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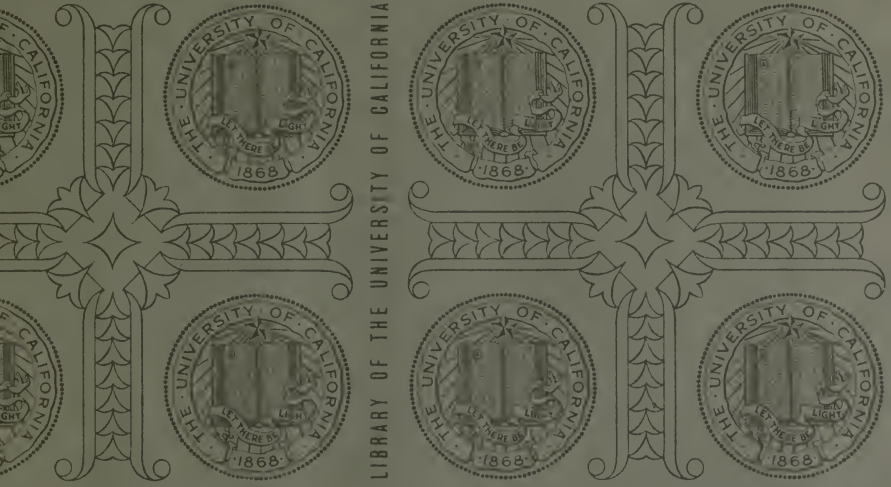
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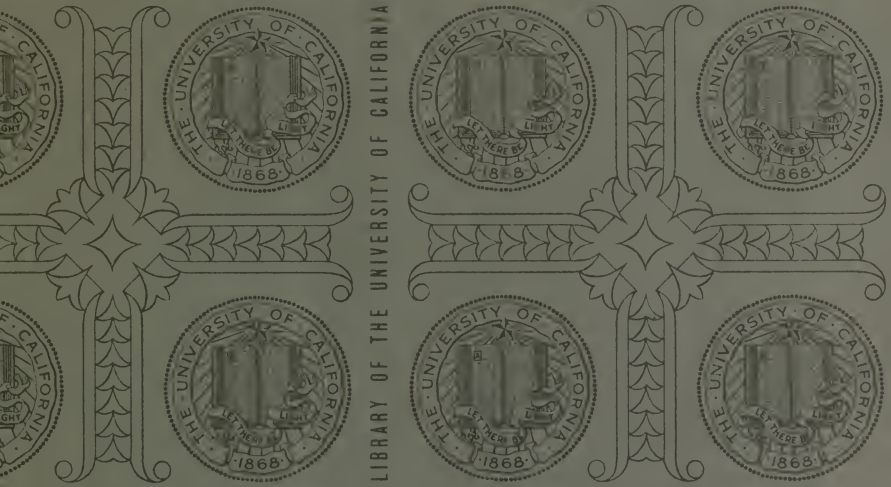
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S. Franklin Peckart.

THE LIFE
OF
ROBERT FULTON,

ONE OF THE MOST DISTINGUISHED INVENTORS THE WORLD HAS EVER PRODUCED. WITH INTERESTING INCIDENTS INDICATING THE CHARACTER OF THE MAN IN HIS YOUTHFUL DAYS. THE DAWNINGS OF GENIUS THEN DISPLAYED; UNTIL HE EMBARKED IN THE VOYAGE OF LIFE, AND, BY UNTIRING INDUSTRY RAISED HIMSELF ABOVE THE BUFFETING STORMS, ERECTED HIS OWN ILLUSTRIOUS NAME, AND SECURED THE HIGHEST DISTINCTION THAT MORTAL MAN CAN ATTAIN — THE ADMIRATION, HONOR, AND GRATITUDE OF NATIONS AND POSTERITY. THIS VOLUME CONTAINS A SIMPLE RECORD OF FACTS, ACCOMPANIED WITH

COPIES OF MR. FULTON'S ORIGINAL DRAWINGS

AND

Numerous Plates,

EXHIBITING THE LEADING INCIDENTS AND ORNAMENTS OF HIS PRIVATE CHARACTER; HIS ELEVATED PRINCIPLES OF ACTION; HIS UNCOMMON USEFULNESS AND CELEBRITY, AND HIS UNDYING FAME.

BY

J. FRANKLIN REIGART,
AUTHOR OF "UNITED STATES AUTOGRAPHY," "THE INVENTORS AND PATENTEES' GUIDE," &c. &c. &c.



PHILADELPHIA:
C. G. HENDERSON & CO.,
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1856.

THE LIFE

OF ROBERT B. LITTLETON

By J. FRANKLIN REIGART, Esq.,
Attorney at Law, Lancaster, Pa.
Lancaster, Pa.: Published by Deacon & Peterson, Printers,
1856.

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THE SUBLIME MOTTO

OF

Robert Fulton.

“THE LIBERTY OF THE SEAS WILL BE THE HAPPINESS OF THE EARTH.”

(iii)

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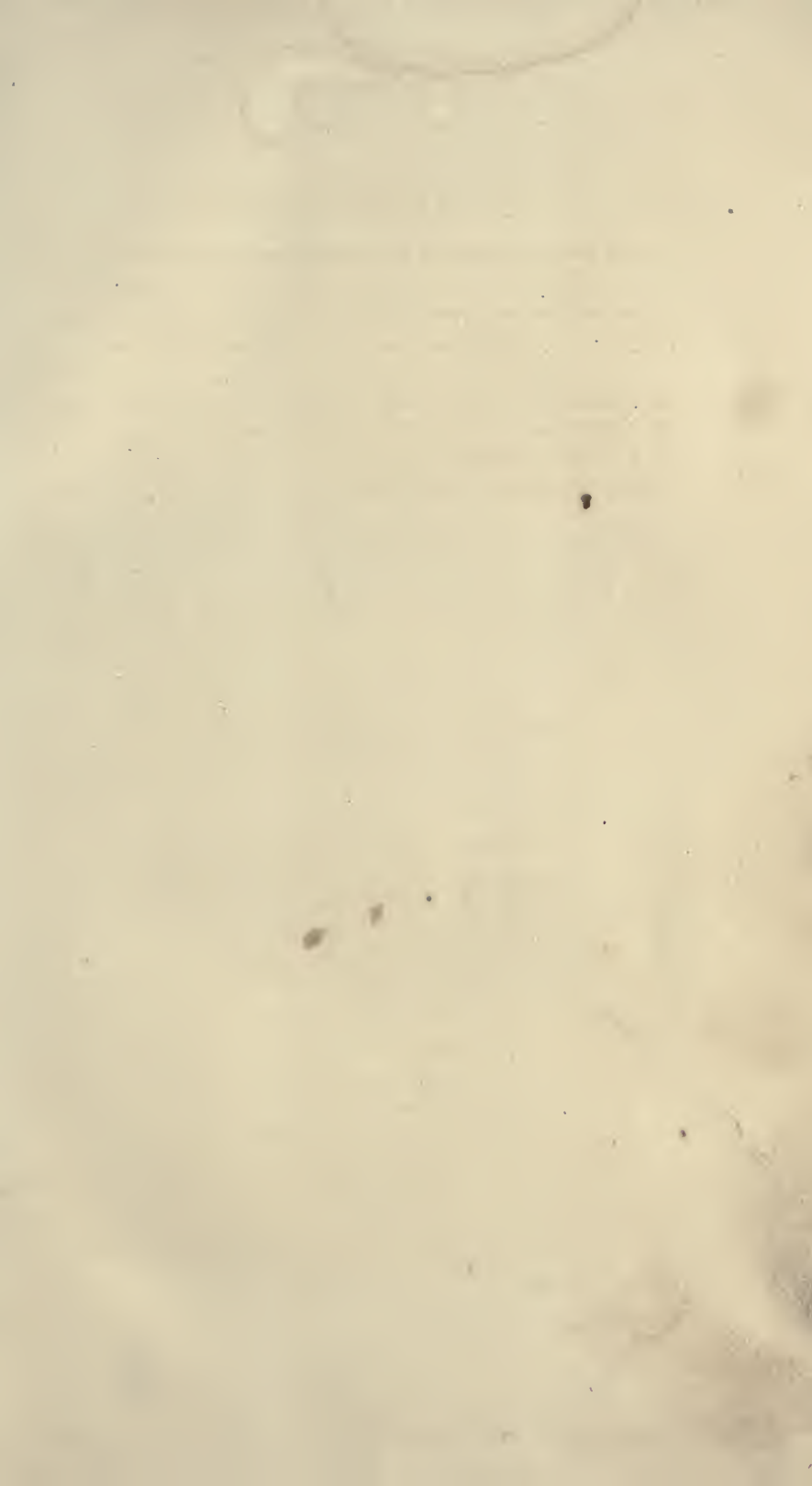
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Clemmons 1807



Paragon 1811



Richmond 1813



Camden 1812



Car of Neptune 1807



Washington 1813



Chancellor 1815



Nassau 1813



Raritan 1808



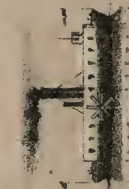
Hemologus 1814



Fire Fly 1812



Ol. Branch 1815



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Vesuvius 1813



Empress 1815



Fulton 1813



Mide 1815



Scythius above



Nautilus below



FULTON BEFORE NAPOLEON



FROM A PAINTING BY WEST.



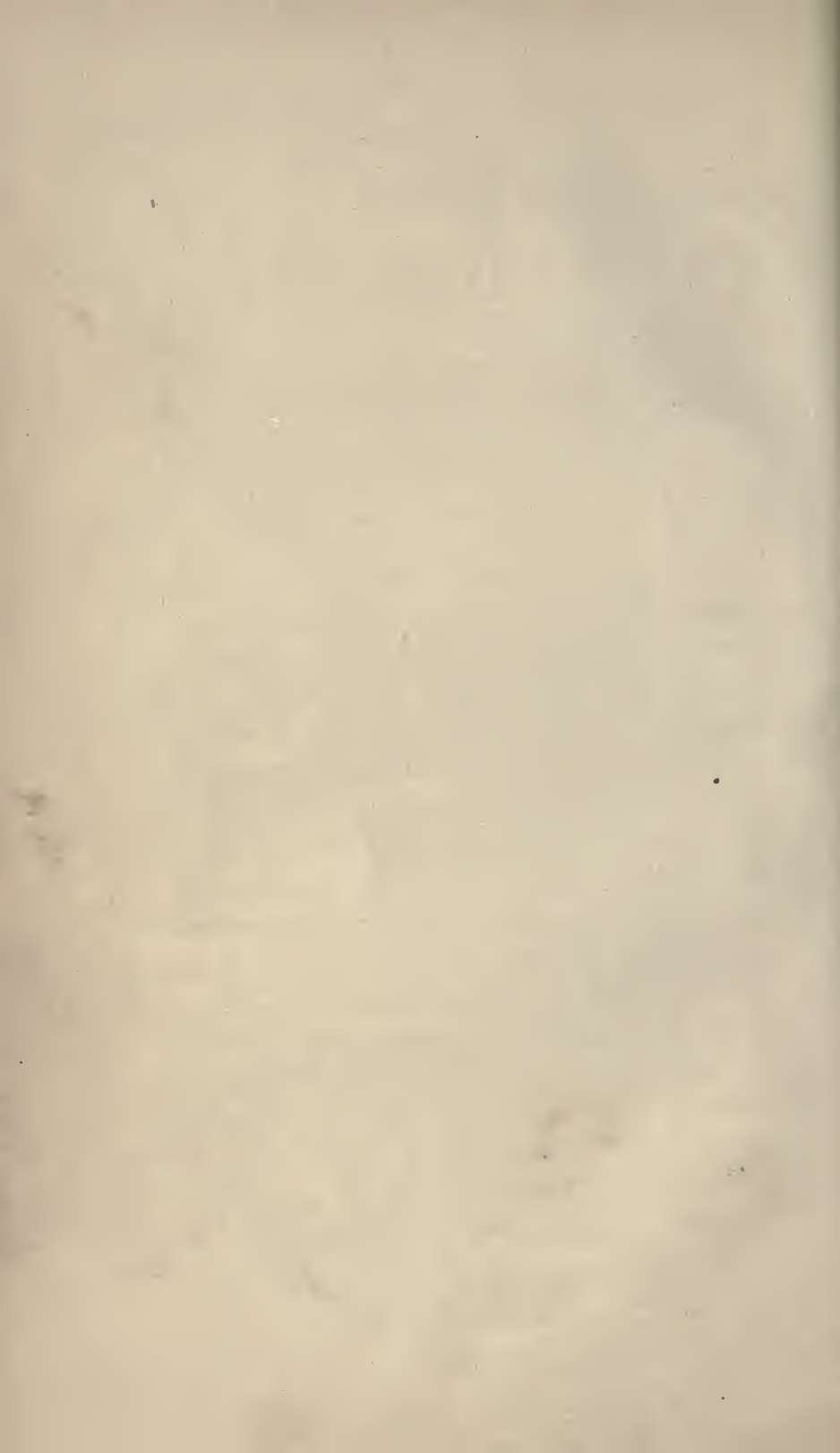
FULTON AS A PAINTER



BUILDING WAR STEAMER



MAN ROSENTHAL DEL.



INTRODUCTION.

AS a citizen of Lancaster, intimately familiar with its history and with its oldest inhabitants, we know that they are best acquainted with the true history of ROBERT FULTON; whilst "*the garden of Pennsylvania,*" the brightest spot on earth, still retains his Birthplace as a brilliant memorial of her most meritorious son. We have endeavoured to exhibit an impartial history of his life; and to accomplish this has been the labour of several years. In collecting the facts, many of our oldest citizens were consulted; and from them the most correct accounts and incidents of his youthful history were obtained. From his cradle to his grave, there cannot be discovered one single spot or blemish that casts a shadow on his honorable career. To pursue the chain of his life, and develop every link, was a task requiring much research; and we thankfully acknowledge our indebtedness for aid in our effort to many individuals who cheerfully furnished us

with the essential data: especially are we grateful for copies of extracts from the minutes and records of several Historical Societies and public offices of New York city, to the "Scientific American" and "People's Journal," and to our obliging friend Dr. Theodore F. Engelbrecht. The kindness of the Hon. Actuary, Mr. Hamilton, and the officers of the Franklin Institute Library of Philadelphia, is also properly appreciated, as well as the important service rendered by Messrs. Cyrus Underwood and Daniel K. Albright, of Washington county, Penna., in furnishing the drawing of Fulton's homestead and the copies of records.

The British "Cyclopædia of Arts," lately published, has endeavoured to place Mr. Fulton's unparalleled inventive genius on the same level with their canal-boat builders. It alleges that Mr. Fulton saw Mr. Symington's canal-boat, and that it was Mr. Symington's invention that deserved all the credit of steam navigation. If so, why did not Mr. Symington start his canal-boat on the river Clyde, or across the ocean? Mr. Symington was mechanic enough to know that his double boat, with a solitary wheel in the stern, might glide along the smooth current of a canal, but could not resist the ocean waves. His knowledge of steam navigation was very limited, and did not become

of any practical use, even to canals. He deserves, however, credit for his invention, so far as he was capable of maturing it, but not one tittle more. We are not a little surprised that an historian, an author of a standard impartial work, as the British Cyclopædia of Arts ought to be, should give Mr. Symington all the credit of steam navigation because his canal-boat was seen floating one day on a smooth current, and heard of no more, excepting that it was left to decay and rot on the canal; and we feel free to say that such an one not only does not understand the nature of an invention, but displays gross partiality, an illiberal spirit, and total ignorance of what is due the worthiest of inventors. We, moreover, boldly declare that no man ever lived before or since Robert Fulton who did so fully and perfectly understand steam navigation, submarine navigation, and inland navigation; and whose experiments and successful improvements created the same interest and astonishment throughout the world. Nor will we admit that his genius has ever been equalled, until reliable records disprove his claims to being the man who built a floating castle, in the shape of an immense steam vessel of war, to divide asunder the rolling billows of the stormy ocean, and alarm the navies of the world; and who erected a terrible engine of war

like the *Nautilus*, that, with its sails, could be guided above the waves when and where its inventor and commander willed—then in a moment lower and hide its masts and sails, and, like a sea-bird, plunge into the watery element, and glide unseen at the bottom of the waters, avoid the pursuit of an enemy, and rise again several miles from the place where it descended; and who projected Double Inclined-Planes for canals, to connect the great lakes of America, to spread the Commerce of the world; and whose days and nights were devoted to improvements in the arts and sciences; and whose every act was, first, “*his country and his country’s good*;” and who, as a universal benefactor, on each and every occasion that presented itself, proclaimed that most sublime motto: “*The liberty of the seas will be the happiness of the earth*;” and whose mind and inventions attracted and engaged the attention of the greatest powers of Europe, whilst his life was the wonder and amazement of his countrymen; and his death was marked with the highest honours that ever were manifested to any civilian in this or any other country—not till then, we say, can we admit that Fulton’s genius was ever equalled; and, we are persuaded, not until Lancaster county, “the garden of Pennsylvania,” becomes

“A barren waste,

Without one spot of green, of feeling, or of taste,”

shall the name of this great man be used with disparagement or reproach by any historian in this or any other country.

The British “Cyclopædia of Arts” says “*this* Fulton” paid a visit to Scotland, and saw Mr. Symington’s canal-boat, and got all his information from Mr. Symington. We would not have noticed Mr. Symington’s *failure* in steam navigation, or Mr. Watt’s credit as an engine-builder, but for the injustice done to Mr. Fulton by “*this* unjust British Cyclopædia of Arts.” In 1765, Mr. James Watt, of England, *improved* the steam-engine, (first invented by the Marquis of Worcester, in 1663,) and was the great and successful inventor of stationary steam-engines. It is a well-known fact, however, that Mr. Fulton called on him and ordered an engine to be built, of a size, make, and power which he described, gave Mr. Watt the proper dimensions and proportions, the mode of connexion between the pistons and cranks, the exact form and construction, as Mr. Fulton’s own mechanical knowledge and calculations dictated and directed, according to his (*Fulton’s*) *own improved plan*, specifications and sectional drawings, *suitable only for steam navigation*, and which have been universally

adopted in every successful steamboat since the "CLERMONT" sailed; and, but for this fact, we should, at this late day, be no farther advanced in steam navigation than we were when Symington left off on the canal. Dr. Rees' Cyclopædia and Dr. Brewster's Cyclopædia both show that, *until Fulton's movement, steam navigation had no real existence*; and they are too sound authorities to be doubted, especially when it is recollected that they published the facts so soon after Mr. Fulton's successful experiments were universally acknowledged by every honourable contemporaneous writer and publisher.

