to the perpetual depredations of freebooters; and it not unfrequently happens that an attack upon them is the principal object of the warfare committed by one petty state against another. In such situations, the expense of affording them protection is so heavy, that they are necessarily of little value. In situations where the caverns are difficult of access to strangers, and where there reigns enough of order and tranquillity to secure them from internal depredation, and to admit of the nests being obtained without other expense than the simple labour of collecting them, the value of the property is very great. The caverns of Karang-bolang, in Java, are of this description. These annually afford 6,810 lbs. of nests, which are worth, at the Batavia prices of 3,200, 2,500, and 1,200 Spanish dollars the picul, for the respective kinds, nearly 139,000 Spanish dollars; and the whole expense of collecting, curing, and packing, amounts to no more than 11 per cent. on this account. The price of birds' nests is of course a monopoly price, the quantity produced being by nature limited and incapable of being augmented. The value of the labour expended in bringing birds' nests to market is but a trifling portion of their price, which consists of the highest price which the luxurious Chinese will afford to pay for them, and which is a tax paid by that nation to the inhabitants of the Indian islands. There is, perhaps, no production upon which human industry is exerted, of which the cost of production bears so small a proportion to the market price."

Foulah Provision Pouch and Powder Flask, Cup, &c.—The Foulahs are a numerous nation in central Africa. They extend from the Atlantic to the confines of Darfour. They have straight hair, some accounts say curled, perhaps both, noses moderately elevated, the parietal bones not so much compressed as those of the negro, nor is their head so much arched. The colour of their skin is a light bronze, and by this characteristic alone can they be classed in the Ethiopian variety of the human species. The Foulahs, or Fellatahs, as they are called by the negroes, are a warlike race of shepherds, and have, within a short period, subjugated a considerable portion of Soudan. It was by the order of the Fellatah governor that the lamented Major Laing was compelled to leave Timbuctoo, and probably to his instigation, or contrivance, is his death to be attributed. Mungo Park also was killed by a party of the same people while descending the Quorra. They are all Mahommedans, and extremely fanatical. In their mountains they cultivate rice, maize, millet, and also cotton, of which they manufacture stuffs in pieces only five inches wide. The principal trade of the country is in salt and cotton cloth. M. Mollien says, "The Fellatahs will, probably, erect the vast empire in

Soudan; and the influence this power may exercise in the great question of African civilization gives to them no ordinary importance. If Sultan Bello should be induced to abolish slavery, the most efficient means will have been discovered for its entire suppression. The example of so great an empire, or the menace of its chief, would effectually check the inhuman cupidity or barbarism of the lesser tribes of the coast. Such an event would cause a great revolution in the commerce of these countries, and the arts of civilized life would speedily be adopted. Morocco, Algiers, Tunis, and Tripoli, would lose their lucrative trade in slaves, which, being no longer objects of barter, commerce would seek the more convenient markets of the Atlantic coast, in preference to encountering the horrors and perils of the desert. This view of the subject has not escaped the Moorish statesmen, who, it is known, have been using their influence with the Negro governments, to obstruct the free access of Christians among them. The colony of Liberia is destined to have an agency in such a revolution of commerce, and will participate in the great advantages thence to result."—(Table of Antiquities, Nos. 41, 43, 44.)

Mandingo Pouch.—The Mandingoes are a nation of negroes found in different parts of Western Africa, in Senegambia and Guinea. They are of the Mohammedan religion, and their language is, in some measure, the commercial language of Western Africa. They are superior to most of the African tribes in civilization. (Table of Antiquities, No. 47.)

Ancient Stirrups found in the Field of Bannockburn.—Five hundred and thirty-three years have winged their flight since the famous battle of Bannockburn was fought, and yet with what interest it is still recollected, and the field still visited. There was vindicated and preserved a nation's freedom; no wonder, then, if the event remains embalmed in a nation's memory. On July 24th, 1314, these curious old stirrups upheld the feet of some stout warrior. English or Scotch? None now can tell. The memory of the conflict alone remains; of few of the actors in it has the name been handed down. The glorious results of the death of our iron-nerved countrymen are known—they are felt even now. Their names have gone to swell the list of brave unknown who have died in the arms of freedom's victories, followed to their rest by the tears and the hurrahs of a nation's gratitude. (Table of Antiquities, No. 11.)

COWRIE PURSE.

(Table of Antiquities, No. 50.)

Cowries are shells used for coins. They are a kind of small muscles, belonging to the Indian seas, &c.; the *cypræa moneta* of Linnæus. They have an oval smooth shell. The largest are an inch and a half in size, and indented on both sides of the opening. They are collected twice a-year in the bay of Bengal, on the Malabar coast, and, in still greater quantity, in the neighbourhood of the Maldive islands. They are used throughout the East Indies, especially in Bengal, and in the African trade, instead of small coins. The demand is so great, that, notwithstanding the insignificant price (in 1780, a pound of them might be bought for three half-pence), about £33,750 worth are sent every year to Bengal.

TO READERS AND CORRESPONDENTS.

T. F. is mistaken. The particular model referred to has not been before exhibited.

W. S., Queen Street.—Yes, on an early day, after the gratuitous admissions.

The Daily Exhibitor.

TUESDAY, Dec. 29, 1846.

This Exhibition is indebted for a number of interesting contributions to two excellent institutions connected with the city, which are existing in a state of isolation from each other, far from advantageous to either. The institutions we refer to, are the Government School of Design and the Royal Botanic Garden. The students connected with the School of Design have no access to the Botanic Garden; we mean, of course, privileged access. This we humbly conceive to be an error. The students attending that school are placed under great disadvantages, from not being in favourable circumstances for studying the grand elements, the nourishment of the designer's art, the beautiful forms of nature, as exhibited in the vegetable kingdom.

his is an error which demands an immediate remedy, and one can easily be found, the parties interested only address themves to it heart and hand. The propriers of our Botanic Garden are, many of em, merchants themselves, all of them terested in elevating the standard of dgn in our city; and, we believe, if prorly applied to, they will be found most lling to make a liberal arrangement in half of the students of the School of esign. One point we would, however, ess strongly upon all parties, and it is a int which, in the present circumstances, ght to take the precedence of all others, e relieving of our splendid Garden from the d of debt which lies like an incubus upon

It is not creditable to the intelligence our city that an Institution which is so ich calculated to forward the best interts of our manufactures of all kinds, and thout access to which our School of esign must necessarily remain in an imrfect state, should be left to pine in its esent condition. A single effort of our erchant princes, and the Garden would relieved from its difficulties, and put in position for being improved and made ore useful than ever; and the School of esign, by being thus rendered complete, uld become a still more efficient nursery cultivating the artistic and inventive ent of our youth. Besides the direct vantage which would accrue from the rden being freed from its trammels, we k to a great indirect advantage which uld be derived from it being more exsively frequented by the inhabitants of r densely-populated streets. Such places resort constitute the lungs of a city. It re well, then, they were rendered easy access to all.

Substitute for the Crank.—Very inious if not useful. But substitutes for e crank appear to us very much like glass es, very well to look at; but the less we ve to do with them the better.—(Table No. 51.)

Cincinnatus (Bronze).—Sometimes called St. Cincinnatus; but what claim he possessed to be inserted in the calender we know not, as he flourished long before the introduction of Saintianity. Lucius Quinctius Cincinnatus was a Roman patrician, equally distinguished by heroism, magnanimity, contentment, and disinterestedness. He was chosen consul B.C. 460. The messengers charged with the information of his election found him at the plough in the fields. He accepted the office, and only regretted that his little farm would be neglected. He behaved, while in the consulship, disinterestedly and honourably, but refused it when it was offered to him the following year, and afterwards received the dictatorship for six months, to terminate the unhappy war with the neighbouring Æqui. The messengers again found him at his plough. He immediately joined and assisted the consul Minutius, surprised the enemies during the night, made prisoners of all their army, and divided the booty amongst his soldiers, only retaining for himself a golden crown, which his army had presented to him to express their gratitude. After having celebrated a triumph, he resigned his office, which he had held only during sixteen days, and returned to his rural retirement. At an advanced age, he was again elected dictator to restrain the power of Spurius Mælius, a dangerous and turbulent man: he proposed the most effectual arrangements, and, after the principal mutineer had been killed by a certain Ahala, dispersed his adherents. Thus Cincinnatus was twice the deliverer of his country, which revered him as a father. —(Table G, No. 60.)

American Washing Apparatus.—This is a washer woman's assistant, which we recommend to the attention of economical house-wives. It loses none of its interest for being Yankee: exotics are often most valued.—(Table B.—No. 18.)

Stretching and Shower Bath.—We recommend this model to the attention of hydropathists, though, in these cold mornings, we fancy a single bath quite enough for ordinary nerves. It may be well, however, to have a choice, unless, indeed, we get into the predicament of the logician, poor ass,—and hesitate between the dip and the shower until we slink into our clothes without tasting the pleasures of either.—(Table B. No. 20.)

TABLE OF ANTIQUITIES.

Relics of the Stuarts.—No. 72 is a clumsy carved oak cradle, and No. 30 is a splendid court dress of white and crimson silk, bedizened with a hundred ounces of gold lace. These two objects, of such dissimilar character, are connected with one another by historical associations of great interest. The cradle was the habitation of Mary Queen of Scots, when an infant at Linlithgow Palace. The glittering raiment is the paraphernalia in which Cardinal York, the brother of Prince Charles, and "the last of the Stuarts," appeared at the marriage of Louis XVI. with Marie Antoinette. Two hundred years previously, the inhabitant of our cradle had also been present at a royal marriage in France,—*her own*. These marriages were both of particular note, and were celebrated with the utmost pomp. The bridegrooms were of the highest rank in the world. The brides, both daughters of kings, nurtured in luxury, ignorant of want and of all the common distresses of human life,—young, beautiful, and ardent,—placed on the highest pinnacle of worldly prosperity, no doubt promised themselves long years of happiness to come. Alas!—

> The best laid schemes o' mice an' [Queens]
> Gang aft a-gee.

These magnificent nuptials realised none of the happiness of which they seemed to be the forerunners. The two Queens, whose maiden days had been angelic, passed troubled lives as married women, and both perished by the hands of the common executioner. The fate of their descendants was varied and romantic. The son of Queen Mary became King of England,* her grandson was beheaded, one of her great-grandsons was restored to the throne, and another was dethroned and expelled from his country. The last of the family, the owner of the embroidered coat, died an exile in Italy. The son of Queen Antoinette perished miserably in prison, and the "last of the Bourbons" lives now, as once did the "last of the Stuarts," a hopeless exile in Italy. So frail and fugitive are the greatness and glory of this visible world. The Queen's cradle comes from Linlithgow, and the Cardinal's costume from Versailles, to tell these wonderful tales to the Glasgow Mechanics of 1847. If the relics could speak, and were cognisant of the characters of the persons before whom they have at different times appeared, we wonder whether they would pronounce the bold old Scottish chiefs, the supple courtiers of Versailles, or the Glasgow people of 1846 to be the best men. Time is a great leveller.

The Exhibition is indebted for these interesting relics to Mr. J. N. Paton of Edinburgh, owner of the cradle, and Mr. Peter Aitken of Glasgow, owner of the Cardinal's costume.

My Grandmother's Spinning Machinery of 1704.—The primitive spinning apparatus by which the substantial fabrics of our forefathers were twisted is by no means complicated. It consists of four parts: 1st, *The rock* (distaff), about three feet long, and, in this instance, rudely but effectively carved,—to one end of which the lint (flax), or tow is fixed, the other being attached to the waist of the spinner by a band passing through a hole near the extremity. 2d, *The spindle*, about nine inches long, of some thickness in the middle, and tapering to near a point at both ends, in one of which is a notch for attaching the thread. 3d, *The thorls* (nodules of ironstone), of various sizes, perforated in the centre so as to fit the spindle. 4th, *The reel*, somewhat anchor-like. The mode of operation of those simple parts could not be made very intelligible by words. The flax being connected to the notch in the spindle, at first loaded with the heavier of the thorls, and laid on the right thigh, received an impulse from the right hand, so as to make it twirl in mid-air till a sufficiency of thread was twisted which being wound round the spindle, a new impulse was given, and so on. As the spindle was filled with yarn the smaller thorls were used, and when of sufficient weight to twirl of itself the thorls were dispensed with. After being filled the yarn was transferred from the spindle to the reel, the winder uttering a counting rhyme —"thoües ane, and thoües nane, and thoües ane a oöt; thoües twa, and thoües nane," and so on. Dames at e'en, in past days, used to assemble in one another's houses, each taking her rock, &c., and for a few hours the distaff was skilfully handled. By and bye, sweethearts arrived, and after a simple meal, merry-making began. *Shuffle-the-brogue*, *blind-harry*, and other like amusements filled up the evening: or when *laxness* had penetrated so far, a dance might eke out the fun. Hence, Rocking, a word synonomous with our social amusement, *reunion*, &c.—(Table B. No. 9.)

STATUE OF GUTTENBERG,

After Thorwaldsen.

The fine work, in bronze, of which
is statuette is a good copy, in Berlin
on, was set up in 1837, in the open space
posite the theatre of Mainz, or Mayence:
mean city, for to it "Europe is in-
bted for two things, which have had the
eatest influence in effecting human im-
ovement, FREE TRADE (in its most just
nse) and the PRINTING PRESS. It was a
tizen of Mayence, named Walpolden,
o first suggested the plan of freeing com-
erce from the oppressive exactions of the
ightly highwaymen (qy. "chivalrous" *low*
ay men) with whose strongholds the
hole Continent was overspread at the be-
nning of the 13th century, by a con-
leration of cities, which led to the for-
ation of the Rhenish, and afterwards the
ore famous Hanseatic League!

Gutenberg's statue was designed by a
ane, and cast by a Frenchman. The
penses, amounting to a total of 26,000
rins (rather more than £2,000), were
frayed by subscriptions from all parts of
urope. Under the figure, which is fully 8
et high, are various appropriate *rilievi*
bronze, inserted in compartments of the
ne pedestal. In one place we find the
llowing inscription:—

rtem quæ Græcos latuit latuitque Latinos,
Germani sollers extudit ingenium:
nc, quidquid veteres sapiunt sapiuntque recentes,
Non sibi, sed populis omnibus id sapiunt.

f the foregoing we offer the following very
ugh translation, which our kind readers
ill, we hope, accept indulgently for want
a better:—

"The Art, which neither Greeks nor
omans knew, is due to the genius of a
erman: henceforth, the lore, whether of
rly or of later times, no longer locked up
the breast of its possessor [*or known at*
st only to a few], becomes hereby the
ental food of all people."

Suing, as we do, for indulgence ourselves,
e are content to let our real cousins-*Ger-*
an, the Teutons, indulge in the above little
t of self-complacency. It is very pardon-
le; for to whom are we indebted, besides
ir own art, for that of making clocks and
atches, for gunpowder, lithography, and
en gun cotton? Inquiring young reader,
any body tells you, "To Germans," we
uld not advise you to attempt to contra-
ct it.—(Table G, No. 54.)

Golden Couroucou. *Trogon pavoninus.* (South America.) This beautiful bird belongs to the family of Trogons, the members of which are peculiar to the hotter regions of America and of India, and its adjacent islands Ceylon, Java, Sumatra, &c., one species only having been discovered in Africa. The Trogons stand confessedly pre-eminent among the feathered tribes for beauty and brilliancy of plumage. They are of solitary habits and frequent the more secluded portions of dense forests. During the day they sit listless and motionless on their perch, and may often be approached so closely as to be knocked down by a stick; the bright glare of the sun obscures their sight, and they wait for evening, the dusk of twilight being their season of activity. Fruits, insects, and larvæ constitute their food. The brilliant tail feathers of the Trogon, we believe of this very species, were used by the ancient Mexicans as ornaments on their head-dresses.—(E, 38.)

Swiss Carved Vase Wood.—A very pretty specimen of an art much cultivated in Switzerland. At every place in Switzerland resorted to by travellers, articles of carved wood are presented for sale. We remember the interest with which we examined the baskets of highly ornamented open work, formed out of a single piece of wood, and the beautiful models of Swiss chalets and farm-houses, together with numerous other articles of ornament and use, all similarly constructed, which were presented to our view in the Rue de la Corratrie, Geneva. These articles are to a great extent made by the shepherds, who thus find profitable employment in the long winter evenings; and to us it added an additional charm to the Alpine solitudes, to be met at times by little smiling girls offering for sale wild strawberries and articles of carved wood, both in a sense the produce of their native mountains.—(Table F, No. 2.)

Thumbkins.—One of a variety of instruments of torture used "in the good old times." Torture was deemed needful in those days to extort confession of crimes, and to secure "soothfast witnessing." Hence, many confessed to crimes of which they were innocent, and witnesses testified to any thing, however far beyond their knowledge! The instrument belonged originally to the Maxwells of Mauldslie (Calderwood).—(Table of Antiq., No. 35.)

PIANO JACQUARD CUTTING MACHINE.

(Area A. No. 3.)

Messrs. J. & G. Morrison, Paisley.—The music of this piano is not addressed to the ear. Even the delicate tympani of Pythagoras would not have vibrated to its harmonies. The name refers merely to its *modus operandi*—to the fingering and treading operations by which it is worked. It is a beautiful appendage to M. Jacquard's beautiful invention, by which the complex apparatus of the harness loom is reduced to the puncturing of a few sheets of pasteboard, with holes possessing a definite arrangement, assigned by the rules of vulgar arithmetic. The picture, design, or pattern which is intended to be produced by the weaver, is in the first place drawn by draughtsmen educated to the business, on paper prepared for the purpose by ruling into small squares, which receive the colours that are intended to appear on the woven fabric. This draughtsman's copy is a fac-simile of the original design, except that it is on an enlarged scale, and the colours are filled into the small compartments of the prepared paper, instead of being laid upon a plain surface, in the usual way of painting. This prepared drawing is placed before the person working the piano, as if it were a sheet of music; and passing the eye along every horizontal line of the ruled paper in succession, he touches a set of keys with the fingers to set the punches, which, by a tread of the foot upon the pedal, pierce holes in the pasteboard sheet, answering, in position, to the points of colour marked in the copy. Every colour has its own set of holes, and every square in the drawing filled with colour is represented by a hole in the pasteboard sheets. These contain, therefore, an exact though gigantic drawing of the pattern, the holes representing the points of colour in the original draft, and in the copy to be woven. The ingenious mode in which the cards are made to effect the purpose in the loom, cannot be told—it must be seen to be understood; and everybody, with three scruples of curiosity in their composition, will pay a visit to the two M. M. Jacquards clicking in the corner.

Farquhar's Electric Clock.—This method of applying a galvanic current to a magnetic pendulum for working a clock movement with alarm bell is the inventio of the maker, Mr. Alexander Farquha Moore Street, Glasgow. The pendulum the clock was first put in motion in Apri 1845, with a plate of zinc, 1 foot by buried in the earth, which Mr. Farquha finds still sufficient to keep up its motion he also finds a flower box or pot, wit one square foot of zinc and copper, equall suited for such purposes.

Circular Gauges by Messrs. Whitewort & Co.—Nothing can suggest a higher con ception of the accuracy attainable in th mechanical arts than these guages. T approximate to accuracy is easy; but t attain it, even in the simplest measure, i almost impossible. We can scarcely forn a conception of the amount of labour be stowed on these gauges from the accurac they display. The correctness with whic the pairs fit together is to us far more evidence of the advanced state of practica mechanics than even the beautiful lathe manufactured by the same firm.—(Tabl B. No. 41.)

Spadix of a Palm Tree.—Unfortunatel we are not told to which Palm it belongs nor whether it is male, female, or herma phrodite. The Spadix of the Palm, a most of our readers are no doubt aware corresponds with the flower of other plants The male and female flowers are produce sometimes upon the same plant, as th Cocoa-nut Palm, and sometimes upon dif ferent plants, as the Date Palm. Th Palms are generally large trees, with simple cylindrical leafless stem, surmounted by a bundle of very large leaves, and pre sent an elegant and picturesque appearance The Palms are a highly useful class o plants, in some countries furnishing th staple food of the inhabitants. Cocoa-nuts sago, palm-oil, plantains, bananas, dates &c., are among the products of the Palm tribe. The cocoa-nut is extensively used as food in the Australasian islands and else where, and the fruit of the Date palm in some parts of Asia, in Egypt, and other parts of the north of Africa; and so numerous are they in some localities, as to have conferred their name upon extensive regions; *Bled el Jareed*, commonly called Bilidulgerid, meaning the land of dates.

Glasgow: Printed for the Proprietors, by W. G. Blackie, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Tuesday, December 29th, 1846.

Daily Exhibitor.

No. 5. GLASGOW, DECEMBER 30, 1846. Price ½d.

ELP MANUFACTURE.—IODINE.

(Table D.)

Amongst the many subjects of interest splayed upon this table, illustrative of r chemical arts and manufactures, this one which will merit a share of the at-ntion of the philosophic visitor. Few of r manufactures have been the subject of many ups and downs — of changes ught with so much weal or woe, so to eak, to those engaged in it, and who so mpletely depended upon it, as this. While e fortunes of the manufacture have fluc-ated thus, little or no change, however, s been effected in the details of the pro-sses connected with it. Kelp is formed the burning of dried sea-weeds, collected on the north-western shores of Scotland d Ireland; these are washed in upon the aches along the shores, during and after orms, and form immense heaps or beds. om these heaps, in the winter season, the rmer draws his stock of manure for his lds, and what remains is, or may be taken the production of kelp. The weeds thus rown up are, of course, of great value to e farmer, as, with abundance of it alone, is enabled to realize crops, when, per-ps, he could otherwise have little or no op. It is chiefly during the summer ason that these weeds are collected for lp making. During a large portion of e summer, it, with the exception of fish-g and occasionally hoeing the potatoes, nstitutes the only employment of the ma-rity of the male, and often female popula-n of the north-western islands and shores Scotland. Upon it they have to subsist; d, of course, upon the healthiness of the ade in kelp, and its products, much of their lfare depends. About thirty years ago, nen the kelp brought as high as £20 to 22 per ton, this manufacture was an ob-t of great interest to them, and also to e Highland chiefs who possessed what e termed kelp shores—shores upon which eds either grew or were cast up. Pre-ous to this, the shores were entirely value-s as productive points; but, with the e of this manufacture rose the value of shores and lands adjacent, and also the wealth of the proud cateran or chief. Kelp was, at this time, used in the manufactures of glass, soap, &c., and the demand increased with the advances and necessities of trade. Barilla, from the shores of Spain and the Mediterranean, was introduced at a lower price; and it being found to answer the purpose of the soap and glass manufacturers better, brought down the value of kelp. This, again, in its turn, together with kelp, was forced to yield to the price and value of soda made from common salt, when the duty was taken off that useful article. This may be said to have been the final blow to the kelp manufacture, which, for years, had been upon the de-cline. The introduction and substitution of soda from this new source, almost en-tirely excluded the use of kelp, as a source of soda. At that time, iodine and its mul-tifarious useful applications was almost unknown, and could not affect the stagger-ing state of the kelp market. Within, however, the last three years, this curious substance being in great demand, caused the price of kelp again to assume an up-ward march, and to lead to the expectation that this trade was again to become an ob-ject of interest and value. In this, how-ever, we have been deceived, the price having again and again fluctuated and un-dulated as the expectations of the specu-lator rose, or the demands of the consumer fell. We have neither time nor space fur-ther to detail the particulars of a story of great interest to us as a manufacturing people; we have merely wished to indicate its importance, and to draw the philosophic mind towards a point from which he may see the workings and results of a branch of industry, upon which depends the sub-sistence of a host of people, whose existence he scarcely imagined, and far less their oc-cupations. A few statistics of this inter-esting manufacture will be given in a suc-ceeding number of the "Daily Exhibitor." In the meantime, we will conclude with a few facts.

On the Table D—No. 10, will be seen

samples of various sea-weeds used for making kelp, and which were brought by Mr. C. Glassford, from the famed Isle of Collonsay. On Table E—72, will also be noticed some beautiful specimens of sea-weeds, carefully spread on paper, and sent to the Exhibition by Major Martin of Ardrossan; few of these weeds have popular names, but those chiefly employed are popularly called tangle ware, bladder and yellow wreck, and black wreck; hundreds of varieties of small parasitical plants grow upon the stalks of the former, and render each stem of the tangle a subject of most delightful study. The whole of those in Major Martin's collection are from this source. It is with these beautiful sea-flowers that the corn and potatoe crops of our Highland neighbours are cultivated; and myriads upon myriads are yearly devoted to this and kelp purposes. When these weeds are collected for kelp making, they are spread out and partially dried in the sun; they are then carefully burned in kilns constructed temporarily for the purpose, and when a large quantity of the ashes have been formed, and while still hot, they are raked and drawn together and well agitated; by this treatment the ashes fuse or melt, and form into a solid cake called kelp; this is broken up, shipped, and sent to its destination for further operations, which are conducted in our chemical manufactories chiefly in and about Glasgow; they have for their object the separation of the various ingredients; water is the first agent employed; this dissolves out all the saline matter, and by subsequent operations these salts are separated; this is done by the second agent, heat. The liquors are boiled up, until the salts in solution are ready to separate by crystallization; they are then run out into proper vessels, and are there allowed to crystallize; in this way, by repeating this operation upon the same portion of liquor, the various salts held in solution are separated, and obtained for other purposes. The salts consist of muriate and sulphate of potassa, employed in the manufacture of alum chiefly; muriate, sulphate, and carbonate of soda, employed for making washing soda (a fine sample of which is exhibited) and for making soap; when these salts have all separated, there remains a thick dark brown liquor, which is called the "Mother water," or the residual kelp liquor. It is from this liquor that all that very interesting substance iodine is manufactured. It is obtained from it by sublimation, after treatment with oil of vitriol and manganese, and being a volatile and easily condensed body it rises in splendid deep violet purple coloured vapours, and condenses in the cool parts of the apparatus as a solid, hard, black crystalline body like iron possessing great weight and acridity. It is much and deservedly employed for medicinal purposes, and it is only lately that its true merits have been appreciated, combined with the metal potassium (from Potasto). It forms a white crystalline body, possessing a peculiar taste, and all the peculiar medicinal properties of the iodine, and in that form is chiefly used by the faculty.

Bronze Tazza, by Benvenuto Cellini.—There is another sample (one or more) of the works of this great artist in our Exhibition. His works are more eagerly sought, and sell higher, perhaps, than any other artist's whatever. He was, at once, a sculptor, engraver, and goldsmith; distinguished particularly by his works in gold and silver, which have become very rare, and are sold at present at immense prices. He was born at Florence in 1500, and died there in 1570. Of a bold, honest, and open character, but vain and quarrelsome, and impatient of encroachment and dependence, he was often entangled in quarrels, which frequently cost his antagonists their lives. He himself incurred great dangers, was put into prison, and was saved only by his boldness and the powerful protectors whom his talents as an artist procured him. At the siege of Rome (if we believe his own account, given in his autobiography), he killed, with one cannon shot, the constable of Bourbon, and, with another, the prince of Orange. He was afterwards imprisoned on the charge of having stolen the jewels of the papal crown, which were intrusted to him during the siege, and was released only by the interference of Francis I., whose court he visited, and executed there several works. He afterwards returned to Florence, and, under the patronage of Cosmo, made a Perseus with the head of Medusa in bronze, which is still an ornament of the market-place; also a statue of Christ, in the chapel of the Pitti palace, besides many excellent dies for coins and medals.—(Ant. Tab., 15, *et al.*)

Druidical Sacrificial Stones.—These are very note-worthy. There are very few authentic reliques of the Druids or their worship extant. They were the priests of the Celts, or Gauls, and resembled, in many respects, the Bramins of India: they formed a distinct caste, possessing the greatest authority, being the learned men and philosophers of these people, and having also very great authority in the government of the state. Julius Cæsar has left more information concerning them than any other writer. According to him, they performed all public and private sacrifices, explained the doctrines of their religion, distributed all kinds of rewards, administered justice at stated times, and determined the punishment which should be inflicted on offenders. Whoever opposed their decisions, was excommunicated by them, and thereby deprived of all share in religious worship. They could even pronounce this curse against a whole people; and, in fact, their power had hardly any limits. They appointed the highest officers in all the cities, and these dared not undertake anything without their advice and direction. They were free from taxes and all public burdens. Instruction in religious and all other kinds of knowledge, the art of war alone excepted, was intrusted entirely to them. They gave oral instruction in the form of verses, which often had a hidden meaning, and which were committed to memory. According to Cæsar, they believed in the immortality of the soul, and its transmigration through different bodies. They taught, moreover, the nature and motions of the heavenly bodies, the magnitude of the universe and the earth, the nature of things, and the power of the gods. They also practised astrology, magic, and soothsaying. According to Pliny, they were not ignorant of natural philosophy and physic. They had a wonderful reverence for the holy mistletoe (a parasitical plant, which grows, not from the earth, but on other plants, particularly on the oak, and which, even at the present time, is celebrated as a remedy for epilepsy). This they looked upon as the holiest object in nature, and as a panacea: they likewise esteemed the oak sacred, from which circumstance they have derived their name. The Druids had a common superior, who was elected by a majority of votes from their own number, and who enjoyed his dignity for life. Their principal seat was in Britain. The temples of the Druids bear a strong resemblance to those of India.

Indian Drinking Cup, made from Calabash Tree.—Nature has here anticipated the art of the turner, as it were. The Calabash tree (*crescentia cujeta*) is a production of the West Indies and the continent of America, about the height and dimensions of an apple tree, with crooked, horizontal branches, wedge-shaped leaves, pale white flowers on the trunk and branches, and a roundish fruit, from two inches to a foot in diameter. The uses to which the fruit in the Calabash tree is applied are very numerous. Being covered with a greenish yellow skin, which encloses a thin, hard, and almost woody shell, it is employed for various kinds of domestic vessels, such as water-cans, goblets, and cups of almost every description. So hard and close-grained are these shells, that, when they contain any fluid, they may even be put several times on the fire as kettles, without any injury. When intended for ornamental vessels, they are sometimes highly polished, and have figures engraven upon them, which are variously tinged with indigo and other colours. The Calabash contains a pale yellow, juicy pulp, of an unpleasant taste, which is esteemed a valuable remedy in several disorders, both external and internal.

Model of a Tide Gauge.—From the Clyde Trustees. This is the nucleus of a good and much wanted apparatus; but should our Clyde Trust determine upon having a tide gauge, we expect that it will be something of a more accurate kind—one that will furnish the abscissæ, as well as the ordinates of the tidal curve. We are glad to know that not only can this be done, but engraved at the same time that the registration is made.—(Table B, 17.)

Criticisms on Works of Art by Visitors.

Painting, No. 10, *Herodias' daughter with the Head of John the Baptist.*—A gentleman and his son were examining this picture. "What does it mean?" inquired the boy. "It means Death on the pale horse," replied the father. "There is no horse there," objected the boy. "But don't you see John the Baptist's head on a charger? Well, John the Baptist's head on a *charger* and death on a *pale horse* mean the same thing. They are synonymous words, you know."

TO READERS AND CORRESPONDENTS.

Patent Bellows.—*Not being bellows-makers, we can pass no opinion, unless he comes the first foggy evening, and blows the fire of our sanctum.*

Sheffield Whistler.—*Not required. We get often enough shaved, without the aid of a razor.*

The Daily Exhibitor.

WEDNESDAY, Dec. 30, 1846.

—o—

It has been frequently asserted, and pretty generally believed, that our countrymen are a destructive race, and not fit to be admitted promiscuously to any place where their endamaging propensities can be easily exercised. Those who make this charge have generally limited its application to the working-classes; and many have been the ill-judged prophesyings of individuals so minded, as to the danger to which *this Exhibition* will be exposed during the THREE FREE DAYS. In our opinion, such a charge does manifest injustice to the working-classes. We entertain no apprehension whatever of their not conducting themselves with perfect decorum upon the occasion referred to. The Open Days of the Botanic Garden are still fresh in our memory, when even the fragile stems of Nature's greatest beauties were left unharmed by the tens of thousands of this same suspected class who availed themselves of the privilege so generously procured for them. We stand by our own order, namely, that of "The Workingmen," *whether by head or hand;* and proclaim our belief that the privilege about to be given them will be enjoyed with delight, and used with a discretion which the more luxuriously dressed, though congregated in much smaller numbers than will then be brought together, would sometimes do well to imitate. Who are they, we inquire, that in Campsie and Fin Glen, destroy the seats set up for the convenience of wearied men and weakly women, visiting the beautiful scenery of the locality? Who are they, after the kind proprietors, in their endeavours to accommodate the public, have renewed these seats several times, that wrench them up, and chuck them over precipices and water-falls, smashing them to "cinnamon-sticks?" *Well-put-on* but ill-nurtured Glasgow visitors! Funny fellows, doubtless, who delight in rendering themselves ridiculous and contemptible; and who, if they get their amusement, care not at whose expense it is purchased. One wrong-minded individual may, however, bring disgrace upon a whole community. Westminster Abbey was first closed upon the public in consequence of a small mutilation of the monument of Major André; and Carlton Palace, which had previously been most liberally shown, was in like manner closed by George IV., because some brainless fellow scratched with a diamond upon one of the mirrors the words, "Not paid for." We fearlessly commit the charge of watching such ill-disposed persons to those who are *not* so disposed, in the firm conviction that everything will be safe under their custody. When a former Queen was upon the throne of this realm, she was observed by a foreign ambassador in public, accompanied merely by her attendants. He expressed his astonishment that she should venture out without her guard, when, pointing to the crowds of passers-by, she proudly said, THESE *are my guard*. In like manner, respecting those few who, it may be supposed, may feel inclined to disgrace themselves and their order, we would say, pointing to the masses of hard-working, intelligent artizans who will crowd the Hall, *These are* OUR *guard*.

THE CATHOLIC ARCHBISHOP OF ST. ANDREWS' CHAIR.— Whose?—When? No account given,—not even a guess; but whensoever and wheresoever that stiff-backed *uneasy* was made, the decorative arts must have been in as barbarous a condition as they are at present among the savage islanders of Polynesia. In fact, we have seen much *better* sculptures than these done by savage hands.—(Antiquarian Table—["another"] No. 73)

A POPULAR DESCRIPTION OF THE PROCESS OF PRINTING.

(Area A.—No. 19.)

A very inadequate idea can be formed of the Art of Printing, or of the labour connected with the getting up and printing of a book, from what is exhibited in this collection;—just as a stone, however beautifully cut, though a very important part of a building, yet, when seen alone and by itself, conveys a very inadequate idea of the appearance the erection will ultimately present. To supply, therefore, a desideratum, and to diffuse as widely as possible a knowledge of this most important art, to which *all* other Arts and Sciences are so much indebted, *We* have prepared a concise account of the Typographic Art, in all its departments, together with the arts of Copper-plate Printing and Bookbinding, as carried on at our own premises.

The bricks ornamented with arrow-shaped characters, found in the ruins of Babylon, afford evidence that the art of imprinting or stamping was known and practised in very ancient times. No kind of printing, however, properly so called, was known until a comparatively recent period. The first approaches to this art were made by means of devices and characters cut upon blocks of wood, which the Chinese are said to have practised prior to the Christian era; with what truth we shall not stop to inquire. Nor shall we stop to settle the much-disputed point to whom the honour of discovering the Art of Printing ought to be attributed. Suffice to say, that whoever led the way, the art was first brought into a state fitted to become universally applicable to the requirements of the times by Johann Gutenberg, of Mainz on the Rhine, about the year A.D. 1440. To him belongs the honour of inventing movable types, and to Peter Schoeffer, the partner and son-in-law of Faust, the honour of inventing cast types, by means of which the art may in a sense be said to have attained a state of perfection. It was thus, at all events, freed from the trammels consequent upon using types cut singly by the hand, and rendered available for the functions it was destined to exercise as the recorder and exponent of events, the furtherer of art and science, and the means of conveying human thoughts from man to man and nation to nation.

The Art of Printing having been brought thus far, all that remained was to copy or improve; and this was rapidly done to such a degree, that the books of the first printers, with their simple means, are yet marvels of correctness and beauty in the eyes of the modern typographer. Most of the ameliorations since the bright day-dawn of this art have been principally in the direction of speed and cheapness of multiplying copies. This it is which gives a complexity to the machinery and details of a large printing establishment, of which those who content themselves with viewing a man or two at work, on such a necessarily small scale as is shown in this miscellaneous Exhibition by the printing of this miniature Journal, can form but a very imperfect idea. Few things are more simple in their elements than printing; few more intricate in the combinations required to realise its great results.

Having dismissed preliminary matters, we have only further to say, that the object of the present sketch is to give the uninitiated a "bird's eye view," as it were, of the various processes connected with the manufacture of books, from the time of the manuscript being produced by the author, to that of the work being sent forth to the world, adorned with all the embellishments that the taste and skill of the Printer, the Engraver, and the Binder, in their respective branches, can supply. To avoid unnecessary repetition and to facilitate and shorten somewhat the process of description, we shall suppose the reader on a visit to *our Printing-office, Villafield*, and shall conduct him through the various departments in the order in which they naturally fall to be described. First, then, we proceed to view the operation of setting the types, called

COMPOSING.

Upon entering a well-lighted room, above a hundred feet in length, the visitor will observe a great number of intelligent-looking artizans, called *Compositors*, standing respectively before a sort of desk or "frame," projecting laterally from the wall at short distances on either side throughout the room; each frame being constructed to hold two pairs of "Cases," containing the types, and the whole so arranged as to give to each workman the utmost available advantage of light. In the centre of the

room, there are at intervals large tables with stone tops, technically called *imposing stones*; and in another part a single press, used only for taking off "proofs" for the *Reader*, or corrector of the press.

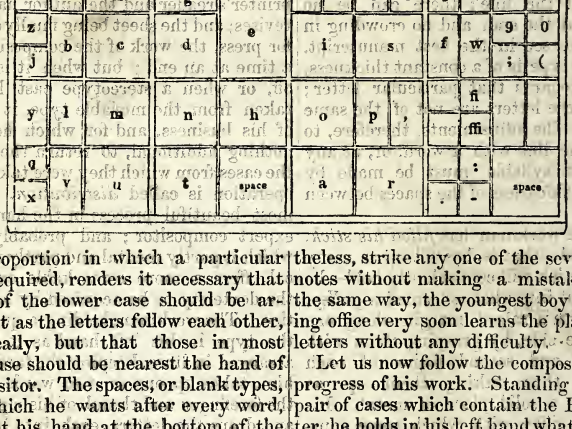
Having observed that some of the compositors are engaged in picking up and arranging the types for bibles, dictionaries, and miscellaneous books of various sizes, we proceed to describe the mode in which those multitudinous masses of single types contained in the "Cases," become converted into "Matter;" that is to say, into words, lines, pages, and books.

Each pair of cases contains all the letters of the alphabet, whether small letters or capitals, as well as points, figures, &c. One pair of these cases is occupied by the Roman letters, the other by the *Italic*. The upper case is divided into ninety-eight partitions, all of equal size; and these partitions contain two sets of capital letters, one denominated "full capitals," the other "small;" one set of figures, the accented vowels, and the marks of reference for notes. The lower case is divided into partitions of four different sizes; some at the top and ends being a little smaller than the divisions of the upper case; others nearer the centre being equal to two of the small divisions; others equal to four; and one equal to six. In all, there are fifty-three divisions or cells, called boxes, in the lower case. The inequality in the size of these boxes of the lower case is to provide for the great differences as to the quantity required of each letter. According to the language in which it is used, one letter is much more frequently wanted than another, and the proportions required of each for the English language, have been ascertained by long experience to be as follows:—

Proportions of the Alphabet, in English works.

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
85	16	30	44	120	25	17	64	80	4	8	40	30	80	80	17	5	62	80	90	34	12	20	4	20	2

Plan of the Compositor's Lower Case.



The proportion in which a particular letter is required, renders it necessary that the cells of the lower case should be arranged not as the letters follow each other, alphabetically, but that those in most frequent use should be nearest the hand of the compositor. The spaces, or blank types, one of which he wants after every word, lie close at his hand at the bottom of the central division of the lower case. Strangers to the art are often surprised at the accuracy with which a compositor dips his fingers into the box containing the letter which he requires. This surprise is generally connected with an opinion that the compositor would do his work more correctly if the boxes were labelled. A very inexpert performer upon the piano will, nevertheless, strike any one of the seventy-eight notes without making a mistake; and in the same way, the youngest boy of a printing office very soon learns the places of the letters without any difficulty.

Let us now follow the compositor in the progress of his work. Standing before the pair of cases which contain the Roman letter, he holds in his left hand what is called a

Composing-stick.

This is a little iron or brass frame, one side of which is movable, so that it may be ad-

justed to the required width of the page or column which the workman has to set up. It is made perfectly true and square; for without such accuracy the lines would be of unequal length. The "Copy," MS. or print, from which the Compositor works, rests upon the least used part of the upper case. The practised compositor takes in a line or two at a glance, always provided the author writes an intelligible hand—which virtue is by no means universal. One by one, then, the compositor puts the letters of each word and sentence into his *Stick*, securing each letter with the thumb of his left hand, which is therefore continually travelling on from the beginning to the end of a line. His right hand goes mechanically to the box which he requires, but his eye is ready to accompany its movements. On each letter there is a nick or nicks, indicating the bottom of the letter; and the nick must be placed outwards in his composing-stick. When he arrives at the end of his line, the compositor has a task to perform, in which the carefulness of the workman is greatly exhibited. The first letter and the last must be at the extremities of the line; there can be no spaces left at the end, and no crowding in others, as we see in the best manuscript. Each metal type is of a constant thickness, as far as regards that particular letter; though all the letters are not of the same thickness. The adjustments, therefore, to complete the line with a word, or, at any rate, with a syllable, must be made by varying the thickness of the spaces between each word.

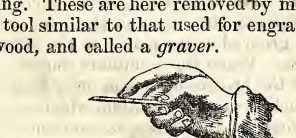
When the workman has *filled his stick*, as it is called—that is, has set up as many lines as his stick will conveniently hold—he lifts them out into what is termed a *galley*, a board with a raised margin along one end and one side, by grasping them with the thumb and second finger of each hand, and thus taking them up as if they were a solid piece of metal. Indeed the facility with which some compositors can lift about what is called a *handful* of movable type, without deranging a single letter, is very remarkable. When a sheet is complete, the compositors arrange the pages in proper order upon the *imposing stone;* surround each page with pieces of wood or metal called *furniture*, so as to leave an equal margin to every page; and, finally, wedge the whole tightly together in a stout iron frame, called a *chase*. The pages thus wedged up, constituting one side of a sheet termed a *form*, may be carried about with as much ease as if it were composed of solid plates, instead of being formed of many thousand movable pieces.

The business of the printer's *Reader*, or corrector of the press, commences immediately after that of the compositor. The ordinary process of correction is for the reader to look upon the proof, while another person, generally a boy, reads the *copy* aloud; as he proceeds, the reader marks all the errors which present themselves upon a first perusal. The proof then goes back to the compositor; and the first corrections being perfected, the reader has what is called a *revise*. He compares this with his first proof, and ascertains that all his corrections have been properly made. In this stage of the business the proof generally goes to the author; and it is rarely that the most practised author does not feel it necessary to make considerable alterations. The complicated process of correction is again to be gone over. The printer's reader and the author have again revises; and the sheet being finally corrected for press, the work of the compositor is for a time at an end; but when it is printed off, or when a stereotype cast has been taken from the movable type, it is a part of his business, and for which he is paid nothing additional, to return the types to the cases from which they were taken. This operation is called *distribution*. It is a most beautiful process in the hands of an expert compositor; and probably no act which is partly mental and partly mechanical offers a more remarkable example of the dexterity to be acquired by long practice. The workman, holding a quantity of the type in his left hand as it has been arranged in lines, keeping the face towards him, takes up one or two words between the forefinger and thumb of his right hand, and drops the letters, each into its proper place, with almost inconceivable rapidity. His mind has to follow the order of the letters in the words, and to select the box into which each is to be dropped, while his fingers have to separate one letter from another, taking care that only one letter is dropped at a time. This is a complicated act; and yet a good compositor will distribute from 4500 to 6000 letters an hour.

STEREOTYPING

Is a process by which a metal plate is obtained, being the *fac-simile* of any given page of types. Stereotyping, which is entirely additional to the process of composing, and of course involves a considerable extra outlay, is only adopted when repeated impressions of a work are anticipated. Its use, therefore, is to enable successive impressions of a work to be printed without incurring the expense of recomposing, or setting up the types for each impression, or of incurring loss by over printing.

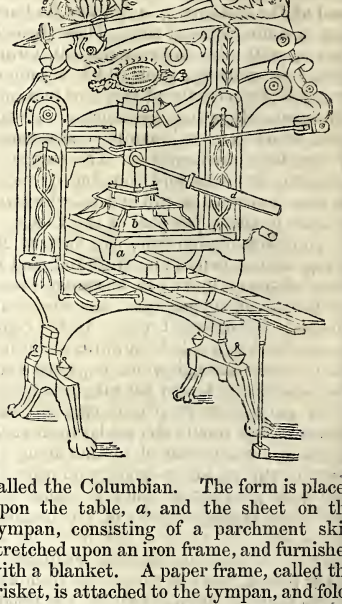
When the *form* or page of types is ready, the face of it is oiled with a brush; then burnt plaster of Paris (gypsum), mixed with water to the consistence of cream, is poured upon it. After a few minutes the plaster is sufficiently hardened, and it is then taken off from the types, and forms a matrix or mould in which to cast a fac-simile of the types. This mould is then placed in an oven to dry. When perfectly dry it is placed in a covered iron casting-box (the lid of which is screwed down) and immersed in a caldron of melted metal, where it remains immersed for about ten minutes, after which it is steadily lifted out by a crane, and swung to a cooling trough, in which the under side of the box is exposed to water. Being completely cooled, the caster proceeds to remove the mould from the casting-box. The plaster mould and the plate cast in it are fixed together; but upon the caster breaking off the ledges of the mould and the superfluous metal with a mallet, the stereotype plate comes out bright and well formed. The plate is then taken to the Picking Room, where any defects are remedied. The face of the plate is sometimes defective, from small globules of metal, arising from air bubbles in the mould, having been formed in the casting. These are here removed by means of a tool similar to that used for engraving on wood, and called a *graver*.



The plates being cast of unequal thickness, the back is turned in a surface lathe, to remedy the inequality as far as possible, and the blank lines being previously lowered by chisels, the plates are ready for press.

HAND-PRESS PRINTING.

The form of the Printing Press was originally very simple, and its appearance very primitive. From time to time various improvements have been effected upon the Printing Press, by Earl Stanhope and others, and we subjoin an engraving of one which has obtained great celebrity, invented by Mr. G. Clymer, of Philadelphia, and



called the Columbian. The form is placed upon the table, *a*, and the sheet on the tympan, consisting of a parchment skin stretched upon an iron frame, and furnished with a blanket. A paper frame, called the frisket, is attached to the tympan, and folds down upon it over the sheet, and thus prevents the margins of the pages from being blacked with ink during the impression. The tympan being folded down upon the form, the table is brought under the platten, *b*, by means of a wheel and belt, moved by a handle called a rounce, *c*. The Pressman then pulls the bar, *d*, which by acting upon a series of levers, brings the platten down upon the tympan, and by its pressure thus transfers the ink from the types to the paper.

(To be Concluded To-morrow.)

Glasgow: Printed for the Proprietors, by W. G. Blackie, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Wednesday, December 30th, 1846.

Daily Exhibitor.

No. 6. GLASGOW, DECEMBER 31, 1846. PRICE ½D.

THE PRUSSIATES OF POTASH.

(Table D, Chemistry.)

What can be more dissimilar in appearance and in properties than horns, hoofs, leather, &c., and those splendid yellow and red crystals which adorn the Table on Chemistry. But the wonder-working hand of the chemist, who believes firmly in the old saying, "waste not, want not," allows nothing to escape that can be turned to any advantage. It is the philosopher's stone which turns every thing into gold.

The yellow prussiate of potash, (Nos. 6—12) or, speaking more correctly, the ferrocyanide of potassium, contains, as its name denotes, iron, cyanogen, and potassium. Cyanogen is the basis of prussic acid, and is found in nature in the bitter almond, but that being too expensive, we have recourse to coarser materials in the horns, &c. (Nos. 1, 2, 3.) Potash (No. 4,) obtained by collecting the ashes of burnt inland plants.

The animal matter and the potash are thrown into an iron pot, and fused when taken out; after this has been undergone, it is called "prussiate cake." This cake is digested in water evaporated to crystallize, when these beautiful crystals are produced, surpassing, in colour and brilliancy and shape, anything that the hand of man can form.

The red prussiate (No. 13,) is procured by passing a stream of chlorine through a solution of yellow prussiate (chlorine is the gas given off by bleaching powder), when crystals, rivalling the ruby in colour, are deposited on evaporation.

Both the prussiates are used in dyeing; and by the addition of a salt of iron, different kinds of Prussian blue (Nos. 14—17) are obtained, a substitute for indigo. The yellow prussiate is much used by our friends, the *Blacksmiths*, in case hardening, that is, rendering the surface of iron steel, so as to make it wear longer, besides taking a better polish, such as buckles, clasps, tobacco boxes, &c.

CHINESE CURIOSITIES.—In these the exhibition is rich. No. 28 contains a whole case-full; and they abound elsewhere. The Chinese are "great curiosities" themselves too. That "pillow" of theirs (No. 3) does not seem to be much more luxurious than the hard snow-ball, which the old Highland chief taxed his *effeminate* son, for rolling under his head.—(Antiquarian Table, No. 28, *et alibi*.)

TUSSAC GRASS.—This useful grass has only lately been brought to Scotland. It has been introduced into the Island of Lewis and other places. Dr. Joseph Hooker, in a letter dated "Birkeley Sound, Falkland Islands, May 3rd, 1842," to his father, Sir W. J. Hooker, gives the following particulars regarding this plant, which promises to be of great use for our more barren soils:—

"Like other parts of these islands, the ground we traversed is quite bare of trees, and the whole surface covered with peat-bogs or grass lands, affording excellent fodder to the herds of wild cattle and troops of horses. Near the coast a very fine *grass* grows in prodigious abundance, called *Tussac*, constituting quite an extraordinary feature in the landscape, covering immense tracts, particularly where the soil is sandy. Round its roots it forms immense balls, which stick up five to six feet above the ground, and are often as much in diameter; on the top of these the *Tussac* throws up its stems and long leaves, which hang down all round, and are often six or seven feet in length. These heaps grow within a few feet of each other, leaving spaces generally bare of vegetation between them; so that in walking among them you are hidden from view, and the whole tussac patch forms a perfect labyrinth."

Sir W. J. Hooker adds:—

"The real *Tussac grass* is the *Festuca flabellata* of D'Urville; and to its extraordinary productiveness, highly succulent, and saccharine nature, I believe all voyagers who have visited the Falklands have borne witness."

OPINIONS OF THE PRESS.

We have been too long behind the scene ourselves, not to be perfectly aware of what these are intrinsically worth ; still we cannot help saying, we think it *seems* odd (or shabby—which ?) that, with the exception of a short but kindly leader, in our honour, in last Saturday's *Citizen*, and a few generous words in the *Herald* (copied, we have heard, into yesterday's *Constitutional*), not one of our editorial brethren has deigned to notice, in any form, our earnest though humble effort to instruct, and in default of that, to amuse, the public of this great city of our own youth. But, be it observed, had we happened to belong, personally, to any of the politico-literary "caw-me-caw-thee" cliques of the place —ah! then there would have been an instant beginning, and no end, of newspaper approval of us and our performances. In *that* case, indeed, there would have been "sich a gettin' up" of commendation! Our little Daily would *then*, questionless, have had no possible escape from being "sicklied all o'er" with laudation, from title to imprint, inclusive.

Our French neighbours have got an expressive and convenient term for the kind of "shouther-to-shouther" principle of association here adverted to,—they call it camaraderie. Our language lacks the *word*, indeed, but we have the *thing* among us in centifold French abundance. This spirit of "cronyship" is either the attached friend or the bond-slave of private preference ; it is, still more strongly, the sworn foe of fair dealing with the public ; which is hoodwinked and humbugged by it to an extent it little dreams of. Faithful to the rule of Molière's pedants and dunces, laid down long ago, most of *our* littérateurs decide that

> "Nul n'aura de l'esprit
> Hors de nous et nos amis."

Imitated:—"Lore nor wit there's none possess,
But *us* and our chums of the press."

Well, well, e'en so let it be. We shall still hold on the even tenor of *our* way, undismayed, though uncheered. If we do get no favour shown us, we have, instead, the comfort of having the less to be thankful for. Here is our consolation,—our minikin Journal is much read, commended, criticised, censured, but it sells steadily and well.

Yet, reverting to the subject we set out with, we conclude in the words of Johnny Armstrong of the Border :—

> "We ask no grace
> Of a graceless face."

Coat and Vest of Cardinal York.
(Table E of Antiquities, No. 30.)

Last rag of the Stuarts—a "*race, comme celle des poulets d'Inde, bête et méchante*," as a Frenchman would say. But no *young* Scotsman will believe, that the whole "*boiling*" of that doomed family were either rogues, or fools, or both: not excepting even "Charles the Martyr." There was truth in the saying, moral as well as *literal*, "Strip M a jest Y of its *externals*, and it becomes a jest."