There are still living numerous witnesses who bear testimony of the original invention of Robert Fulton, Esq.; and one, as late as October, 1855, in Mr. Symington's own neighbourhood, has honourably shown himself to be

"A REMARKABLE WITNESS.—Those who have only casually observed and reflected on the mighty revolution accomplished by steam in nearly all departments of human industry and enterprise, and especially in the navigation of the world's waters, and the operations of travel and commerce, can have scarcely an adequate conception of the gigantic triumph of this subtle element, in less than half a century. But there was a man among the festival party gathered in honour of the splendid new Cunard steamer *Persia*, (390 feet in length,

and of 3,600 tons burden), at Glasgow, who could feel all the greatness of this triumph. That man was the Dean of Ripon, England, who, being toasted, stated that forty-eight years ago he accompanied *Robert Fulton* on his first steamer trial trip on the Hudson river—that being the first successful trial ever made. He thanked God that he had been spared to witness this perfected steamer, the *Persia*, the most magnificent vessel afloat; and that, coupled with the long succession of triumphs of steam, which he had carefully observed, whether on the sea or on the land, the triumphs of peace, intelligence, and a broader brotherhood, had gone hand in hand. He trusted and prayed that this would continue to be the history of steam—the most potent of all the agencies of enterprise and civilization.”—*N. Y. Mirror*.

In preparing this work for publication, it seems proper to state, what the reader perhaps will readily conceive, the difficulties that we had to encounter. As an ardent admirer of the genius of *Fulton*, we imagined that a history of his life would be considered interesting and instructive. We commenced the task, and soon found that it was possible to write and compile a volume of this character. But to succeed in the enterprise of writing a history of all *Fulton's* acts, and the events of his life, and all his discoveries and inventions, we felt was far beyond our capacity. We searched for months through the portraits of biographies, carefully read

the pages of cyclopædias, the histories of statesmen, of warriors, of inventors, and though *we would not exalt the character of one inventor at the expense of another*, yet we must say, that the more we searched were we forced to conclude that Robert Fulton was the most distinguished inventor the world has ever produced. All the written laudations that mortal man can bestow, cannot convey a more correct and complete idea of Fulton's life than the plain narration of facts, showing his acts as they are already inscribed upon the scroll of fame.

“Worlds beyond worlds shall bring to light their stores,
Time, nature, science, blend their utmost powers,
To show, concentrated in one blaze of fame,
The ungather'd glories that await his name.”

Robert Fulton was a man at fifteen years of age, and his whole life exhibited the boldest statesmanship—evincing a mature knowledge of the arts of government. In his minority he was the most industrious and skilful miniature painter, numerical calculator, mechanical draughtsman, original and practical artist, and remarkable caricaturist, exhibiting a perfect knowledge of human nature.

He was the most obedient and noblest son a virtuous mother ever bore, the most affectionate brother that sisters ever owned; and the records

of history do not describe a youth of such unblemished character, or of equal talents.

During his later years, his acts and inventions were of such an extraordinary character, that the eminent philosopher, Benjamin Franklin, who had tamed the thunders of the cloud-capped skies, the world-renowned Emperor Napoleon, who had crossed the Alpine rocks and blown up the magazines of nations, and the wise directors of scientific and philosophical societies, who had collected the arts and sciences of the world, could not comprehend them, and publicly rejected and repudiated them as visionary and impracticable.

To some this may appear exaggeration; but the generous inventor, who has ever recognized Fulton as the HERO of inventors, will cheerfully acknowledge that, though others may have been conducted in the paths of science by superior learning, and may have had a more dazzling career, the labours of no individual have manifested the same originality, have been more honourable, meritorious, or practically useful. He put the first machine into practice, and became the real inventor.

He was a director of the American Academy of Fine Arts, a member of the New York Historical and Philosophical Society, of the United States Military and Philosophical Society, and of

the Literary and Philosophical Society of New York.

To confirm our ideas of the greatness of Fulton, great in all his inventions, and to show that none knew him but to admire and love him, we refer our readers to the following generous sentiments, expressed by learned and prominent Americans shortly after his decease :

Extract from the Address—a Memoir of Robert Fulton, Esq.—delivered before the Literary and Philosophical Society of New York, March 12, 1817, by C. D. Colden, Esq.

“GENTLEMEN :

“In compliance with the practice of institutions similar to our own, this Society has resolved to preserve on its records memorials of the lives of those who have been its distinguished associates—who have contributed to its reputation and honour by their virtues, their genius, and by the employment of their talents.

“It is greatly to be lamented that the first subject for a record of this kind should be an associate taken from us in the prime of his life, and in the midst of his usefulness; whose virtues and manners endeared him to all who knew him, and whose loss has been lamented as a public calamity.

“We cannot think that it will be imputed to an undue partiality for our regretted associate, if we say *that there cannot be found, on the records of departed worth, the name of a person to whose indi-*

vidual exertions mankind are more indebted than they are to the late Robert Fulton. The combined efforts of philosophers and statesmen have improved the condition of man, but *no individual has conferred more important benefits on his species than he whose memory now engages our attention.*"

Extract from a Discourse delivered before the American Academy of the Arts, by his Excellency DeWitt Clinton, Governor of New York.

"Fortunately for the interests of mankind, Mr. Livingston became acquainted with ROBERT FULTON, a self-created man, who has risen into distinguished usefulness, and into exalted eminence, by the energies of his own genius, unsupported by extrinsic advantages.

"Mr. Fulton had directed the whole force of his mind to mathematical learning and mechanical philosophy. Plans of defence against maritime invasion, and of subaquatic navigation, had occupied his reflections. During the late war, *he was the ARCHIMEDES of his country.*

"The poet was considered under the influence of a disordered imagination when he exclaimed :

"'Soon shall thy arm, unconquer'd steam, afar
 Drag the slow barge, or drive the rapid car;
 Or on wide-waving wings expanded bear
 The flying chariot through the fields of air!'

"The connexion between Livingston and Fulton realized, to a great degree, the vision of the poet. *All former experiments had failed,* and the genius of Fulton, aided and fostered by the public spirit

and discernment of Livingston, created one of the greatest accommodations for the benefit of mankind. These illustrious men will be considered, through all time, as the benefactors of the world; they will be emphatically hailed as the Castor and Pollux of antiquity—*lucida sidera*—stars of excellent light and of most benign influence.

“Mr. Fulton was personally well known to most who hear me. To those who were favoured with the high communion of his superior mind, I need not expatiate on the wonderful vivacity, activity, comprehension, and clearness of his intellectual faculties; and while he was meditating plans of mighty import for his future fame and his country’s good, he was cut down in the prime of his life, and in the midst of his usefulness. Like the self-burning tree of Gambia, he was destroyed by the fire of his own genius, and the never-ceasing activity of a vigorous mind.”

Extract from a Discourse delivered before the New York Historical Society, in September, 1816, by the Hon. Gouverneur Morris.

“If the learned leisure of European wealth can gain applause or emolument for meting out, by syllables reluctantly drawn together, unharmonious hexameters, far be it from us to rival the manufacture. Be it ours to boast that the first vessel successfully propelled by steam was launched on the bosom of Hudson’s river. It was here that American genius, seizing the arm of European science, bent to the purpose of our favourite parent art the wildest and most devouring element.

The patron, the inventor, are no more. But the names of Livingston and of Fulton, dear to fame, shall be engraven ON A MONUMENT SACRED TO THE BENEFACTORS OF MANKIND. There generations yet unborn shall read:

“ ‘ Godfrey taught seamen to interrogate
 With steady gaze, though tempest-tossed, the sun,
 And from his beam true oracle obtain.
 Franklin dread thunderbolts, with daring hand,
 Seized, and averted their destructive stroke
 From the protected dwellings of mankind.
 FULTON by flame compelled the angry sea,
 To vapour rarefied, his bark to drive,
 IN TRIUMPH proud, thro’ the loud-sounding surge.’ ”

“ This invention is spreading fast in the civilized world; and though excluded as yet from Russia, will, ere long, be extended to that vast empire. A bird hatched on the Hudson will soon people the floods of the Wolga, and cygnets descended from an American swan glide along the surface of the Caspian sea. Then the hoary genius of Asia, high-throned on the peaks of Caucasus, his moist eye glistening while it glances over the ruins of Babylon, Persepolis, Jerusalem, and Palmyra, shall bow with grateful reverence to the inventive spirit of this Western World.

“ Hail, Columbia! child of science, parent of useful arts—dear country, hail! Be it thine to meliorate the condition of man. Too many thrones have been reared by arms, cemented by blood, and reduced again to dust by the sanguinary conflict of arms. *Let mankind enjoy at last the consolatory spectacle of thy throne, built by industry on the basis*

of peace, and sheltered under the wings of justice. May it be secured by a pious obedience to that Divine will which prescribes the moral orbit of empire with the same precision that his wisdom and power have displayed in whirling millions of planets round millions of suns through the vastness of infinite space."

In presenting this work to a generous public, we not only desire to attract the attention of AMERICAN INVENTORS to the unparalleled perseverance of Fulton, but we call upon the youth of this country, "Young America," to honour the name of Fulton by imitating his exemplary acts, his industrious habits, and adopting his youthful motto :

"There is nothing impossible to do."

No student possessed a mind more tremblingly alive upon the peculiar subjects of his pursuit than Mr. Fulton. His whole mind and heart were actively engaged in calculating how he could best promote the happiness of his fellow-man. No college lore, no academic shade in the forests of Lancaster county, had he to improve his intellect; but on the quiet banks of the winding Conestoga stream he gathered natural strength and originality to express the conceptions of his own mind with force; and there did this youthful genius, under the impulse of a new thought, pursue the chain with which it was connected.

Another object of the author in publishing this book, is to collect money sufficient, from the proceeds of the sales, to erect, in the city of Lancaster and other places,

MONUMENTS TO THE MEMORY OF ROBERT FULTON;

and he has full confidence in his fellow-citizens, that they will cheerfully aid his humble efforts in this worthy project.

The monument will be of cast iron, a colossal statue of Robert Fulton, supported by a richly ornamented pedestal, composed of heavy cast plates, containing twelve correct representations of Mr. Fulton's inventions and drawings, in *alto relievo*. From the original patterns and moulds, a large number of these statues and ornamented plates can be cast; and every city in the United States can be supplied, and enabled to perpetuate the fame of Fulton.

The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the structure of the atom is determined by the laws of quantum mechanics. The second part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the structure of the atom is determined by the laws of quantum mechanics. The third part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the structure of the atom is determined by the laws of quantum mechanics.





Designed by Rougart

FULTON FARM.

L. N. Rosenthal's lith. N. W. cor. Fifth & Chestnut Sts. Philad^a.

THE
LIFE OF ROBERT FULTON.

CHAPTER I.

EARLY YEARS OF FULTON.

“The warrior’s name,
Tho’ peal’d on all the tongues of fame,
Sounds less harmonious to the grateful mind,
Than his who fashions and improves mankind.”

ROBERT FULTON was born in the township of Little Britain, (now called Fulton), in the county of Lancaster, and State of Pennsylvania, in the year seventeen hundred and sixty-five. He was of a respectable though not opulent family. His father, Robert Fulton, emigrated from Ireland when young: he had followed the tailoring business, but afterwards turned his attention to farming. His mother was of a respectable family by the name of Smith, established in Pennsylvania.

Robert Fulton, Sr., and Mary Smith, his wife, had five children—three daughters and two sons. Robert was their third child and eldest son.

Mr. Fulton bought, August 23, 1759, and resided

in, the present brick dwelling-house situate on the north-east corner of Centre Square, in the city of Lancaster; and afterwards, Feb. 8, 1765, sold and conveyed the same to Edward Shippen, Esq. He then, Feb. 8, 1765, purchased at sheriff's sale the farm in Little Britain township, and removed to it. It was there that Robert was born. It contained 364 acres of land, and the consideration was £965.

The father of the celebrated Benjamin West resided in the adjoining county, and was an intimate acquaintance of Mr. Fulton. It is certainly a remarkable coincidence that Benjamin West and Robert Fulton, the two immortal artists, were born in the immediate neighbourhood, in the then wild and dense forests of Pennsylvania, enlivened only by the Indian camp-fires along the Octorara and Conawanga hills; and that both commenced their career and spread their unparalleled fame together from the city of London, the capital of the world.

Mr. Fulton mortgaged his farm to William West, Samuel Purviance, and Joseph Swift; and, Nov. 29, 1766, he and his wife Mary conveyed the property to the mortgagees, and again removed to Lancaster city, where he died in 1768, and was buried in the cemetery of the first Presbyterian church erected in Lancaster, of which he was one of the founders. It is also a singular fact, and

creditable to the family of Mr. Joseph Swift, Sr., that they are still in possession of the Fulton farm; and by the industry of three brothers, Joseph, John, and Daniel Swift, grandsons of Joseph Swift, Sr., who reside there and own the property, it is now one of the handsomest farms in Lancaster county.

In 1773, Robert Fulton was sent to school by his mother to acquire the rudiments of a common English education. At that early period he had already a slight knowledge of reading, writing, and arithmetic, which he had learned at home. Many persons may think that a history of his infancy would be of no importance; but his peculiar genius manifested itself at so early an age, that even his childhood acts and schoolboy pranks are not uninteresting. All his hours of recreation were spent usefully, although he was considered as a dull boy in school. He preferred the employment of his pencil: his books were a secondary consideration with him. He frequented the shops of mechanics, and exhibited his talent for mechanism and taste for drawing to such a degree, as to become a helper to the apprentices, and a welcome visitor to their employers. His teacher, a Quaker gentleman by the name of Caleb Johnson, one day called him to account for neglecting his studies, and took occa-

sion to strike Robert over the knuckles with a rule, at the same time remarking that he would make him do something. Robert quickly placed his arms a-kimbo, and looking his tutor sternly in the face, replied: "Sir, I came here to have something beat into my brains, and not into my knuckles."

At another time, when about nine years of age, he came to school one afternoon rather late. Mr. Johnson inquired the cause of his detention: Robert candidly told him that he had been at Mr. Nicholas Miller's shop pounding out lead, and had manufactured a very neatly shaped lead-pencil—"the best I ever had in my life, sir." He exhibited the pencil to his teacher, and it was pronounced excellent; and in a few days afterwards nearly all his schoolmates supplied themselves with pencils similar to that young Robert had made. Some time after this, Mr. Johnson being in conversation with Robert's mother, who expressed her earnestness in his improvement, yet doubted his proper attention to his books, the tutor frankly remarked that he had used his best endeavours, and that Robert had pertinaciously declared to him "that his head was so full of original notions that there was no vacant chamber to store away the contents of any dusty books." This was a remarkable explanation to be made by a youth of ten years of age, and positive

proof that the particular bent and direction of Fulton's genius was the work of nature, and not the result of habit or early associations. On the 1st of July, 1778, the following notice was published in the city of Lancaster :

“The excessive heat of the weather, the present scarcity of candles, and other considerations, induce the Council to recommend to the inhabitants to forbear illuminating the city on Saturday evening next, July 4th.

“*By order*

(Signed) “TIMOTHY MATLACK, *Sec.*”

Robert had candles prepared, and went to Mr. John Fisher, brushmaker, living near the jail, who kept powder and shot for sale. Mr. Fisher was somewhat astonished at Robert's desire to part with the candles, which at that time were scarce articles ; and he asked him why he wished to part with them ? Robert replied that “our rulers have requested the citizens to forbear illuminating their windows and streets : as good citizens, we should respect their request ; and *I prefer* illuminating the heavens with sky-rockets.” Having procured the powder, he left Mr. Fisher's, and entered a small variety store kept by Mr. Theophilus Cossart, where he inquired the price of his largest size pasteboard ; and having purchased several sheets, which Mr. Cossart was in the act of rolling up for

him—he requested him not to roll them, he wished to carry them open. Mr. Cossart, well knowing that Robert was an inventive genius, inquired what he was about to invent.

“Why,” said Robert, “we are prohibited from illuminating our windows with candles; and I’m going to shoot my candles through the air.”

“Tut, tut, tut!” said Mr. Cossart, laughingly; “that’s an impossibility.”

“No, sir,” said Robert; “*there is nothing impossible.*”

It cannot be doubted that this idea was his success in after life.

Robert was known to purchase small quantities of quicksilver from Dr. Adam Simon Kuhn, druggist, residing opposite the market-house. He was trying some experiments that he did not wish to make public; and which the workmen in Mr. Fenno’s and Mr. Christian Isch’s shops were anxious to find out, but could not. He was in the almost daily habit of visiting those shops—Mr. Isch’s smithshop was then located on the north-east corner of West King and Prince streets—and was a favourite among the workmen, who took advantage of his talent for drawing by getting him to make ornamental designs for guns, and sketches of the size and shapes of guns, and then giving the

calculations of the force, size of the bore and balls, and the distances they would fire; and he would accompany them to the open commons near by Potter's field, to prove his calculations by shooting at a mark. On account of his expertness in his calculations, and of their ineffectual efforts to discover the use he was making of quicksilver, the shop-hands nicknamed him "quicksilver Bob."

Mr. Messersmith and Mr. Christian Isch were employed by the Government to make and repair the arms for the troops; and on several occasions guards were stationed at their shops to watch and see that the workmen were constantly employed during whole nights and on Sunday, to prevent any delay. The workmen had so much reliance and confidence in "quicksilver Bob's" judgment and mechanical skill, that every suggestion he would make as to the alteration of a gun, or any additional ornament that he would design, were invariably adopted by common consent.

In the summer of 1779, Robert Fulton evinced an extraordinary fondness for inventions. He was a frequent visitor at Mr. Messersmith's and Fenno's gunsmith shops, almost daily; and endeavoured to manufacture a small air-gun. One of Mr. Jacob Messersmith's apprentices, Mr. Christopher Gumpf, who was at the time eighteen years of age, used

frequently to accompany his father, Deter Gumpf, to the Conestoga on fishing excursions, Mr. Deter Gumpf being an experienced angler, and very fond of fishing, and he was pleased to have the company of Christopher and Robert. The old gentleman had a small flat-boat, which he had kept secured to the trunk of a tree by a chain and padlock, for his own accommodation. He generally required the boys to pole the boat to different parts of the creek in the neighbourhood of Rockford, the country-seat of General Hand, which at that time was the most secluded, deeply shaded, and quiet neighbourhood along the Conestoga. Returning homeward one evening, Fulton observed to Christopher that he was very tired using that pole, and Christopher coincided with him that the labour was too severe.