These gaudy vestments, stoled the person of Cardinal York, at the nuptial ceremonies of the marriage of hapless Louis XVI. and his more unhappy spouse, Marie Antoinette. Those nuptials took place May 16, 1770. On the 30th of the same month, great public rejoicings were got up in Paris, to celebrate the event; which were sadly terminated with the loss of life to more *than twelve hundred persons;* in addition to which, a great number were maimed, or otherwise hurt!—an event of terrible augury for the after fate of the young couple. This sad accident was caused, it is said, by the imprudence of the police, who allowed carriages to pass at will among the serried crowds drawn together by the hopes of seeing the splendid fireworks.—All sorts of sad reminiscences attach to these old gauds. Cardinal York, the last of the Stuarts, died at Rome in 1809.

Chronometric-Governor. — This is a very ingenious piece of mechanism, but unfortunately for the inventor, Watt' governor happens to answer the purpose remarkably well. It is, however, a very beautiful addition to the mechanism of our government. As a hint, we would suggest that governors ought not to be in leadin strings.—(Table B, No. 23.)

Death of Archbishop Sharp, painted by Sir W. Allan, R.A., Lond.; P.R.A., Edin.—Every one is familiar with this work of art, by means of the print. The conspirators, in their account of the deed, gave an inventory of the articles found in the prelate's coach, &c. One of them they call "a bee in a box." It was, no doubt, one of the green-and-gold scarabæi, set under a lens in a casket. Allan seems to have made use of the accessory incident of its opening, by one of the figures. If the finder chose *that* moment for indulging his curiosity, it must have been great indeed. The figure, we speak of, is in the centre plan, to the left. How "knowing" he looks!—(Painting, No. 50.)

Stirling and the Links of the Forth, from Stirling Palace (Castle).—There is some merit in this work, though Mr. Hill has done better in his time. The old Scotch royal building (set up by James V.) is, in its architecture, a raw attempt at imitating the hybrid gotho-byzanti-classic, in vogue in France, during the reign of James; it was called "*de la renaissance*," or revival. James's architect, was Cochran "the Mason," hanged on Lauder bridge, by the varnished feudal savages of Scotland of those blessed days.—(Painting, No. 17.)

Eve at the Fountain; Parisina; Meditation; in China lace.—Charming indeed.—Several years have passed since we first saw this beautiful and elegant adoption of the *biscuit* or unglazed porcelain; and we were delighted to renew the acquaintanceship here.—(Table C, Manufactures, Nos. 60, 61, 62.)

Battle Piece, modelled in clay.—Was the clay taken from the field of Waterloo, or any other human slaughter-heap? it would have been the right place whence to take the material. How many "heroes," panting for a mouthful of "fame" as the hart for water-brooks, have had their mouths filled with clay! As it is, that one mouthful they cannot swallow, it sufficeth their wants, once and for ever.—(Table C, Manufactures, No. 18.)

Law Broom.—"Your legal Broom (*sub voce* Brougham,) 's a moral chimney-sweeper," says Lord Byron; that is, always aspiring by the dirtiest of ways. Broom is a potentate in its way, a scourge for the rising generation with us; it is a sceptre, it would seem, for the *risen* generation in Africa.—(Antiquarian Table, No. 46.)

Model for a River Steamer.—This differs somewhat, in build and equipment, from the little *Comet* (Henry Bell's), which we remember seeing in the Clyde, in 1812. The body of the latter had much the appearance of a donkey between two heavy panniers. The story ran, that it went up Lochfyne, against wind and tide, to Inverary, paddling away, and making a terrible splash, with *flaughts* of flame rising occasionally out of the chimney, and, of course, "reekin' like a killogie." Crowds, at first, seemed waiting to greet her arrival at Inverary quay; but one by one, not liking the little Comet's looks, they departed to places of shelter or distant observation; insomuch that there was no one to catch a rope, or aid the crew any how, in getting the vessel secured. If they had stormed Inverary at that moment, the town would have been theirs; it would have needed no storming, indeed, but fallen fainting into their hands.—(Table B, Mechanics and Engineering, No. 35, &c.)

Models of Vices, &c., by A. Stiven, Manchester.—We know something of these models, and of their inventor, who is an ingenious, and, we believe, working mechanic. At Messrs. Shanks' of Johnstone, who are coproprietors of Mr. S.'s inventions, we have seen his vice, which is really an admirable bench companion.—(Table B. Mechanics and Engineering, Nos. 49, 53½.)

Blunderbusses.—One taken at Cabul. This is interesting; but still more so an other, which belonged to the good Colonel Gardiner. The late Thomas Hood used to say, that although he could not "come the *gun trick*," he was quite capable of making a *blunderbuss;* and (in his heedless way) had made many, "by getting into the wrong omnibus!"—(Antiquarian Tables, Nos. 19 and 21.)

Circular Shears.—By James Smith, Esq. This is the model of a very excellent tool, which does much credit to the inventor. A modification of it has of late come into pretty extensive use among tinsmiths, for cutting circular plates for the bottoms and covers of cylindrical vessels; and by a further slight adjustment, which consists chiefly in setting the cutters further apart, it is made to fold up the edge both of the cylinder and the disc which is to be soldered upon it. Workmen, however, have a prejudice against using these tools. (Table B—No. 16.)

The Daily Exhibitor.

THURSDAY, Dec. 31, 1846.

In a former Number we said a few words on the School of Design, and the Botanic Garden; but the importance of the subject will, we hope, plead our excuse for recurring to it again.

We are no masters of the art of design ourselves; we do not know, and have never practised, its scholastic rules. There are, however, some obvious truths connected with it, as applied to manufactures, to which we may be allowed to advert.

Our manufacture designs have generally, and we believe with truth, been esteemed inferior to those of the Continent. Whence does this inferiority arise? Not, certainly, from inferior mental capacity in the designer, but from the inferior culture he has received. The progress in design, lately made in this country, has been great, as a better system has been adopted, considerable attention having been given to the education of our youth in this particular department. In former years, the young designer's labours may truly be said to have been a pursuit of knowledge under difficulties. School-learning is indispensable; but it will not do everything. He who confines himself to copying and combining forms from the drawings and designs of others, will never attain to great perfection in his art. He who would be great must study nature. In foreign countries, many designers who are favourably situated cultivate flowers; thus they may experiment in combinations of form and colour, and then adapt them to the fabrics. In a city such as Glasgow, few can cultivate plants for themselves. It is therefore perfectly apparent that so much the greater is the necessity for the pupils in the School of Design and the public, but more especially designers, generally, having free access to our Botanic Gardens. This can easily be accomplished, as we have hinted in a former Number, by sweeping away its debt. Our designers would then be able to study in nature, and adapt to their purpose the spreading palm leaves, the beautiful flower-clusters of many leguminous plants, the flowing acacia, the delicate heath, and many others of nature's most favoured children. Were such an arrangement fairly entered upon, our designers would soon be in the same position as our manufacturers—the first in the world!

A POPULAR DESCRIPTION OF THE PROCESS OF PRINTING.

(Area A.—No. 19.)

Concluded, from our last.

In our last number, we were brought to a sudden pause, after having described the Hand Press, and before we had said anything of the process. A few words here will suffice for this department. By this process (Hand-Press Printing) impressions are taken from the types upon the sheet of paper, which has been previously damped and pressed, so as to soften and thus prepare it for receiving the ink easily. Each press, such as we have described, in our preceding number, is wrought by two men, one of whom supplies the ink—a substance composed of boiled linseed oil and lamp black, and of the consistency of bird lime—by means of a roller, composed of treacle and glue, while the other lays on the sheet and gives the impression.

STEAM MACHINE PRINTING.

It will be observed, in this department, that most of the Machines are somewhat similar to double presses, but wrought by steam power instead of by manual labour. The motion is conveyed from an engine shaft, running the whole length of the room, to each machine, by means of riggers and endless straps; these set in action two bevelled wheels that are connected with a large iron drum, furnished with a groove and traveller, on the principle of an endless screw, thus transferring a rotatory into a horizontal motion, and propelling the table of types at each end (which are respectively furnished with tympans, &c., like the hand-presses) beneath a set of inking rollers, and thence under a platten, which regularly rises and falls as the tables come under it, to receive the impression on the paper. The chief difference between one of these

achines and the hand-press which we have escribed, consists in the fact that when e machine is once set properly in motion, ur boys, with a man to superintend them, ill lay on and take off 1000 copies an our, while four men at two of the ordi- ary hand-presses cannot produce, on an erage, more than half that number.

But the operation of printing by the *ylinder* Machine is by far more compli- ted; not only because this sort of ma- ine is calculated to produce considerably ore impressions per hour, but on account its capacity to print, by once passing rough the machine, *both sides* of a news- per, or other work, of a size so large that surface press could accomplish, even if pidity were but a secondary object. One an, and sometimes two men, are engaged what is technically called *making ready;* d this, with stereotype plates, is a tedious d delicate operation. The plates are se- red upon wooden blocks, by which they e raised to the height of movable types; t then, with every care in the casting, d in the subsequent turning operation, ese plates, unlike movable types, do not esent a perfectly plane surface. There e hollow parts, which must be brought up careful adjustment, and this is effected placing thin pieces of paper under any int where the impression is faint. This ocess often occupies many hours, particu- ly where there are casts from wood-cuts. t us suppose it completed. Upon a lished iron table, at each end of the ma- ine, lie the forms or pages which print e side of the sheet. At the top of the achine stands a "laying-on-boy," before om is a heap of wet paper. [Previous to ng brought to the Machine-room, the per undergoes the process of wetting. ch quire of paper is dipped two or three nes, according to its thickness, in a trough water; and is gradually pressed till the isture is equally diffused through the ole heap. If the paper were not wetted, ink would lie upon the surface and ear.] The signal being given by the chinist, the laying-on-boy turns a small ndle, and the moving power of the strap nected with the steam-engine is imme- tely communicated. Some ten or twenty iled sheets are first passed over the es, to remove any moisture; and, if the chinist is satisfied, the boy begins to lay the white paper. He places the sheet on a series of web tapes stretched across a table before him, with its edge ready to be seized by the apparatus for conveying it upon the smoothing drum. At the first movement of the great wheel, the inking apparatus at each end has been set in motion. The steel cylinder attached to the reservoir of ink begins slowly to move; a roller called "the doctor" rises to touch that cylinder for an instant, and thus re- ceive a supply of ink; the inking table passes under "the doctor," and carries off that supply, and the distributing rollers spread it equally over the surface of the table. This surface having passed under the inking-rollers, communicates the sup- ply to them, and they in turn impart it to the *form* which is to be printed. All these beautiful operations are accomplished in the sixteenth part of a minute, by the travelling backward and forward of the carriage or table upon which the *form* rests. Each roller revolves upon an axis which is fixed. At the moment when the *form* at the back of the machine is passing under the inking- rollers, the sheet, which the boy has laid to a mark on the table before him, is caught in the endless bands or tapes which pass it over the first impression cylinder, the bands themselves falling between the pages and on the outer margins of the paper. The moment after the sheet is seized upon the first cylinder, the *form* passes under that cylinder, and the paper being brought in contact with it receives an impression on one side. To give the impression on the other side the sheet is to be turned over, and this is effected by two drums in the centre of the machine. The endless tapes never lose their grasp of the sheet, although they allow it to be reversed. While the impression has been given by the first cylin- der, the second *form* of types at the other end of the machine has been inked. The drums have conveyed the sheet during this inking upon the second cylinder; it is brought in contact with the types, and the operation is complete; for the sheet, which was white paper when placed in the ma- chine, comes out printed upon both sides.

COPPER OR STEEL PLATE PRINTING.

The art of taking impressions upon paper or cloth, from engraved plates of copper or steel.

The subject or design (landscape, portrait, or other drawing) is first engraved upon a

plate of steel or copper; with fine subjects, more usually the former. This is accomplished by the engraver making an outline pencil drawing of the subject or design required, which, by means of a copper-plate press, he transfers to the plate, previously covered with a substance called etching-ground, capable of resisting the action of acids. The markings made by the drawing upon the etching-ground having been traced over with a needle, so as to remove the ground and expose the plate at the places necessary, the engraver applies an acid to the lines thus cleared, for the purpose of biting them in to the metal. By the use of acid, and subsequently of a dry graver, he ultimately succeeds in producing what is called an engraving. This process being slow, the cost of fine works is very great, a comparatively small engraving costing frequently, according to the quality of the work, £40, £80, £100, or even a much larger sum.

Having now described the process by which the engravings are made upon the plate of metal, we would draw attention to the apparatus for printing from them, consisting of a Press and a Heating-box. The *Press* is of simple construction, and consists of a frame or stand of iron, formed of two checks or sides, connected by cross pieces of malleable iron, with two iron rollers accurately turned on a lathe, their axes working in the side cheeks of the frame. The axis of the upper roller is turned by means of levers disposed like the spokes of a wheel; and a plank of wood or plate of iron, whose breadth is nearly equal to the length of the rollers, is placed so as to slide between them when they are made to revolve by working the levers. After remarking that the upper roller is furnished with a blanket, we turn to the *Heating-box*. This is a contrivance for providing the workman constantly with a heated metal surface on which to rest his plate during the process of inking, and consists, in the present instance, of a metal box, in which gas is burned through a wire gauze, to consume the smoke and spread the flame, and thus give the requisite heat.

Copper-plate and letter-press printing are the reverse of each other. In the latter the impression is given by the raised surfaces, in the former by the sunk ones. It is for this reason the workman requires so much heat, that the ink, which is similar in its composition to that used by letter-press printers, may flow easily into the fine engraved lines. And, for the same reason it will be perceived that he apparently wipes off all the ink and polishes the plate the workman, however, only clears the ink from the surface, but leaves it in the hollows. The blank portions of the plate must be carefully cleaned and polished, to prevent them from soiling the paper during the printing process, which is accomplished simply by placing the plate upon the table or plank of the press, with the sheet of paper (previously well wetted) over it, and then making the rollers of the press revolve, so as to draw in the plank and give the requisite degree of pressure to both paper and plate. In less time than we have taken to describe it, one of these beautiful prints has been produced.

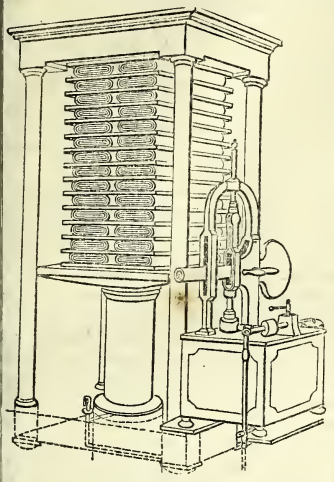
After being printed, the impressions are taken to the drying room, where they are placed between soft pasteboards and submitted to pressure. The spongy boards absorb the water with which the paper is charged, and it is thus dried. This process goes on during the night, and during the day the pasteboards are ranged in racks and dried over a series of steam pipes, and thus prepared for being used again next night.

The last process through which the impressions or engravings are put is the cleaning process. Specks of ink or dust are apt to adhere to the paper, which also becomes sometimes marked by the fingers. All soil marks of whatever description are cleared away in the cleaning room, and the implements used for that purpose, by the boys employed in this department, are a penknife, a hare's hind foot, and a piece of caoutchouc.

DRYING AND FINISHING.

When a newspaper is printed off, the copies are at once removed from the machine to a folding-room, where they are either placed in covers and directed, for transmission by the post, or delivered in quires to the distributors. But in the printing of books, it is important that every sheet be delivered to the binder perfectly dry; and the warehouse of a printing-office is, therefore, usually a scene of considerable activity. When the required number of any particular sheet of a book is wrought off, the printed paper is transferred to a room kept very hot, by means of steam

ipes, called the Drying-room; it is here ung upon poles, and in a few hours ac- uires the requisite hardness. The sheets re next placed singly between glazed boards, nd subjected to heavy pressure, to re- ove the roughness caused by the impres- on of the types, and to render the whole nooth and compact. Formerly this pro- ss was accomplished by means of screw- esses and great manual labour; but these ve been superseded by the hydraulic press,



beautiful and useful invention of the e Joseph Bramah. The ease and sim- city with which the most surprising wer can be applied to these presses, will der a brief account of the process de- able. The glazed boards, with the printed ets between them, having been laid on table of the press, the pressure is caused a pump, which, instead of the old down- rd pressure, causes the table to rise to- rds the head of the press. Thus when lever or pump handle is raised, it brings the piston, which would leave a vacuum eath if the pressure of the atmosphere not force the water in through a side ve. The lever is then to be pressed vn, which causes the side valve to shut, l forces the water through a valve at the tom, whence it passes through a pipe o the cavity of the great cylinder, and ses the piston or pressing rammer. A etition of the same process forces more ter in, and the pressure may in this man- ner be carried to a great extent. One pound at the end of the pump lever, only 15 inches long, will be equivalent to between seven and eight pounds at the piston rod, and this will be equivalent to 120 pounds on the table of the press; so that a man in pumping by a downward pressure can, without difficulty, apply a force equal to 6000 pounds, that is to say, nearly three tons. No known application of the screw, however fine the thread or long the lever, would afford a purchase like the hydraulic press, of 120 to one; leaving entirely out of consideration the absence of friction, by the use of water power in lieu of the collision of solid bodies.

The sheets having been properly dried and pressed are next collated, or counted into given quantities or sets, and in this state are ready for being sent to the binder.

BOOKBINDING.

The sheets having been Pressed in the Warehouse as already described, and the engravings having been finished, the book is ready for being put into the hands of the binder, so as to be put together in a form fitting for being sent out for sale.

Up the centre of the Binding Shop, are a series of tables, occupied by a number of young women, technically styled *Stitchers*, some of whom are engaged in the first operation of binding, namely, folding the sheets. If the book be folio, each sheet is folded into two leaves; if quarto, into four leaves; octavo, eight leaves; 12mo, twelve leaves; 18mo, eighteen leaves, and so of all others, to 72mo, the smallest size in general use. The first page of each sheet of all English books has, at the bottom, a letter of the alphabet; French books have a number. These marks, technically denominated signatures, direct the workmen in the proper arrangement of the sheets. After the sheets are folded, they are arranged in the order of the alphabet. If the work is a magazine or other periodical, only as many sheets are taken together as comprise one number. These being arranged are introduced into a simple machine, which makes three holes near the back edge of the sheets, through which the needle is easily put when stitching on the cover, and thus finishing the number. If the work is a volume, and to be bound either in cloth or leather, the process of finishing is very different. The sheets having been arranged alphabetically, the book is given to one of the men employed at the benches round

the room, called the binder, by whom it is beat on a large smooth stone, with a heavy hammer, or put through a rolling machine —or both, to make it smooth and solid. After beating, the book is separated into three or four portions, and put between smooth hardwood boards, and pressed in a screw or hydraulic press for several hours; and then sawed on the back, in three or five places, according to the size of the work, in order to admit the cord on which it is to be sewed. When a book has been sewed, it is then secured by a coating on the back of thin glue, care being taken that the sheets be accurately adjusted at the head and back. When the glue has dried, the back is rounded with a hammer, the same as those used by shoemakers; it is then screwed up very tight in the *cutting press*, between hardwood boards, bevilled on the top edge, half the breadth of the book; and the boards being kept a certain distance from the edge of the back, according to the thickness of the board. The back of the book is now beat smooth, and the edge of the back being beat on the edge of the boards that compress it, a groove is formed for the pasteboard to rest in. The pasteboards are then laced to the book, by the ends of the cords on which it is sewed; after the lacing, the superfluous parts are cut away, and the rest are hammered smooth. The book is then pressed again for several hours, to make it solid for cutting, which is performed by a machine called a plough.

When the book is cut, it may either be gilt, marbled, or sprinkled on the edges, or left white, as all law-books are. In order to gilding, the book is screwed hard up in the cutting press, between two *cutting boards*, and scraped perfectly smooth with a small steel scraper. It is now burnished with a bloodstone or agate burnisher; a solution of the white of egg and water being spread over with a camel's hair brush, the gold is laid on with a piece of paper in the ordinary way, as in sign gilding; after having dried for about twenty minutes, the gold is then burnished.

Sprinkling the edges of a book is performed with a brush. Holding the brush in the right hand, and a bar of iron in the left, the brush is dipt in the requisite solution, and having beat the brush on the bar till the colour is nearly out, the residue falls fine, and produces the desired effect. The edges of sprinkled books are eithe burnished or not at pleasure. The usu compositions for sprinkling are a solutio of amber, vermilion, sap-green, or indigo

The head-band is now added, which is a ornament made of cotton cloth, thread, silk, of two or three colours, placed at t and bottom of the book, across the leave and woven or twisted about a strip vellum the width of the *square*. Whe the book is head-banded, it receives on t back another coat of strong glue; on t top of the glue is laid a piece of cartrid paper the size of the back, and rubbe smooth with a *folder*. The cover bein damped with a sponge and water, the ed pared off on a marble stone, and the roug side smeared with strong paste made flour, is now pulled on, and doubled over t edges of the boards.

The letters or ornaments on books a made with brass tools engraved in rilievo Those parts of the leather on which go is to be applied, are glazed over two three times with *glair*, allowing each coa ing to dry before another is applied. Whe dry, the cover is slightly rubbed over wit oil or hog's lard, and the gold laid on; t brass tools, after being heated to about 20 Fahrenheit, are then impressed; the supe fluous gold leaf is rubbed off with a piece cotton cloth. An iron tool, called *the po isher*, heated as above, is then applied, a the book, after being pressed for four five hours in smooth japanned plates, considered finished.

This is the process when books a bound in leather; when they are done i in cloth it differs somewhat. Boards pr viously prepared of the requisite size, a covered with cloth glued on to them, a put through a powerful press, provided wi blocks of brass, having the desired patte cut upon them in relief, and thus stamp or embossed. In the same manner, t gilt title or other gilt ornament is produc upon the cloth. The sheets are prepar for cloth binding in a manner very simil to what is required for leather bindin When so ready, they are transferred the prepared and embossed boards, cover with cloth, by a process very much t same as we have described for the leathe

Glasgow: Printed for the Proprietors, by W. Blackie, (residing at 25, Richmond Street) at *premises*, Model Exhibition, No. 19, Area A, *Hall*.—Thursday, December 31st, 1846.

Daily Exhibitor.

No. 7. GLASGOW, JANUARY 5, 1846. PRICE ½D.

ICHTHYOSAURUS,

OR FISH-LIZARD.

Opposite the east end of Table E, and ecumbent against the front of the gallery, s to be seen a small but beautiful speci- nen of this remarkable fossil animal. We re indebted to Mr. De la Beche and the Rev. W. D. Conybeare, for first pointing ut and illustrating the structure of this xtraordinary creature. Various others ave since contributed to throw light upon his being, which has ceased to exist, so hat its anatomy and animal economy are ow nearly as well known as that of the orpoise, which revels in the ocean that ashes the shores of our existing continents nd islands.

"If," writes Dr. Buckland, in his Bridgewater Treatise,' "we examine hese creatures with a view to their capa- ilities of locomotion, and the means of ffence and defence which their extraor- inary structure afforded to them, we shall nd combinations of form and mechanical ontrivances which are now dispersed hrough various classes and orders of exist- ng animals, but are no longer united in he same genus. Thus, in the same indi- idual, the snout of a porpoise is combined ith the teeth of a crocodile, the head of a zard with the vertebræ of a fish, and the ternum of an *ornithorhynchus* with the ddles of a whale. The general outline f an ichthyosaurus must have most nearly sembled the modern porpoise and gram- us. It had four broad feet or paddles, nd terminated behind in a long and power- l tail. Some of the largest of these rep- les must have exceeded thirty feet in ngth."

The osteology of the head agrees in many oints with that of the crocodile, but the rbit of the eye is much larger, and the ostril is not, as in that genus, placed near he point of the snout, but near the ante- or angle of the orbit, as in some other zards. The teeth, which in some cases mount to a hundred and eighty, are not ocased in deep and distinct sockets as in he crocodiles, though the rudiments of an alveolar separation may be traced in the small ridges between the teeth running along the furrow of the maxillary bone in which they are set. The elongated jaws in which these instruments of destruction are ranged are made up, as in many of the crocodiles and the other lizards, of many thin bony plates, so as to produce a union of lightness, elasticity, and strength. "It is obvious," says Dr. Buckland, in the interesting work above quoted, "that an under jaw, so slender and so much elongated as that of a crocodile or ichthyosaurus, and employed in seizing and retaining the large and powerful animals which formed their prey, would have been comparatively weak and liable to fracture if composed of a single bone. Each side of the lower jaw was therefore made up of six separate pieces, set together in a peculiar manner. This contrivance in the lower jaw to combine the greatest elasticity and strength with the smallest weight of materials, is similar to that adopted in binding together several parallel plates of elastic wood or steel to make a crossbow; and also in setting together thin plates of steel in the springs of carriages. As in the carriage-spring or compound-bow, so also in the compound-jaw of the ichthyosaurus, the plates are most numerous and strong at the parts where the greatest strength is required to be exerted; and are thinner and fewer towards the extremities, where the service to be performed is less severe. Those who have witnessed the shock given to the head of a crocodile by the act of snapping together its thin long jaws, must have seen how liable to fracture the lower jaw would be were it composed of one bone only on each side: a similar inconvenience would have attended the same simplicity of structure in the jaw of the Ichthyosaurus. In each case therefore the splicing and bracing together of six thin flat bones of unequal length and of varying thickness, on both sides of the lower jaw, affords a compensation for the weakness and risk of fracture that would otherwise have attended the

elongation of the snout. Mr. Conybeare points out a further beautiful contrivance in the lower jaw of the Ichthyosaurus, analogous to the cross-bracings lately introduced in naval architecture."

Hitherto the structure of the skeleton of ichthyosaurus is, as we have seen, sauroid or lizard; but we now come to a part of its bony frame, and a very principal part, which is formed on the ichthyoid or fishy type. The *vertebral column*, consisting of more than one hundred vertebræ, each of which is hollow and fashioned after the manner of those of fishes, to facilitate the progress of the animal through the watery medium in which it existed, is constructed for a swimming, not a walking animal; and the sauroid type is here departed from in favour of a conformation demanded by the habits of the animal.

The *ribs* appear to be constructed more upon the sauroid type, for they are continuous along the vertebral column from the head to the pelvis; they are slender and mostly bifurcated at the end, and many of them are united in front across the chest. Intermediate bones, analogous to the sternal and intermediate costal cartilages in the crocodiles and the sterno-costal arcs in plesiosaurus, united the ribs of the right side to those of the left. Dr. Buckland is of opinion that this structure was probably subservient to the purpose of introducing into their bodies an unusual quantity of air, the animal being by these means enabled to remain long beneath the water without rising to the surface for the purpose of breathing.

In the *sternum* we find a combination of bones admirably adapted for resistance. The form of the sternal arch and the broad surfaces of the clavicles is such as to impart great strength to the chest, enabling the animal to breast the most disturbed waters, and affording an extensive surface for the attachment of powerful muscles to assist in moving the anterior extremities; and the bones composing this arch are combined nearly in the same manner as in the Ornithorhynchus of New Holland, which seeks its food at the bottom of lakes and rivers, and is obliged, like the ichthyosaurus, to be continually rising to the surface to breathe air. To this sternal arch the *anterior paddles* are articulated; they are nearly one-half larger than the posterior paddles, and in this part of the structure the cetaceous or whale type appears to have been followed. The short and stout shoulder is followed by the bones of the fore-arm; and these are succeeded by numerous regularly-disposed polygonal bones, exceeding, in some species, the number of one hundred, which form the paddle or fin. In *form* these bones differ both from the phalanges of lizards and whales.