Robert absented himself a week, having gone to Little Britain township to spend a few days at his aunt's; and while there he planned and completed a small working model of a fishing-boat with paddle-wheels. On leaving his aunt's, he placed the model in the garret, with a request that it should not be destroyed. Many years afterwards, that simple model was the attraction of friends, and became, instead of lumber in the garret, an ornament in the aunt's parlour, who prized it highly.



Designed by Reigart.

ROBERT FULTON'S FIRST EXPERIMENT WITH PADDLE WHEELS IN THE SUMMER OF 1779 ON THE CONESTOGA.

J. M. Rosenthal's 14th, N. W. cor. Fifth & Chestnut at Sta. Pinhead

That model was the result of Robert's fishing excursions with Christopher Gumpf; and when he returned from his aunt's he told Christopher that he must make a set of paddles to work at the sides of the boat, to be operated by a double crank, and then they could propel the old gentleman's fishing-boat with greater ease. Two arms or pieces of timber were then fastened together at right angles, with a paddle at each end, and the crank was attached to the boat across it near the stern, with a paddle operating on a pivot as a rudder; and Fulton's first invention was tried on the Conestoga river opposite Rockford, in the presence of Deter and Christopher Gumpf. The boys were so pleased with the experiment, that they hid the paddles in the bushes on shore, lest others might use and break them, and attached them to the boat whenever they chose; and thus did they enjoy very many fishing excursions.

Robert was a violent revolutionary Whig, a regular *rebel*, and made numerous pencil sketches ridiculing the tories of the Revolution. He made a drawing representing the barracks at that time containing the British prisoners of war, and located in Duke above Walnut street. Along Duke, between Walnut, numerous square huts of mud and sod were erected, in which the Hessians were sta-



Drawn by D. Abright.

THE FULTON HOMESTEAD.

L. N. Rosenthal's Ill. N.W. cor. Fifth & Chestnut Sts. Philadelphia.

CHAPTER II.

THE HOMESTEAD.

“Behold the maternal homestead!
Arch'd by filial acts, its portal gleams
With various gems of intermingling beams.”

THE WIDOW'S HOME, AND THE GOLDEN DEED OF THE WIDOW'S SON.

ROBERT FULTON, at the age of seventeen years, left Lancaster city for Philadelphia, to pursue his enterprising genius and talent as an artist with his pencil. He there derived emolument from painting portraits and landscapes, and making drawings of machinery; and he remained there until he was about twenty-one years of age, and enjoyed the acquaintance and company of Benjamin Franklin, by whom he was much noticed. He returned to Lancaster *on his twenty-first birthday*; and, with his heart bounding with joy, he gave the means he had acquired in Philadelphia to the relief and comfort of his mother and sisters. He took them immediately to Washington county, Penna., and pur-

chased a small farm, on which he settled them; and after seeing his parent comfortably established in the home which he had provided for her, he sat out with the intention of returning to Philadelphia. On his way, he visited the Warm Springs of Pennsylvania for the benefit of his health. A short time previous he had been attacked with an inflammation of the lungs—this was succeeded by a spitting of blood, and other symptoms indicating a disposition to pulmonary complaints: under these circumstances, at the same time that he was influenced by other views, he was induced, by the advice of his friends, to make a voyage to Europe. He was assured that he would meet with the patronage of his countryman Mr. West, who had already attained great celebrity as an artist unrivalled. Full of expectations, he left his native country for England, whilst his manly brow bore the imprint of his mother's caress and blessing, and he became the maker of his own fortune.

Poets have sung their loud pæans of the GOLDEN AGE, Chronologists of the GOLDEN NUMBER, Arithmeticians of the GOLDEN RULE—we would strike the strings of a new golden harp, whose vibrations shall excite every filial heart, and touch the particular passions of the

YOUTH OF AMERICA.

THE GOLDEN DEED.

Let us with hurried hands grasp hold of the brightest plume of the American eagle; and with its piercing point o'ertipped with gold, write of the GOLDEN DEED, that man hath ne'er foretold.

The Golden Deed.

“KNOW ALL MEN BY THESE PRESENTS, that I, Thomas Pollock, and Margaret, his wife, of the township of Hope-well, county of Washington, and State of Pennsylvania, for and in consideration of the sum of eighty pounds, lawful money of the State aforesaid, to me in hand paid by Robert Fulton, miniature painter, of the city of Philadelphia, and State aforesaid, yeoman, before the sealing and delivery of these presents, the receipt whereof we do hereby acknowledge, and ourselves therewith fully satisfied, contented, and paid, have granted, bargained, sold, and confirmed, and by these presents do grant, bargain, sell, make over, and confirm unto the aforesaid Robert Fulton, to his heirs and assigns—

“A certain parcel of land on the waters of Cross creek, it being part of a tract of land granted by the Commonwealth of Pennsylvania, the 12th day of December, A.D. 1785, to the Rev. Joseph Smith, his heirs and assigns, called Wiliome, situated on the waters aforesaid, in the county aforesaid, BEGINNING at a corner white-oak, thence by other lands of the said Joseph Smith south eighty-five degrees, west forty-six perches to a white-oak on the Wheeling path, thence north thirty-two degrees, west eighteen perches to a post, thence south sixty-eight degrees, west one hundred and thirty-seven perches to a dogwood tree, thence north thirty degrees, west one hundred and fifty perches to a stump and hickory tree, thence south thirty degrees, west two hundred perches to the place of Beginning—CONTAINING eighty-four (84) acres and three-fourths of an acre—

THE GOLDEN DEED.

“With the appurtenances, (which said land was formerly surveyed and platted by a certain John Hale for a certain Thomas Gardner, afterwards surveyed with a tract of land in pursuance of a warrant granted to the said Joseph Smith, dated the 30th of September, 1785, and conveyed by said Joseph Smith and Esther his wife to Thomas Pollock)—To have and to hold the tract or parcel of land, with the appurtenances, unto the said Robert Fulton and his heirs, to the use of him, the said Robert Fulton, his heirs and assigns, for ever, free and clear of all restrictions and reservations as to mines, royalties, quit-rents, or otherwise, excepting and reserving only the fifth part of all gold and silver ore for the use of this Commonwealth, to be delivered at the pit’s mouth, clear of all charges.

“In witness whereof we have here set our hands and caused our seals to be affixed, the 6th day of May, A.D. 1786.

“THOMAS POLLOCK, [L. S.]

“MARGARET POLLOCK, [L. S.]

“Signed, sealed, and delivered in the presence of

“J. MARSHAL,

“MARY MARSHAL,

“THOMAS MARQUES.”

All of which was duly acknowledged before J. Marshal, Esq., and afterwards recorded in the Recorder’s office in and for the county of Washington, in Record Book C, vol. i., page 56, May the 8th, 1786.

This earthly heritage gave peace and comfort to the widow's heart, dispersed all sore distress; and each day fresh beams of gladness brightened round the maternal mansion, until the deep trumpet's solemn voice called her from the cares of the world to that house not made with hands, eternal in the heavens.

She died in seventeen hundred and ninety-nine. Afterwards Mrs. Elizabeth Scott, her daughter, continued to reside there, having inherited the farm, stock of horses and cattle, implements of husbandry, furniture, and everything belonging thereto, through the noble generosity of her brother, the author, the original inventor, of the GOLDEN DEED.

Robert Fulton's whole life was wonderfully novel. There was some unknown influence that was his guardian GENIUS. The maternal lessons he had received formed his conduct through life; and there was a secret which we cannot fathom, which was useful to his success of affairs, and which at his death produced the greatest respect ever offered to a private citizen. He started through life with his mother's blessing; and that may have been the secret which buoyed up all his hopes and anticipations to surmount and get the better of all difficulties and impediments.

These testimonials of respect were drawn forth chiefly by admiration of the transcendent genius of Fulton, and for the benefits he had rendered to mankind. But there was that in his character which the world did not so readily see, and which was hardly thought of amid all the imposing demonstrations at his funeral. If he was great by the superiority of his genius, he was no less so by the goodness of his heart; and it will be difficult to find, in the whole range of remarkable biographies, anything more touching and beautiful than the *filial piety* which prompted him, with the very first earnings that he could call his own, to purchase a homestead for his widowed mother. He felt within himself, no doubt, the irrepressible impulses of a great intellect. Humble, unknown, unpatronized as he was, he was yet conscious to himself what great things he was capable of; and the most ardent wish of his soul, we may presume, was to go abroad, to mingle with men, to come in contact with that mighty world on whose destinies he already felt that he was to exert a lasting influence. But, repressing all selfish and personal considerations, all the aspirations of a noble ambition, with a filial piety that never can be too much commended, he devotes his first hard earnings to the comfort of his widowed and dependent mother.

Nor was it until he saw her provided for that he went forth to see the world, and to bring to light the great thoughts and discoveries that were already struggling in his bosom.

In the splendor of his discoveries, we are apt to forget that Fulton was anything but a great mechanical genius; but in his own secret consciousness, we doubt not, and especially as his last hours drew nigh, the honours paid to his genius gave him less satisfaction than the remembrance of those modest, unseen virtues, which were known only to God and his own heart. And whilst we pay the willing tribute of admiration to his splendid mechanical achievements, let us remember, as at least equally worthy of our respect and imitation, his beautiful devotion to the wants and comfort of his widowed mother. If the mother of Washington felt her heart throb with joy when she replied that "*George was always a good boy,*" the county of Washington will for ever bear evidence of the fact that "*Robert Fulton was a noble son!*"

CHAPTER III.

FINE ARTS, AND MECHANIC ARTS, A SHORT HISTORY OF BENJAMIN WEST, AND THE INVENTIONS OF MR. FULTON.

When the American poets shall in future times celebrate the golden age of their country, they will draw their descriptions from the authentic history of Pennsylvania — the age of Penn, of Fulton, and of West.

MR. FULTON'S reception by Mr. West was such as he had been led to expect. That distinguished American was so pleased with his promising and enterprising genius, and his many amiable qualities, that he took him into his house, where he continued an inmate for several years.

When Mr. Fulton returned to this country, he brought with him a family piece representing that great artist and his lady, done by Mr. West himself, who also painted a portrait of Mr. Fulton, which his family now possesses, a correct copy of which embellishes the front of this work. These pieces were offerings of friendship, and were made and received as tokens of the attachment formed between the family of that great painter and his

young friend, at an early day, and which lasted until his death.

After leaving that family, he appears for some time to have made the art in which he had had the benefit of the instructions of that great master, his chief employment. He spent two years in Devonshire, near Exeter, where he made many respectable acquaintances, and among others he became known to the Duke of Bridgewater, so famous for his canals, and Lord Stanhope, a nobleman celebrated for his love of science, and particularly for his attachment to the mechanic arts. Mr. Fulton was for a long time in correspondence with Lord Stanhope; and they communicated to each other ideas on subjects to which their minds were mutually directed.

Mr. Fulton, throughout his course as a civil engineer and mechanist, derived great advantage from his talent for drawing and painting. He was an elegant and accurate draughtsman. Of his abilities in this important branch of his profession, the plates annexed to the "Columbiad," the work we have mentioned, and the copies of which we have here inserted, afford strong proof. This gave him great facility in causing his designs to be executed, and a great advantage over most who have engaged in similar pursuits.

There is dignity of character, fine expression, delicate design, correct drawing, and beautiful conception, in all Mr. Fulton's paintings. All which qualities can only spring from an elevated mind—such a mind that could only be benefited by the works of the great Benjamin West, who was one of the most celebrated classical painters the world ever produced, second only to the immortal Raphael, and who exceeded all other historical painters (except Rubens) in the number and variety of his productions.

Mr. Fulton's attachment to the fine arts led him to conceive the design of inducing his countrymen to purchase the works of Mr. West, the principal part of which that great artist was then willing to part with. For this purpose he wrote an address to the citizens of Philadelphia, urging them to establish an Institute for the Fine Arts, similar to the one which now exists in that city. After exhibiting with great force and animation the advantages to be derived from the cultivation of a taste for painting and sculpture, and portraying the character and merits of Mr. West with all the warmth of friendship and admiration, Mr. Fulton says: "I now have the pleasure to offer you a catalogue of the select works of Mr. West, and with it to present the most extraordinary oppor-

tunity that ever was offered to the lovers of science. The catalogue referred to is a list of all Mr. West's productions, portraits excepted. No city ever had such a collection of admired works from the pencil of one man, and that man is your fellow-citizen. The price set on the collection is fifteen thousand pounds sterling—a sum inconsiderable when compared with the objects in view, and the advantages to be derived from it.”

Mr. Fulton then proceeds to propose means for raising the necessary funds, and to suggest arrangements for the establishment, which he wishes might be called the Westinian Gallery.

This proposition could not have been made without the assent of Mr. West. If it were so, it is curious to remark that he was then willing to part with his whole collection, which must have contained the works of the prime of his life, for little more than he has since received for a few of his celebrated paintings.

Every man to whom this proposition was addressed, must now deeply regret that it was not accepted; and the more so because we learn, from this same address of Mr. Fulton, that had the offer been accepted, and the plan proposed by Mr. Fulton carried into execution, Mr. West would proba-

bly have returned to and have spent the evening of his life in his native country.

At the sale of the pictures of the Royal Academy, in 1805, Mr. Fulton purchased West's *Ophelia* and his *King Lear*: for the first of these he gave one hundred and twenty-five, and for the other two hundred and five guineas. In such estimation were the works of West, that the English seemed to have been unwilling to spare us even these specimens of his talents. A periodical work published in London at this time, thus notices the purchase of Mr. Fulton :

“We have to regret that the two last-mentioned pictures, which are the most happy productions of the truly classic mind of Mr. West, are going out of the country. They have been purchased by an American gentleman, (Mr. Fulton, of Philadelphia,) and are to be the first ornaments of a gallery which is to be established in that city. We cannot part with them without feeling interested in the fate of the beautiful *Ophelia*, whose charming elegance, mingled with delirious wildness, fills the soul with the most lively sentiments; nor with the majestic *Lear*, whose heart seems torn with ingratitude and the sense of complicated evils. There is a grandeur of conception and spirit of execution in this picture, which has been seldom surpassed, and which can only be enjoyed by men of cultivated taste and elevated minds. In such paintings we are not to look for delicate complexions, smooth and polished surfaces, or fine colours—nor do we look for such qualities in the works of Raphael; but for correct drawing, fineness of touch, fine flow of drapery, dignity of character, and movement of soul, all of which are treated in these pictures with the

highest order of intellect, and will rank them among the most distinguished works of art when Mr. West will be no more. Feeling as we do, it is with reason we regret that those pictures are to leave this country; but it must be highly gratifying to the Pennsylvanians to possess such works of their celebrated and much-esteemed countryman."

This eulogy on one of the earliest, best, and most respected friends of Mr. Fulton, will not be considered, it is hoped, as a too long, or as a misplaced digression. The genius of West and Fulton have secured them an immortal fame. It is possible that the humblest efforts to preserve memorials of either of them, may rescue from oblivion a performance of the slightest merit; and when succeeding generations shall view, with increased admiration, these productions of the first and greatest American masters improved by the hand of time, their histories will be most interesting, and will be thought to have been worth preserving.

In honor of the great preceptor of Fulton, we insert a short history of his life and works.*

* Benjamin West, President of the Royal Academy in London, who cast a splendour upon the age in which he lived, was born in Chester county, Pennsylvania, on the 10th of October, A.D. 1738. The old mansion house where he was born is still standing, and is now called "Westdale," about ten miles south-west of Philadelphia city. The farm was originally settled by his maternal

In 1797, Mr. Fulton took his lodgings in Paris, at an hotel in which Joel Barlow, our American

grandfather, and called "Springfield." The West family emigrated from England with William Penn, on his second visit to Pennsylvania, in 1699, and belonged to the Society of Friends. John West, the father of Benjamin, married Sarah, the daughter of Thomas Pearson, about the year 1714, by whom he had ten children: Benjamin was the youngest son. As early as June, 1745, he sketched with red and black ink a correct likeness of his sister's child, whilst it was asleep in the cradle. The young artist was not provided with better materials than pen and ink until the following summer, when a party of Indians came to pay their annual visit to Springfield, and being amused with the sketches of birds and flowers which Benjamin showed them, they presented him with the colours with which they painted their ornaments, and they taught him to prepare the primary colours. The mythologies of antiquity furnish no allegory more beautiful. Here is the immortal artist instructed by nature; AND WE CANNOT IMAGINE ANYTHING MORE PICTURESQUE THAN THE REAL INCIDENT OF INDIANS INSTRUCTING WEST TO PREPARE THE PRISMATIC COLOURS.

His first pencils he made of the fur of a cat, drawn tightly through a goose-quill. His first picture was painted for his mother, and was a composition from two engravings; and sixty-seven years afterwards, the artist had the picture in the same room with the sublime painting of "Christ rejected;" and he then declared that he had never been able to surpass some of the touches of art in his first and juvenile essay. His second picture was a landscape, which comprehended a picturesque view of a river, with vessels on the water, and cattle pasturing on the banks: he afterwards presented it to his friend William Henry,

Minister and celebrated clergyman, and his lady, had their residence. "Here," to use the warm

Esq., of Lancaster, whose family still retain it in possession. The little artist was sent for to go to Lancaster, for the purpose of taking the likenesses of Mrs. Ross and her family. Mrs. Ross was greatly admired for her beauty. Such was the success with which he executed this first portrait, that his celebrity was greatly enlarged.

In 1750, whilst Benjamin West was painting these numerous portraits in this city, Mr. William Henry closely watched and examined the young artist's performances, and he observed to him that if he (Henry) could paint as well, he would not waste his time on portraits, but would devote himself to *historical subjects*; and he mentioned the "Death of Socrates," as affording one of the best topics for illustrating the moral effect of the art of painting. The painter knew nothing of the history of the philosopher; and, upon confessing his ignorance, Mr. Henry went to his library, and taking down a volume of the English translation of Plutarch, read to him the account given by that writer of this affecting story. West said that he would be happy to undertake the task, but, having hitherto painted only faces and men clothed, he should be unable to do justice to the figure of the slave who presented the poison, and which he thought ought to be naked. Henry had among his workmen a very handsome young man, and, without waiting to answer the objection, he sent for him. On his entrance into the room, he pointed him out to West, and said: "*There is your model!*" And this instruction instantaneously convinced the artist that he had only to look into nature for his models. The "Death of Socrates" was finished, and the career of the artist was from that time facilitated. And thus did the taste, intelligence, and generosity

language of one who participated in the sentiments expressed, "commenced that strong affection, that

of the citizens of Lancaster secure the *first portrait*, the *first landscape*, and the *first grand historical production* of the immortal West.

In this favorable state of things he attained his sixteenth year, when a meeting of the Society of Friends was called at Springfield, to consider publicly what ought to be the destiny of Benjamin West. After sitting some time in silence, John Williamson addressed the meeting. At the conclusion of his address, the women rose and kissed the young artist, and the men one by one laid their hands on his head, and prayed that the Lord might verify in his life the value of the gift which had induced them, despite of their religious tenets, to allow him to cultivate the faculties of his genius. One of his early productions was the treaty of William Penn with the Indians, under the great elm tree in Kensington, illustrating the first public contract which connected the inhabitants of the Old and New World together: a treaty, though not ratified by oath, that has never been broken.

In 1759, Benjamin West visited Europe to study the masterly performances of Rome and the other cities of Italy, where he received the applause of the best judges, and honorable membership conferred on him by the Academies of Parma, Florence, and Bologna.

Among the distinguished persons whom Mr. West found in Rome, was the celebrated Cardinal Albani, at an evening-party. The Cardinal became curious to witness the effect which the works of art in the Belvidere and Vatican would produce on the young artist. The whole company, which consisted of the principal Roman nobility and strangers of distinction then in Rome, were interested in the event; and it was arranged, in the course

devoted attachment, that real affection, which subsisted in a most extraordinary degree be-

of the evening, that, on the following morning, they should accompany West to the palaces. At the hour appointed, the company assembled; and a procession consisting of upwards of thirty of the most magnificent equipages in the capital of Christendom, and filled with some of the most erudite characters in Europe, conducted the young Quaker to view the master-pieces of art. It was agreed that the APOLLO should be first submitted to his view, because it was the most perfect work among all the ornaments of Rome; and, consequently, the best calculated to produce that effect which the company were anxious to witness. The statue then stood in a case, enclosed with doors, which could be so opened as to disclose it at once to full view. West was placed in the situation where it was seen to the most advantage, and the spectators arranged themselves on each side. When the keeper threw open the doors, the artist felt himself surprised with a sudden recollection altogether different from the gratification which he had expected; and without being aware of the force of what he said, exclaimed: "My God! how like it is to a young Mohawk warrior!" The Italians, observing his surprise and hearing the exclamation, were excessively mortified to find that the god of their idolatry was compared to a savage. They mentioned their chagrin, and asked West to give some more distinct explanation, by informing them what sort of people the Mohawk Indians were. He described to them their education, their dexterity with the bow and arrow, the admirable elasticity of their limbs, and how much their active life expands the chest, while the quick breathing of their speed in the chase dilates the nostrils with that apparent consciousness of vigour which is so nobly depicted in the APOLLO. "I have seen them

tween Mr. Barlow and Mr. Fulton, during their lives."

often," added he, "standing in that very attitude, and pursuing with an intense eye the arrow which they had just discharged from the bow." The Italians were delighted with this descriptive explanation, and allowed that a better criticism had never been pronounced on the merits of the statue. In the meantime a number of Italians had gathered round them to look at Mr. West, who, they had heard, was an American, and whom, like Cardinal Albani, they had imagined to be an Indian, come to study the fine arts in Rome; and that such an event furnished a new and magnificent theme, and they beheld in him an instrument chosen by Heaven to raise in America the taste for those arts which elevate the nature of man — an assurance that his country will afford a refuge to knowledge and science when, in the old age of Europe, they shall have forsaken her shores.

He spent four years in Italy: from thence he went to France, visited the works of the French artists, and reached London in August, 1763, where he became the companion of courtiers, and obtained the patronage and friendship of princes. In 1765, his father accompanied Miss Sewel, of Philadelphia, across the Atlantic, to whom West was married. She was a lady of great merit, and in London she was called the Philadelphia beauty. On the death of Sir Joshua Reynolds, in 1791, West was elected President of the Royal Academy, which office he held until his death. In 1817, he lost the companion with whom he had lived for more than half a century, and in the month of March, 1820, this extraordinary man breathed his last. He was buried in St. Paul's Cathedral, London. He left two sons, Rembrandt and Benjamin.

Mr. West painted about one hundred portraits, and finished

Soon after Mr. Fulton's arrival in Paris, Mr. Barlow removed to his own hotel, and invited Mr.

upwards of two hundred drawings with the PEN, which last, for sublimity of conception, are among the finest of his works: so that the whole of his pieces amount to above six hundred. Some of them are larger in size than any in the national gallery of France, being from thirty to forty feet square.

In the zenith of his glory he was beloved as an amiable and upright man; and in the memoirs of his life, written by himself, and published in London, by John Galt, in 1816, we find the following: "*Towards his old friend William Henry, of Lancaster city, he always cherished the most grateful affection: he was the first who urged him to attempt historical composition.*"

And this grateful acknowledgment is from the immortal West, whose works were composed with the serious ambition and hope of illustrating Scripture, and rendering Gospel truth more impressive. No subject seemed to him too lofty for his pencil: he considered himself worthy to follow the sublimest flights of the prophets, and dared to limn the effulgence of God's glory, and the terrors of the Day of Judgment. The mere list of his works makes us shudder at human presumption: "Moses receiving the Law on Sinai," "The Descent of the Holy Ghost on the Saviour in the Jordan," "The opening of the Seventh Seal in the Revelations," "Saint Michael and his Angels casting out the Great Dragon," "The mighty Angel with one foot on Sea and the other on Earth," "Death on the Pale Horse," (it is irresistibly fearful to see the triumphant march of the terrific phantom, and the dissolution of all that Earth is proud of beneath his tread—war and peace, sorrow and joy, youth and age, all who love and all who hate, seem planet-struck!) "The Crucifixion" and "The

Fulton to reside with him. Mr. Fulton lived seven years in Mr. Barlow's family, during which time he learned the French, and something of the Italian and German languages. He also studied the high mathematics, physics, chemistry, and perspective, and acquired that science which, when united with his uncommon natural genius, gave him so great a superiority over many of those who, with some talents, but without any sort of science, have pretended to be his rivals. Mr. Fulton, during his residence with Mr. Barlow, projected the first panorama that was exhibited in Paris. This was a novelty which attracted many spectators, and afforded a handsome emolument.

At this period, an honored representative of one of the congressional districts of New Jersey visited Mr. Fulton. On the wall of his room was sketched distinctly the plan of a steamboat. "There," said Fulton, as he pointed it out to his visitor, "is the

Resurrection!" And there are many others of the same class. With such magnificence and sublimity, who could cope?

"Old paintings! who would not spare them? they are priceless for their age:

O spare them! they are sacred to the dead!

They tell of times, of happy times, in years long, long gone by;

Of dear ones that have ceased to live but in the memory:

They picture many a bright, bright scene, in sunny days of yore:

O, then, spare them! they are a priceless store:

They are the only links that bind us to the past."

image of what will yet traverse the river and the ocean." And wherever he went, this image of the future he carried with him. It was written in his mind. He saw it as he walked along, he thought of it, he dreamed of it, and at last he acted it. The taper of his lone room illuminated the world.

Mr. Fulton's Inventions.

1.—In 1797, Mr. Fulton invented and designed the first panorama ever exhibited in Paris, which he sold, to try his experiments on the propulsion of vessels by steam.

2.—In 1794, he invented and received letters patent in England for a mill for sawing marble; for which the British Society for the "Promotion of the Arts and Commerce" presented him with their thanks and an honorary medal.

3.—In 1797, he likewise invented and patented Double Inclined-Planes for canals.

The DOUBLE INCLINED-PLANE, extending from one level of the canal to the other, and running into each canal about sixty feet.

A TUB or cistern to move in a pit, into which water is drawn from the upper canal, in order to create a power to put the machine in motion. A drum-wheel over the pit, which gives motion to the apparatus.

Balance-chains attached to the tub.

A horizontal wheel at the bottom of the plane: also a wheel inclined on the same angle as the plane, to be placed at the top: round these two wheels the chains are continued, and perform a rotatory movement. A shaft with two wheels multiplied movement, to convey the motion from the drum to the inclined-wheel. A stopper on the plane near the bridge, to prevent the boat descending until the man is ready. Centrifugal fans regulate the movement.

4.—Also a machine for spinning flax.

5.—Also for a machine for making ropes, which can stand in a room forty feet square, and by which the rope-yarns are put on spools, and any sized cordage made by one man.

6.—He likewise obtained letters patent for a machine and contrivance for scooping out the earth to form channels for canals or aqueducts, afterwards much used in England.

7.—He likewise invented and erected cast-iron bridges and cast-iron aqueducts, and wooden bridges, with his peculiar mode of combining the timbers.

8.—His treatise on the "Improvement of Canal Navigation," in quarto form, one hundred and twenty pages, containing seventeen elegantly engraved plates, all his own designs, was published

in London in 1796. He there exhibits several kinds of boats for canals, for the purpose of passing the planes, to avoid the loss of time, if the boats were placed on any kind of a carriage.

9.—His invention of what he called the MARKET or PASSAGE BOAT.

10.—Another: the DESPATCH BOAT, for the purpose of conveying such goods as require expedition.

11.—Another: the TRADER, which was twenty feet long, four wide, two feet ten inches deep in the clear, flat at the bottom, and ends like a box, bolted and screwed and stayed at the corners, with two knees or ribs inside, exactly above the wheels, and about five feet from the ends, which would leave ten feet in the centre. Two keels of scantling, about six inches square, eighteen inches asunder, were laid along the centre of the bottom to receive the wheels. The wheels from six to ten inches in diameter, two feet distance from the extremities—axle and wheel cast in one piece, and turned at the shoulders the axle moved on brass or iron steps.

12.—The MODE OF CROSSING RIVERS and gaining height at the same time, performing the double operation of an aqueduct and locks.

13.—A PERPENDICULAR Lift to pass boats by means of cranes on the upper side of the upper

canal: behind the cranes was a drum-wheel of two diameters—to the largest the crane chains were fastened. To the crane chains a cage of iron was fixed to receive the boat: thus suspended, the cage and a tub of water moved alternately between the the summit and lower canals.

14.—Another mode of passing, by machinery, a DESCENDING TRADE, and saving the whole of the water by means of the pumps.

15.—His invention of beautiful air-guns—one of which he sold to a gentleman of Chester county for seventy-five dollars. He experimented with air-guns, to test the difference between the force of air and steam: he concluded that they might be considered equal, but that steam was the most practicable.

16.—The “Cable Cutter,” to cut the cables of vessels when lying at anchor.

17.—“Torpedoes:” copper cylinders which contained about one hundred pounds of powder, discharged by a gun-lock and clock-work, by which vessels could be blown to atoms—the explosion taking place according to the time fixed.

18.—In 1807, the first STEAM PACKET that was ever built, or sailed against wind and tide, which was called the “CLERMONT.”

19.—The first submarine plunging-boat, as a

terrible engine of war, constructed for carrying torpedoes and submarine guns, adapted for a mode of maritime warfare which he called the "torpedo war." These boats had a main-sail and a jib like a sloop: the masts and sails could be taken in, and the boat dive under water in one minute, and be rowed and steered by a compass, at any depth.

Mr. Fulton was thoroughly acquainted with the pneumatic machinery by which the fish rise to the surface or lie at the bottom of the sea, and had imitated this natural power for his boat by some mechanical contrivance—most probably through a contraction and expansion of the volume of the boat. His mode of propelling the boat was by a spiral sculler in the stern, turned by a crank; and it made between two and three miles an hour. This was supposed to be the first propeller on the Archimedean plan. This "diving-boat," the "NAUTILUS," was much admired at Brest for the science of the conception, and the extraordinary and wonderful skill in the execution.

20.—Submarine guns.

21.—A beautiful steamship called the "CAR OF NEPTUNE," of 295 tons.

22.—In 1811, the "PARAGON," of 331 tons.

23.—In 1812, the "FIREFLY," of 118 tons.

24.—In 1812, the Jersey ferry-boat "CAMDEN,"

which commenced running at Philadelphia May 9, 1812, from Market street ferry, upper side, to Springer's ferry, at Camden, New Jersey.

25.—In 1813, the "RICHMOND" steamer, of 370 tons.

26.—In 1813, the steamer "WASHINGTON," of 275 tons.

27.—In 1813, the "YORK" ferry-boat.

28.—In 1813, the "NASSAU" ferry-boat.

29.—Dec., 1813, the steamboat "VESUVIUS," 140 feet keel, 400 tons burden, was launched at Pittsburgh, designed as a regular trader between the Falls of the Ohio and New Orleans; and, August 10, 1816; with a rich cargo, bound up the Mississippi, was destroyed by fire off New Orleans. Luckily, she was anchored in the river, whereby no other damage was suffered. The people all saved. Property lost estimated at \$200,000.

A contract was made by the U. S. Government with Mr. Fulton, Dec. 27, 1814, for the purpose of employing his steamboats "VESUVIUS," "ÆTNA," "NEW ORLEANS," and "NATCHEZ," on the Mississippi, in transporting troops and munitions of war, and the "BUFFALO" steamboat on the Ohio.

The celebrated battle of the 8th of January took place but a week afterwards, and it was upon

the possession of the "VESUVIUS," this auxiliary instrument of war, that the commanding General relied, in his anticipations of safety to the city and the accomplishment of a brilliant victory; and what would have been the mighty rivers of the West without Mr. Fulton's invention? And the records of our country exhibit the names of the two celebrated statesmen and presidents, John Quincy Adams and Andrew Jackson, certifying to Congress the invaluable services rendered to the country by Mr. Fulton, at the great battle of New Orleans. Such unquestioned proofs of his genius, and the application of his steamships to the best uses of his country, in so trying an emergency, entitle him to the gratitude of his countrymen and the applause of the world.

30.—In 1813, the steamship "FULTON," of 327 tons.

31.—In 1814, the "FULTON THE FIRST," the first steam vessel of war in the world. Jan. 5, a number of influential and patriotic gentlemen of the city of New York assembled at the house of Robert Fulton, Esq., to investigate the principles and utility of a *steam vessel of war* invented by that gentleman. After examining the plan and hearing the reasons submitted, they immediately adopted measures to raise \$120,000, for the purpose of

giving a trial to the experiment, proposing to build one to carry 24-long-pounders, to aid in the defence of that city.

Jan. 3, 1814, the committee, Stephen Decatur, Evans, Perry, Warrington, Lewis Jones, etc., reported having examined the MODEL and PLANS, and that it was among the best interests of the United States to carry the plan into immediate execution.

Oct. 31, 1814, the steam frigate "FULTON THE FIRST" was launched at New York, of 2475 tons burden. She was cannon-proof. She carried thirty 32-pound carronades, and two 100-pound columbiads, to fire hot shot. The gallant Porter commanded her. This frigate was one hundred and forty-five feet deck, fifty-five feet in breadth, and drew eight feet water.

Nov. 22, she was moved from the wharf of Messrs. Browns, in the East river, to the works of Mr. Fulton, on the North river, to receive her machinery—cost \$320,000. On the 4th of July she made a passage to the ocean and back, fifty-three miles, in eight hours and twenty minutes. She was used by the United States as a receiving-ship until June 4, 1829, when, by some accident, her magazine blew up, killing twenty-five persons and wounding nineteen others, causing the complete destruction of the vessel.

32.—In 1815, the “OLIVE BRANCH.”

33.—In 1815, the “EMPEROR OF RUSSIA,” built August 10, 1815, for Russia, where she was under contract to be on the 1st of December—Captain Bunker, commander. This grand undertaking was in fulfilment or acceptance of a contract previously offered to Mr. Fulton by the Emperor of Russia, allowing him the exclusive navigation of steam-boats in the Russian Empire for twenty-five years. The vessel was built as substantial and strong as a sloop-of-war, and no doubt was entertained by naval men of the practicability of the attempt. The “SAVANNAH” was, however, afterwards built, and sailed to Russia.

34.—In 1815, the “CHANCELLOR LIVINGSTON,” of 526 tons.

35.—Mr. Fulton’s last boat, which he called the “MUTE.”

Perpetual Motion.

We here notice an occurrence that seems to show the practical knowledge Mr. Fulton had acquired in mechanics, and to mark the quickness of his apprehension, as related by Mr. Colden :

“It is well known how long and how successfully Red-heffer had deluded the Pennsylvanians by his perpetual motion.

“Many men of ingenuity, learning, and science had seen the machine: some had written on the subject— not

a few of these were his zealous advocates — and others, though they were afraid to admit that he had made a discovery which violated what were believed to be the established laws of nature, appeared also afraid to deny what the incessant motion of his wheels and weights seemed to prove. These contrived ingenious theories, which were hardly less wonderful than the perpetual motion itself. They proposed that Redheffer had discovered a means of developing gradually some hidden power, which, though it could not give motion to his machine for ever, would keep it going for some time, which they could not pretend to determine.

“One of these perpetual motions commenced its career in New York city, in 1813. Mr. Fulton was a perfect unbeliever in Redheffer’s discovery; and although hundreds were daily paying their dollar to see the wonder, Mr. Fulton could not be prevailed upon to follow the crowd. After a few days, however, he was induced by some of his friends to visit the machine. It was in an isolated house in the suburbs of the city.

“In a very short time after Mr. Fulton had entered the room in which it was exhibited, he exclaimed: ‘Why, this is a crank motion!’ His ear enabled him to distinguish that the machine was moved by a crank, which always gives an unequal power, and therefore an unequal velocity in the course of each revolution; and a nice and practised ear may perceive that the sound is not uniform. If the machine had been kept in motion by what was its ostensible moving power, it must have had an equable rotary motion, and the sound would have been always the same.

“After some little conversation with the showman, Mr. Fulton did not hesitate to declare that the machine was an imposition, and to tell the gentleman that he was an impostor.

“Notwithstanding the bluster and anger which these charges excited, he assured the company that the thing was a cheat, and that, if they would support him in the

attempt, he would detect it, at the risk of paying any penalty if he failed.

“Having obtained the assent of all who were present, he began by knocking away some very thin little pieces of lath, which appeared to be no part of the machinery, but to go from the frame of the machine to the wall of the room, merely to keep the corner-posts of the machine steady.

“It was found that a catgut string was led through one of these laths and the frame of the machine, to the head of the upright-shaft of a principal wheel; that the catgut was conducted through the wall, and along the floors of the second story, to a back cockloft, at the distance of a number of yards from the room which contained the machine, and there was found the moving power. This was a poor old man with an immense beard, and all the appearance of having suffered a long imprisonment; who, when they broke in upon him, was unconscious of what had happened below, and who, while he was seated on a stool gnawing a crust, was with one hand turning a crank.

“The proprietor of the perpetual motion soon disappeared. The mob demolished his machine, the destruction of which immediately put a stop to that which had been, for so long a time and to so much profit, exhibited in Philadelphia.”