The bones of the *pelvis* closely resemble those of the crocodile, and the femoral bone and *posterior paddle* are altogether analogous to the shoulder and anterior paddle; but, contrary to the development of the posterior extremities of quadrupeds in general, they are very considerably smaller, nearly in the proportion of one to two.

That the ichthyosauri enjoyed the sense of smelling in a considerable degree can hardly be doubted from the structure and position of the nostrils, nor is there any reason for supposing that they were not gifted with the sense of taste; but their power of vision must have been great, and indeed Dr. Buckland justly speaks of the enormous magnitude of the eye as very much exceeding that of any living animal, and as being the most extraordinary feature of the head.

An enormous expansion of the jaws, which were so constructed as to bear the shock of the most violent collision, and were furnished with a constant succession of teeth, formed an organ of seizure well fitted to the voracity of an animal that not only preyed upon fishes and other marine animals, but, like the ravenous pike of our fresh-waters, fed upon its own congeners and even species. The prey was transmitted into a stomach which must have been nearly coextensive with the cavity of the body, and the contents were thence made to pass through an intestinal canal which appears to have resembled the spiral intestines of some of the swiftest and most voracious of our modern fishes.

The external integument appears to have been a simple naked skin unprotected by any defence; it probably resembled in some degree the dermal covering of the cetaceans or whales.

We have thus endeavoured to give a sketch of the organization and structure of a form blotted out from the catalogue of existing beings. Admirably adapted to its wants, its conformation enabled it either rapidly to pursue its prey, to dive far beneath

the sea, or to ascend to the surface, and, in short, to execute with precision and quickness all the motions necessary to its mode of life.

Ichthyosauri abound throughout the lias and oolitic formations.—*Abr. from Pen. Cyc.*

TEA.

(Table E, Nos 30 and 31.)

In the case No. 30 are dried specimens of the Tea Plant, *Thea Bohea* and *Thea Viridis*, and in case No. 31 are specimens of the tea of commerce from China, Japan, Java, Assam, &c. This leaf was first imported into Europe by the Dutch East India Company, in the early part of the seventeenth century; but it was not until the year 1666 that a small quantity was brought over from Holland to this country by the Lords Arlington and Ossory; and yet, from a period earlier than any to which the memories of any of the existing generation can reach, tea has been one of the principal necessaries of life among all classes of the community. The tea-plant is indigenous to China or Japan, and probably to both. It has been used among the natives of the former country from time immemorial; and, from the age of Confucius, has been the constant theme of praise with their poets. It is only in a particular tract of the Chinese empire that the plant is cultivated; and this tract, which is situated on the eastern side, between the 30th and 33d degree of north latitude, is distinguished by the natives as "the tea country." The tree or shrub whence the tea of commerce is derived, is the *Thea* of botanists. The Chinese give to the plant the name of *tcha* or *tha*. It is propagated by them from seeds, which are deposited in rows four or five feet asunder; and so uncertain is their vegetation, even in their native climate, that it is found necessary to sow as many as seven or eight seeds in every hole. The ground between each row is always kept free from weeds, and the plants are not allowed to attain a higher growth than admits of the leaves being conveniently gathered. The first crop of leaves is not collected until the third year after sowing; and when the trees are six or seven years old, the produce becomes so inferior that they are removed to make room for a fresh succession. The flowers of the tea-tree are white, and somewhat resemble the wild rose of our hedges: these flowers are succeeded by soft green berries or pods, containing each from one to three white seeds. The plant will grow in either low or elevated situations, but always thrives best and furnishes leaves of the finest quality when produced in light stony ground. The leaves are gathered from one to four times during the year, according to the age of the tree. Most commonly there are three periods of gathering; the first commences about the middle of April; the second at Midsummer; and the last is accomplished during August and September. The leaves that are earliest gathered are of the most delicate colour and most aromatic flavour, with the least portion of either fibre or bitterness. Those of the second and third gatherings are inferior in value. The leaves, as soon as gathered, are put into wide shallow baskets, and placed in the air or wind, or sunshine, during some hours. They are then placed on a flat cast-iron pan, over a stove heated with charcoal, from a half to three quarters of a pound of leaves being operated on at one time. These leaves are stirred quickly about with a kind of brush, and are then quickly swept off the pan into baskets. The next process is that of rolling, which is effected by carefully rubbing them between men's hands; after which they are again put, in larger quantities, on the pan, and subjected anew to heat, but at this time to a lower degree than at first, and just sufficient to dry them effectually without risk of scorching. This effected, the tea is placed on a table and carefully picked over, every unsightly or imperfectly-dried leaf that is detected being removed from the rest, in order that the sample may present a more even and a better appearance when offered for sale. With some finer sorts of tea a different manipulation is employed; the heated plates are dispensed with, and the leaves are carefully rolled into balls, leaf by leaf, with the hands. The Chinese do not use their tea until it is about a year old, considering that it is too actively narcotic when new. They partake of tea at all their meals, and frequently at other times of the day. They drink the infusion prepared in the same manner as we employ, but they do not mix with it either sugar or milk. The working-classes in that country are obliged to content themselves with a very weak infusion. Mr. Anderson, in his narrative of Lord Macart-

ney's embassy, relates that the natives in attendance never failed to beg the tea-leaves remaining after the Europeans had breakfasted, and with these, after submitting them again to boiling water, they made a beverage which they acknowledged was better than they could ordinarily obtain.

TO READERS AND CORRESPONDENTS.

S. W.'s commentary on No. 28, *Table B, may pass well enough as a holiday joke,* viva voce; *but* we *confess ourselves to be so obtuse as not to see the direct connection between the "model for a set of Buckets for raising* water," *and S. W.'s description of the intended patent* air-*pump. Has S. W. been trying to "raise the wind?"*

The Daily Exhibitor.

TUESDAY, JAN. 5, 1846.

THE *three free days* are now over, and the results have been all that we anticipated. While our LARGER brethren of the Press were pouring forth jeremiades as to the probable fate of THE EXHIBITION during the THREE FREE DAYS, and puling to the working classes to remember the bounty thus conferred upon them, under the apparent fear that, animated with iconoclastic furor, they might martyr the models, —images,—nay, embodiments of many a long revolved and oft rejected, but still cherished idea, *we* adopted a more cheerful and hopeful tone, and expressed our confidence that all would go on well. And nobly has our opinion been confirmed. Visitors of all ages and both sexes, to the number of upwards of 54,000, have crowded the City Hall during these three days, and as far as discovered, nothing has been missed—nothing injured. The crowd outside, eager for admittance, was immense, and the amount of squeezing great, but everything went on *inside* with the most perfect good order. From the excitement all along evinced regarding the Exhibition, it early became quite evident to the Committee that if during the three free days all the visitors were allowed to circulate through the whole of the passages, the curiosity of only a very limited number could be satisfied. It was therefore thought more prudent and more in unison with the original scheme of the Exhibition to gratify the curiosity of a great number partially than of a small number fully. In carrying out this idea during the *three free days* visitors were at first allowed to pass along only one passage. Every one thus obtained a *particular* view of the tables on either side his passage, and a *general* view of the whole collection. This arrangement was, however, afterwards departed from. Visitors were allowed to circulate freely through several passages; and thus any slight discontent which may at first have been felt was completely allayed, and the feeling of contentment became general, as was manifest from the delighted countenances which everywhere met the eye. We are happy to congratulate all parties on the results of these three days, those who promoted and laboured to arrange the Exhibition, as well as those who gratified themselves with a sight of it. To the one it must be a source of satisfaction, that they have been the means of gratifying so large a portion of the community, and to the other the recollection of what was there seen, must mingle with their most pleasing reflections. Its ultimate results, we trust, are yet to be developed in the electric spark it may have communicated to the genius, smouldering possibly unknown, in the breast of some young and ardent spirits.

COTTON PLANT.—This is become an indispensable product for Britain; it comes next in importance after the cereals. It will behove her to cultivate it herself, in some or all of her numerous southern colonies. The States are flagging in their supplies; and what is to become of our filatures and textile cotton manufactures, if a war were to break out with our transatlantic and other "slippery customers?"—(Table E., Nat. Hist. Nos. 12 and 82.)

ANTIQUITIES FROM NUREMBERG.

Crest of Albert Durer, born at Nuremberg in the 15th Century, carved by himself.---(Antiquarian Table, No. 9.)

Wrought Iron Work from Nuremberg, of the School of the celebrated PETER VISCHER---*In the Back Room, above the Doors.*

WHAT a glorious old town is Nuremberg! It contains everything that the antiquary's heart could desire, from the finely and grotesquely carved doorways of churches, cathedrals, and chapels, to the dilapidated jug from which some ancient sacristan swilled his beer. All bear the impress of antiquity, *fine* antiquity. How does one revel in old architecture, ecclesiastic, domestic, and hydraulic; in painted glass, carved wood, and still more elaborately carved stone, within the precincts of this ancient imperial city! Its walls once were strengthened by a hundred towers—its interior now is adorned by a thousand beauties of ancient art—become, alas, as a thing of history! Many of the ancient beauties of Nuremberg are no doubt gone. Many houses which belonged to her once affluent merchants, are now no more!—and treasures of art have been parted with from stern necessity, that great scatterer of many noble collections. Still much remains that is attractive—much to instruct. The city has a dark ancient appearance in almost every corner. Its inhabitants seem to have prided themselves in the ancient guise of their town; and, therefore, when compelled to rebuild their houses, have built them of exactly the same dimensions, and in exactly the same form as those they required to take down. The city has thus, even in its renewed portions, an ancient appearance seldom to be found elsewhere. Many, however, of its ancient glories remain unimpaired; besides churches, we have still in their ancient state the Town Hall, the Nassau House, Peller's House, Albert Durer's House, and many others too numerous to name. Indeed, so ancient is the whole appearance of the city, both from the quaint style of its gable end architecture, and the intricate windings of its streets, that the traveller, on entering it, might suppose himself transported back to a town of that indefinite and convenient period, the middle ages.

"Quaint old town of toil and traffic,
Quaint old town of art and song,
Memories haunt thy pointed gables,
Like the rooks that round them throng."

How remarkable must such a city appear to those conceited democrats who rejoice in the significant banner of the *Stripes* and Stars. Here are houses and monuments and relics in stone, wood, bronze, and iron, made hundreds of years before their boasted republic was ever thought of, and even before the continent upon which it has been established was made known to the civilized world. But we have been led somewhat into digression. Suffice to say, Nuremberg is one of the most interesting cities the traveller can visit, if he has any taste for ancient art, or any feeling of delight in historical associations.

Here was born, in 1471, Albert Durer the painter, the sculptor, the engraver in metal and wood, the mathematician, the engineer, once Burgomaster, we believe, of Nuremberg, and whose house is preserved externally in its original state, with praiseworthy care, by a society of artists. Durer was a pupil of Michael Wohlgemuth, at that time the best painter in Nuremberg. Having finished his studies, he entered upon his travels, and visited various countries with the view of perfecting himself in his art. In 1494, he executed at Nuremberg, a drawing of Orpheus, esteemed his masterpiece; but the proper era of his greatness begin in 1507. His fame spread far and wide. Maximilian I. appointed him his court-painter, and Charles V. confirmed him in this office, bestowing upon him, at the same time, the painter's coat of arms, viz., three escutcheons argent, in a deep azure field. Durer was in favour with high and low. All the artists and learned men of his time honoured and loved him, and his early death, in 1528, was greatly lamented. Untiring application, great facility in the mechanical part of his art, and a remarkable talent of imitation, were the characteristics of Durer, and enabled him to exert a great influence on the character of German art. He was the first in Germany who taught the rules of perspective, and of the proportions of the human body, according to mathematical principles. His treatise on proportions was occasioned, it is said, by his studies on the picture of Adam and Eve. He not only made use of the burine, like his predecessors, but was also the inventor of etching, or, if not the inventor, the first who excelled in the art. He invented the method of printing wood-

cuts with two colours. His great mathematical knowledge enabled him to form a regular system of rules for drawing and painting. He wrote the first book on fortification, in Germany, and showed how to cast the letters of the alphabet according to fixed proportions, by geometrical calculations.

On the walls of a large room in the Town Hall is still to be seen, in a state of fair preservation, an able painting by Albert Durer. Those who know this artist only from some of his characteristic but stiff pieces, would scarcely be prepared for the finish and flow of this excellent work. A fine bronze statue, from the studio of the celebrated Rauch, has recently been erected to his memory; and, in the churchyard of St. John, about a mile to the N.W. of the city, where the tombstones are regularly numbered to the extent of 3,000, his grave, No. 649, may still be seen.

Not inferior to Durer in his own peculiar walk was Peter Vischer (born 1460, died 1529). He was a sculptor, and worker in iron and bronze, and though nominally an artizan, was in reality an artist in the highest sense of the word. His works were so original and elegant in design, that they may be said to have founded a school, and since his day NUREMBERG IRON WORK has been every where celebrated for its remarkable elegance. Even in the present day the traveller may perceive in the windows of the ironmongers' and braziers' shops, that the spirit of Peter Vischer is stamped upon the modern productions, though as far behind him in elegance as they are after him in time. It is delightful in visiting the relics of ancient art in this once wealthy city, to notice the beautifully designed and wrought iron and bronze work in hinges, knockers, lamps, railings, &c., which every where attract the attention to minute objects too frequently overlooked in the usually hurried examination given to such matters. But the most remarkable work of Vischer is the celebrated bronze *Tomb of St. Sebaldus*, which stands in the centre of St. Sebald's church. It is 15 feet high and more than eight long, by upwards of four broad, and consists of a miniature Gothic chapel, composed of a rich fret-work canopy supported on pillars. The niches round the tomb are occupied by figures of the twelve apostles of exquisite workmanship. The varied position and action of these figures with the force of expression conveyed in the countenances, and the graceful flow of the draperies constitute them truly first-rate works of art. A variety of other figures, to the number of nearly a hundred, are placed above these, and in the various niches of the tomb; and basso-rilievos under the coffin, represent the reputed miracles of the saint. Among the figures is an admirable one of Vischer himself in his working dress. But it were to occupy too much of our space fully to describe this wonder of art. Suffice to say there is also an excellent figure of St. Sebald, and the whole tomb rests upon a series of snails. Vischer assisted by his five sons, was occupied thirteen years in constructing this his master-piece. He appears to have been poorly paid for his labour; and has recorded in an inscription upon the monument that "he completed it for the praise of God Almighty alone and the honour of St. Sebald, Prince of heaven, by the aid of pious persons, paid by their voluntary contributions." We leave old Vischer with regret. For chasteness of design in his peculiar walk he has had few equals, no superiors.

Another name remains to be mentioned, which fills up the glorious trio at the same time flourishing in Nuremberg, the sculptor Adam Krafft. Among the numerous works of this eminent artizan-artist, we can only notice the one which is most remarkable, namely, the tabernacle, for the sacramental vessels in the church of St. Lawrence. It is cut in white stone, and rises in the form of a crosier to the height of 64 feet. In various compartments are represented scenes from the history of our Saviour, and the whole is supported upon three expressive human figures half kneeling, which are those of Krafft himself, and his two apprentices who laboured with him five years on this magnificent work. Of the elegance of the tracery, the design and the execution of this beautiful piece of gothic sculpture, no conception can be conveyed by means of mere description. It must be seen to be appreciated.

We can only further mention the Schönbrunnen or Beautiful Fountain, an admirable stone gothic cross of the 14th century, sixty feet high, ornamented with sixteen well executed figures representing the seven Electors, Godefroi de Bouillon, &c., &c.; and the beautiful bronze fountain cast

in 1580 by George Wurzelbauer. As a hint may be taken from the construction of this fountain for some *hydraulic* improvements in our city, when once the water has been brought in from Loch Lubnaig, we may be pardoned for being a little minute in its description. The design of this fountain, which is extremely elegant, consists of six female figures, emblematic of virtues, sending water out from their breasts. These are surmounted by an equal number of nude boys, each playing water out from a trumpet. The summit is composed of a large female figure of justice, sending down a stream of water in the same manner as the other female figures, and behind her a stork vomiting a stream in the opposite direction. All these figures are sending curved streams of water down; but under the whole are a number of dolphins sending curvilinear jets of water in the reverse direction. The intermingling of these numerous *jets d'eau* has a curious but pleasing effect. Many other points of interest we could note in this antique city, the house in which Gustavus Adolphus and his staff resided during the siege of Nuremberg by Wallenstein, in the thirty years' war, the house of Hans Sachs, the famous cobbler poet of the reformation, the painted glass in the church of St. Lawrence, &c., but we must pause. Our limits forbid us from proceeding further with a subject which could easily have been expanded to fill a whole Number.

MIRRORS AND REFLECTORS.

The visitors to the Exhibition must have observed on one of the tables a *curved mirror*, and those who have looked into it need not be reminded that its effects upon the countenance of the spectator are by no means flattering to his vanity. We trust it will not be thought that we intend to cast unpleasant *reflections*, if we take the aforesaid mirror as our text, and discourse for a brief interval concerning the varied effects of reflection under different circumstances.

Light is reflected from bodies of all colours, except intense black, in a greater or less quantity, according as the colour of the body approaches to blackness or whiteness. No coloured surface, however, of rough exterior will reflect an image of any illuminated object placed before it; in the first place, it absorbs in a great degree all colours except its own; whilst in the second place, and as a consequence of the first condition, it does not reflect with sufficient intensity to give back an image. Polished surfaces of all colours *do* reflect an image more or less vivid, according to the nature of the objects and their relation in colour to the reflecting surface. But of all surfaces, those give the most perfect image which do not blend with the light they receive any local colour of their own, and which moreover are so little absorbent that not less than half the light falling upon them is reflected back. Polished silver, steel, and other metals, form very good mirrors. These substances, some of them at least, were employed in the construction of mirrors at a very early period. The ladies of ancient Egypt had metallic mirrors as the adjuncts of their toilet; and amongst the remains of Herculaneum and Pompeii, similar articles are found. Indeed the use of these mirrors appears to have been very general amongst ancient nations. Metals are still used for the curved reflectors (or *specula*,) of philosophical instruments, since the required peculiarity of surface can be communicated to them with greater certainty than to glass; but the mirrors and reflectors ordinarily in use amongst ourselves are of glass coated with mercury or quicksilver. Another reason may be given for continuing the use of metals in the construction of *specula* for microscopes and telescopes: viz. that the reflection from metal is from the first surface, and consequently single; whilst from a silvered glass it is from the second surface (or the back), and is reduplicated by successive reflections from the two surfaces. This peculiarity in a glass mirror or looking-glass is evident to any one who places a candle before it. So long as his eye and the candle are in the same plane, and perpendicular to the mirror, he sees only one image; but if he stands on one side and looks obliquely upon the mirror, he sees a number of images, commencing with the vivid reflection of the second surface, and ending with the faintest duplication, whilst a greater or less number of images, of different intensity, are visible between these two extremes. Now in the case of microscopes and telescopes it must be obvious that this reduplication of the image would be a serious inconvenience, since in however small a degree it might exist, its effect

would be increased by the magnifying power of the instrument.

The great law of *reflection*, which explains the peculiar action of different mirrors, may be illustrated in a very simple manner. If a ball be thrown against the side of a room in a line perpendicular to the surface, it will return in the same line, and come back into the hand of the person who threw it; but if it be thrown in a line inclined to the surface of the wall, it will rebound and pass off in another line more or less distant from the hand of the thrower. Supposing a line to be drawn upon the floor, perpendicular to the wall, and the ball to be cast by a person from one side of this line to the point where it touches the wall, the ball will then rebound in a direction as far distant from the line on one side, as the thrower's position is distant from it on the other. In other words, the angle of *incidence* and the angle of *reflection* will be equal.

A *plane* mirror, more popularly named a looking-glass, reflects an image the very counterpart of the object; for though all the light that is incident is not reflected back, it *is* reflected back in just proportions, so that the relations of colour are not disturbed. It also reflects dimensions correctly, without decrease or enlargement, there being no curvature to give a new direction to the rays and alter their angle after reflection. Hence, the great use of the plane mirror in the every-day concerns of life.

A *convex* mirror (one with a round swelling surface) decreases the image in proportion as the object recedes from it. At one time, glass globes silvered on the inner side, formed an ordinary household ornament, and one affording much delight to the juvenile members of the family. Its surface presented to them *in little*, a vivid miniature picture of all objects posited round it, whether near or remote; and great amusement was found in gradually approaching it, and receding from it; in the one case, little ladies and gentlemen *grew* with amazing rapidity, and in the other, they became "small by degrees and beautifully less." The action of this globe and that of convex mirrors generally, is easily understood by keeping in mind the great law before cited, that the angle of incidence is equal to the angle of reflection. The rays of light falling upon convex surfaces diverge after reflection, and those which come back to the eye to form the image have a very small angle, and proceed as it were from a point or focus on the other side of the mirror; hence the farther an object be placed from a convex mirror the more it must be diminished, since we take in fewer and fewer of the incident rays, and are continually lessening the angle under which it is viewed.

A *concave* mirror (one shaped like a bowl) magnifies an object, but only so long as its distance from the mirror does not exceed the focus of the latter. The action of the concave mirror is directly the reverse of that of the convex mirror. The latter, we have already explained, throws back diverging rays, the former, on the other hand, reflects them in a state of convergence, and at a certain point they all meet together. Now, if an object be placed opposite to a concave mirror and within its focus, the reflected rays to form the image are brought to the eye in greater quantity, and *converging towards the eye*, their angular direction consequently gives to the image great increase of size. When, however, an object is removed further from the mirror than its focal distance, a contrary effect takes place; for at the focal point all the rays meet and cross, and receding from this point the object appears inverted and decreases in size as it retires. The reason is, that in this last case the rays come diverging, as from the convex mirror, whilst they formerly came converging.

The mirror in the Exhibition is of a compound nature, being curved only in one direction. Hence, whilst the face of the spectator is reflected in its natural *breadth*, the longitudinal concave curvature of the mirror magnifies the *length* of his countenance to a dismal extent. Distorting mirrors are of various kinds, and their effects are not a little astonishing to persons unacquainted with the principles of Optics. The few remarks we have made will probably aid to explain their action.

OWLS AND YOUNG IN NEST.—A thriving family. The sight of these droll cat-faced animals put us in mind of the favourite cockney simile, "Like a *h*owl in a *h*ivory bush."—(West Gallery, No. 95.)

Glasgow: Printed for the Proprietors, by W. G. BLACKIE, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Tuesday, January 5th, 1847.

Daily Exhibitor.

No. 8. GLASGOW, JANUARY 6, 1847. PRICE ½D.

CARTOON.—Drake on the Quarter-Deck, viewing the Destruction of the Spanish Armada by his Fire Ships. By DAVID SCOTT, R.S.A. (No. 112; on front of West Gallery.)

IN mingling with the crowds that daily congregate in the Exhibition rooms, we have been sorry to observe that this great work receives but a small share of the attention it merits. The remark of many is, "I cannot understand it," to which we rejoin, You will not take time to understand it. There are many beautiful models of machinery in the room, and how few of them can be fully understood at a glance; but let any man of ordinary intelligence study them attentively, or have them explained to him, and in a short time he may easily comprehend both their purpose and their working. If it be necessary to study a model in order to understand it, how much more is careful consideration required to the full appreciation of learned and elaborate works in historical painting like the one before us. The artist deals with forms and motions much more delicate and subtle than those taken cognizance of by the mechanic—for what element in machinery is more varied and difficult to be understood than the expression of the human countenance? and what motion can for beauty and delicacy be compared to the action of the human figure? Historical painting, like machinery, has its prime mover—the principal figure or group in the subject, which first arrests the eye of the spectator. From it (to retain our simile), the power is carried off through all the various figures in the picture; and as in machinery power must be distributed to the various parts according to the functions they are required to perform, so in painting the power must be carried throughout the subject, each part, in some measure, connected with the leading group, and introduced prominently or subserviently according to the amount of interest it possesses in the scene that is depicted.

To explain the principles on which this picture is composed, and point out in detail the application of these remarks to the different parts of its structure, would require more space than our limits will permit. We shall therefore content ourselves with shortly explaining the leading features of the work.

Drake, whose foot is planted on a cannon, views with calm satisfaction the havoc and destruction which his fire-ships are making among the Spanish fleet, and examines how he can most effectually complete the work of destruction. His officers, who stand behind him, feeling that the day is already their own, exhibit the same quiet and gratified demeanour as their commander. The attendants on the gun, at which Drake is standing, wait with intense impatience for the orders of their leader. Nearer the spectator another group is seen, hastily pulling forward to the port the gun they have been loading. The other foreground figures on the main-deck give vent to their joy in boisterous mirth, affording a striking contrast to the group on the quarter-deck, and showing how differently the same feeling affects the disciplined and the undisciplined mind. The artist who executed this great work is a philosopher, and the more carefully his pictures are examined, the more evidence will be afforded of how deeply he has studied the working of the human mind.

The picture of which we have been speaking is a *Cartoon*. Of late years, many people have become familiar with the name, but comparatively few are acquainted with its meaning, and the uses to which works so called are applied. Generally speaking, Cartoons are drawings upon paper, in black and white chalk, and are the preparatory mode of defining the design of large pictures, more particularly when they are to be painted in fresco. The Cartoon is drawn the exact size of the fresco to be painted. Fresco paintings are usually executed on interior walls of public buildings; they are painted while the plas-

ter is wet, in water colours, which resist the action of lime; and the colours being absorbed by the lime, they are considered to be imperishable so long as the plaster adheres to the wall, and the building, in which they exist, is kept in repair.

In addition to the Cartoon, the fresco painter usually prepares a study of a smaller size in colours, in which the masses of light and shadow, and the different tints to be used in the picture, are carefully rendered. The wall, on which the fresco is to be painted, is first prepared by having several coats of plaster put on it, and when these are properly dried, the plasterer, acting under the direction of the artist, plasters as much of the wall as the artist thinks will be sufficient for a day's work. The artist then fits the Cartoon to the wall in the position the fresco is to occupy, and by using a pointed instrument, traces upon the wet plaster the outline of the figures he is going to paint. This tracing gives him the correct outlines of the figures upon the wall, and these he proceeds to paint upon, making continual reference to the Cartoon and coloured study, to the one for form and expression, to the other for colour and light and shade. When the fresco painter has finished his day's work, he cuts off all the plaster which he has not painted, and this he endeavours to do at the outline of a figure or other definite form, so that the joinings of the plastering may not easily be discovered when the work is completed. Fresco painting requires the work be finished before the lime becomes dry, otherwise the colours are not absorbed by the lime, and do not form with it a solid mass, but merely adhere to the surface, and are liable to peel off. This constitutes one of the great difficulties of painting in fresco. Each figure requiring to be completed before the adjoining parts are painted in, there is no opportunity left for revising the general effect; and should a figure be too light or too dark, too brilliant in colour or too sombre for the other parts of the composition, so it must remain, it cannot be altered. It will be seen what mastery in the art is required for such a process, and with the difficulty also superadded, that both the tones of the ground itself, and of the colours that are soaked into it, are completely altered in drying. The fresco painter is, therefore, perhaps justly entitled to the highest rank among artists.