CHAPTER IV.

EXTRACTS FROM THE "COLUMBIAD."

"Fulton with his own soul the canvas warms,
Creates, inspires, impassions human forms."

WE copy the following from the "COLUMBIAD," or "VISION OF COLUMBUS," a poem in quarto form, containing four hundred and fifty pages, written by Joel Barlow, and dedicated to his friend Robert Fulton. The subject of this splendid patriotic poem is altogether national and historical. The elegant plates which adorn that work were designed and published by Mr. Fulton, at an expense of \$5,000; and the original paintings form a part of the handsome collection which he left to his family. The work is dedicated in such terms as evince the strong attachment which subsisted between these men of genius.

To Robert Fulton.

"MY DEAR FRIEND:

"This poem is your property. I present it to you in manuscript, that you may bring it before the public in the

manner you think proper. This letter will explain to them my motives for offering you such a testimony of my attachment — an attachment which certainly comprises all the good affections that the virtues and talents of one man can inspire in the breast of another.

"Our friendship has been uncommonly useful to us both. Yet, in no instance, has that delicious bond of union been more disinterested than between you and me. According to the common course of nature, you have longer to live than I have; and though, as a faithful guardian, you would foster an orphan of mine, yet, as an adoptive father, your power over it would seem to be more complete.

"These are motives of affection and precaution, but I am likewise impelled by a motive of justice. My poem, having grown up under your eye, much benefited by your observations, as well as by those of my excellent wife, is to come forward, I find, *ornamented by your taste*. You designated the subjects to be painted for engravings; and, unable to convince me that the work could merit such expensive and splendid decorations, you ordered them to be executed in my absence, and at your own expense; so that the whole work, as committed to the publisher and estimated by its cost, is chiefly yours already; for my proportion has cost me nothing but that leisurely and exhilarating labour in which I always delight.

"Take it then to yourself, and let it live, as long as it is to live, a monument of our friendship: you cannot need it as a monument of your fame. Your inventions and discoveries in the useful arts, the precision and extension of your views in the physical sciences, and in their application to the advancement of society and morals, will render it proper that the lines you have selected and written under my portrait, should be transferred to yours. Posterity will vindicate the right, and fix them in their place.

"Continue to be happy, my Fulton, as your various merit entitles you to be. Continue to enhance that merit by well-directed labours for the good of mankind; and

since this address will not outlast the poem to which it is prefixed, I leave you to take some other method to unite my memory more durably with your own.

“JOEL BARLOW.”

Philadelphia, MAY 1, 1807.

HESPER, *a brilliant planet, called the evening-star, assumes the figure of a beautiful young man, and appears to COLUMBUS in prison, as his guardian genius.*

“Thus mourn’d the hapless man: a thundering sound
Roll’d through the shuddering walls, and shook the
ground:

O’er all the dungeon, where black arches bend,
The roofs unfold, and streams of light descend:
The growing splendour fills the astonish’d room,
And gales ethereal breathe a glad perfume.
Robed in the radiance moves a form serene,
Of human structure, but of heavenly mien:
Near to the prisoner’s couch he takes his stand,
And waves, in sign of peace, his holy hand.
Tall rose his stature, youth’s endearing grace
Adorn’d his limbs and brighten’d in his face;
Loose o’er his locks the star of evening hung,
And sounds melodious moved his cheerful tongue.

‘Rise, trembling chief! to scenes of rapture rise!
This voice awaits thee from the western skies:
Indulge no longer that desponding strain,
Nor count thy toils, nor deem thy virtues vain.
Thou seest in me the guardian power who keeps
The new-found world that skirts Atlantic deeps.
Hesper my name, my seat the brightest throne
In night’s whole heaven, my sire the living sun.



DESIGNED BY FULTON

UNROSENTHALS CHROM. LITH. PHOT.

HERA APPEARS TO PROMETHEUS IN PRISON.



My brother Atlas, with his name divine,
 Stamp'd the wild wave: the solid coast is mine.
 This hand, which formed, and, in the tides of time,
 Laves and improves the meliorating clime,
 Which taught thy prow to cleave the trackless way,
 And hailed thee first in occidental day,
 To all thy worth shall vindicate thy claim,
 And raise up nations to revere thy name.' "

CAPAC and OELLA instructing the Peruvians.

"Now to yon Southern cities turn thy view,
 And mark the rival seats of rich Peru.
 Here reigns a prince whose heritage proclaims
 A long, bright lineage of imperial names;
 Where the brave roll of Incas love to trace
 The distant father of their realm and race —
 Immortal Capac. He, in youthful pride,
 With young Oella, his illustrious bride,
 Announc'd their birth divine: a race begun
 From heaven — the children of their god the sun:
 By him sent forth a polished state to frame,
 Crush the fiend gods that human victims claim,
 With cheerful rites their pure devotions pay
 To the bright orb that gives the changing day.
 On this great plan, as children of the skies,
 They plied their arts, and saw their hamlets rise.
 First of their works, and sacred to their fame,
 Yon proud metropolis received its name.
 Cusco, the seat of states, in peace design'd
 To reach o'er earth, and civilize mankind.
 Succeeding sovereigns spread their limits far,
 Tamed every tribe, and soothed the rage of war,

Till Quito bowed, and all the Heliac zone
 Felt the same sceptre, and confirm'd the throne.
 They form to different arts the hand of toil —
 To whirl the spindle, and to spade the soil,
 Adore their persons, robed in shining white,
 Receive their laws, and leave each horrid rite,
 Build with assisting hands the golden throne,
 And hail and bless the sceptre of the sun."

Action of the INCA CAPAC. A general invasion of his dominions threatened by the mountain savages. ROCHA, the INCA'S son, sent wth a few companions to offer terms of peace. Character and speech of ZAMOR, their chief. Capture of ROCHA and his companions. Sacrifice of the latter. The savage armies march down the mountains to Peru. The Peruvians march in haste out of the city, and engage the savages. Exploits of CAPAC. Death of ZAMOR.

"He ceased; and where the savage leader lay
 Weltering in gore, directs his eager way,
 Unwraps the tiger's hide, and strives in vain
 To close the wound, and mitigate the pain;
 And while compassion for a foe distress'd
 Mix'd with reproach, he thus the chief address'd:
 'Too long, proud prince, thy fearless heart withstood
 Our sacred arms, and braved the living God:
 His sovereign will commands all feuds to cease —
 His realm is concord and his pleasure peace:
 This copious carnage, spreading far the plain,
 Insults his bounties, but confirms his reign.
 Enough! 't is past: thy parting breath demands
 The last sad office from my yielding hands.
 To share thy pains and feel thy hopeless woe,
 Are rights ungrateful to a fallen foe;





DESIGNED BY FULTON.

L.N. ROSENTHAL LITH. PHILA

CAESAR PASSING THE RUBICON

Yet rest in peace ; and know, a chief so brave,
 When life departs, shall find an honor'd grave :
 Myself in princely pomp thy tomb shall rear,
 And tribes unborn thy hapless fate declare.'

'Insult me not with tombs !' the monster cried :
 'Let no curs'd earth conceal this gory head,
 Nor songs proclaim the dreadful Zamor dead.'
 Thus pour'd the vengeful chief his fainting breath,
 And lost his utterance in the gasp of death.

Vision confined to North America. Congress' endeavours to arrest the violence of England compared with those of the Genius of Rome to dissuade CÆSAR from passing the Rubicon.

"The virtuous delegates behold with pain
 The hostile Britons hovering o'er the main ;
 Lament the strife that bids two worlds engage,
 And blot their annals with fraternal rage :
 Two worlds in one broad State ! whose bounds bestride,
 Like Heaven's blue arch, the vast Atlantic tide :
 By language, laws, and liberty combined,
 Great nurse of thought, example to mankind.
 Columbia rears her warning voice in vain,
 Brothers to brothers call across the main :
 Britannia's patriots lend a listening ear,
 But kings and courtiers push their mad career :
 Dissension raves, the sheathless falchions glare,
 And earth and ocean tremble at the war.
 Thus with stern brow, as worn by cares of state,
 His bosom big with dark unfolding fate,
 High o'er his lance the sacred eagle spread,
 And earth's whole crown still resting on his head,

Rome's hoary Genius rose, and mournful stood
 On roaring Rubicon's forbidden flood,
 When Cæsar's ensigns swept the Alpine air,
 Led their long legions from the Gallic war,
 Paused on the opposing bank with wings unfurl'd,
 And waved portentous o'er the shuddering world.
 The god, with outstretch'd arm and awful look,
 Call'd the proud victor, and prophetic spoke:
 'Arrest, my son, thy parricidious hate,
 Pass not the stream, nor stab my filial State —
 Stab not thyself, thy friends, thy total kind,
 And worlds and ages in one State combined.'
 The chief, regardless of the warning god,
 Rein'd his rude steed, and headlong pass'd the
 flood,

Cried, 'Farewell, peace!' took fortune for his guide,
 And o'er his country pour'd the slaughtering tide.

High on the foremost seat, in living light,
 Resplendent Randolph caught the world's full sight.

Sage Franklin next arose, with cheerful mien,
 And smiled unruffled o'er the solemn scene:
 His locks of age a various wreath embraced,
 Palm of all arts that e'er a mortal graced;
 Beneath him lay the sceptre kings had borne,
 And the tame thunder from the tempest torn.
 Crowds rose to reason, while their accents rung,
 And INDEPENDENCE thunder'd from their tongue!

Now the broad field, as untaught warriors' shade,
 The sun's glad beam their shining arms display'd;
 High waved great WASHINGTON his glittering steel,
 Bade the long train in circling order wheel,
 And, while the banner'd youths around him press'd,
 With voice rever'd he thus the ranks address'd:



DESIGNED BY FULTON

L.N. ROSENTHAL'S LITH. PHIL.

GRUELTY PRESIDING OVER THE PRISON SHIP.

'Ye generous bands, behold the task — to save
 Or yield whole nations to an instant grave.
 Rise then to war! to timely vengeance rise!
 Ere the grey sire, the helpless infant dies:
 Look thro' the world, see endless years descend;
 What realms, what ages, on your arms depend!
 Reverse the fate, avenge the insulted sky;
 Move to the work: we conquer or we die!'

*British cruelty to American prisoners. Prison-ship.
 Story of LUCINDA.*

"But of all tales that war's black annals hold,
 The darkest, foulest, still remains untold;
 New modes of torture wait the shameful strife,
 And Britain wantons in the waste of life.

Cold-blooded CRUELTY! first fiend of hell!
 Ah! think no more with savage hordes to dwell:
 Quit the Caribbean tribes who eat their slain,
 Fly that grim gang, the inquisitors of Spain,
 Boast not thy deeds in Moloch's shrines of old,
 Leave Barbary's pirates to their blood-bought gold,
 Let Holland steal her victims, force them o'er
 To toils and death on Java's morbid shore;
 Some cloak, some color, all these crimes may plead—
 'Tis avarice, passion, blind religion's deed;
 But Britons here, in this fraternal broil,
 Grave, cool, deliberate, in thy service toil.

Come then, curs'd goddess, where thy votaries reign;
 Inhale their incense from the land and main:
 Come to New York, their conquering arms to greet,
 Brood o'er their camp, and breathe along their fleet,
 See the black PRISON-SHIP'S expanding womb
 Impested thousands, quick and dead, entomb.

Bark after bark the captured seamen bear,
Transboard and lodge thy silent victims there :
A hundred scows, from all the neighbouring shore,
Spread the dull sail and ply the constant oar,
Waft wrecks of armies from the well-fought field,
And famish'd garrisons who bravely yield :
They mount the hulk, and, cramm'd within the cave,
Hail their last house — their living, floating grave.

She comes, the fiend ! her grinning jaws expand,
Her brazen eyes cast lightning o'er the strand,
Her wings like thunder-clouds the welkin sweep,
Brush the tall spires and shade the shuddering deep ;
She gains the deck, displays her wonted store,
Her cords and scourges wet with prisoners' gore ;
Gripes, pincers, thumbscrews spread beneath her
feet,

Slow poisonous drugs and loads of putrid meat ;
Disease hangs drizzling from her slimy locks,
And hot contagion issues from her box.

U'er the closed hatches ere she takes her place,
She moves the massy planks a little space,
Opes a small passage to the cries below,
That feast her soul on messages of woe ;
There sits with gaping ear and changeless eye,
Drinks every groan and treasures every sigh ;
Sustains the faint, their miseries to prolong,
Revives the dying and unnerves the strong.

But as the infected mass resign their breath,
She keeps with joy the register of death.
As toss'd thro' port-holes from the encumber'd cave,
Corpse after corpse fall dashing in the wave —
Corpse after corpse, for days and months and years,
The tide bears off, and still its current clears ;

At last, o'erloaded with the putrid gore,
 The slime-clad waters thicken round the shore.
 Green ocean's self, that oft his wave renews,
 That drinks whole fleets with all their battling crews,
 That laves, that purifies the earth and sky,
 Yet ne'er before resign'd his natural dye,
 Here blushes, purples for the race he bore
 To rob and ravage this unconquer'd shore :
 The scaly nations, as they travel by,
 Catch the contagion, sicken, gasp, and die."

Murder of LUCINDA (MISS MACREA.)

"One deed shall tell what fame great Albion draws
 From these auxiliars in her barbarous cause :
 Lucinda's fate ! the tale, ye nations, hear !
 Eternal ages, trace it with a tear !
 Long from the rampart, thro' the embattled field,
 She spied her Hartley where his column wheel'd,
 Traced him with steadfast eye and tortured breast,
 That heaved in concert with his dancing crest ;
 And oft, with head advanced and hand outspread,
 Seem'd from her love to ward the flying lead ;
 Till, dimm'd by distance and the gathering cloud,
 At last he vanish'd in the warrior crowd.
 She thought he fell ; and, wild with fearless air,
 She left the camp to brave the woodland war,
 Made a long circuit, all her friends to shun,
 And wander'd wide beneath the falling sun ;
 Then veering to the field, the pickets pass'd,
 To gain the hillock where she miss'd him last.
 Fond maid, he rests not there : from finished fight
 He sought the camp, and closed the rear of flight.

He hurries to his tent— O rage! despair!
No glimpse, no tidings of the frantic fair;
Save that some carmen, as a-camp they drove,
Had seen her crossing for the western grove:
Faint with fatigue, and choked with burning thirst,
Forth from his friends with bounding leap he burst,
Vaults o'er the palisade with eyes on flame,
And fills the welkin with Lucinda's name—
Swift thro' the wildwood paths frenetic springs—
Lucinda! Lucinda! thro' the wildwood rings.
All night he wanders: barking wolves alone,
And screaming night-birds, answer to his moan;
For war had rous'd them from their savage den—
They scent the field, they snuff the walks of men.

The fair one, too, of every aid forlorn,
Had rav'd and wander'd, till officious morn
Awak'd the Mohawks from their short repose,
To glean the plunder ere their comrades rose.
Two Mohawks met the maid—historian, hold!
Poor human nature! must thy shame be told?
Where then that proud preëminence of birth,
Thy moral sense?—the brightest boast of earth.
Had but the tiger changed his heart for thine,
Could rocks their bowels with that heart combine,
Thy tear had gush'd, thy hand relieved her pain,
And led Lucinda to her lord again.

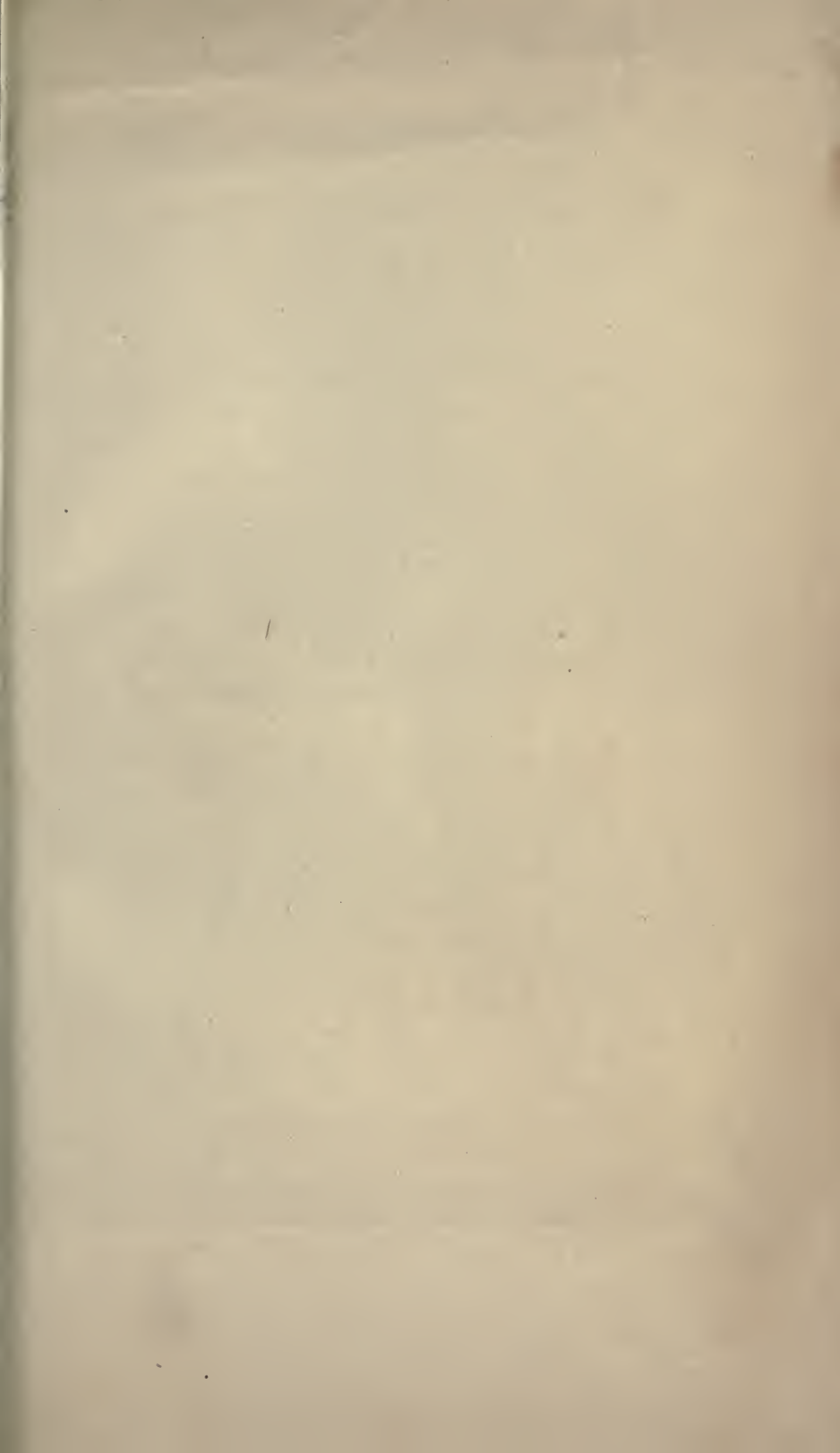
She starts: with eyes upturned and fleeting
breath,
In their raised axes views her instant death,
Spreads her white hands to heaven in frantic prayer,
Then runs to grasp their knees, and crouches there.
Her hair, half-lost along the shrubs she pass'd,
Rolls in loose tangles round her lovely waist;



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L. N. ROSENTHAL LITH. PHIL. A.

CONTRACTS FIRST REBID THE S W O R D T O W A S H I N G T O N





DESIGNED BY FULTON.

L. N. ROSENTHAL'S LITH. PHOT.

THE MURDER OF LUCINDA

Her kerchief torn betrays the globes of snow
 That heave responsive to her weight of woe.
 Does all this eloquence suspend the knife?
 Does no superior bribe contest her life?
 There does: the scalps by British gold are paid —
 A long-hair'd scalp adorns that heavenly head;
 And comes the sacred spoil from friend or foe,
 No marks distinguish, and no man can know.
 With calculating pause and demon grin,
 They seize her hands, and thro' her face divine
 Drive the descending axe: the shriek she sent
 Attain'd her lover's ear — he thither bent
 With all the speed his wearied limbs could yield,
 Whirl'd his keen blade, and stretch'd upon the field
 The yelling fiends; who there disputing stood
 Her gory scalp, their horrid prize of blood.
 He sunk delirious on her lifeless clay,
 And pass'd, in starts of sense, the dreadful day.
 Are these thy trophies, Carleton? these the swords
 Thy hand unsheath'd and gave the savage hordes,
 Thy boasted friends, by treaties brought from far,
 To aid thy master in his murderous war?"

*Capture of CORNWALLIS and his army. Their banners
 furled and muskets piled on the field of battle.*

"Cornwallis first, their late all-conquering lord,
 Bears to the victor chief his conquer'd sword,
 Presents the burnish'd hilt, and yields with pain
 The gift of kings, here brandish'd long in vain.
 Then bow their hundred banners, trailing far
 Their wearied wings from all the skirts of war.
 Battalion'd infantry and squadron'd horse,
 Dash the silk tassel and the golden torse;

Flags from the forts and ensigns from the fleet
Roll in the dust, and at Columbia's feet
Prostrate the pride of thrones: they firm the base
Of freedom's temple, while her arms they grace.
Here Albion's crimson cross the soil o'erspreads,
Her lion crouches and her thistle fades,
Indignant Erin rues her trampled lyre,
Brunswick's pale steed forgets his foamy fire,
Proud Hestia's castle lies in dust o'erthrown,
And venal Anspach quits her broken crown.

Long trains of wheeled artillery shade the shore,
Quench their blue matches and forget to roar;
Along the encumber'd plain thick planted rise
High stacks of muskets glittering to the skies,
Numerous and vast. As when the toiling swains
Heap their whole harvest on the stubbly plains,
Gerb after gerb the bearded shock expands,
Shocks rang'd in rows hill high the burden'd lands:
The joyous master numbers all the piles,
And o'er his well-earned crop complacent smiles;
Such growing heaps this iron harvest yield,
So tread the victors this, their final field.

Triumphant WASHINGTON, with brow serene,
Regards unmov'd the exhilarating scene,
Weighs in his balanced thought the silent grief
That sinks the bosom of the fallen chief,
With all the joy that laurel crowns bestow,
A world reconquer'd and a vanquish'd foe.

He bids brave LINCOLN guide with modest air
The last glad triumph of the finish'd war;
Who sees once more two armies shade one plain,
The mighty victors and the captive train."

*The danger of losing LIBERTY by inattention, illustrated
in the Rape of the Golden Fleece.*

"Think not, my friends, the patriot's task is done,
 Or freedom safe, because the battle's won.
 Unnumber'd foes, far different arms that wield,
 Wait the weak moment when she quits her shield,
 To plunge in her bold breast the insidious dart,
 Or pour keen poison round her thoughtless heart.
 Perhaps they 'll strive her votaries to divide,
 From their own veins to draw the vital tide ;
 Perhaps, by cooler calculation shown,
 Create materials to construct a throne,
 Dazzle her guardians with the glare of state,
 Corrupt with power, with borrowed pomp inflate,
 Bid thro' the land the soft infection creep,
 Whelm all her sons in one lethargic sleep,
 Crush her vast empire in its brilliant birth,
 And chase the goddess from the ravaged earth.
 The dragon thus, that watch'd the Colchian fleece,
 Foil'd the fierce warriors of wide-plundering Greece ;
 But the sly priestess brings her opiate spell,
 Soft charms that hush the triple hound of hell —
 A settling tremor through his folds extends,
 His crest contracts, his rainbow neck unbends,
 O'er all his hundred hoops the languor crawls,
 Each curve develops, every volute falls,
 His broad back flattens as he spreads the plain,
 And sleep consigns him to his lifeless reign.
 Flush'd at the sight, the pirates seize the spoil,
 And ravaged Colchis rues the insidious toil."

Initiation to the mysteries of Isis. Progress of the Arts and Sciences.

"Unfold, thou Memphian dungeon! there began
 The lore of mystery, the mask of man:
 The bold initiate takes his awful stand,
 A thin pale taper trembling in his hand;
 Long ladders heaved on end, with banded eyes
 He mounts, and mounts, and seems to gain the skies;
 Then backward falling, tranc'd with deadly fright,
 Finds his own feet, and stands restored to light.
 Here all dread sights of torture round him rise:
 Lash'd on a wheel, a whirling felon flies;
 A wretch, with members chain'd and liver bare,
 Writhes and disturbs the vulture feasting there;
 One strains to roll his rock, recoiling still;
 One, stretch'd recumbent o'er a limpid rill,
 Burns with devouring thirst: his starting eyes,
 Swell'd veins, and frothy lips, and piercing cries,
 Accuse the faithless eddies, as they shrink
 And keep him panting still—still bending o'er the brink.

* * * * *

GENIUS assumes new force and elevates his pride,
 Calls up DISCOVERY, with her tube and scroll,
 And points the trembling magnet to the pole.

Rome, Athens, Memphis, Tyre! had you but known
 This glorious triad, now familiar grown,
 The PRESS, the MAGNET faithful to its pole,
 And earth's own MOVEMENT round her steadfast goal,
 Ne'er had your science, from that splendid height,
 Sunk in her strength, nor seen succeeding night."



DESIGNED BY FULTON.

L.N. ROSENTHAL. LITH PHILA.

INITIATION TO THE MYSTERIES OF ISIS



DESIGNED BY FULTON

EN. ROSENTHALS CHROM. LITH. PHILA.

THE FINAL RESIGNATION OF PREJUDICES.

The final Resignation of Prejudices.

"So, from all tracts of earth, this gathering throng
 In ships and chariots shape their course along,
 Reach with unwonted speed the place assign'd
 To hear and give the counsels of mankind.

South of the sacred mansion first resort
 The assembled sires, and pass the spacious court.
 Here in his porch earth's figur'd GENIUS stands,
 Truth's mighty mirror poising in his hands:
 Graved on the pedestal and chased in gold,
 Man's noblest arts their symbol forms unfold,
 His tillage and his trade; with all the store
 Of wondrous fabrics and of useful lore:
 Labors that fashion to his sovereign sway
 Earth's total powers — her soil, and air, and sea;
 Force them to yield their fruits at his known call,
 And bear his mandates round the rolling ball.
 Beneath the footstool all destructive things,
 The mask of priesthood and the mace of kings,
 Lie trampled in the dust; for here at last
 Fraud, folly, error, all their emblems cast.
 Each envoy here unloads his wearied hand
 Of some old idol from his native land;
 One flings a pagod on the mingled heap,
 One lays a crescent, one a cross to sleep;
 Swords, sceptres, mitres, crowns, globes, and stars,
 Codes of false fame and stimulants to wars,
 Sink in the settling mass — since guile began
 These are the agents of the woes of man.
 'Here, then,' said Hesper, with a blissful smile,
 'Behold the fruits of thy long years of toil.
 To yon bright borders of Atlantic day
 Thy swelling pinions led the trackless way,

And taught mankind such useful deeds to dare,
To trace new seas and happy nations rear ;
Till by fraternal hands their sails unfurl'd
Have waded at last in Union o'er the world.

Then let thy steadfast soul no more complain
Of dangers braved and griefs endured in vain,
Of courts insidious, envy's poison'd stings,
The loss of empire and the frown of kings ;
While these broad views thy better thoughts compose
To spurn the malice of insulting foes ;
And all the joys descending ages gain,
Repay thy labours and remove thy pain.' ”

CHAPTER V.

INLAND NAVIGATION, CIVIL ENGINEERING, AND STATESMANSHIP.

“Nor seas alone the countless barks behold,
Earth’s inland realms their naval paths unfold.
Her plains, long portless, now no more complain
Of useless rills and fountains nursed in vain:
CANALS curve thro’ them many a liquid line,
Prune their wild streams, their lakes and oceans join.
New York resigns her stagnant world of fen,
Allures, rewards the cheerful toils of men,
Leads their long new-made rivers round her reign,
Drives off the putrid air, and waves her golden grain,
Feeds a whole nation from her cultured shore,
Where not a bird could skim the skies before.

From Mohawk’s mouth, far westing with the sun,
Thro’ all the midlands recent channels run,
Tap the redundant lakes, the broad hills brave,
And HUDSON marry with MISSOURI’S wave.
From dim SUPERIOR, whose uncounted sails
Shade his full seas and bosom all his gales,
New paths unfolding seek Mackenzie’s tide,
And towns and empires rise along their side;
Free crystal highways all his north adorn,
Like coruscations from the boreal morn.
Proud MISSISSIPPI, tamed and taught his road,
Flings forth irriguous from his generous flood
Ten thousand watery glades; that, round him curl’d,
Vein the broad bosom of the Western World.

Sway'd with the floating weight each river toils,
 And joyous Nature's full perfection smiles ;
 While growing arts their social virtues spread,
 Enlarge their compacts and unlock their trade,
 Till each remotest clan, by commerce join'd,
 Links in the chain that binds all human kind."

IN 1793, we find Mr. Fulton actively engaged in a project to improve inland navigation: even at that early day, he had conceived the idea of propelling vessels by steam; and he speaks in some of his manuscripts with great confidence of its practicability. In May, 1794, he obtained from the British Government a patent for a Double Inclined-Plane, to be used for transportation.

Indeed, the subject of canals appears chiefly to have engaged his attention about this time. He now, and probably for some time previously, professed himself a civil engineer. Under this title, he published his work on canals. In 1795, he published some essays on the same subject in the London Morning Star.

In the introduction to his Treatise on Canal Navigation, he says that his thoughts were first turned to this subject by reading a paper descriptive of a canal proposed by the Earl of Stanhope. In the spring of 1796, he published in London his "Treatise on the Improvement of Canal Navigation," with many plates. The object of this work

was to prove that small canals, navigated by boats of little burden, were preferable to canals and vessels of the dimensions then in use, and to recommend a mode of conveyance over mountainous countries independent of locks, railways, and steam-engines. This he proposed to accomplish by Inclined-Planes, upon which vessels navigating the canal, of a construction adapted to his plan, and their cargoes, should be raised and lowered from one level to another, or by lifting or lowering the boat and her freight perpendicularly by machinery of very ingenious construction, placed on the higher level. This was to be moved by the power of water taken from the superior height, and applied to a water-wheel; or by the weight of a body of water received into a coffer, which was to move in a direct line between the higher and the lower level, through a perpendicular shaft or well made in the earth for the purpose. He also proposed, by a different modification of his machinery, and by what he calls Double Inclined-Planes, to accomplish the passage over a valley, from one summit to another. He does not pretend that to use Inclined-Planes for these purposes was an original thought of his; but their connection with machinery, as he suggests, and particularly the perpendicular lift, he claimed as his invention.

Before he published this work, he submitted his plan, with models of his machines, to the British Board of Agriculture, of which Sir John Sinclair was then president. It was favorably received and strongly recommended by a resolution of the Board, which was communicated to Mr. Fulton in a very complimentary manner. It would not be right to omit noticing that the work of which we have been speaking is not confined to canals. These are so nearly connected with aqueducts and with bridges, that he bestows some chapters, containing new ideas and valuable information, on these objects.

It is gratifying to find that Mr. Fulton ever felt as an American. His long residence abroad did not enfeeble his attachment to his country. Thoughts of her prosperity and welfare were connected with all his projects; and those that he thought might be of advantage to her, he communicated with a promptness and disinterestedness which marked his desire to serve her. With his Treatise on Canals, he published a letter to the governor of his native State, in which he illustrates the advantages of forming interior communications by canals, rather than by turnpike roads; and recommends his own system of small canals and boats, as being preferable to the method of canal-

ling then in use in Europe. With the same views, he sent a copy of his work to General Washington, from whom he received in return a flattering acknowledgment.

In the spring of 1798, he addressed two letters on this and other subjects to Lord Stanhope. They have the following title: "Letters from Robert Fulton to the Right Honourable the Earl of Stanhope, explaining the present projects of the Government of France, their plans of aggrandizement, their system of acquiring revenues, and their views with regard to foreign possessions and trades." These are rather essays than letters, and were evidently intended for the press; but whether they were ever published, we do not know. In a confidential letter to Lord Stanhope, he tells him that the title sounds high; that he had adopted it to excite curiosity, and to induce the people of England to read them, and to awaken their minds to the advantages of canals, home improvements, simple taxation, and free trade. In this letter, he makes another disclosure which shows how constantly his country was in his mind, and how intimately her prosperity was connected with all his projects. He acknowledges to Lord Stanhope that his principal reason for wishing these letters to be printed, was that a knowledge of them might

precede his return to America, which he then contemplated; and where he intended, as he informed his lordship, to use all his influence to induce his countrymen to adopt the systems of which his letters point out the advantages.

It seems to be at about this time that he wrote a work which is found among his manuscripts, and which probably was designed to have an influence on the great political questions which were then agitated in France. It is addressed "to the friends of mankind," and is intended to enforce on the French legislators the duty of providing for education, and of attending to interior improvements, upon which he maintains that the happiness of a nation, and more particularly of a republic, most essentially depends; or, to express his sentiments in his own words, he says: "The whole interior arrangements of governments should be to promote and diffuse knowledge and industry; their whole exterior negotiations, to establish a social intercourse with each other, and to give a free circulation to the whole produce of virtuous industry." An universal free trade is his favorite theory in political economy, and one which he loses no opportunity of advocating, with all the force of his ardent mind.

He considers what he calls the war-system of the

Old World as the cause of the misery of the greatest portion of its inhabitants; and this leads him into a curious investigation of its effects, as well as an interesting enumeration of the inhabitants of Europe. These he classes as *producers* and *idlers*: of the number of each of these he gives an estimate, and then presents a variety of calculations to show what are the effects of the last upon the society they encumber.

This work, like everything that came from the pen of Mr. Fulton, is written with great natural strength and originality. He never attempts to borrow either ideas or ornament, but is content to express the conceptions of his own mind with force and perspicuity.

There is also among his manuscripts another volume on the same subject. It is entitled, "*Thoughts on Free Trade; with reasons why foreign possessions, and all duties on importations, are injurious to nations.*" It is written with great animation and force.

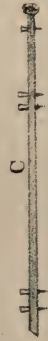
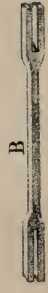
Ardour and perseverance were characters of Mr. Fulton's mind: when he had conceived what he thought a practicable and beneficial project, *he left no means untried, and spared no pains for its accomplishment.*

Mr. Fulton says, in one of his manuscripts:

“After this, I was convinced that society must pass through ages of progressive improvement before the freedom of the seas could be established by an agreement of nations; that it was for the benefit of the whole: I saw that the growing wealth and commerce, and the increasing population of the United States, would compel them to look for a protection by sea, and perhaps drive them to the necessity of resorting to European measures, by establishing a navy. Seeing this, I turned my whole attention to find out means of destroying such engines of oppression, by some method which would put it out of the power of any nation to maintain such a system, and would compel every government to adopt the simple principles of education, industry, and a free circulation of its produce.”

Out of such enlarged and philanthropic views and reflections, grew Mr. Fulton's inventions for submarine navigation and explosions; and with such patriotic motives did he prosecute them.

Mr. Fulton, while he was on a visit to Washington, January, 1807, was invited by General Dearborn, then the Secretary at War, to make the necessary surveys and drafts for a canal from Lake Pontchartrain to the Mississippi. He declined this undertaking, on account of his engagements with his steamboats and torpedoes. On these, he says in a letter to the Secretary: “*I labour with the ardour of an enthusiast.*” He avails himself of this opportunity of submitting to the Government some ideas on canal navigation; and this letter contains the earliest suggestion we have met with



Designed by Fulton

L. N. Rosenthal's lith. Philade

FULTON'S CAST-IRON AQUEDUCT

of the practicability and advantages of a canal to unite our great Western lakes with the waters of the Hudson.

Aqueducts.