COFFEE—*(coffea Arabica).*

(Table E, Case No. 30.)

The coffee tree is of low stature, seldom exceeding twelve feet in height; slender, and at the upper part dividing into long trailing branches. The bark is almost smooth, and of a brown colour. The leaves are elliptical, smooth, entire, pointed, waved, three to four inches long, placed opposite on short footstalks. They are evergreen, and somewhat resemble those of the Portuguese laurel. The flowers are white, in form not unlike those of the jessamine. The fruit is a red berry, resembling a cherry, and having a pale, insipid, and somewhat glutinous pulp, inclosing two hard oval seeds, each about the size of an ordinary pea. The use of coffee as an alimentary infusion has been long known in Arabia, where the plant is supposed to be indigenous. All authorities agree in ascribing its introduction to Megalleddin, mufti of Aden, in Arabia Felix, who had become acquainted with it in Persia, and had recourse to it medicinally when he returned to his own country. The progress which it made was by no means rapid at first, and it was not until the year 1554 that coffee was publicly sold at Constantinople. The consumption of coffee is exceedingly great in Turkey. So necessary was coffee at one time considered among the people, that the refusal to supply it in reasonable quantity to a wife, was reckoned among the legal causes for a divorce. The Turks drink their coffee very hot and strong, and without sugar; occasionally they put in, when boiling, a clove or two bruised, or a few seeds of starry aniseed, or some of the lesser cardamums, or a drop of essence of amber. Much uncertainty prevails with respect to the first introduction of coffee into use in the western parts of Europe. The Venetians, who traded much with the Levant, were probably the first to adopt its use. Coffee cannot be cultivated to advantage in climates where the temperature at any time descends below fifty-five degrees of Fahrenheit's scale. Coffee possesses both an aromatic and narcotic principle. The flavour and taste, which at first are both rather repulsive, become by habit agreeable and grateful. Its effects are stimulating, soothing, and exhilarat-

ing, in a calm and moderate degree, unlike the turbulent effects of fermented liquors. It is more stimulating than tea, and to some constitutions proves too heating and exciting; in general, however, it is grateful to the stomach, and seems to aid digestion if taken an hour or two after a full meal. It possesses little nutritive qualities in itself, though conjoined with sugar and cream it may be reckoned a nourishing drink. The addition of much sugar, however, is apt to make the beverage disagree with weak stomachs, and to cause acidity.

Model of Law's Coffee-Roaster.—We know not whether this invention may be the best to attain the end in view; but we are perfectly aware of the importance of proper coffee-roasting. The French are very careful in this particular. Many French householders of the better classes will not allow even their own servants to perform this delicate operation, or to *grind* the coffee beans, when roasted. As a consequence of these, and other precautions, the coffee of France excels that of every other country; and the British visitor who tastes it, well made in a good house, for the first time, looks upon it as an event—a small epoch, as it were, in his gustatory experiences. As the aroma of ground coffee is very evanescent, it ought to be used within a few hours (better yet, if within a few minutes) of being pulverized. The coffee liquid ought to be STRONG, and the softening milk or cream abundant. Both milk and cream ought to be *scalded*—*i. e.*, brought to the boiling point, before being added. By such a preliminary, *good milk* is raised to the "nutty" level of unscalded cream in taste. Nothing is so destructive to the flavour, either of coffee or tea, as the use of coarse sugar. All over the continent, lump sugar is used in both cases; it may be a *little* dearer than moist, but certainly not much; and the gain arising from its use in improving results is immense, to those palates which have their delicacy unimpaired by age, or by the depraving use of fermented or distilled liquors. —(Table B, Mechanics and Engineering, No. 25.)

GUTTA PERCHA.

On Table D, the visitor will find a wand or rod made of this curious substance. It possesses very great flexibility and toughness, and closely resembles Indian rubber, or caoutchouc, in appearance and properties. This substance is peculiarly interesting, from the many uses to which it may be applied, and which we will notice, and from the fact that up to 1842 scarcely any thing was known of it. Now, however, hundreds of tons of it are collected and made use of. The tree from which it is obtained exists in great abundance in the Malayan Islands, in Malacca, in Sumatra, and in Borneo. It is called "Niato" by the Sarawak people in Borneo, who pursue the following destructive mode of obtaining it from the tree.—"A magnificent tree of 50 or 100 years growth is cut down, the bark stripped off, and the milky juice collected and poured into a trough formed by the hollow stem of the plantain leaf; it quickly coagulates on exposure to the air, and can afterwards be formed or moulded into any shape; from one tree it is said that not more than 20 or 30 lbs. are procured. It is probable that it might be obtained by tapping the tree, which might thus be made to produce for many years; but this method, it seems, is too slow for the natives, who are too greedy and stupid to perceive that they are thus ruining and destroying their splendid forests, and as yet there are no local powers to prevent this demolition. The name, which is a pure Malayan one, means the gum or concrete juice of a plant (gutta), and a tree (percha), being the particular tree from which it is obtained. It appears also that there are several varieties of trees producing this Gutta; one is called "Girek," another "Tuban."—The Malays make handles for various instruments and a variety of tools with it. It may be moulded into any form which necessity suggests, by simply dipping it in boiling water, until it becomes heated throughout, when it becomes plastic as clay, and when cold regains its original hardness, and rigidity unchanged. It is evident from this, that were it largely introduced into this country, it could be made to perform a great variety of very useful purposes, and it is to be hoped that more economical methods of obtaining it may be discovered, that we may be enabled not only to have it in abundance, but that the existence of it as a trade may be extended. Amongst the various uses to which it has been proposed to apply this

substance, and for which it is peculiarly applicable, from the clear sharp impression it receives, and the toughness of the substance, is printing for the blind, and the formation of embossed maps for that unfortunate class. It could also be used for forming some of the printer's tools, and might be made to substitute leather in many cases, in the acts of bookbinding and shoemaking. It has been successfully employed for shoes for horses, and no doubt it might be as usefully employed in the construction of our own shoes. But to the suggestive mind a variety of uses and purposes will no doubt readily present themselves. Its name is sounded "Gutta *Pertsha.*"

TO READERS AND CORRESPONDENTS.

J. G.—*There* is *a specimen of the kind* (93 *in the West Gallery). We shall give a sketch to-morrow.*

The Daily Exhibitor.

WEDNESDAY, JAN. 6, 1847.

How much more satisfactory it is to *see* a thing, than merely to *hear* or *read* about it! This sentiment is brought strongly to the mind by reflecting on the present Exhibition, and the unquestionably great, and probably long-lasting, impression it will have made on the minds of many of those who have viewed it. Much of what even the lettered *read,* "goes in at one *eye,* and out at the other." But what a man *sees* he attends to better at the moment, and does not so readily forget afterwards. We have read a great PRACTICAL LESSON to the people by the sights, whether of active or passive nature, in the City Hall.

Language, as expressed in verbal symbols, is but a roundabout way, after all, of conveying a strong impression of facts. A glance of the eye, a tone of the voice, a gesture with the finger, in a moment conveys a feeling, or a direction, which scores of words, oral or written, would scarcely intimate so well. The *animals* evidently have a shorter cut than we wot of, to convey what information they have to give, each to each. And barbarous as we may think the hieroglyphical symbols of the old Egyptians were, as a medium for the transit of thought, they had the great advantage of being *pictorial;* an advantage which the public, of every civilized nation, has largely appreciated in these later times; witness the wonderful success of "illustrated publications."

Mrs. Anne Radcliffe, in the opening chapter of her "Mysteries of Udolpho," gives thirty mortal pages of description of one scene in the Pyrenees—mountains, by the way, which she had only read of. One rough sketch, in the "*Illustrated News,*" would have given a far more satisfactory impression of the scene, in the compass of four inches square. Foreign admirers of the works even of Sir Walter Scott, have oftimes complained to ourselves, that they found *his* verbal landscapes *bien ennuyeux*—awfully wearisome. Whenever a properly illustrated edition of his Works, supplying views of the scenes he describes with such careful painstaking, shall appear (and many of his scenes are *real*) impatient readers will be able to skip all such verbose descriptions.

And as pictures are a universal language, so are machines, especially when set to work. This it is which has made us congratulate ourselves, when viewing the eager curiosity of the at once instructed and delighted crowds in the City Hall: to the young, more especially, such a speaking sight must have been priceless. Wise were they in their generation "according to the wisdom of the serpent"—who propped up a certain nameless superstition by filling the popular eye, and crowding the popular imagination, with attractive symbols and engaging forms. "Pictures and statues," said they, "are the books of the people." Yea, verily, are they; and something more. How much more justly the observation applies, when extended to models, drawings, samples,—to all the manifold and multi-

arious results of art, and products of na-ure, drawn from sources distant and ear?

This is a subject upon which we could ay much. At the very outset, a disquisi-on upon it ought to be based on the great uestion of the PHILOSOPHY OF LANGUAGE. ur limits and our leisure—perhaps, also, distrust of our own ability to develope the bject properly—all alike forbid us to nter upon it here. We therefore now close ith a thankful *Gaudeamus:*—Let us re-ice at what has been doing, and yet re-ains to be done, for educating the public ye and guiding the public taste; at the and we have had in leading its footsteps nto the flower-strewed paths of useful and rofitable knowledge, opened up by the Exhibition in the City Hall.

AIR PUMP.

Many persons may deem it gratuitous nformation to be told any thing about so amiliar an apparatus as the air-pump; but hese individuals must recollect that our eaders are numerous, and that probably a arge proportion of them have seen the in-trument for the first time at the Exhibi-ion; to these last, therefore, a few gene-al remarks on the properties and effects of he air-pump cannot be unacceptable.

We dwell in the midst of an unseen fluid *air*), which, in the aggregate, forms he atmosphere surrounding the earth. his atmosphere varies in density, and be-omes rarer, or more attenuated, the higher ve ascend above the level of the earth's urface; and even upon the surface, the ensity of the air is not uniform, being ubject to variation from many causes. Persons are sensibly affected by the changes vhich occur on the surface; but they are et more affected by the rarity, or thin-ess, of the air at a great altitude above he ordinary level. Long before the in-ention of the air-pump, it had been ob-erved that, in certain states of the at-nosphere, the animal spirits were de-ressed, and the bodily faculties were sub-ect to languor; and also that the ascent f high mountains was accompanied by a legree of lassitude and weariness greater han the mere toil of climbing could pro-luce. That the inhalation of the air is necessary to animal life, it needed not the air-pump to demonstrate, for this was a truth too obvious to be overlooked; but a philosophical solution of the phenomena resulting from a more than ordinary density or rarity of the atmosphere was first afforded by that instrument; and to it we are indebted for an amount of knowledge concerning the properties and uses of air which we could not otherwise have obtained.

The air-pump is a contrivance for producing a *vacuum;* or, in other words, a space emptied of air. It consists of a bell-shaped glass, named the *receiver*, in which the vacuum is to be made; and of an apparatus for drawing off the air from the receiver. This last was originally a single piston, which, by successive strokes, rarified the air within the bell to a great degree. To effect a nearer approximation to a perfect vacuum, a second piston was introduced. The upper part of the piston-rods were of rack-work, and a toothed wheel gave motion to both at the same time, alternately raising one rod and depressing the other. A few strokes of the double pistons were found to produce a greater effect than many strokes of the single pump. The air-pump now in use does not differ materially from the construction introduced about seventy years ago, by Benjamin Martin, a London optician, who added to great skill in the manufacture of philosophical instruments, an amount of theoretical knowledge seldom possessed by artificers.

It is necessary to bear in mind that an air-pump of the very best construction can never produce absolute vacuity,—can never draw off *all* the air from the receiver. After the first stroke, the air remaining in the bell expands and fills its entire volume; after a portion of this rarified air has been drawn off by the second stroke, a second expansion takes place; and thus every successive stroke draws off only a *portion* of the air left by the preceding stroke, whence it follows, that there must always be a remainder in the receiver; and though this remainder forms an almost insensible atmosphere within the bell, indeed approaches nearly to a practical vacuum, its presence is sufficient to modify the deductions we draw from our experiments upon animal life. We cannot enter into a long detail of the experiments which have been performed with the air-pump, nor is it necessary that we should, since

they have already been presented to the popular mind in pages as readily accessible as our own. The experiments on animals have shown how necessary the ordinary supply of air is to animal life; how that life languishes when the supply is partially withdrawn; and how all its functions are suspended when the supply is nearly or altogether discontinued. Some animals will live in the exhausted receiver longer than others; and some few will endure the confinement for many hours, and even after life appears to be extinct, they will recover if brought again into the air. We are not, however, to argue from this, that possibly some of the cold-blooded animals can live without air. We must never forget that the vacuum is imperfect, and that whilst some animals die in it almost instantly, other some may find in the attenuated atmosphere, and that for a long period, all the supply of air that is absolutely requisite for their existence. Air is as necessary to combustion as to animal life. A lighted candle placed under the receiver will not burn after it has consumed the air within the glass; neither will gunpowder explode in vacuo, but merely smoulder away, and this feeble combustion is sustained only by the air in the nitre of the powder. Bodies give no sound in vacuo. There is a contrivance by which a bell may be rung under the receiver, but though we see the clapper strike the side, the ear can detect no sound if the receiver is properly exhausted of air. All bodies are of equal weight in vacuo. A sovereign and a feather, if let fall from the top of the receiver at the same instant, will reach the bottom together. These are the principal phenomena revealed to us by the air-pump; and they can be exemplified and illustrated by a variety of interesting experiments.

RHINOCEROS HORNBILL.

(West Gallery, No. 86.)

This bird attains four feet in length, with an expanse of wings of about three feet. The bill is nearly a foot in length; and, stuck on it, as it were, at the base of the upper mandible, is a second bill, or prominence, which is turned upwards and backwards, like the horn of the rhinoceros.

Notwithstanding the formidable appearance given to this bird by its monstrous bill, it is utterly useless to it as a weapon; and the bird itself is of too cowardly a disposition to make use of it offensively, even if it were more effective. It advances by leaps, and displays in general every appearance of cowardice and stupidity, except indeed when food is offered, which causes it to assume a momentary air of confidence and vivacity by spreading the wings, opening the monstrous bill, and uttering a cry of satisfaction, feeble indeed for a bird of its dimensions. Levaillant had an opportunity of seeing one at the Cape in a vessel which touched there from Batavia. It was fed in general with biscuit moistened in water, and with meat, both cooked and raw, and ate also rice and vegetables. It appears therefore that these naturally very voracious birds easily accommodate their appetite to circumstances; though, in a natural state, insects, snakes, lizards, and even carrion, are their usual food. M. Levaillant on one occasion offered the hornbill in question some small birds he had shot, which were seized immediately; and after being for a short time pressed and rubbed in the bill, were swallowed whole. The sailors stated that he hunted the rats and mice whenever they came within sight, though he never had dexterity enough to catch them; he swallowed however very readily all that were offered to him. The habit of this bird appeared to be to seize everything that was given, and afterwards to reject such as did not suit its taste, to which it never recurred.

The true bill of this bird is black at the base, then slightly reddish, and afterwards light-yellow to the point. The false bill or prominence is red or flesh-coloured on the upper side, and light yellow beneath. A black line marks the contact between it and the true bill; which, rising with the bend of the false bill on each side, gives it the appearance of a perfect beak, with the two mandibles closed.

The eyes are large, and are furnished above with black lashes. The feet are strong, and covered with large brown scales, and the nails, flatted laterally, have their points blunted and injured by friction on the ground.

The general colour of the bird is black; but the tail, which is slightly cuneiform, is tipt with dirty white.

The rhinoceros hornbill is found in India, as well as in Java and the Philippine islands.—*Cuvier.*

MANUFACTURES OF PAISLEY.—*Mr. Robert Kerr's* PORTRAIT LOOM.—This wonder-working loom rivals any in the establishment of the Gobelins at Paris.—We have been favoured by Mr. Kerr with a few particulars regarding it; and also some respecting the companion shawl jacquard loom:—

"In consequence of the time required in erecting the complicated machinery of the PORTRAIT LOOM, and the cost of its materials, not less than two hundred pounds were expended before the first likeness of the French king could be woven. The cost of *card paper* alone was not under £30, the *duty* on which amounted to about £2. Nothing of a similar kind had been previously attempted in Great Britain, excepting the *Spitalfields abortion* (we give the words as they are set down) of the Duke of Wellington.

"The SHAWL LOOM, which is more simple in its construction, did not cost so much as the other; but if the price of the *pattern* be included, the sum expended thereon will have been nearly as great. Only from £40 to £45, indeed, would be required for the erection of such another, including harness and needful equipments; but the *pattern* would cost from £80 to £100 more; in some cases, even £150.

"Every lb. weight of card paper is charged 1½d. *duty;* and, although that impost may appear to be small, yet the whole cost price of each lb. weight, including the tax, being about 6d. per lb., it is but too plain that such an item in the cost price must operate most injuriously to the interest of the manufacturer." True, Mr. Kerr; and the interests of the PUBLIC, too, are thus wounded through *your* sides—*Manufactures, No.* 150, *&c.)*

SPECIMENS OF TEAS.—TEA BRICK, &c.—We find the following passage regarding the tea used in Tartary in a recent work by a French explorer, which we think we shall be gratifying our readers by translating for their amusement:—

"Among the Kalmouks, TEA is prepared in a manner peculiar to the Tartars. It comes to them done up in the state of very solid brick-shaped masses, composed of the leaves and coarser parts of the tea-plant. After breaking off some fragments of one of these, and boiling them in water, the decoction is mixed up with milk, butter, and salt. The infusion thereby takes a soupy consistence, and its colour becomes of a dirty rusty yellow. We drank of such a mixture in the dwelling of prince Tumène; and we are constrained to admit that we found the beverage altogether detestable; the moment we saw it, we thought of the unimaginable preparation served up, with burlesque solemnity, by *Madame Gibou.** We were assured, however, that in time this repulsive stuff, by use, becomes not merely tolerable, but delicious. It certainly does have this precious property, that by favouring perspiration in the body of the drinker, it saves him from the evil effects of sudden chills after heating exercise.

"The Kalmouks drink their tea out of small wooden vessels, of circular form and shallow make; some kinds of their teacups are highly valued; I have seen a few which cost from two to three *horses*—the constant Tartar measure of value. It is unnecessary to add, that the Kalmouks, totally unacquainted as they are with our kettles, necessarily make their tea in earthen pipkins or cast-iron pots. Next to tea, the beverages most in favour with these Tartars are weak alcoholic preparations, distilled from mares' or cows' milk."—"*Les Steppes de la Mer Caspienne,* &c. Par Xavier Hommaire de Hell, tome second, pp. 104-5. Paris, 1845."—(Natural History; Table E, Case 31, Brick of Tea, from China.)

UPRIGHT BOOK-CASE, &c.—The ornaments are in "burnt wood;" a new invention this, which is a plausible but poor substitute for wood-carving; it is inferior, even, to the papier mâché modelling. Both want the sharp outline and easy flow of the skilful carver, and call up recollections, not favourable to either, of the marvels of Flemish Verbruggen, and English Grinlin Gibbons. Still, for furnishers of showy "*Wood*-if-I-could" interiors—the burnt stick ornaments may answer. How true it is that "fire is a useful servant, but a bad master." How many carvings, it can but poorly imitate, it has ruthlessly devoured! Perhaps it was from a spirit of envy? There are other samples of this manufacture—art it cannot be called—in other places of the Exhibition.—(Manufactures, Table C, No. 127.)

* Allusion to a piece of Parisian drollery, played at the Théâtre des Nouveautés, in recent years.

Specimens of Printing in Colours.—By H. Wilson.—Another auxiliary of ours. We know the sender of these, and wish him well. Such being the case, we give him this friendly advice: "Stand fast by your colours," and *quit them not* for any new-fangled ways of *stereotyping*, which are apt to burn a too fond patentee's fingers. Before shaking hands and parting with H. W., we cannot help expressing our admiration of his late coloured map of the new parliamentary divisions of our city, whereon the figured indication of "Ward No. 4" is planted right upon the bed of the river; a junction, this, of the "Clyde and the *Fourth*," which we did not think even H. W. could have managed so cleverly.—(Manufactures, Table C, No. 132.)

An Eccentric (primitive) Chuck.—Some people always *turn* in a circle, but this *chuck* can turn circles beyond the circle. It is an *eccentric*, and, therefore, not to be circumscribed in its gyrations. It is, moreover, a primitive eccentric, and therefore, not to be criticized by the rules of Holtzapffel.—(Table B, No. 7.)

Portland Vase, copy by Wedgwood.—This is interesting; no less for the merit of the original, than for its history and vicissitudes; from the day of its discovery to its being 'knocked into immortal smash' last year, in the British Museum, by an Irish bookbinder. *Immortal* it has proved, so far; the pieces (and some of them were almost pulverised) having been carefully picked, yea, swept up, the whole has been since put together, in the most complete and satisfactory manner, by a delicately artistic hand. One benefit has accrued to the country, which the Irish smasher did not count upon; it is this, that by an act of parliament passed last session, the *hides* of those who are impenetrable to shame, care not for public exposure, or the infliction of a small fine, as a punishment for damaging or destroying such objects; their backs, we say, will, in future, become acquainted with the hangman's whip. The Portland vase was long called the "Barberini vase," from its having been in the possession of a noble Roman family of that name. It was presented to the country by the late Duke of Portland.—(Table C, Manufactures, No. 41.)

Pass of Killycrankie.—This pass is in Athole, Perthshire, near the junction of the Tummel and the Garry, formed by the lofty mountains impending over the Garry The wild looks of it *frightened* a body o Hessian soldiers in the year 1746, when o their way to join the Butcher of Culloden it appeared to those hireling heroes to b the *ne plus ultra* of the habitable world, s through it they *would* not go! Near th north end was fought the fight of 1689 where Clavers, Viscount Dundee, receive the mortal wound which sent him out o that world where he had lorded it so mer cilessly. *He* was not

"———— that tool,
Which knaves do work with, called a fool."

On the contrary he was a knave (cleve and cruel) in the hands of unprincipled an vicious fools.—(Picture, No. 16.)

Paintings.—Portrait of James Wat painted from the life. Effigies less respect able than this, men have fallen down be fore. We felt, as our eyes met the kee (almost stern) regards of our Glasgow Tris megistus, that it would be but decorous an befitting to uncover at least, and bow to it It was our fortune to hear Arago's Elog pronounced upon him, in the Institute o France, in the month of December, 1832 It took fully three hours in the delivery but we heard it to the end with unrelaxe attention. We seemed to rise three goo inches in our boots as we listened to th great astronomer sounding the lofty praise of the greater mechanician. Arago spoke too, then and there, of the Model of New comen (No. 56 B) and which we little ex pected at that time ever to see.—(Area No. 56.)

Patent Wire Rope Machine.—This i an extraordinary piece of work, and one o the finest models in the Exhibition. Se it put in movement: it is like a disordere universe of suns and planets, first getting out of order and then into it again; a kin of celestial quadrille! We almost think w see before us, in little, a mimic realisatio of Darwin's lines:—

"Star after star from Heaven's high arch shall rush
Sun sink in sun, and systems systems crush;
Headlong, extinct, to one dark centre fall,
Where Death, and Night, and Chaos mingle all."

(Table B. Mechanics and Engineering No. 58.)

Glasgow: Printed for the Proprietors, by W. G Blackie, (residing at 25, Richmond Street) at hi *premises*, Model Exhibition, No. 19, Area A, *Cit Hall*.—Wednesday, January 6th, 1847.

Daily Exhibitor.

No. 9. GLASGOW, JANUARY 7, 1847. PRICE ½D.

RAILWAY INDICATOR.

(West Gallery, South Side.)

The inventor of the Railway Indicator, Mr. William Anderson, mail-guard, Elm Row, Edinburgh, has supplied us with the following description of it, which we willingly transfer to our columns:—

This Indicator is for showing, at any moment, the number of miles the train has travelled from the station from which it started, as well as the number to travel to the station at the end of the journey. It also enables the engineer, and any other person on the train, whether traveller or official, to ascertain, at night or in dense fogs, within a foot of the particular spot of the line on which the train is. It also tells the rate of speed at which the train is travelling; and at the same time pointing out the different stations and localities which the train passes. The dial of the Indicator, as shown on the drawing which accompanies this (the model), is fixed, and is in connection with a clock-dial which is made to revolve, and which, as shown separately by the drawing, will show how the machine is adapted to *register* on the skeleton clock-dial, for twelve consecutive hours, the length of time the train takes to run every mile. Thus, supposing 12 hours run on a stretch at 30 miles an hour, would be equal to 360 miles, every one of which would be registered. The clock is placed at the back of the Indicator dial, and nothing is seen from without but the moving dial, which is one and a half inch broad, and lifts off at pleasure, to show what has been done on the journey. The small hand shown on the lower part of the drawing, is the mile hand, every revolution of which is equal to a mile; and on the end of it is attached a spring with a pencil, so that every turn it makes over the clock or moving dial, it *marks* or *registers* a mile on the white margin opposite the minute figures. This hand goes on a joint, and when passing over an inclined plane, which will be seen on the drawing, raises the hand so as to bring the pencil in contact with the minutes at the proper place of marking. The large hand in the centre points out the number of miles on the journey. The uppermost small hand, pointing to 12 o'clock, is a fixture; consequently, the dial revolves to it to show the time. The dial differs from the ordinary clock-dial, in so far as between each chapter figure sixty minutes are included in place of five.

This machine would be an effectual check upon careless or reckless driving, which is too often indulged in. In fact, it would operate as a complete *check* upon book-keepers, conductors, and every other servant connected with the train, if under proper management; as at the end of the journey it has only to be examined to show the time when the train started—when it reached each of the different stations on the line—the length of time it had been detained at each—and the precise speed at which it had travelled on any part of the journey. And in connection with this check, and to render the benefits of the machine more complete, I would suggest that a book for the special purpose should be kept at the station at each end—terminus,—into which the dial should be copied each journey, which could be done in a few minutes; and this book would form a complete and lasting register of the whole working on the line.

In connection with, and in addition to, this machine, the invention comprehends a new plan of a *tail signal light*,—namely, a revolving one of red and white. This is to show *the rate of speed at night*, at a distance of 4 or 5 miles, when one train is following another; so that the engine-drivers might be able to keep their respective distances from one another, and regulate their speed. When wished to use this light, the lamp has merely to be fixed to the top of the upright spindle of the Indicator, by which it is made to revolve along with it, at the rate of 24 revolutions, and showing 48 different lights, per mile.