The SHREWSBURY CANAL passes over the valley of TERN, at LONG, for a distance of sixty-two yards, upon an aqueduct. In consequence of the great floods which happened in the beginning of the year 1795, much damage was done to the canal. Mr. Robert Fulton, the American engineer, happened to be at LONG at the time, and availed himself of what was going on at the aqueduct, and of the machinery of various kinds in use upon the KETLEY and SHROPSHIRE canals, and prepared DRAWINGS and MODELS of a variety of such machinery, with *many improvements of his own*, and submitted the same to the examination of a committee of the Board of Agriculture, in March, 1796. On constructing aqueducts of CAST-IRON for a canal, the following is a copy of his specifications and *drawings* annexed:

“The abutments and piers being raised, it will only be necessary to extend two pieces of timber across the span; each to be braced back to the piers and covered with plank, to form a stage or scaffolding which will answer every purpose of centres necessary to works of stone. The iron-work, as represented in the section, may all be cast in open sand, and of the following dimensions—supposing

the span one hundred feet, and the spring one-sixth of the span. First, three segments of a circle, each in three pieces about thirty-six feet long, eight inches by four diameter, to be united as at A. Second, three straight bars, to extend from one pier to the other, to be of the above diameters, may also be cast in three pieces; which bars are to extend along the top of the segments to the piers, and form a line parallel to the horizon: the bars and segments to be united by perpendicular stirrups like B, ten or fifteen feet distant from each other. The mortice in the lower end of the stirrup being thirteen inches long, will be sufficient to secure the segment, and leave room for a hole two inches square, through which a cross-brace, C, is to pass, and fasten the segments at proper distances: the brace to have a mortice cast on each side of the stirrup, in order to tighten the work by wedges. On the top of the stirrup, the square hole to receive the cross-brace may be beneath the mortices, as in the figure; by which means the whole may be combined, and form an iron stage to support the troughs. The trough plates should be at least one inch thick, the side plates six feet broad, and as great a length as can conveniently be cast; which may be performed twelve feet, and perhaps more in length: the flange to be outside on these plates. The bottom plates may be six feet wide, thirteen feet long, seven feet plate, and four arms projecting, each three feet long, in order to support the horse-path and braces, as exhibited at D. Two of these plates laid across the stage, and screwed together, with a flange under, will compose a length equal to one of the side plates, which may either meet or break joint, as is thought proper. The whole may, in this manner, be screwed together on packing of wool and tar, and have the seams pitched like those of a ship. On the plates composing one side of the trough, small brackets, about three feet from the top, must be cast, as at E, in order to support the horse-path: perpendicular rails, eight feet long, being raised from the arms of the bottom plates, will sup-

port the outside of the horse-path—also the iron railing, as in the section. By this mode, two patterns will answer for the whole of the trough plates, and but few will be required for the springs, rails, and spurs; while the saving in time and expense will be considerable—particularly where it is necessary to bring the stone by long land carriage; for the arches being dispensed with, and the piers not more than one-third of the dimensions necessary to an aqueduct of stone, will most materially reduce the quantity of masonry.

“In aqueducts of stone, one of the great difficulties is to line and puddle so tight as to prevent the water penetrating into and injuring the masonry; but in one of iron, should a leak take place, it will instantly appear; and, on shutting the stop-gates at each end, and discharging the water, it may be stopped in a few hours, if not minutes: this circumstance in aqueducts is, perhaps, one of the greatest preservatives—they are consequently less liable to injury, and only subject to the corroding tooth of time.”

A short time after this, a most stupendous work of this kind (a Fulton cast-iron aqueduct) was undertaken and completed for crossing the DEE river, in Scotland, at PONTCYSYLTEE, about twenty miles south-west of Chester; where nineteen massive conical pillars of stone, at fifty-two feet from each other, the middlemost of which is no less than one hundred and twenty-six feet in height, support between the top of every pair a number of elliptical cast-iron ribs, which, by means of uprights and horizontal bars, support a cast-iron aqueduct about three hundred and twenty-nine yards long, twenty feet wide, and six in depth, composed of massive

sheets of cast-iron, cemented and riveted together, having on its south side an iron platform and railing for the towing-path.

It was foretold that the effects of heat and cold would destroy it, but no expansion or contraction of the metal is as yet visible; and notwithstanding the summer's heat, the winter's ice, and numerous floods, this cast-iron aqueduct still remains an evidence of Fulton's practical engineering.

Bridges.

Mr. Fulton also submitted his PLANS, DRAWINGS, and MODELS of bridges, to the British Board of Agriculture; and his different kinds of cast-iron bridges for passing railways over valleys, either level across, down one slope and up the other of the valley, or rising obliquely up: in the first and last of which he proposed to avoid any solid platform or top for carrying the horse-path, and to tow or drag the wagons over this open railway by an endless rope or chain, passing over a pulley at each end, which can be set in motion by a windlass, a descending weight, or other power. On the approach to a river or yard where considerable quantities of coals or other minerals are to be discharged, it will be proper to keep the railway upon a high level, by embankment, or on arches, or on a stage

of timber, that the wagons may be discharged from the top of a staith or stage into ships or boats, or into carts and wagons, without being moved by manual labour. Rivers, brooks, or hollow roads, must be crossed on bridges whose tops are formed to the regular slope of the plane; and where roads cross the intended railway, they must either be raised so as to be carried over, or sunk so as to pass under the same, or be made up the same height; and the rails must, in that part, have ribs of less height and greater strength, and the whole must be so firmly embedded in masonry, that the heaviest carriages, in crossing, cannot damage it.

The Board was highly pleased, and approved of Mr. Fulton's plans; and one of his bridges was erected in Wandsworth town, and at several other places on the SURREY IRON RAILWAY.

Mr. Fulton's *designs* fully explained the principles of his different bridges of cast-iron; also for bridges for newly settled and woody countries, wherein large timbers dowelled together supply the place of keystone, above which the platform for the road was to be supported.

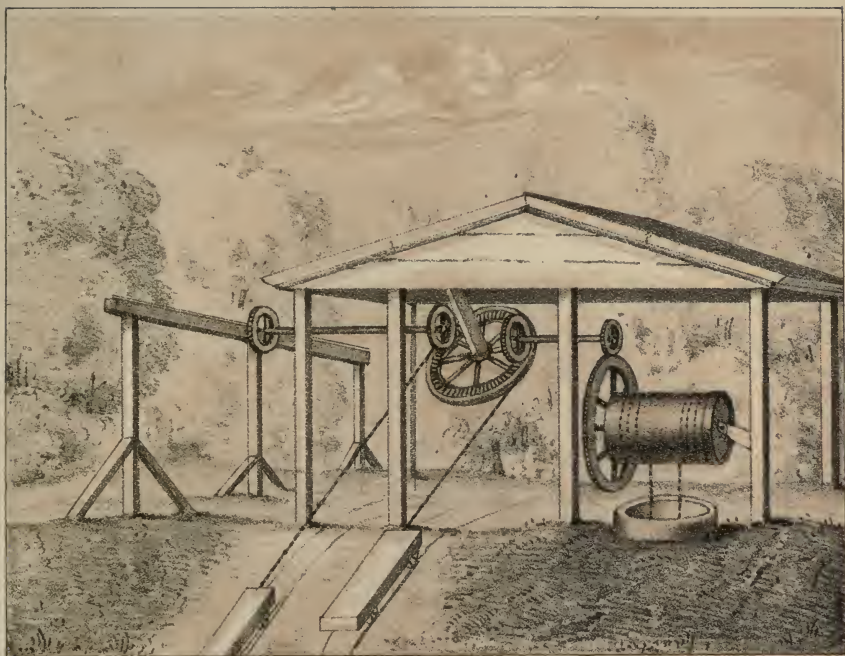
He never completed a model until he had first designed and projected a perfect drawing, according to the proper scale; and for canals and railways his specifications, descriptions, and calculations, are

most remarkable for their accuracy, and quite voluminous; showing the cost of every foot of the work, its complete proportions and dimensions, the average number of tons to a horse, the rate of miles per hour, from one ton and upwards, according to the speed, and the clear amount of revenue and profits on each and every ton or article of transportation—evincing the practical knowledge of a most experienced and perfect civil engineer.

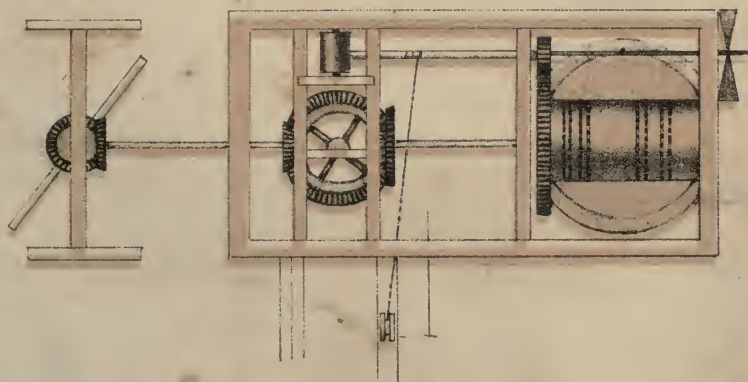
Inclined-Planes.

On the 8th of May, 1794, Mr. Fulton obtained a patent in England for the use of a DOUBLE INCLINED-PLANE, with cradles having cisterns or caissons under them, that the boats were in some cases to be taken on to the cradles *sideways* instead of lengthways: this was proposed to be accomplished by short Inclined-Planes, on which the boats, upon wheeled carriages, were to be dragged out of the upper and lower canals by means of ropes working on the axles of water-wheels: a brake is to be used for regulating the motion of the boats and cisterns when brought nearly to an equilibrium by the valves: brace-locks or pulleys to be used for shortening or lengthening the large ropes when necessary.

He recommended the general adoption of fords



Double Inclined Plane.



on his small canals; and stated that fifteen or twenty of his small rectangular boats, linked together, could be drawn by one horse, and be kept in their proper line upon the canal by a man with a boat-hook walking by the side of them on the towing-path: this was to prevent the use of pointed poles tipped or shod with iron, which the boatmen used for shoving barges along, on account of the damage which such often did, by penetrating and disturbing the lining and banks of the canal, thus causing it to leak.

Mr. Fulton's Treatise on Canals made it known that he had turned his thoughts to that subject, and probably induced Mr. Gallatin, then Secretary of the Treasury, to address a number of queries to Mr. Fulton, for information on which to ground the Report made by the Treasury Department to Congress, on the subject of public roads and canals, in the spring of 1808. In answer to these queries, Mr. Fulton made a communication to Mr. Gallatin, which is annexed to the Report. It contains a great variety of information and calculations of the most useful kind, upon the subjects proposed. We cannot refrain from extracting some passages of it which show the extensive view which Mr. Fulton took of objects which were presented to his mind; that, so far from being limited by mere

mechanical operations, he connects the great improvements of art which he had in contemplation, with their ultimate effects on the happiness, prosperity, and policy of his countrymen.

After having enumerated the economical advantages of improving internal communications, he says :

“Secondly: on their effect in cementing the Union, and extending the principles of a confederated republican government. Numerous have been the speculations on the duration of our Union, and intrigues have been practised to sever the Western from the Eastern States. The opinion endeavoured to be inculcated was that the inhabitants beyond the mountains were cut off from the market of the Atlantic States; that consequently they had a separate interest, and should use their resources to open a communication of their own; that, remote from the seat of government, they could not enjoy their portion of advantages arising from the Union; and that, sooner or later, they must separate, and govern for themselves.

“Others, by drawing their examples from European governments, and the monarchies which have grown out of the feudal habits of nations of warriors, whose minds were bent to the absolute power of the few and the servile obedience of the many, have conceived these States of too great an extent to continue united under a republican form of government; and that the time is not distant when they will divide into little kingdoms—retrograding from common sense to ignorance, adopting all the follies and barbarities which are every day practised in the kingdoms and petty states of Europe.

“But those who have reasoned in this way, have not reflected that men are the creatures of habit; and that their habits, as well as their interests, may be so combined

as to make it impossible to separate them without falling back into a state of barbarism.

“Although in ancient times some specks of civilization have been effaced by hordes of uncultivated men, yet it is remarkable that, since the invention of printing and general diffusion of knowledge, no nation has retrograded in science and improvements; nor is it reasonable to suppose that the Americans, who have as much, if not more information, in general, than any other people, will ever abandon an advantage which they have once gained.

“England, which at one time was seven petty kingdoms, has by long habit been united into one. Scotland by succession became united to England; and is now bound to her by habit, by turnpike roads, by canals, and reciprocal interests.

“In like manner all the counties of England, or departments of France, are bound to each other; and when the United States shall be bound together by canals, by cheap and easy access to a market in all directions, by a sense of mutual interests arising from mutual intercourse and mingled commerce, it will be no more possible to split them into independent and separate governments, each lining its frontiers with fortifications and troops, to shackle their own exports and imports to and from the neighbouring States, than it is now possible for the government of England to divide, and form again into seven kingdoms. But it is necessary to bind the States together for the people’s interests; one of which is to enable every man to sell the produce of his labour at the best market, and purchase at the cheapest. This accords with the idea of Hume: ‘That the government of a wise people would be little more than a system of civil police; for the best interest of man is industry and a free exchange of the produce of his labour for the things which he may require.’

“On this humane principle, what stronger bonds of union can be invented than those which enable each individual to transport the produce of his industry twelve

hundred miles, for sixty cents the hundred weight? Here then is a certain method of securing the union of the States, and of rendering it as lasting as the continent we inhabit.

“It is now eleven years since I have had this plan in contemplation for the good of our country. At the conclusion of my work on small canals, there is a letter to Thomas Mifflin, then governor of the State of Pennsylvania, on a system of canals for America. It contemplates the time when canals should pass through every vale, winding round each hill, and bind the whole country together in the bonds of social intercourse; and I am now happy to find, through the good management of a wise administration, a period has arrived when an overflowing treasury exhibits abundant resources, and points the mind to works of such immense importance.”

We have already said that the earliest notice we have met with, of the utility and practicability of opening a communication between the great lakes and the Hudson, is in a letter addressed by Mr. Fulton, in 1807, to the Government, in answer to an application made by him, through General Dearborn, respecting a canal from Lake Pontchartrain to the Mississippi. But a project which promised such incalculable advantages to the State of New York, and indeed, it may be said, to the world, soon attracted the attention of the public; and, in the spring of 1810, the Legislature of New York appointed commissioners to explore the route of an inland navigation from Hudson river to Lakes Ontario and Erie. This commission reported

in 1811. The same session, Mr. Fulton was, by an act of the Legislature, appointed one of the commissioners.

In 1812, a second report was made. In their report of 1811, the commissioners had suggested the possibility of bringing the waters of Lake Erie to a reservoir near the Hudson, a distance of three hundred miles, in a canal on an Inclined-Plane, having a descent of six inches to a mile, by making mounds and aqueducts over the intervening valleys: as the descent of six inches to a mile would place the reservoir at a great elevation from the level of the river, the commissioners proposed that it should be brought down from thence by locks, so that the extreme of the Inclined-Plane at the lake would be one hundred and fifty feet higher than the end at the river.

Though the commissioners, in their second report, appear to have abandoned the idea of an Inclined-Plane for the whole extent, they yet supposed that the canal might be conducted as far as the Seneca outlet, as they had proposed in their first report. It is probable that Mr. Fulton, though this proposal had been sanctioned by an English engineer of great eminence, may have found it difficult to conceive how water could be confined within the banks of a canal which should have so considerable an

elevation at the one end above the locks, by which it would be stopped at the other. He might also have supposed that there would have been great difficulty in raising a mound of earth one hundred and thirty feet high, as a bed for the canal over the Cayuga outlet and its valley for a mile in extent.

In February, 1814, he addressed a letter to Gouverneur Morris, Esq., President of the Board of Commissioners, in which he shows what would be the advantages of the proposed canal, and exhibits very interesting and curious calculations of the comparative expense of transportation upon land, upon rivers, and upon canals.

When we speak of Robert Fulton as an INVENTOR, we do not allude to his successful application of steam to machinery for propelling boats, the mere mechanical devices, as his chief merit, although they were the first successful experiments that had been accomplished, and ever since adopted, and although improvements innumerable have been made and added since to steam navigation, and many wonderful contrivances have been used, yet each and all have only been additional improvements in the building of steamships for beauty and comfort; whilst his original combination of the piston and crank and paddle-wheels with the pro-

portionate power of steam, is the only invention used in the best steamers now traversing the ocean, and all are guided by the "phantom-ship Clermont" and the immortal spirit of Fulton! We admire Fulton still more as a man of *science*, as a man whose every invention was the contrivance of a real philanthropist, whose every act was for the benefit of mankind, whose whole mechanical powers and scientific attainments were combined and concentrated to find out and produce things that were hidden and unknown, and whose mind dictated and directed communications of facts and truths to the greatest men then known to the world. He communicated in writing with Washington, with Napoleon, with King George the Third, with Lord Stanhope, Earl of Chatham, President Madison, the National Congress, the officers of the United States' army and navy, Governor DeWitt Clinton, of New York, Governor Mifflin, of Pennsylvania, Benjamin West, Benjamin Franklin, and with the prominent scientific societies of England, France, and America, on the subjects of *education and the arts and sciences*; and in all his communications, in all his writings, he is to be most admired for the application of the whole force of his imagination, mind, and genius, to the interests, credit, honour, and glory of his own country.

In 1810, in a letter addressed to President Madison and the Congress of the United States, giving a sketch of the improvements which should be made in America, Mr. Fulton wrote as follows :

“Canals, bending round the hills, would irrigate the grounds beneath, and convert them into luxuriant pasturage. They would bind a hundred millions of people in one inseparable compact, alike in habits, in language, and in interest—one homogeneous brotherhood, the most invulnerable, powerful, and respectable on earth. Say, legislators, you who direct the destinies of this great nation—shall Americans, like servile creatures of established habits, imitate European vices, or copy them because they are familiar?—shall they nourish a useless marine, lay the basis for its increase, and send it down the current of time to futurity with all its complicated evils?—shall such a system consume our resources, deprive the earth of improvements, draw into its vortex ambitious men, divert the best talents of our country from useful works, and interest them in its support, creating non-productive labourers, who must be the consumers of the produce of the productive class, and diminish their enjoyments?—or will you search into the most hidden recesses of science, to find a means for preventing such incalculable evils, and direct the genius and resources of our country to useful *improvements*, to the *sciences*, the *arts*, *education*, the amendment of the public *mind* and *morals*?

“In such *pursuits* lie real *honor* and the nation's glory: such are the labours of enlightened republicans—those who labour for the public good. Every order of things which has a tendency to remove oppression and meliorate the condition of man, by directing his ambition to useful industry, is in effect republican. Every system which *nourishes war*, and its consequent thousands of *idlers* and

oppressors, is *aristocratic* in its effects, whatever may be its name.

“These sentiments exhibit my *political creed* — the object of all my exertions; and these *principles*, practised by Americans, will create for them a *real grandeur of character* which will secure to them the *respect* and admiration of the civilized world.”

And *this is* the language of Robert Fulton, and *he is* the man that every American should love to read and speak of.

It was such language, such sentiments, and acts like his, that have placed this country upon the highest pinnacle of fame.

Let us then, as Americans, as neighbours, as friends of the lamented Fulton, *erect such a monument* as shall show to the world that *here*, where he is best known, his unblemished virtues, his nobleness of character, and his immortal genius, shall be remembered with gratitude: his noble *sentiments*, his *Golden Deed*, and his imperishable motto: “Education, the arts and sciences, and the liberty of the seas, shall be the happiness of the earth,” are adopted, and *prove* to the world the *brightest page* in American history.

CHAPTER VI.

TORPEDOES.