The Indicator represents its full-sized working order in all its parts, excepting the endless screw on the axle wheel, and the horizontal screw of 28 teeth communicat-

ing therewith,—the former of which, in its full size, is much deeper in its thread, and the latter also much deeper in the teeth, so as to afford room for the oscillations or shakings of the carriage, or the pressure on the springs from its weight by being full of passengers or otherwise.

The Indicator is placed at the back end of the carriage with the dial inside, near the roof, and the signal light projects above the roof. The working of the machine is seen by every person in the carriage, and is not confined to the use of the railway directors or officials; thus giving confidence to the public by enabling them to see what the train is performing.

It is now nearly *three years* since the Indicator was in working order; and in the end of last year it was in actual operation on the Dundee and Arbroath Railway, where it gave every satisfaction, and worked with the greatest regularity for upwards of three successive months.

The signal lamp and the mile-marking hand, which accompany the Indicator, are not complete, but mere models to show the workings of the machine.

SUGAR.

(Table E, No. 15, and No. 31.)

On the south front of East Gallery, No. 15, is exhibited a drawing of the Sugar Cane, and on the Table in the case No. 31 are exhibited a variety of specimens of the sugar of commerce.

The sugar-cane—*saccharum officinarum*—must be considered as a native of China, since it has been pretty accurately shown that its cultivation was prosecuted in that empire for two thousand years before sugar was even known in Europe, and for a very long period before other eastern nations became acquainted with its use.

Early in the fifteenth century the sugar-cane first appeared in Europe. Sicily took the lead in its cultivation; thence it passed to Spain, Madeira, and the Canary Islands; and shortly after the discovery of the New World by Columbus, this plant was conveyed to Hayti and Brazil, from which latter country it gradually spread through the islands of the West Indies.

The canes have knotty stalks, and at each joint or knot a leaf is produced. The number of joints varies in different specimens, some having as many as eighty, and others not half that number.

The sugar-cane varies exceedingly in its growth, depending upon the nature of the soil. In new and moist land it sometimes attains the height of twenty feet; while in ground that is arid and calcareous, its length does not exceed from six to ten feet. It is always propagated from cuttings. The top joints are always taken for planting, because they are less rich in saccharine juice than the lower parts of the cane, while their power of vegetation is equally strong.

In preparing a field for planting with the cuttings of cane, the ground is marked out in rows three or four feet apart, and in these lines holes are dug from eight to twelve inches deep, and with an interval of two feet between the holes. Where the ground is level, larger spaces are left at certain intervals, for the facility of carting; but there are many situations at the sides of steep hills where no cart can be taken, and in such cases these spaces are not required. The ripe canes are then conveyed to the mill in bundles on the backs of mules, or are passed down to the bottom of the hill through wooden spouts.

The hoeing of a cane-field is a most laborious operation when performed, as it must be, under the rays of a tropical sun. Formerly this task was always effected by hand labour, but, of late years, where the nature of the ground will admit of the employment of a plough, that instrument has been substituted, to the mutual advantage of the planter and his labourers. The planting of canes does not require to be renewed annually. The most general plan is for a certain portion of the land in cultivation to be planted annually and in succession, the roots and stoles of the canes of the former year being left through the remaining parts of the plantation. From these, fresh canes, which are called rattoons, spring up, and are nearly as large the first year as plant canes.

The manufacture of sugar is a somewhat complicated process, requiring for its successful performance not only some degree of chemical knowledge, but likewise a considerable amount of practical experience.

When the canes are fully ripe they are cut close to the stole, and being then divided into convenient lengths, are tied up in bundles, and conveyed to the mill. This always consists of three iron cylinders, sometimes standing perpendicularly in a

line with each other, and at other times placed horizontally, and disposed in the form of a triangle, and so adjusted that the canes, on being passed twice between the cylinders of either kind of mill, shall have all their juice expressed. This is collected in a cistern, and must be immediately placed under process by heat to prevent its becoming acid, an effect which has sometimes commenced as early as twenty minutes from the time of its being expressed. A certain quantity of lime in powder, or of lime-water, is added at this time to promote the separation of the feculent matters contained in the juice; and these being as far as possible removed at a heat just sufficient to cause the impurities to collect together on the surface, the cane liquor is then subjected to a very rapid boiling, in order to evaporate the watery particles, and bring the syrup to such a consistency that it will granulate on cooling. The quantity of sugar obtainable from a given measure of cane-juice varies according to the season, the soil, the period of the year, and the quality of the canes; but it may be calculated, that, taking one state of circumstances with another in these respects, every five gallons, imperial measure, of cane-juice, will yield six pounds of crystallized sugar, and will be obtained from about one hundred and ten well-grown canes.

The fuel used for thus concentrating the juice is furnished by the cane itself, which, after the expressing of that juice, is dried for the purpose by exposure to the sun.

When the sugar is sufficiently cooled in shallow trays, it is put into the hogsheads wherein it is shipped to Europe. These casks have their bottoms pierced with holes, and are placed upright over a large cistern into which the molasses—which is the portion of saccharine matter that will not crystallize—drains away, leaving the raw sugar in the state wherein we see it in our grocers' shops.

With the planters in our own colonies, the process of sugar-making mostly ends with the draining away of the molasses in the manner just mentioned; but in the French, Spanish, and Portuguese settlements it is usual to submit this raw sugar to the farther process of claying. For this purpose the sugar, as soon as it is cool, is placed in forms or moulds, similar to those used in the sugar refineries in England, but much larger; and these being placed with their small ends downwards, the top of the sugar is covered with clay moistened to the consistence of thin paste, the water contained in which gradually soaks through the sugar and washes out a farther quantity of molasses, with which it escapes through a hole purposely made at the point of the earthen mould. It is then called clayed-sugar: the loaves, when removed from the forms, are frequently divided into three portions, which, being of different colours and qualities, arising from the greater effect of the water in cleansing the upper portion, are pulverized and packed separately for exportation.

The molasses which have drained from the sugar, together with all the scummings of the coppers, are collected, and, being first fermented, are distilled for the production of rum. The proportionate quantity of this spirit, as compared with the weight of sugar produced, varies considerably with the seasons and management. In favourable years, when the canes are fully ripened, and the quality of the sugar is good, the proportion of molasses and scummings is comparatively small, and the manufacture of rum is consequently lessened: the proportion usually made is reckoned to be from five to six gallons of proof spirit for every hundred-weight of sugar.—*Veg. Substances.*

Salter's Model of Chester and Holyhead Railway Bridge. By Stephenson.—An example of the skilful daring of our engineers. It is to pass over the Menai Strait, like the Suspension Bridge of Telford; the use of which was asked for from Government by the railway company, but (perhaps well judgingly) refused. The bridge of which this is a beautiful model, will be, if we mistake not, a continuous iron tube, composed of massive plates of cast iron, bolted together.—(Mechanics and Engineering; Table B, No. 60.)

Model of a Bookbinder's Bench. By Mr. Bulloch.—What a change has come over the spirit of this trade, auxiliary to our own art, since we first knew it! or to go still farther back, from the "bought-borrowed-stolen" projections of book-backs, in the dear school-boy time!—For many a day, there was "nothing like leather;" now cotton is, almost, "your only wear." The material of book-boards passed

from wood, and its bark (*liber*), to parchment, then to leather, then to calico. But while the material of the cover has been much altered of late, there has been a decided reverting—in ornamenting—to the old style of "table binding," and to antique ornaments.—(Mechanics; Table B, No. 45.—Manufactures; Table C, No. 121, *et seq.*)

The Daily Exhibitor.

THURSDAY, JAN. 7, 1847.

IN Paris there exists a collection of models called the *Conservatoire des Arts et Métiers*. This monster collection is national; and its rapid increase is secured by the French Patent Law, which provides, that of every machine or other apparatus or scheme whatsoever, for which a patent is granted, there shall be deposited a model, drawing, or plan, in the *Conservatoire des Arts et Métiers*. These models are not placed there for a time only. They remain perpetually, and are open at all times to be inspected. This plan of making a collection of models possesses both advantages and disadvantages; the latter of which, we believe, predominate. One advantage is, that the inventor of any new apparatus may go to this collection and consult all that has been already patented in the same line. He may thus avoid the defects of others, and improve his own invention. It must, however, be a very great disadvantage to have such a heterogeneous assemblage of articles, good, bad, and indifferent. Because, let it be remembered, no matter though the machine or apparatus of which the model is here deposited, may never have accomplished the purpose for which it was intended, or any other practical purpose, here it remains in virtue of having been patented. The collection thus to a considerable extent has become a gathering of useless articles, interesting merely as showing how many abortive schemes may receive a patent in a given time;—we can hardly suppose that it will serve the good purpose of scaring the unwary or not sufficiently skilled. In forming a collection of models for Glasgow or for Britain, we trust this error of the French will be avoided. Our *Conservatory* ought to contain models of no apparatus which has not been found capable of fulfilling its purpose, or if such *were* admitted, they should be placed in a section by themselves, a sort of mechanical Limbo, to be entitled ABORTIVE SCHEMES.

We trust the time is not far distant when a Collection such as we have hinted at will be set a-going in good earnest. Nothing is required but a certain amount of funds, and a few energetic individuals to regulate matters. Every workshop in the kingdom would vie with another in sending models of all they possess of interest to such a depository and exhibition of the skill of our working, and the fecundity of our inventive, powers. We, however, meantime, leave the matter to the consideration of our readers.

A CHILD PLAYING WITH A GOOSE.

CAST FROM THE ANTIQUE.

(Table G, No. 4.)

We read in Pliny the description of a child squeezing a goose's neck, the action of which was admirably expressed; it had been executed in bronze by the Carthaginian sculptor Bœthus. Winckelmann thought that the marble in the Capitoline Museum was a copy; this conjecture is strengthened and acquires additional weight from the recent discovery of two marbles absolutely alike. The group from which the one exhibited is a cast, was found in 1789, at the place called *Roma Vecchia*, a league and a half from Rome, upon the ancient Appian way; it is in Pentelic marbie. Nothing can be more graceful than the action of the child; infantile mirth and happiness are rendered with rare felicity. The light and easy touch which pervades this work has induced the belief that it was executed in Rome towards the end of the second century. In this group, which is in the Vatican, the child's head is a modern restoration; whilst in that of the Capitoline Museum, the head is antique.

BUST OF PROFESSOR WILSON,

BY JAMES FILLANS.

(Table G, Sculpture No. 8.)

This bust, representing one of the most eminent of Paisley's sons, has very properly been executed for the town of Paisley, by a native sculptor, and one who not only does honour to the town of his nativity, but also to his country. This admirable work sets before us not only the bodily presence of the learned and eloquent Professor in vivid reality, but also conveys, in its expression, much of his elevated intellect and vigorous genius. No one who looks on this bust, even though he knows nothing of the individual represented, but must feel that such a head belongs to no ordinary man. So many are the excellencies of this work in all that is lofty and difficult to achieve in the sculptor's art, that we would venture to place it beside the finest remains of antiquity, and dare the comparison. Had it only been buried for a few years by the margin of the Lago Albano, or in any other locality of classic interest, and been recently excavated, and submitted for examination to some antiquary of authority, such as the Abbé Winckelmann, we little doubt but he would have pronounced it to be one of the finest antiques of the beardless Jupiter yet discovered, however much a more modern appearance, and traces of a more modern style, might weigh against that judgment.

THE DYING GLADIATOR.

A REDUCED COPY FROM THE ANTIQUE IN MARBLE.

(Table G, No. 19.)

This statue is so generally known by the name of the *Dying Gladiator*, that it is doubtful whether another denomination would be adopted for it, although it is evidently proved to have no affinity with the other figures of gladiators. Visconti justly remarks, that "the short bristling hair, the moustache, profile of the nose, shape of the eyebrows, the sort of *torquis* collar around the neck, and every thing in this figure, prove it to be meant for a barbarian warrior (perhaps a Gaul or German) mortally wounded, and expiring like a brave man on the field of battle, which is strewed with arms and warlike instruments."

The noble posture of this figure, a great purity in the forms of the trunk, an admirable expression in the head, render this statue deservedly admired; and it excites astonishment, by the side of such eminent perfections, to find other parts feeble, and even a hand badly formed, although it is incontestibly antique. The whole of the right arm, and the extremity of the feet, are restorations of the sixteenth century. This statue in Luni marble comes from the villa Ludovisi; it is now in the Museum of the Capitol at Rome. If erect it would measure 6 feet 11 inches.

The copy of this statue exhibited scarcely conveys an adequate idea of the original, the delicate markings of the anatomy not being rendered with sufficient spirit and precision.

THE PYTHIAN APOLLO.

CALLED THE APOLLO BELVIDERE.

(East Gallery, No. 5.)

When the waters of the deluge had subsided, a monstrous serpent appeared in the marshes of Phocis; but Apollo delivered the earth from the terrible Python. A sculptor choosing for his subject this beneficent action of the god of day, represents him the moment after he has shot his arrow: his limbs still quiver from the action, the hand that holds the bow is yet stretched out; satisfaction beams upon his brow and in his eyes, whilst the nostrils and lips retain some traces of the god's anger.

This master-piece of antique sculpture deserves the most minute attention to scan its numerous beauties, while such an examination exalts the soul of him who is thus engaged; and as M. Cemeric David justly observes—"The unlearned who survey it are affected, excited, and as they admire it, feel within themselves an indescribable sensation. The connoisseur, each time he looks at it, perceives with astonishment that he had not yet embraced all its perfection: the more he knows it, the more he discovers in it, truth, delicacy, grandeur, and beauties ever new."

This statue, in Luni marble, was discovered towards the end of the fifteenth century, near Capo d'Anzo, formerly *Antium;* it was purchased by pope Julius II., then a cardinal; who, on his elevation to the pontificate, had it placed in the Belvidere gardens: the two hands which were wanting, were then supplied by Fr. Jean-Ange de Montorsalo, a pupil of Michael Angelo.

BANYAN TREE, OR INDIAN FIG.

On the south front of the East Gallery there is a drawing of this remarkable tree *(ficus indica)* which belongs to the family of figs. It is a native of India; and it and another species *(f. religiosa)*, are held in such veneration by the Hindoos, that if a person cuts or lops off any of the branches, he is looked upon with as great abhorrence as if he had broken the leg of one of their equally sacred cows.

Some specimens of the Indian fig tree are mentioned as being of immense magnitude. One near Mangee, twenty miles to the westward of Patna, in Bengal, spread over a diameter of 370 feet. The entire circumference of the shadow at noon was 1116 feet, and it required 920 feet to surround the fifty or sixty stems by which the tree was supported. Another covered an area of 1700 square yards; and many of almost equal dimensions are found in different parts of India and Cochin China, where the tree grows in the greatest perfection. The fruit is small, not exceeding the size of a hazle nut, and is of no use.

The common fig of commerce is obtained from quite a different plant. The fig tree *(ficus carica)* is a native of Asia, Africa, and the south of Europe, and has been cultivated from remote antiquity in the countries surrounding the Mediterranean, where it forms a principal article of food in many places. The stem is from fifteen to twenty-five feet high, with a trunk sometimes two feet in diameter, giving out a great number of long, twisted, pliant branches, which are grayish and rough when young; the leaves are deciduous, of the size of the hand, having three to five rounded lobes; the flowers are very small, unisexual, contained in great numbers in a common receptacle, which is fleshy and connivent at the summit, where it is almost closed by a series of little teeth; the male flowers occupy the superior part of this receptacle, and the female, which are the most numerous, the bottom, and all the remaining part of the cavity; each ovary becomes a seed, surrounded with a pulp, which, together with the receptacle, forms the fruit. The fruit is solitary, generally of a purplish colour, has a soft, sweet, fragrant pulp, and is much esteemed, being constantly brought upon the table, during five months of the year, in the south of Europe.

THE BAOBAB.

The fruit of the Baobab, commonly called Monkey-bread (Table E, No. 81), and elsewhere on the same table, the produce of *Adansonia digitata*. This tree is a native of Western Africa, and is likewise said to be found in Egypt and Abyssinia; it is cultivated in many of the warmer parts of the world. There seems to be no doubt but that it is the largest known tree, its trunk being sometimes not less than thirty feet in diameter. The height of its trunk by no means corresponds with the thickness which it attains. Thus, according to Adanson's calculations, at one year old its diameter is one inch, and its height five inches; at thirty years old it has attained a diameter of two feet, while its height is only twenty-two feet, and so on; till, at 1000 years old, the baobab is fourteen feet broad, and fifty-eight feet high.

It often happens that the profusion of leaves and of drooping boughs almost hide the stem, and the whole forms a hemispherical mass of verdure, 140 to 150 feet in diameter, and sixty to seventy feet high. The wood is pale-coloured, light, and soft; so that in Abyssinia the wild bees perforate it and lodge their honey in the hollow, which honey is considered the best in the country. The negroes on the western coast, again, apply their trunks to a very extraordinary purpose. The tree is liable to be attacked by a fungus, which, vegetating in the woody part, without changing the colour or appearance, destroys life, and renders the part so attacked as soft as the pith of trees in general. Such trunks are then hollowed into chambers; and within these are suspended the dead bodies of those to whom are refused the honour of burial. There they become mummies, perfectly dry, and well preserved, without further preparation or embalming, and are known by the name of giuriots. The baobab is emollient and mucilaginous: the pulverised leaves constitute *lalo*, a favourite article with the natives, which they mix with their daily food to diminish excessive perspiration; and which is even used by Europeans in fevers and diarrhœas. The flowers are large, white, and handsome; and the fruit is from nine to twelve inches long, and about four in diameter, of a brownish colour, and rather pointed toward the extremities. The pulp is a little farinaceous, mixed with fibres: when recent, it has a

very refreshing acid taste; and eaten with sugar, it is both pleasant and wholesome. It retains its cooling qualities when dry; and, on that account, the physicians of of Cairo administer it in fevers and other diseases.

THE DISCOBULUS OR QUOIT PLAYER.

(East Gallery, No. 10.)

Lucian and Quintilian mention a bronze statue of a discobulus or quoit player, by Myro. It is believed that this marble statue is a copy of it; but the sculptor deserves the highest praise for having so correctly given the expression of all the parts.

There were two ways of playing at quoits: the one consisted in throwing the discus, or quoit, vertically; the other in hurling it forwards, which was the more usual, as the intent was not to reach an aim, but to pitch the quoit as far as possible. In whatever manner it was cast, the discobuli held it so that its lower edge was within the hand, and supported by the four fingers bent inwards; whilst its hinder surface rested against the thumb, the palm of the hand, and part of the fore-arm. When they intended to use it, they advanced one of their feet, upon which the whole body rested; then balancing the arm, they whirled it several times, almost circularly, to drive the quoit with the more impetus,—it being thus thrown, not only by the hand, but by the arm, and, in a manner of speaking, by the whole body.

This statue, which was found in the Villa Adriana, at Tivoli, towards the end of the eighteenth century, was purchased by pope Pius VI,, and placed in the Vatican Museum: it was brought to Paris in 1797, and returned in 1815. The name of the statuary is engraved, in Greek letters, on the trunk of the tree by which the statue is supported; but this indication is the work of the modern restorer.

Carp-Bream *(Abramis brama)*, East Gallery, south front, No. 4. A short account of this not uncommon fish may be interesting to our readers. The specimen exhibited is from Lochmaben. The Bream is an inhabitant of many of the lakes and rivers of the continent of Europe generally, even as far north as Norway and Sweden. In this country it appears also to thrive best in large pieces of water, or in the deep and most quiet parts of rivers that run slowly, being found in many counties, and particularly in some of those that contain lakes and canals of considerable extent. The lakes of Cumberland, and some of the most extensive lakes in Ireland, produce large quantities of Bream of great size. Bream swim in shoals, feeding on worms, and other soft-bodied animals, with some vegetable substances; and if the water they inhabit suits them, which is generally the case, as they are hardy in their nature, they grow rapidly, and spawn in May.

The flesh of the Bream being generally considered insipid and bony, they are not in great estimation for table, though the breeding of them is cultivated, or rather permitted, as useful to feed Pike, and other voracious fishes. It may be inferred, from a couplet in Chaucer's Prologue to the Canterbury Tales, that the feeding and eating of Bream was more in fashion in the days of Edward the Third than at the present time:—

"Full many a fair partrich hadde he in mewe,
And many a Breme and many a Luce* in stewe."

* Luce, a Pike.

Angel-Fish *(Squatina angelus)*, East Gallery, south front, No. 7. This fish, certainly more remarkable for the singularity of its form than for its beauty, is called Angel-fish in England, France, and Italy, and is said to have acquired that name from the extended pectoral fins having the appearance of wings; it is also called Monk-fish, because its rounded head looks as it enveloped in a monk's hood. It is also called Shark-Ray, from its partaking of the characters of both Shark and Ray, though in some respects distinct from either.

It is most numerous on the southern coast of our island; but is occasionally taken in the Forth, and some other parts of the east coast, particularly about Cromer and Yarmouth.

This fish is very voracious, and feeds on the smaller flat-fishes, which, like itself, swim close to the bottom; occasionally, like them also, hiding itself in the loose, soft soil that floats over it. The Angel-fish sometimes attains a large size. Cuvier, Pennant, and others, mention having seen specimens that would have weighed one hundred pounds. The flesh is now considered indifferent and seldom eaten, but is said to have been formerly held in high estimation. The skin is rather rough, and is used for polishing, and other works in the arts.—*Yarrel.*

MÆNURA LYRA, or LYRE-BIRD.

(West Gallery, No. 93.)

Notwithstanding the sombre hues of this extraordinary bird, the magnificence and peculiar structure of the beautiful tail of the male, which imitates the form of an ancient Grecian lyre, give it a superb appearance.

Locality—New South Wales, principally in the forests of *Eucalyptus* and *Casaurina*, which cover the Blue Mountains, and in their rocky and retired avenues.

Habits—Lieutenant Collins says that "the following particulars relating to these birds were observed by persons resident in the country, and who were eye-witnesses of what is here told. They frequent retired and inaccessible parts of the interior; have been seen to run remarkably fast, but their tails are so cumbrous that they cannot fly in a direct line. They sing for two hours in the morning, beginning from the time when they quit the valley, until they attain the summit of the hill, where they scrape together a small hillock with their tail spread over them, imitating successively the note of every bird known in the country. They then return to the valley." If dependence could be placed upon this account as far as relates to the singing, it would assist the views of those who would place *Mœnura* near the Thrushes; among the gallinaceous birds, singing, in the common acceptation of the word as applied to birds, is not known. But this sort of statements, taken as they mostly are from the relation of those who are not very careful as to the truth of their communications, if they can only surprise and please their auditors, must be received with many grains of allowance. The "song" is not corroborated by subsequent observers.

These birds have their young in December, the season when all the wild animals in the colony are produced, and can be then procured with facility. "It is," says Mr. Bennett, "a bird of heavy flight, but swift of foot. On catching a glimpse of the sportsman it runs with rapidity, aided by the wings in getting over logs of wood, rocks, or any obstruction to its progress; it seldom flies into trees, except to roost, and then rises only from branch to branch: they build in old hollow trunks of trees which are lying upon the ground, or in the holes of rocks; the nest is formed merely of dried grass or dried leaves scraped together; the female lays from twelve to sixteen eggs of a white colour, with a few scattered blue spots; the young are difficult to catch, as they run with rapidity, concealing themselves among the rocks and bushes. The Lyre Pheasant, on descending from high trees, on which it perches, has been seen to fly some distance; it is more often observed during the early hours of the morning, and in the evenings, than during the heat of the day. Like all the gallinaceous tribe, it scratches about the ground and roots of trees, to pick up seeds, insects, &c. The aborigines decorate their greasy locks, in addition to the emu feathers, with the splendid tail feathers of this bird, when they can procure them."

Mr. Bennett laments the rapid disappearance of the races of animals found in a new country, and which are pursued, whether useful or dangerous, even to extermination. He states that in the settled parts of the colony, the harmless kangaroos and emus are rarely seen, when they might easily be domesticated about the habitations. "The same remark," he adds, "applies to the Lyre Pheasant. Why are they not domesticated, before, by extermination, they are lost to us for ever?

We trust that this may meet the eye of some spirited individual who will *not* suffer the loss to take place, but bestir himself to import these magnificent birds. That they would live in this country, as well as the emus and kangaroos, with ordinary care, there can be little doubt; and they would form a striking addition to our aviaries,—perhaps even to our homesteads.—*Penny Cyclopædia.*

WOODEN PEAR.—A curious instance of deterioration in fruit. In this specimen the fibrous tissue of the fruit has so greatly increased, that the cellular or parenchymatous tissue has become wholly ligneous or woody. This deterioration is not uncommon in the pear, though it seldom proceeds so far as in the specimen before us. Every one must at times have remarked gritty particles between his teeth when eating pears. These are the incipient nuclei of the ligneous formation.—(Table E, Case 32.)

Glasgow: Printed for the Proprietors, by W. G. BLACKIE, (residing at 25, Richmond Street,) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Thursday, January 7th, 1847.

Daily Exhibitor.

No. 10. GLASGOW, JANUARY 8, 1847. PRICE ½D.

SERIES ILLUSTRATING THE VARIOUS STYLES OF ENGRAVING.

BY ROBERT BLACKIE, ESQ.

Wall F.—Nos. 96 to 109.

This series of prints has been exhibited that persons possessing little knowledge of engraving might, by seeing specimens of the different styles placed side by side, become so acquainted with their characteristic differences as to be able to tell in what style any print is executed. We shall endeavour shortly to describe the process pursued in the various methods of engraving.

LINE ENGRAVING.

This is considered the highest and most difficult branch of the profession. Engravings in this style have the forms almost entirely produced by lines.

Etching, No. 96.—There are two varieties of line etching. The one intended for prints to be completed by the etching process, and the other for the preparatory process to finished line engraving. We describe the latter.

In producing a line engraving an outline pencil drawing is first made the exact size the subject is to be engraved. If the original be a large picture, it is reduced by dividing its surface into a number of squares, of equal size, by means of threads fastened to pins in the edges of the canvas, passed over it vertically and horizontally. The paper on which the reduced outline is to be made is divided into a corresponding number of squares, drawn by a pointed instrument. In reducing his subject, the engraver takes care to put exactly the amount that is contained in one square of the large picture into the corresponding small square on his paper. If the copy be the same size as the intended engraving, the engraver makes his outline by placing a semi-transparent paper over his copy and tracing it through. The outline in pencil being finished, the plate of steel or copper is thinly coated with etching ground, a waxy composition capable of resisting the action of acids. The drawing is placed in its position on the plate with its face to the etching ground, and by passing them together through a copperplate printer's press, a *reverse* of the pencil drawing is distinctly transferred to the surface of the etching ground. It is necessary that the subject be *in reverse* on the plate, otherwise the impressions from it would be a reverse of the copy. The engraver now refers to his copy, by the reflection of it in a mirror instead of directly to the picture; as, by this means, he obtains an image of it in the same reversed position as he has already got it by transference upon the etching ground. The outlines are now gone over with an etching needle, merely cutting through the etching ground and slightly scratching the surface of the plate. In a similar manner all the other lines seen in the specimen exhibited, are drawn or scratched upon the plate, the subsidiary forms being copied direct from the original without the assistance of previous pencil lines. The plate is now surrounded by a ledging of shoemaker's wax, after which diluted nitric acid is poured upon it, which *bites*, or corrodes into hollows, all the parts of the metal that have been laid bare by the etching needle removing the etching ground. The acid being poured off, the lines that are intended to print lightest are stopped up with varnish, and the acid again applied to the parts intended to be darker. This process of *stopping out* and *biting in* is repeated as often as the engraver considers necessary. If, on removing the etching ground, he finds any part where the lines are not sufficiently deep, that portion is re-coated with etching ground, taking care not to fill up any of the lines, and the acid is again applied, while the portions of the plate considered completed, are protected from the action of the acid by being thickly coated with varnish. This is called *re-biting*. Impressions from a plate in this stage are called Etchings, or Aquafortis Proofs.

Finished Proof, No. 97.—The opera-

tion of engraving, properly so called, now commences. It is done by an instrument called a *graver*, which is either square or lozenge-shaped, according to the work for which it is used. The figures in the print exhibited are entirely produced by cutting the lines with the graver. The principal lines are at first cut delicately. This is termed *laying in*. They are afterwards *entered*, or gone through with the graver, to make them wider and deeper; the cross lines are then cut, and subsequently the whole of the lines are repeatedly entered by the graver. Each time they are gone through they approach nearer to the smoothness and delicate appearance which they have in the finished work. Where great depth of line is required, the parts after having been laid in are subjected to the operation of re-biting, by which, in large plates, an effect may be given in the course of an hour or two, which would require some days, or even weeks, to produce by using the graver alone. In the landscape parts, many of the lines which were left unconnected in the etching are now joined, parts are again re-bit, and the whole revised and perfected by the graver. In the operation of cutting the lines, small portions of the metal are thrown up, which form a roughness or burr upon the edges. This must be from time to time removed by the scraper. If the engraver makes a mistake, or changes his mind respecting any part of his work, this can be remedied by burnishing and scraping it out; but should the lines that are to be taken out be deep, the plate is placed with its face upon a smooth anvil and the part struck up from behind with a punch or pointed hammer. While the engraving is in progress, the engraver takes a proof of his plate, from time to time, that he may know exactly the progress of his work.

ENGRAVING IN STIPPLE, CALLED ALSO THE CHALK MANNER. NO. 98.

The principal difference between this and the line manner is, that the forms are almost entirely produced by dots of various sizes instead of by lines. The process of execution is very similar to that employed for line engraving, but admits of a greater portion of the work being done by the action of acid. If engravings of this kind are examined by means of a lens, it will be found that what appears a single dot to the naked eye, consists of several dots joined together or nearly so. It is this that imparts the beautiful softness so pleasing in this style. In the coarser kinds of work, an instrument has been devised for producing dots in a more expeditious manner than by the point and graver, called a *roulette*, which is a small wheel moving on a pivot, and having very fine sharp teeth. By using a firm pressure, and running it along the face of the plate, a large surface can be dotted in a very short time. This, however, is quite inapplicable to the finer kinds of work, as the mechanical regularity of the dots cannot be concealed without much labour. The stipple engravers of the present day are in the habit of mixing a considerable portion of line engraving with the dotted work, thus imparting a richness and variety of texture which could not be produced by the dotted work alone.

ENGRAVING IN MEZZOTINTO. NO. 99.

The principal characteristic of pure mezzotinto is the entire absence of either lines or dots, and its perfect resemblance to drawings in Indian ink. It has, for many years past, been a favourite style of engraving for large portraits and historical subjects. The tools required for this rapid and easy mode of proceeding are, the grounding tool, the scraper, and the burnisher. A delicate outline is first etched, in the manner already described; the surface of the plate is then gone over with the grounding tool, which has a number of fine sharp teeth. This tool is held perpendicularly upon the plate, and rocked backwards and forwards with a moderate pressure till it produces a rough furry surface; care being taken never to allow the tool to cut twice in the same place. The light forms and gradations of shading are made out by scraping with a sharp instrument which removes a portion of the rough surface; this is done to a greater or less extent according to the brightness required. Any large part intended to be perfectly white is not gone over with the grounding tool. The deepest shadows are grounded with a coarser tool, giving it greater pressure, while the more delicate parts are grounded with a finer tool, pressed lightly. When completed, the rough surface retains the ink, and furnishes it to the paper. The parts that have been much scraped print nearly white, owing to the roughened surface being almost entirely removed,

parts which have undergone less scraping print darker, and those which have not been scraped print positively black. The principal objection to this method of engraving is, that the plates soon become worn, and produce a comparatively small number of good impressions. To remedy this defect, modern engravers are in the habit of commencing their plates with line etching and stipple work, thus laying a firm foundation for the mezzotinto grounding, and causing it to wear much longer. The French engravers are in the habit of *biting in* all the strongest darks of the picture with aquatint, which produces a firm ground, and wears much longer than mezzotint. In all kinds of engraving the extreme darks are the first parts that become worn.

ENGRAVING IN AQUATINTA. NO. 100.

Aquatinta somewhat resembles mezzotinto, but has not the same mellow softness, the tints having rather a granular appearance. An outline being etched in the manner already described, the plate is properly cleaned with whiting. The ground for *aquatinting* is composed of resin reduced to powder, more or less fine, according to the kind of subject to be represented, and mixed with spirit of wine. The plate being placed in a sloping position, this composition is poured over it in a slow and uniform manner, taking care to cover the face of the plate without requiring to repeat the operation. The spirit of wine runs off or evaporates, leaving a beautiful and uniform surface of the particles of resin, which adhere firmly to the copper. The etched outline can be distinctly seen through this transparent ground. All the places where there is to be no work or shading are covered with a thick black varnish, on which acid does not act. The nitric acid is now poured on, and acting on the uncovered portion of the plates between the granules of the resin produces the lightest shade. The acid being poured off, the light shades are now stopped out with varnish, and the acid allowed to act a second time, and this stopping out is continued till the deepest shades are come to, which are *bit in* last. When this operation is completed, the parts which require softening must be done by the scraper and burnisher. Aquatinting is in a great measure the reverse of the process of etching, already described. In etching, we have a solid ground, and whatever lines are to be acted upon by the acids must be scratched through the ground, to admit of its reaching the plate. In aquatinta we have a porous ground, and all the parts that are *not to be acted upon* by the acid must be stopped up, to protect them from its influence.

ETCHING ON SOFT GROUND. NO. 101.

Plates executed by this method have very much the appearance of drawings in chalk or rough pencil sketches. Common etching ground is taken, and rendered soft by the admixture of oil and tallow. A ground is then put upon the plate, in the same manner as for common etching. When cold, a piece of silk is stretched tightly over the surface of the plate, and above it is placed a piece of white paper. The subject is drawn on this paper with a hard pencil, while strong pressure is used. By this means the ground adheres to the silk, and thus leaves the plate exposed; so that, by being bit with acid, a picture is produced having a soft appearance. Defects that sometimes occur in the biting are remedied by stipple work, but this is used to a very limited extent. This kind of engraving is mainly suitable for large subjects that have not much detail, and especially for those in a sketchy style.

AN ENGRAVED COPPERPLATE, WITH AN IMPRESSION FROM IT. NOS. 102, 103.

No. 102 shows the lines produced upon the plate by the combined action of acid and the graver. In taking an impression from it, the surface is daubed over with ink till the lines are all filled up; the surplus ink is then wiped off, and the plate polished with chalk till its surface is quite bright, no ink remaining on any part of it but in the lines. The plate, with a piece of damped paper laid upon it, is now passed between the rollers of a copperplate printer's press. The pressure causes the ink to leave the lines in the plate and adhere to the paper, producing an impression, No. 103.

The process of copperplate printing is shown in operation in the Hall, Area A, No. 18, and is described in No. 5 of the *Daily Exhibitor*.

ENGRAVINGS ON WOOD. NO. 104.

Engravings on wood may generally be distinguished from line engravings on steel or copper, by the light parts being unusually

large and free from work, and the shadows more intense and abrupt. The lines which produce the picture, instead of being cut into the substance of the wood, are left in relief, like the letters of printing types, and printed in the same manner. Boxwood is used for this purpose, and is cut across the grain (into pieces of the height of common types), that the engraving may be made upon the end of the grain, it being impossible to cut lines running with the grain or thread of the wood. The surface being planed smooth, the design is drawn upon it in reverse, with a black lead pencil, with all the shadows hatched or *laid in* as they are to appear in the impression of the wood-cut. The graver is then used, and all the interstices which are left between the lines of the drawing are picked out; the parts which, in the impression of the cut, are to be pure white have the surface of the wood completely cut away, and the parts to be positively black require no engraving. The tools made use of besides the graver are chisels, gouges, and knives of various forms and sizes. On account of wood-cuts being printed from the raised surface, it is much more difficult to execute cross lines on wood than on steel or copper. In the former, the small white spaces that appear between the lines must be picked out separately; while in the latter, the black lines are cut continuously as they are seen in the impression.

The great advantage of wood engravings is, that they can be printed in the same page, and at the same time as types; thus allowing the illustration to be introduced exactly where it is wanted, and saving much tedious reference to plates and figures. The printing of engravings on wood, in the best manner, requires much time and ingenuity. This process involves so many technicalities that our limited space will not permit of our entering upon its description.

The Daily Exhibitor.

FRIDAY, JAN. 8, 1847.

WHY have we no Exposition of industrial art? This question has been frequently asked, but has not received any answer; and that, just because none suitable can be given. In the experience of the Highland Agricultural Society, we have an excellent example of the improvement that may be effected by means of Exhibitions and Premiums. Looking at the results obtained by that Society in regard to agriculture, and sundry other branches of industry connected with it, we wonder why expositions, which would include *all* branches of industry, have never been yet tried in this country. The French, to whom we generally esteem ourselves superior, are ahead of us in this respect. They commenced Expositions of industrial art in Paris so far back as 1798, since which time *nine* have taken place—the last in 1844. These Expositions have greatly increased in repute and efficiency since their first establishment. Much of the jealousy existing usually among manufacturers, artizans, &c., has subsided, and much improvement has been effected. Parties are no longer so unwilling to divulge the secrets of their craft. Each feels, while he gives, that he also receives, and thus a counterbalance is effected beneficial to all. The number of contributors to the first French exposition, in 1798, was 110; to the eighth, in 1834, 2447; to the ninth, in 1839, 3381; and to the tenth, in 1844, 3969; showing an increase over 1834 of more than a half. All parties are eligible as contributors; but every article any one may choose to send is not admitted. In each Department of France a local jury is appointed, to whom the articles must be submitted, and who judge which of them are suitable for being sent to the Exposition. The expense of carriage to and from Paris to the chief town of the Department is defrayed by government. Parties at a distance from the capital, who may have erected establishments, within the prescribed period, calculated to further the progress of the arts and manufactures, or who may have invented objects not susceptible of being sent to the Exposition, are judged of by the local jury, and reported upon, and partake

in the distribution of rewards according to their merits. A central jury is appointed by government, which, of course, must exercise its functions chiefly at Paris. This jury, comprising the names of many of the first manufacturers and men of science in the kingdom, adjudicates the prizes. And here, be it remarked, the directors of the Exposition do not encourage the exhibition of the *single elaborated specimen* of the individual. Their object is utilitarian; the real progress of the arts and manufactures of the country, not to feed the vanity of individuals, however skilled. Consequently, in awarding prizes, the jury is guided by a consideration which, we are afraid, even the Highland Agricultural Society has never fully realized; namely—is the article exhibited, not only good in itself, but is it a *fair sample of the article* which the manufacturer exhibiting it *exposes for sale in his place of business?* It will thus be apparent, as already adverted to, that the French Expositions do not favour the production of individual elaborated examples of any manufacture. They seem to have no sympathy for a plaything-model, on which the inventor or maker may have expended years, in order to give it extra finish, and bring it out a non-such article, to be the seven-days wonder of a gazing public. We do not by this mean to underrate the importance of such labours—they are beneficial in their way, that is, in tending to the greater perfection of the individual *workman*. A collection of such works would be highly interesting, and rewards for the best executed productions might stimulate workmen on to still greater mechanical perfection; but it could only indirectly subserve the great practical end, kept in view by the French Expositions. A prize, obtained under the circumstances above described, becomes doubly honourable, as well as doubly valuable, being obtained for what is good in *the market*, as well as good in the *show-room*. So highly are such rewards esteemed in France, that the successful competitors regularly mention their prize in their advertisements—some even have it stated on their sign-boards. It is, therefore, not uncommon to see the gold medal, the silver, the bronze medal, or even the *honourable mention* of the contributors' works, with the date of the exposition, fully stated, and with great effect, in public advertisements. The French have already had their imitators almost everywhere but in Britain. In Belgium, Prussia, Austria, &c., Expositions of the same description have been instituted, and are in high repute. In this country, almost the only similar exhibition which we believe ever took place, was the League Bazaar. Its object, however, was totally different, being *sales*, and not the improvement of the arts and manufactures. In it, however, we have an earnest of what could be done, were proper means adopted. Covent Garden Theatre, large as it is, was found much too small for properly displaying the articles sent in. Such an exhibition would require a pavilion erected for its own special use, upon a plan suited to the end in view, namely, to let every article be well and easily seen. This is the plan adopted in Paris. The last Exposition was held in the Champs-Elysées. It was open two months, and the building, named the Palace of Industry, erected to contain it, covered twenty thousand square yards, and the avenues between the stalls or tables, where the articles were exhibited, extended to between five and six miles. An Exhibition, chiefly of textile fabrics, took place in Manchester last winter, which was eminently successful, as far as it went. It was, however, as we understand, *merely* an *Exhibition;* there was no *competition* for *premiums* connected with it, and, therefore, it did not fulfil the desired conditions. Many conflicting interests tend to prevent such an Exposition being commenced in the metropolis of our country; but any of the great manufacturing cities might lead the way. We ourselves might begin in Glasgow. Success is certain. And if, after showing the thing to be practical as well as practicable, the Exposition became *National* in place of local, the honour of being the first to commence it, would be so much the greater.

PLAN IN RELIEF OF THE BASIN OF LOCH LUBNAIG, LOCHS VOIE AND DOINE, THE PASS OF LENI, &C.

The river Lubnaig, the general drainer of these fine sheets of pure water, is a tributary of the Teath, or Teith. This plan will surely interest all Glasgow visitors, as they there see before them the sources of their future supplies of water. The Clyde is a cow which will bear no farther milking.—This whole mimic scene is further interesting for two reasons more. The braes around are Tannahill's "Braes of Balquhidder;" and Benledi is close by (not in the plan though). The half of Loch Lubnaig is in Callander parish; and Callander town is a few miles below the extreme south point of the lower lake. The distance that the water has to be taken for our use is therefore great; about 30 miles. The water-course, as projected, will be mostly a covered one. The largest water-course in Britain (which is an uncovered one) for the supply of water to a community, is that of the New River, from Hertfordshire to London, 40 miles long. But some of the Roman aqueducts, carried on arches, were yet longer. One, still extant, is about 42 miles long, and ends at the Eternal City itself. The greatest modern aqueduct is that which conveys water to the city of New York, the CROTON, lately finished and opened, of which we are tempted to give a description from the *United States Gazetteer* for 1844:

"The most splendid and expensive public work undertaken by the city is the Croton water-works. The aqueduct commences at the Croton river, 5 miles from Hudson river in Westchester county. The dam is 250 feet long, 70 wide at bottom, and 7 at top, and 40 high, built of stone and cement. It creates a pond 5 miles long, covering 400 acres, and contains 500 millions of gallons of water. From the dam, the aqueduct proceeds, sometimes tunnelling through solid rocks, crossing valleys by embankments, and brooks by culverts, until it reaches Harlem river, a distance of 33 miles. It is built of stone, brick, and cement, arched over and under, 6 feet 9 inches wide at bottom, 7 feet 5 inches at the top of the side-walls, and 8 feet 5 inches high, has a descent of 13¾ inches per mile, and will discharge 60 millions of gallons in 24 hours. It will cross Harlem river on a magnificent bridge of stone, 1450 feet long, with 14 piers, 8 of 80 feet span, and 7 of 50 feet span, 114 feet from high tide water to the top, and which will cost 900,000 dollars. The receiving reservoir is at 86th Street, 38 miles from the Croton dam, and covers 35 acres, and contains 150 millions of gallons. The water is conveyed to the distributing reservoir on Murray's Hill, 40th Street, in iron pipes. It covers 4 acres, and is built of stone and cement, 43 feet high above the street, and holds 20 millions of gallons. Hence the water is distributed over the city in iron pipes, laid so deep under ground as to be secure from frost. The whole cost of the work will be about 12 million dollars. The water is of the finest kind of river water. No city in the world is now more plentifully supplied with pure and wholesome water than the city of New York; and the supply would be abundant if the population were five times its present number."—[It was, however, not before it was wanted. When we were in New York it was deplorably off; and a few weeks after we left it, Dec. 18, 1835, the richest part of the city was consumed, and not a drop of water was to be had to stop the ravages of the flames.]

In the city of Paris, water is still carried up the different floors of its high houses by pailsful; just as in Old Edinburgh it used to be similarly taken in *stowps*. The French price for the not too high floors is about the same as the former Scotch; namely, a bawbee (sou) one measure full, or a penny a *gang*. In nearly every house there are filtering cisterns belonging to the tenants. These cost from 12s. to 40s. or 50s., according to capacity and equipment.

In a paper read before the Academy of Sciences, on the 20th February 1843, by M. Dureau de Lamalle, it appears that the municipal authorities of Paris received in 1842, 890,000 francs from the inhabitants for supplying the public fountains with water. Even the water-carriers are charged about one penny for every twenty-five gallons they take thence; and when the expense of its carriage into the house is added, the total expense of water to the Parisians considerably exceeds four millions of francs. In his elaborate paper on this subject, M. Dureau gives the result of some curious researches on the manner in which ancient Rome was supplied with water. It would appear that the expensively con-

tructed aqueducts, several of which remain o excite our admiration till this hour, tretching their astonishing and apparently nterminable length further than the eye an reach along the Campagna di Roma, were most profitable concerns for those who onstructed them. Their waters were sold very dear to the rich and voluptuous Romans, for few else could obtain them. Both private houses and public baths, according to Vitruvius, paid an onerous impost for the use of the water nominally supplied to the public; it was named *vectigal ex aquæductibus*, or else *vectigal formæ*. The common people of Rome must have been a most uncleanly race, seeing that the first requisite for purification was scarcely obtainable by them; no wonder they were such frequenters of public baths, where, we suspect, the common fluid was none of the purest. According to the authorities cited by M. Durcau, a few rich men (those who had gardens nearest to the chief public fountains), paid annually to the general treasury for their irrigation 250,000 sesterces, or about 2,700*l.* sterling. The total sums paid by the city on account of the public conduits have not come down to us. An estimation tolerably exact, however, could easily have been made, had the historians of the city furnished us with indications of the medium contents of the water-ducts. One thing, however, is certain; the aqueducts were in all the Roman towns sources of public revenue, not of ultimate loss; and we have every reason to believe that, as populations increased, private speculators turned the public wants to account, then as now.—In early times, Paris, like London, was wretchedly supplied with water. For most of the inhabitants, the open streams of the river Seine were nearly the only resource; and what state these were usually in we may gather from a proclamation issued in 1388, by Charles VI., prohibiting all persons, under pain of imprisonment, from throwing water out at window into the streets, and from depositing filth in the Seine, which had then notoriously become a *(rivière remplie d'ordures)* perfect cloaca of impurity.

And the same observation might, in some measure, be applied to our Clyde now. As it will daily get worse, it was high time that we looked about us for other sources of supply. We believe the Glen Lubnaig limpid will be conveyed in a covered waterway for the most part.—("Model of the Lochs chosen by the Glasgow Water Company as the Source from which the City is to be supplied with Water by their New Works." — Antiquarian Supplementary Table, west end, No. 67.)

MACAW.

(Table in front of East Gallery.)

These magnificent birds belong to the parrot tribe, and are distinguished by having their cheeks destitute of feathers, and the feathers of the tail long. They form the sub-genus *ara*. They are only found in the tropical regions of South America. They prefer moist situations, from the palm growing in such spots, of the fruit of which they are very fond. They usually go in pairs; sometimes, however, they assemble, in the morning and evening, in great numbers. Although they fly well, they seldom wander far, except in quest of food, and regularly return in the evening. They build their nests in the hollow of rotten trees, and lay twice in the year, generally two eggs at a time. The male and female share alternately in the labour of incubation and rearing the young. When young they are easily tamed, and soon grow familiar with persons whom they frequently see. But like all the parrot tribe, they have an aversion to strangers, and particularly to children. In a domesticated state, they will feed on almost every article, but are especially fond of sugar, bread, and fruits. They do not masticate the latter, but suck them by pressing their tongue against the upper mandible. Like the other parrots, these birds use their claws with great dexterity, though, in climbing, they always begin by taking hold with their bill in the first instance, using their feet only as a second point of their motion. When they were first carried to Europe, their great beauty and size caused them to be in much request, and they were considered as valuable presents between sovereign princes. This bird was spoken of, by Aldravandus, as early as 1572.

Sword found in Major Weir's House, Edinburgh.—The Major would have been held "no conjuror," had he lived in our day. His celebrated staff would have been a much more curious article to show than any sword in "all his aught." Bombastes Paracelsus, indeed, professed to keep a

little demon shut up in the pommel of his; which gave his enemies a *handle* to say that Bombastes was a humbug. Most of these fellows became the victims of their vanity; they allowed, encouraged even, the vulgar to take them for what they were not. From credit they passed into discredit; and so got strangled or burnt. Curious particulars of the Major may be had by perusing Sir Walter Scott's *Demonology*, Chambers' *Traditions of Edinburgh*, &c. —(Antiquarian Table, No. 24.)

WARD'S PLANT CASE, for growing Plants without contact with external air.—Talk of a "self-contained house," indeed; here is a self-subsisting "vegetable world!" It has its own sky even; and although the clouds of it are not visible — everything being on so infinitesimal a scale—fairy eyes may be able to see rainbows in them, when the gas light falls favourably upon them. The processes of evaporation and absorption are continually going on in this microcosm of Mr. Ward's, as surely as on the great globe itself. Few things are more curious than this case, and yet few things in the Exhibition are less looked at.—(Natural History, No. 76.)

THE BOA CONSTRICTOR.—We have a well-authenticated account of the voracious appetite of a serpent of this species, which was brought from Batavia, in the year 1817, on board a vessel which conveyed Lord Amherst and his suite to England. This serpent was of large dimensions, though not of the very largest. A living goat was placed in his cage. He viewed his prey for a few seconds, felt it with his tongue, and then, withdrawing his head, darted at the throat. But the goat, displaying a courage worthy of a better fate, received the monster on his horns. The serpent retreated, to return to the combat with more deadly certainty. He seized the goat by the leg, pulled it violently down, and twisted himself with astonishing rapidity round the body, throwing his principal weight upon the neck. The goat was so overpowered that he could not even struggle for escape. For some minutes after his victim was dead the serpent did not change his posture. At length he gradually slackened his grasp, and having entirely disengaged himself, he prepared to swallow the lifeless body. Feeling it about with his mouth, he began to draw the head into his throat; but the horns, which were four inches in length, rendered the gorging of the head a difficult task. In about two hours the whole body had disappeared. During the continuance of this extraordinary exertion the appearance of the serpent was hideous; he seemed to be suffering strangulation; his cheeks looked as if they were bursting; and the horns appeared ready to protrude through the monster's scales. After he had accomplished his task, the boa measured double his ordinary diameter. He did not move from his posture for several days, and no irritation could rouse him from his torpor. —Happily the appetite of these gigantic snakes bears no proportion to their means of gratifying it, as a full meal is uniformly succeeded by a state of torpor, which frequently lasts for a month or six weeks, or, during the cold season, even for a longer period.—(West Gallery, 105.)

DAGUERREOTYPES.—By Dr. Paterson, St. Enoch Square.—We have seen happier examples of the doctor's skill, in his own laboratory, than these: this observation applies more especially to the doctor's copy of Mr. Andrew Shanks's daguerreotype of the Place du Carrousel, Paris. The reproduced portraits are a shade better; but after all, what are these, or *any* daguerreotype, or any other *type* of man's physiognomy, compared with a life-like portrait of him—mind and body—done by a skilful limner, in colours? *This* is all but flesh and blood; *that* is "the human face divine," done in a dish of dirty water on a dull day.—(Chemistry and Manufactures; Table D.)

"JUNGLE COCK AND HEN; *Gallus Bankiva*, Java; the origin of our domestic fowls." —We are glad Mr. Ker has settled here a long-disputed question, so as to leave *us* nothing to say on the matter; except that, whatever may be the *origin* of our domestic fowls, their *end* is usually a violent one. All "go to pot," literally or figuratively.—(Natural History, Table E, Nos. 67, 68.)

JEW LIZARD, Australia.—This looks a very rum *fish*, rather; he's a genuine "figure of fun," and really not badly named, so far as the semblance of a beard goes.—(Natural History, Table E, No. 48.)

Glasgow: Printed for the Proprietors, by W. G. BLACKIE, (residing at 25, Richmond Street) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Friday, January 8th, 1847.

Daily Exhibitor.

No. 11. GLASGOW, JANUARY 9, 1847. PRICE ½D.

SAMPLES OF CAST STEEL,

Manufactured at Avon Steel Works, near Linlithgow.

Of all the stages in the manufacture of iron, steel is the highest, the most expensive, and the most useful. We know of no substitute for this valuable article that could produce the same effect, and have the same important bearing upon the arts and manufactures of our country. To insure a superior quality of steel, it must be made from Swedish iron. The iron, in alternate layers with charcoal, is laid into a furnace, called a converting furnace, and kept at a strong heat for six days and nights. The fire is then allowed to go out, and in other eight days the workmen can enter the furnace and put out the bars of iron, which by this time are covered over with small blisters; hence its name, blistered steel. The internal appearance of the metal is also much changed. From a strong fibrous blue texture, it has now assumed a bright granulated appearance, which has been produced by the iron taking in a portion of the carbon from the charcoal. In this state it is used for facing hammers and many such purposes, where steel requires to be welded upon iron. It is also in this state used for making cast steel; for which purpose it is broken up into small pieces and put into a crucible, and exposed to an intense heat in an air furnace for four hours, by which time it becomes melted and fit for pouring into cast-metal moulds of various forms, according to the size of bars into which it is to be drawn under the hammer. It is now called cast steel, and the moulded pieces are technically named ingots. The cast steel is next taken to the forge, and re-heated and drawn under the hammer, which strikes about 500 blows per minute. When it has undergone this operation it has assumed the form of the samples exhibited in the room; and in this state is fit for the market, and for the manufacture of all kinds of edge-tools, cutlery of the finer descriptions, graving-tools, and all kinds of engineering-tools. In short, there is scarcely a single piece of machinery, from the delicate and beautiful movements of a watch, to the mighty steam-engine itself, to which the aid of cast steel is not indispensable as an essential element in its manufacture. When we take into account the large consumpt of this article in the shape of coach springs and all kinds of land and marine engineering, we have often wondered that its manufacture has not been established amongst us before this time.

MEDALS.

The Cabinet of Medals (Table G, Sculptures and Bronzes, No. 64,) is one of the objects in the Exhibition likely to be passed by with too cursory a notice. Indeed it is scarcely possible that, amidst so many objects of interest, this one can claim such an amount of patient investigation as is necessary to ascertain its value. The cabinet is contained in an octagonal revolving frame, and its eight sides are covered with copies of an extensive series of medals illustrating important periods of history, &c. The obverse and reverse of each medal is shown; and the whole number exhibited amounts to three hundred. One side is occupied by the Napoleon Medals, consisting of medallion portraits of the Emperor and his family, and commemorations of the leading incidents in his career. Two sides are filled with copies of Mudie's Series of National Medals, of which the obverse sides exhibit the likenesses of eminent personages, and the reverse sides display some incidental or emblematic allusion to the history of the individuals, or to the national events in which they took an important part. Four sides are occupied by medallion portraits of monarchs, statesmen, philosophers, painters, sculptors, literary men, &c., &c., of all countries and of all ages. And the remaining side contains exquisite copies of gem sculptures, together with portraits of distinguished men, and a miscellaneous variety of rilievos exhibiting many of the choicest remains of ancient art.

In connection with the Cabinet of Medals, we may notice the Illustrations of Die-Sinking and Medal Engraving (Nos. 46, 46*, and 47). The objects exhibited require little to be said in the way of explanation. The spectator sees several examples of perfect medals, pieces of unstamped metal ready to receive the impression, and the dies and necessary apparatus for producing a medal. Every medal requires a pair of dies, on one of which the obverse side is engraved, and on the other the reverse. A ring fits closely upon the lowest die, and by confining the metal produces the edge; and the other die fits also into the ring, and by the force with which it is struck conveys its own impression to the upper side of the metal, whilst the lower die impresses the under side. Medals are struck by a power ranging from steam machinery down to the simple operation of a stroke with a hammer.

CACAO.

(Table E, No. 32.)

The cacao, or chocolate-tree, is known to botanists by the name of *Theobroma*, signifying "food for a god," and which name was bestowed upon it by Linnæus, to mark his opinion of the excellent qualities of its seeds. Benzoni, who travelled in the sixteenth century, formed a very different estimate of its merits, and declared that chocolate was a drink "fitter for a pig than for a man."

The cacao-tree is carefully cultivated in many of the settlements in Spanish America, and particularly in Mexico, where, we learn from Humboldt, it was extensively reared so long ago as the time of Montezuma; and whence, indeed, it was transplanted into other dependencies of the Spanish monarchy. The seeds of the cacao were made use of as money in Mexico, in the time of the Aztec kings, and this use of them is still partially continued, the smaller seeds being employed for the purpose, six of them being reckoned the value of one halfpenny.

The cacao-tree seldom rises above the height of twenty feet; its leaves are large, oblong, and pointed. The flowers, which are small, and of a pale red colour, spring from the large branches; they are succeeded by oval pointed pods, that contain a white pithy substance, which is sweet, but disagreeable, and surrounding numerous seeds: these are the cacao of commerce. These seeds are oval formed, and about as large as a moderate-sized almond-kernel, but not so slender; they are internally of a very dark brown colour, approaching to black, and are covered with a thin skin or husk, of a light reddish brown colour.

Cacao is principally used after having been made into cakes, to which the name of chocolate is given. The method anciently employed by the Indians in making these cakes, was simply to roast the seeds in earthen pots, and after clearing them from the husks, which, by reason of the heat employed, could be easily removed, the naked seeds were bruised between two stones, and made up with the hands into cakes. The process at present used by Europeans does not differ greatly from that just described: more care is taken in grinding the seeds after they are roasted, so as to convert them into a paste which is perfectly smooth, and some flavouring ingredients are added, according to the taste of the people who are to consume the chocolate. Cloves and cinnamon are much used for this purpose by the Spaniards; other aromatics, and even perfumes, such as musk and ambergris, have sometimes been added; but the principal flavouring ingredient used with cacao is vanilla. The intimate mixture of these substances having been effected, the whole is put, while yet hot, into tin moulds, where it hardens in cooling; and in this form, if preserved from the air, it will keep good for a considerable time.

GALILEO'S TELESCOPE (*fac simile of*).

(Table B, No. 69.)

The invention of the telescope is usually attributed to Galileo, but not correctly; for so early as 1590, a Dutch optician accidentally hit upon a mode of arranging two magnifiers in such a manner as to exhibit distant objects under an enlarged visual angle. It was not until 1609 that Galileo directed his attention to the instrument; although we must admit that he set to work without having seen the rude constructions existing in Holland, and, that the telescope in his hands was raised from a mere toy into a means of enlarging the then narrow limits of astronomical science.

It is difficult to convey a popular idea of the construction and action of the telescope without illustrative diagrams. The end to

be attained by a telescope is this: to bring an image of a distant object nearer to the eye, and thereby enlarge the angle of vision. Take a simple illustration: suppose two pillars of equal height and dimensions to stand, the one at the distance of twenty yards, and the other at the distance of one hundred yards, from the spectator. In this case, the most distant pillar, when compared with the one nearest to the eye, is lessened in all its dimensions. Consider, therefore, the distant pillar as the *object*, and the nearest pillar as the *image* of that object formed by the telescope, and thus a general idea is obtained of telescopic power. Every person is familiar with the exterior of the telescope, and knows that it is a tube of a certain length with a glass at each end. Most persons also know that the end containing the largest glass is directed to the object, and that the smallest glass is brought to the eye. Now, the object glass gathers up the rays of light from every point in the object, and forms of these rays so many corresponding points within the tube of the telescope, thus forming a perfect image of the object within a few inches of the eye; and the eye-glass merely gives to the rays which issue from the points composing the image, such a direction that, on entering the eye, they produce distinct vision. This general explanation must suffice.

The telescope of Galileo consisted of a plano-convex object-glass, and a plano-concave eye-glass. This construction had the advantage of exhibiting the object erect; whereas the earlier constructions, in which both the glasses were convex, reversed the object. The employment of the concave eye-glass, however, limited the field of view considerably, and rendered the instrument of little service for terrestrial purposes, though it answered well enough, for the time, for astronomical uses. Galileo's first telescope was merely a tube of lead with the glasses fixed into the ends. Yet, with this rude instrument, he observed the surface of the moon, and determined the height of its mountains; resolved a nebula into stars; noticed the varying phases of Mercury, Venus, and Mars; and discovered the satellites of Jupiter.

Before we can form anything like an adequate idea of the patient industry of the old astronomers, we must compare their telescopes with those now in use. For a long period the *refracting* telescope was the only instrument known; the *reflecting* telescope being comparatively of modern invention. Now, it is one of the great disadvantages of the refractor that its magnifying power is dependent on its length; and to obtain a high power, a ponderous length of tube is required. The early astronomers finding it impossible to get the power they desired, with a manageable length of tube, hit upon the expedient of elevating their object-glass upon the top of a high pole, and looked through it standing at a great distance with the eye-glass held in the hand. By this means they formed telescopes of one hundred and two hundred feet in length. But what a serious matter it must have been to effect an observation with such an instrument; what patient perseverance was necessary to direct the object-glass, and after this was done, what steadiness of hand was required to preserve the eye-glass in its position. One smiles to read that the celebrated Huygens was granted, as an especial favour, the use of the May-pole in the Strand to raise his object-glass to a sufficient elevation. Such were the instruments with which the first giants in astronomical science laid the foundation of our knowledge of the heavens. Turn from these cumbrous constructions to the elegant, effective, and portable instruments of the present day. A reflecting telescope of a few feet in length reveals more than the two hundred feet contrivances of the old observers; and to its manifold superior qualities in all respects, is added a facility of management that renders telescopic research a mere philosophical recreation.

The model of Galileo's telescope is doubly interesting; first, as being the original of that instrument by which the architecture of the heavens has been brought within our view; and secondly, as the reminiscence of a man not less celebrated for his scientific labours, than for the persecutions he endured from the ignorant bigots of his day.

Sea Hedge-hog.—We doubt very much whether this *is* a sea hedgè-hog; but as we never examined any of the hedges of the ocean, either *fish-nesting* or otherways, we cannot positively say. Till the point be determined, we call this chap the marine bashaw-of-three-tails.—(West Gallery, 90.)

RATTLESNAKE.—This serpent has a very bad character, and he appears to deserve much of it. The rattling noise he makes, however, while in motion, gives a useful premonition of his approach. It is something like the *roll* of coaches or omnibuses, which warn one to keep out of the way of being crushed with their wheels. Now, *cabs* and *minibuses*, wriggling vipers that they are! give little of such needful warning. The venom of the rattlesnake, also, it would appear, grows weaker the more and oftener it is called into activity. For Mr. Bell, in his history of *British Reptiles* (a work little less entertaining than scientific), relates, as a proof that the effect of wounds inflicted by venomous serpents subsequently to the first, is greatly lessened, either by the diminution of the quantity of venom, or of some deterioration of its strength, the following anecdote :—A gentleman of his acquaintance had received a living rattlesnake from America. Intending to try the effect of its bite upon some rats, he introduced one of those animals into the cage with the serpent, which immediately struck the rat, and the latter died in two minutes. Another rat was then placed in the cage, and ran to the farthest corner from the snake, uttering cries of distress. The serpent did not attack it immediately; but after about half an hour, on being irritated, struck the rat, which exhibited no symptoms of being poisoned for several minutes, nor did it die till twenty minutes after the bite had been inflicted. A third rat, remarkably large, was then introduced into the cage, and exhibited no signs of terror, nor was it apparently noticed by its dangerous companion. After watching for the rest of the evening, Mr. Bell's friend retired, leaving the rattle-snake and the rat together. He rose early the next morning, and visited the cage : there lay the snake dead, and the rat had supped upon the muscular part of its back. Mr. Bell does not remember at what time of the year this took place, but he expresses his belief that it was not during very hot weather. The length of time during which a man will linger after being bitten by one of those deadly snakes, was manifested in a very distressing case, which will perhaps be remembered by many of our readers. Some years ago, a carpenter came to see a rattlesnake which was publicly shown for money in London. The man endeavoured to excite it, probably to hear its rattle, with his rule, which he dropped into the serpent's cage. As he was trying to recover it, the snake bit him in the hand. He was taken to one of our hospitals (St. George's, if we recollect right), and bore up so long that hopes were entertained of his recovery; but his constitution gave way at last, and after many days he fell a victim to the poison.—(West Gallery, No. 104.)

The Daily Exhibitor.

SATURDAY, JAN. 9, 1847.

THIS day the Exhibition closes, and with it also close the labours of "*The Daily Exhibitor.*" The race of both has been somewhat short, but we trust neither inglorious nor useless. We look back with feelings of unmingled satisfaction on the events which have occurred since the opening of the Exhibition, on the evening of the 24th December. Those hard-working individuals who had used such praiseworthy exertions in collecting and arranging the objects, were that evening relieved of any doubts that may have beset their minds regarding the reception their labours would meet with from the public. Every day the Exhibition has been rising higher in public estimation, as evidenced by the daily increase of visitors, many of whom regret they are so soon to be deprived of the mine of intellectual improvement they had commenced to work within these walls. All classes of the community have been furnished with opportunities for enjoying the treat of a visit to this Collection, and most extensively have these opportunities been made use of. We believe that before the close of the Exhibition this evening, the immense number of nearly 100,000 will be found to have visited it, exclusive of the frequent re-visits of those possessed of Season Tickets. The universal satisfaction which has been expressed was scarcely to be hoped for, and must therefore be the more gratifying to every one who has

had his hand in the work. As mentioned on a former occasion, we look upon this as the first of a long series of Exhibitions. Like the wizard who met Lochiel, we can see, *dimly*, into the future. Our second sight, however, reveals not scenes of death and destruction, but a long vista of years, with here and there an Exhibition among them. Nevertheless, though palpable enough so far, the shadowing forth of the vision is too dim, the objects waver too much before the eyes, to enable us to perceive whether the Exhibitions descried will be of a *permanent* or of a *periodical* character; whether got up for temporary enjoyment and instruction, or for the *advancement of our Arts and Manufactures*. Time will test the accuracy of our *foresight!*

In our own humble capacity, *we* have endeavoured to instruct; and, failing that, somewhat to amuse those who frequented the Exhibition. What has been the measure of our success we leave to others to judge. To our supporters, the numerous purchasers of our Journal, are due our cordial thanks. Our warmest acknowledgments are also willingly given to those who aided us in our editorial labours in the capacity of *contributors*. What a pity truth compels us to add, regarding the helps we have had in this respect—

Apparent rari nantes in gurgite vasto!

Meantime we do not, like Prospero, *break* our wand; we only *bury* it, holding it in readiness to be exhumed whenever circumstances may require its exercise.

On a former occasion we threw out a few hints regarding the Botanic Garden. Before finishing our editorial labours, we wish to throw out one more in reference to the establishment of an *Herbarium* in connection with it. Were the Garden placed in the position it ought to occupy (we mean as to freedom from burdens, which weigh it down), we believe that a proper Herbarium would constitute an admirable adjunct. In building the Lecture Room, which we expect to see erected there ere long, suitable accommodation ought to be provided for this purpose. A sum of money would also require to be vested, so as to secure a certain amount to pay for the salary of a curator, who must of course be a thoroughly scientific person. As the whole time of the curator would not be occupied, the office might be conjoined with some other already existing: thus rendering a large salary unnecessary. Were such a scheme fairly commenced, an excellent Herbarium might soon be formed. For, independently of the contributions it would receive from kindred Institutions, and from the numerous private *herbaria* existing throughout the country, the Foreign Merchants of our City could easily obtain, at small expense to themselves, and great advantage to science, multitudes of specimens from every quarter of the globe. A few copies of printed directions, regarding the drying and preserving of plants, would effectually remove any hinderance that might exist in the mind of any one, from not possessing a proper knowledge of how to set about what is required. The method of drying plants is no mystery. It can very easily be acquired. We venture to affirm, were some plan like this energetically followed up, Glasgow would soon be possessed of an Herbarium such as few cities can boast of.

HUMMING-BIRDS.

(Various specimens, Table E.)

The family of humming-birds (*Trochilidæ*) is divided into numerous genera. Upwards of 100 species are now known to naturalists. Recent discoveries have proved that their range of habitation is more extended than was once imagined; for though they chiefly abound in the intertropical latitudes of America, many visit the temperate and colder portions of that continent. The ruby-throated humming-bird (*Trochilus Colubris*), passes north as far as the interior of Canada, migrating like the swallow. Nor is this the only species which extends into a colder climate. Still, however, the central regions of the conti-

nent, and the islands adjacent, are their chief resort. There they people the woods and the gardens, glancing in the sun like meteors as they flit by with inconceivable rapidity, or, suspended on their burnished and quivering wings, explore the nectary of some scented blossom. These birds may be almost said to live upon the wing. There is no bird that equals them in power of flight, and they are quick as lightning in their motions. Their wings are of extraordinary length, and this, with their shape and the character of the feathers composing them, contributes to their efficiency. The feet and legs, on the contrary, are small and feeble; they are, in fact, of merely second-rate importance in the economy of the humming-bird. The ground and the trees are not its element. It sometimes, indeed, settles on a twig, while it preens its plumage of glittering scale-like feathers, or arranges the moss and down of its nest; but the air is its abiding place, where it feeds and passes the whole of its active existence. With respect, then, to the shape of these powerful organs of flight, we may notice that they are narrow-pointed, and more or less curved inwards, a good deal resembling those of the swift,—and are mainly composed of the primary quill feathers, beautifully graduated, the first or outer one being the longest. Of the immense strength of the pectoral muscles by whose actions these long pointed wings are thus rapidly agitated, we can scarcely form an adequate conception.

Next to the wings, the tail is the most important agent as an organ of aerial progression. It is not only the rudder by which a bird directs its course, or turns and wheels, but it adds to the superficies of the body without increasing its weight. In this group the tail is ample, but varies extremely in shape; in some species it is square, in others forked, in some pointed, but in all it is composed of feathers closely resembling those of the wing in texture. Thus is the humming-bird constituted for flight; nor is this extremely rapid merely, but it is capable of long continuance. The flitting progress of the humming-bird from flower to flower resembles that of a bee,—but is infinitely more quick. When, however, the bird is journeying, it sweeps through the air in long undulations, rising and sinking alternately.

It has been supposed by many that the nectar of flowers constitutes the sole food of this charming race, but such is not the fact. Nectar is no doubt a part of their diet, but by no means the whole; they feed on the small insects which lurk in the nectary, or wander over the petals,—nay, they even take insects on the wing, as was observed by Wilson, who also found their fragments in the stomach of such as he examined; and Audubon states, in confirmation, that insects, especially those of the coleopterous order, are the principal food of the humming-bird. The bill, fitted for penetrating into the recesses of flowers, is long and slender, but varies in shape. According to Brisson and others, the tongue consists of two muscular tubes. This organ, which in the humming-bird is mainly instrumental in procuring food, is capable of being protruded to a considerable distance, as we see in the wry-neck, wood-pecker, &c. Audubon says, that the double-tubed tongue of the humming-bird is covered with a glutinous saliva, so that the insect adheres to it when touched; hence the bird has only to dart its tongue at its prey, and retract it into its mouth.

Diminutive as they are, these beautiful creatures are bold and intrepid, and defend their nests against intruders with the greatest spirit. Their powers of flight give them every advantage in these aerial combats over birds much larger than themselves, at whose eyes they tilt with their sharp-pointed beak, uttering, at the same time, a shrill piercing shriek. Two males seldom meet without a battle; and while the female is sitting her mate attacks indiscriminately every bird that approaches, exhibiting the utmost fury. The nest of the humming-bird varies in different species. Some are built on the branch of a tree, others attached to the extreme twigs, so as to wave in the breeze. The materials with which they are constructed are, for the most part, the cotton or down of various plants, beautifully interwoven; some species add an outside layer of moss or lichen. It appears that the number of eggs laid by the female is usually two, and their colour pure white.

That these beautiful and elegant birds should not be kept in captivity will not surprise those who know the difficulty of preserving them, even in their own regions, for any length of time, in imprisonment.

Several attempts have, however, been made; and, on one occasion, two nestlings of a species termed the Mango humming-bird were actually brought alive to England, and lived for a short time in the possession of Lady Hammond; they were very docile, and fed on honey, but we do not know whether insects were offered them or not. Audubon states that he has seen many humming-birds in partial confinement; and that, when fed with honey or syrup exclusively, they soon died in a state of emaciation, but that, when duly supplied with fresh flowers (abounding with insects), and surrounded with gauze-netting, through which insects could enter, they lived in health and were active. Indeed, he mentions an instance in which several were thus kept for the space of twelve months, when they were restored to liberty, the person who attended to them having a long voyage to perform.

Scarlet Ibis.—This beautifully coloured bird is a native of America. These birds live almost always in flocks, and the old ones most frequently form distinct and separate bands. Their flight is rapid and sustained, but they do not put themselves in motion, except in the morning and evening, for the purpose of seeking their food, which consists of insects, shell animals, and small fishes, collected in the slime along the sea-coast, or at the mouths of rivers. During the greatest heat of the day and at night, they remain in sheltered places. The broods commence in January, and are concluded in May. They deposit their eggs, which are greenish, in large tufts of grass, or on little piles collected in the brush-wood. These ibides are spread throughout the warmest countries of America, and being not at all wild they are easily accustomed to live in houses. M. de la Borde mentions his having kept one for more than two years. It was fed with bread, raw or cooked meat, and fish; but it gave the preference to the entrails of fish and fowl. It would frequently occupy itself in seeking for earth-worms around the house, or following the labours of a negro gardener. In the evening, this bird would retire of itself into a poultry-house, where it reposed in the midst of a hundred fowl. It would perch on the highest bar, awake very early in the morning, fly round the house, and sometimes proceed to the sea-shore. It would attack cats with great intrepidity. It would have lived longer, had it not been accidentally killed, by a fowler, who mistook it for a wild curlew, when it was on a pond. All this shows the possibility of rearing in the warmer climates of Europe a bird which, according to the testimony of Laet, has already produced in a domestic state, and may, perhaps, one day be turned to good account.—(Table E, Case No. 64.)

Patent Guide Screws and Stocks.—The irregular pitch and cut of die-screws issued by the different engineering establishments throughout the country is a source of great annoyance, and is particularly felt in repairing machinery. In the locomotive shops of the railway companies, where engines manufactured at different establishments are to be repaired, it is unbearable. From want of uniformity in the pitch and threads of the screws, it has been necessary to maintain a complex and costly variety of screwing apparatus, and withal a vexing waste of bolts and nuts cannot be avoided. The magnitude of the evil has, however, at length wrought its own cure; and the dies and taps of Messrs. Whitworth Co. have been acknowledged as the standard at the Admiralty Dock Yards, and in nearly all the railway shops throughout the country. In all machinery made for the Admiralty, and for railways, the bolts must be screwed with these dies, and no other will be received. This is as it ought to be; for we are fully confident that the standard could not be entrusted in better hands, or be associated with a name which will give more confidence. A very casual examination of the specimens in our Exhibition is sufficient to convince every mechanic of the correctness of this opinion. In respect of proportion, durability of thread, and beauty of cut, it would be difficult to imagine any system of screwing more perfect. To the non-mechanical reader we would observe, that only a few years ago the screwing of a bolt by hand was an operation which required the application of a large amount of muscular energy: the process consisted in *crushing* the solid iron until a thread of the required depth was raised; with the apparatus under notice, the thread is formed by cutting, as effectually as if the process were performed in the lathe. There is no cressing of the iron whatever; and to give an idea

of the difference of the two processes, we are within the bounds of truth when we assert, that with Messrs. Whitworth's dies and taps, one man can do with ease more work than ten could have done with those in use in our young days, and produce work incomparably better and more durable. In a few years hence we expect to find no other screwing apparatus in use than that made according to Messrs. Whitworth's standard. We are no advocates of monopoly; but this is one of those cases in which monopoly may be beneficial, and therefore commendable.—(Mechanics and Engineering, Table B, No. 42.)

BRANKS in which the last woman was burnt for the imaginary crime of witchcraft in Fife.—The executions among the "folk of Fife" usually took place in the ancient city of St. Andrew's, near the sea cliffs of whose iron-bound shore to the N.W. is a kind of bight, still called "the Witches' Hole," where "trial by flotsom" was entered upon. If the witches and warlocks (being hand-and-foot tied) sank, they were considered innocent, and only got *drowned;* if they floated, they were tortured and burnt. The *branks* were merely a species of *gag;* and the term is thus defined by Dr. Plott, author of the "History of Oxfordshire." "In some parts of England and Scotland a *scolding bridle*; an instrument for correcting scolding women. It consists of a head-piece, which encloses the head of the offender, and of a sharp iron, which enters the mouth and restrains the tongue." The branks of the present Exhibition differ from the description in this, that the sharp iron is a ribbed-edged *wheel*, a good deal like the rowel of a spur.—The rationale of the restraint thus imposed upon the sufferer was founded upon the axiom, that as the Deity spoke by the mouth of his prophets, so the devil spoke by that of witches and warlocks; ergo, the sooner a stopper was put upon these unhallowed communications the better. Q. E. D. The real "practick" of the matter was simply this, that as the poor victims, when not absolutely lunatic, or driven crazy by their tormentors, would naturally wish to appeal to the compassion or right human feeling of the people gathered around the blazing pile,—this accursed device of the branks effectually prevented the poor creatures from uttering an intelligible word!

In *Haydn's Dictionary of Dates*, we find these words under his article "Witchcraft:"—"The last sufferer in Scotland was burnt in 1722, at Dornoch." This is a mistake. In Burt's "Letters of an English Gentleman in the North of Scotland to his friend in London," an almost contemporary and usually excellent authority, we find the following passage at Letter XII.—"In the beginning of the year 1727, two poor Highland women (mother and daughter) in the shire of Sutherland, were condemned before the *sheriff depute* (!) to be burnt. The young one escaped from prison, but the old woman was burnt alive in a pitch barrel, in June, at Dornoch."

Scotland has the sad distinction of being the last of these realms which practised such immolations, and Paisley (we believe) the last town where such an *auto da fe* was offered up. If we misremember not, the last witch burnt in these realms was shortly before 1736. In that year the laws against this factitious crime were repealed, by the statute 10 Geo. II.—(Antiquarian Table, No. 35.)

JEANIE DEANS interceding with Queen Caroline for the Pardon of her Sister. By J. G. Middleton.—As a work of *art*, this painting has its merits; but, as a work of *nature* (if we may use that word here), it is naught. A short criticism we heard upon the picture, this very day, from the lips of a *sonsy auld leddie*, expresses much of our sentiments upon the work. Asking us what the subject was, and being told that the kneeling figure was meant for *Jeanie Deans*, she said, "That's no like a Scots lassie ava."——Then the face and figure of Queen Caroline, at the time the scene was laid a middle-aged and plain-looking woman, represented by a perfect young Peri! This reverses the metamorphoses of the stage; where the parts of young beauties are often played by antiquated demireps.—(Area F, Paintings and Works of Art, No. 18.)

PORTRAIT OF PEG WOFFINGTON.—How *gay* the painter has made Peggy; and how well, too, he has painted her! That actress never laid the rouge on her cheeks, with her own pet hare's foot, one half so skilfully. —(Area F, No. 81.)

Glasgow: Printed for the Proprietors, by W. G. BLACKIE, (residing at 25, Richmond Street,) at his *premises*, Model Exhibition, No. 19, Area A, *City Hall*.—Saturday, January 9th, 1847.

A correspondent, who classes himself as "one of our too many unemployed, who has no home, having been ejected for want of rent," writes to ask what is the money value of a little book in his possession. He does not mention its title, though his description would lead one to suppose that it is a complete set of the "Daily Exhibitor," an eight-page paper printed at an industrial exhibition held under the auspices of the Glasgow Philosophical Society in the City Hall from December 24, 1846, to January 9, 1847. The exhibition was open for fourteen days, but only eleven numbers of the paper were issued, the diurnality of the paper being interrupted for the first three days of the year, for 60 years ago New Year-tide was given up to holiday, so much so that on these three days working men who were presumed to be idle were admitted to the exhibition free. Afterwards a title-page and table of contents was provided by the publishers (Messrs Blackie), and the complete issue was sold as a booklet. The importance of the publication lies in its claim to be "the first of all the Scots press to attain the dignity of being a daily paper," anticipating the appearance of the "North British Daily Mail" by fully three months. It is a volume which some Glasgow collector would surely like to possess, though the price that is likely to be offered for it would certainly disappoint the would-be seller. A copy was sold recently for a few shillings.