It has been mentioned that the Earl of Stanhope had taken great pains to inform himself as to Mr. Fulton's proceedings in France. This nobleman's mathematical and mechanical mind perceived what consequences might result from the application of Mr. Fulton's inventions. The information he obtained was communicated to the British Cabinet, and excited alarm. It was determined by the British Ministry, if possible, to withdraw Mr. Fulton from France. Lord Sidmouth, who was then one of the ministers, contrived to have a communication with Mr. Fulton while he was in Paris, and obtained his consent to meet an agent of the British Government in Holland. In October, 1803, Mr. Fulton went from Paris to Amsterdam, for this purpose. But the agent with whom he was to confer did not arrive; and after being in Amsterdam three months, he returned to Paris.

It may be well to stop here, and notice a matter not otherwise of importance than as it serves to

mark the pliancy of Mr. Fulton's mind, and the versatility of his genius. At a time when he was taking a step which, as he thought, would be decisive of the fate of nations, which put his life at risk, and might determine his own fortune, he amused himself with making sketches from the scenery of Holland, and representations of the manners, figures, and costume of the Hollanders: some of them are broad caricatures, which cannot but excite a smile. They are found in his portfolio; and though in general they are but sketches, they show that they are from the hand of a master, guided by wit and genius.

Sometime after his return to Paris, the agent whom he was to have met at Amsterdam made his appearance in the French metropolis, bearing a letter from Lord Hawkesbury to Mr. Fulton, which induced him to proceed to London, where he arrived in May, 1804. Lord Sidmouth was then out of office, and Mr. Pitt had resumed the administration. The new ministry seemed to approve of what had been done by their predecessors in relation to Mr. Fulton. He soon had an interview with Mr. Pitt and Lord Melville. When Mr. Pitt first saw a drawing of a torpedo, with a sketch of the mode of applying it, and understood what would be the effects of its explosion, he said *that*,

if introduced into practice, it could not fail to annihilate all military marines.

It would not be extraordinary if Mr. Pitt, entertaining this opinion, should, as the minister of a nation which had then the largest navy in the world, have felt cordially disposed to encourage an invention that might deprive her of the mighty superiority she derived from her fleets. This was certainly the view that some of her statesmen had on the subject. When Mr. Fulton had an interview with the Earl St. Vincent, he exhibited to him a torpedo, and described to him the effects it had produced, the noble earl, in the strong language of his profession, rather than in a style comporting with his new dignity, exclaimed against Mr. Pitt for encouraging a mode of warfare which, he said, with great reason, they who commanded the seas did not want, and which, if successful, would wrest the trident from those who then claimed to bear it as the sceptre of supremacy on the ocean.

In June, the British Ministry appointed a commission to examine Mr. Fulton's projects. The commissioners were Sir Joseph Banks, Mr. Cavendish, Sir Home Popham, Major Congreve, and Mr. John Rennie. Many weeks passed before Mr. Fulton could prevail on them to do anything; and

finally, when they met, they reported against the submarine boat, as being impracticable.

At about this time, an expedition was fitted out against the French flotilla in the roads of Boulogne. In the night, torpedoes were thrown, by boats from a British squadron, across the bows of two of the French gun-brigs. The Frenchmen, when the torpedo-boats were discovered, exclaimed, with horror, that the infernal machines were coming! They had in their minds, no doubt, the effects of some vague reports as to Mr. Fulton's engines; and were terrified by knowing what had been the tremendous consequences of the explosion, in the streets of Paris, a short time previously, of a machine intended to destroy the life of Bonaparte.

The torpedoes exploded alongside of the French vessels, without doing them any injury. Mr. Fulton imputed this failure to a mistake, arising from want of experience, in what was apparently a slight matter. The torpedo had been so placed as that it hung perpendicularly by the side of the vessel, whereas it should have been so arranged as that the current would have swept it under her bottom. This, he was convinced, might be accomplished by the simple contrivance of attaching a bridle to the torpedo in such a manner as that it should lay in the water at an angle with the line

of direction of the current. This, when the torpedo was stopped by a line connected with it meeting the hawser or bow of the vessel, would give it a sheer which would carry it towards the keel of the vessel to be destroyed. Mr. Fulton's subsequent experiments proved that his theory on this subject was perfectly correct.

On the 15th of October, 1805, he blew up a strong-built Danish brig, of the burden of 200 tons, which had been provided for the experiment, and which was anchored in Walmar roads, near Deal, within a mile of Walmer castle, the residence of Mr. Pitt at that time. He has given an interesting account of this experiment in a pamphlet which he published in this country, under the title of "Torpedo War." In a letter to Lord Castlereagh, of the 16th of October, 1805, he says:

"Yesterday, about four o'clock, I made the intended experiment on the brig, with a carcass of one hundred and seventy pounds of powder; and I have the pleasure to inform you that it succeeded beyond my most sanguine expectations. Exactly in fifteen minutes from the time of drawing the peg and throwing the carcass in the water, the explosion took place. It lifted the brig almost bodily, and broke her completely in two. The ends sunk immediately, and in one minute nothing was to be seen of her but floating fragments: her mainmast and pumps were thrown into the sea, her foremast was broken in three pieces, her beams and knees were thrown from her deck and sides, and her deck planks were rent in fibres. In



Designed by Fulton.

Sept 15 1805. BRIG BLOWN UP by Fulton's Torpedo

L N Rosendahl del Philad^a

fact, her annihilation was complete, and the effect was most extraordinary. The power, as I had calculated, passed in a right line through her body, that being the line of least resistance, and carried all before it. At the time of her going up, she did not appear to make more resistance than a bag of feathers, and went to pieces like a shattered eggshell."

Mr. Fulton embarked at Falmouth in October, 1806, and arrived at New York, by the way of Halifax, on the 13th of December, in the same year.

Upon his arrival in this country, he immediately engaged in the pursuit of both the objects which had latterly engaged his attention in Europe; that is, submarine war and steam navigation.

He had not been landed in America a month before he went to the seat of government, to propose to the administration to enable him to prosecute a set of experiments with his torpedoes. He found Mr. Madison, then Secretary of State, and the Secretary of the Navy, Mr. Smith, much disposed to encourage his attempts, the success of which Mr. Fulton, by his ingenious models and drawings, with his lucid and engaging mode of lecturing upon them, made to appear so probable. The Government authorized a certain expenditure to be made, under the direction of Mr. Fulton, for this purpose. In the meantime, anxious to pre-

possess his countrymen with a good opinion of his project, he invited the magistracy of New York, and a number of citizens, to Governor's Island, where were the torpedoes and the machinery, with which these experiments were to be made: these, with the manner in which they were to be used, and were expected to operate, he explained very fully. While he was lecturing on his blank torpedoes, which were large empty copper cylinders, his numerous auditors crowded around him. At length he turned to a copper case of the same description, which was placed under the gateway of the fort, and to which was attached a clock-work lock; this, by drawing out a peg, he set in motion, and then said to his attentive audience: "Gentlemen: this is a charged torpedo, with which, precisely in its present state, I mean to blow up a vessel: it contains one hundred and seventy pounds of gunpowder, and if I were to suffer the clock-work to run fifteen minutes, I have no doubt but that it would blow this fortification to atoms." The circle round Mr. Fulton was very soon much enlarged, and before five of the fifteen minutes were out, there were but two or three persons remaining under the gateway; some, indeed, lost no time in getting at the greatest possible distance from the torpedo, with their best speed, and did

not again appear on the ground till they were assured it was lodged in the magazine from whence it had been taken, and did not seem to feel themselves quite safe as long as they were on the island. The conduct of Mr. Fulton's auditors was not very extraordinary or unnatural; but his own composure indicated the confidence with which he handled these terrible instruments of destruction, and the reliance he had on the accuracy of the performance of his machinery. The apprehensions of the company surprised, but amused him, and he took occasion to remark, how true it was that fear frequently arose from ignorance.

On the 20th of July, 1807, in pursuance of the experiments which the Government had authorized him to make, he blew up with a torpedo, in the harbor of New York, a large hulk brig, which had been provided for this purpose. Of this experiment, Mr. Fulton has given a circumstantial account in his work entitled "*Torpedo War*." There were several unsuccessful attempts to place and fire the torpedoes, so that the explosion did not take place till several hours after the time fixed for it by Mr. Fulton, and after it was expected by the multitude of spectators who crowded the shores. The torpedo locks missed fire several times: this was owing to the following trivial circumstances: Mr.

Fulton had tried his prepared carcasses in a tub of water, till he found they were so balanced by the corkwood, or buoyant matter attached to them, that they would retain the desired position; but he had done this without their locks, which were of considerable weight, being attached to them. When these came to be fixed to the torpedoes, and thrown into the river to be floated against the hulk, the additional gravity which the locks gave to one side of the torpedoes reversed them, so that the locks were downwards: the consequence was, that when the hammer of the lock drove up the pan, the priming powder fell out, and the spark from the flint could have no effect. Nothing could have been easier than to have provided against such an occurrence, but it was in vain to attempt to correct the error at that moment: an adjustment of the parts of the machine was necessary, which required leisure—so much do matters of this kind depend on slight circumstances, and so necessary is practice to perfect every theory. At length, however, the explosion took effect, and nothing was seen in the place of the vessel but a high column of water, smoke, and fragments. This experiment only served to prove to the inhabitants of New York, by ocular demonstration, what indeed was not doubted by any one who had the least acquaintance

with the subject, that the explosion of a torpedo under a vessel's bottom would annihilate her.

The day after this experiment, Mr. Fulton addressed a letter to the governor, mayor, and members of the corporation of New York, from which the following are extracts :

“Having now clearly demonstrated the great effect of explosion under water, it is easy to conceive that, by organization and practice, the application of the torpedoes will, like every other art, progress in perfection. Little difficulties and errors will occur in the commencement, as has been the case in all new inventions; but where there is little risk, little expense, and so much to be gained, it is worthy of consideration whether this system should not have a fair trial. Gunpowder, within the last three hundred years, has totally changed the art of war; and all my reflections have led me to believe that this application of it will, in a few years, put a stop to maritime wars, give that liberty on the seas which has been long and anxiously desired by every good man, and secure to America that liberty of commerce, tranquillity and independence, which will enable her citizens to apply their mental and corporeal faculties to useful and humane pursuits—to the improvement of our country and the happiness of the whole people.”

The torpedo was a copper case two feet long, twelve inches in diameter, containing one hundred pounds of powder, having a lock similar to a gun-lock to contain a musket charge of powder: the box, with the lock cocked and barrel charged, is screwed to the copper case. The lever at top has

a communication to the lock inside of the box, and holds the lock cocked and ready to fire, a weight holds it down to any given depth under water, a small anchor prevents a strong tide moving it from its position.

The torpedo thus anchored, it is obvious that, if a ship in sailing should strike the lever, the explosion would be instantaneous, and she be immediately destroyed; hence, to defend our bays or harbors, let a hundred of these engines be anchored in the channel; as, for example, the Narrows, to defend New York: they may be set to stay under water a day, a week, or a year.

Having made improvements on his invention, and learned much, as he conceived, by his late experiments, Mr. Fulton, in January, 1810, visited Washington again. Mr. Jefferson, Mr. Madison, and a number of members of Congress, assembled by his invitation at Kalorama, the seat of his friend Mr. Barlow, to see his new models and drawings, and to listen to his explanations of them, and of the modes in which he intended they should be applied.

Soon after this, he published his work entitled "*Torpedo War; or, Submarine Explosions.*" He adopted as a motto for his publication, his favourite sentiment: "THE LIBERTY OF THE SEAS WILL BE THE

HAPPINESS OF THE EARTH." He addressed it to the President of the United States, and to the members of both houses of Congress: it contained a description of the experiments he had made, of his engines as he had improved them, and of the manner in which they might be used.

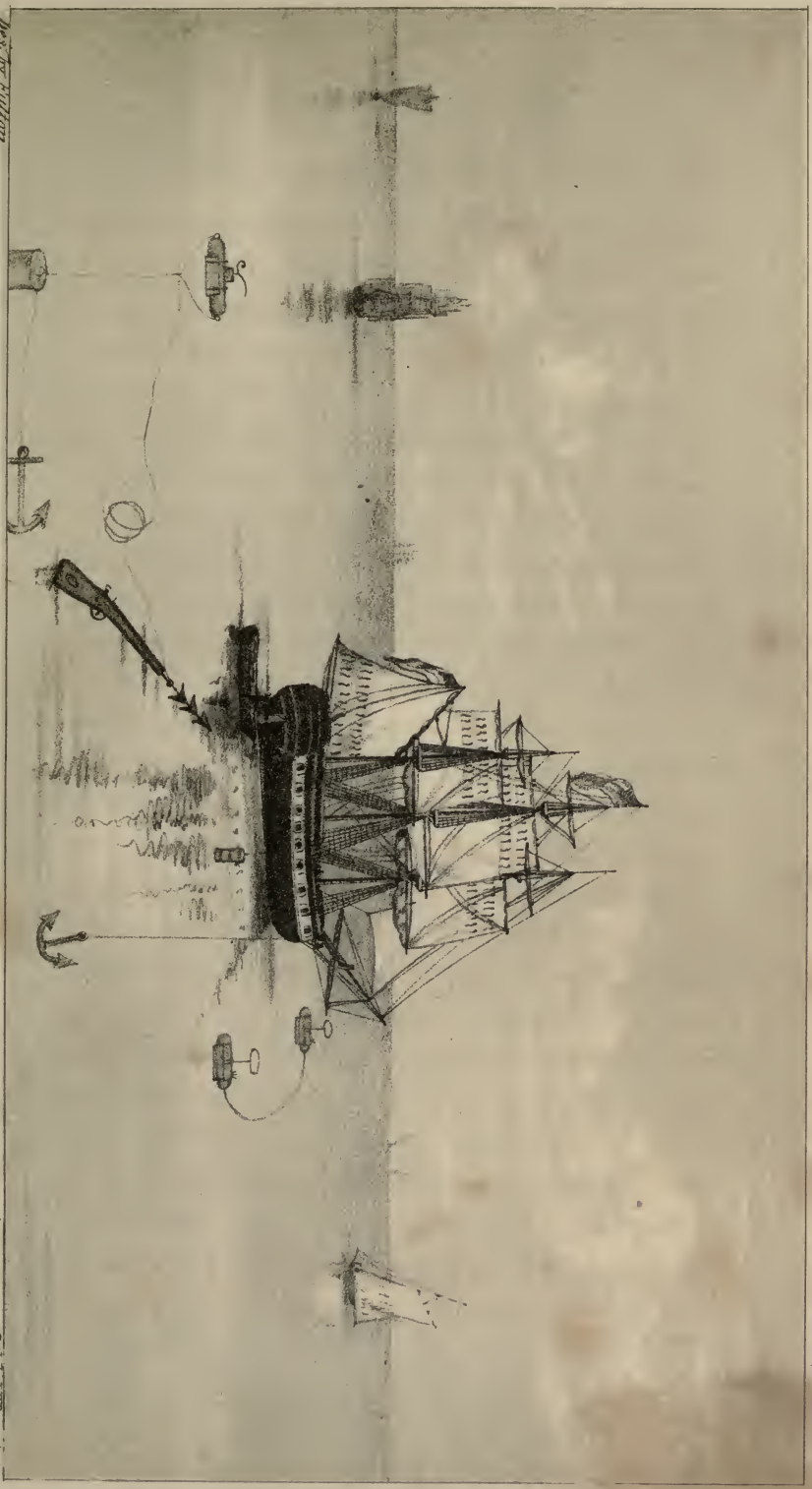
The members of Congress were so favourably impressed with respect to Mr. Fulton's inventions, by the lectures which he had given upon them in their presence, that, in March, 1810, they passed an act making an appropriation for trying practically the use of torpedoes and submarine explosions. For this purpose, five thousand dollars were granted, to be expended at the discretion of the President, under the immediate direction of the Secretary of the Navy. In execution of this act, it was proposed that some preliminary experiments should be made in the harbor of New York. The Secretary of the Navy addressed a circular letter to several gentlemen, inviting them to be present at the experiments, and to make a report, so far as the gentlemen might be enabled to form satisfactory opinions. Commodore Rodgers and Commodore Chauncey were directed to give their superintendence.

In the month of September, Mr. Fulton exhibited to the gentlemen appointed by the Government the

models of his engines, and explained to them the manner in which he proposed they should be used. His machines were torpedoes, which were to be applied to the bottom of a vessel in various ways. First, he proposed that two torpedoes should be united by a coupling-line; that they should be floated in the tide at a certain depth below the surface, and suffered to drift down on each side of the vessel to be attacked, so as that the coupling-line would be arrested by the cable of the vessel: this would occasion the torpedoes, when pressed by the force of the current, to approach each other and come in contact with the inferior parts of the vessel to be destroyed. Secondly, he proposed that a torpedo should be fastened to one end of a line, the other end of which should be attached to a harpoon, which was to be discharged into the bows of a vessel at anchor in a current, or under way, from a piece of ordnance that he had contrived, and which was to be carried by a light boat constructed for the purpose. He conceived that such a boat might approach a hostile vessel near enough to do execution, with at least as little danger as fire-ships are exposed to in accomplishing their objects. The line being fastened to the vessel at one end by the harpoon, the current, if the vessel were at anchor, or the progress of the vessel through

View by Hullson

Copper Shinders, Torpedoes united by a coupling line, drifting down on each side of the vessel.
The Mastigon and a Torpedo set with weight and anchor, so that a vessel passing over and touching



Edw. G. A. K. Howard

the water, if she were under way, would bring the torpedo at the other extremity of the line under her bottom. The torpedoes, when in this situation, were to be discharged by clock-work locks, or by locks so constructed that the triggers should be drawn by levers connected with them coming in contact with the vessel.

He proposed also to apply a torpedo by having it attached to a long spar, which should be suspended, by a swivel from the bowsprit of a torpedo-boat, so nearly on a balance, that a man in the bow of the boat could elevate or depress the torpedo with one hand, while with the other he could pull a string attached to the trigger of the lock, when the torpedo should be run under the bottom of a vessel.

He also proposed to employ in his "torpedo war" what he called block-ships; that is, large vessels of from 50 to 100 tons measurement, the sides of which were to be cannon-proof, and the decks impenetrable to musket-shot. Each of these vessels was to be propelled by machinery, which was to be worked by her crew, who were to be under the protection of her impenetrable sides. On each quarter and bow she was to be armed with a torpedo, fastened to a long spar, the interior end of which was to be supported and braced by ropes

from the yards, like the lower steering-sail-boom of a ship. By means of these spars, the torpedoes were to be thrust under the bottom of the vessel to be destroyed. He afterwards thought of employing our common river sloops for this purpose, and to prepare them for it by lining them with thick timber and covering their decks with pretty stout sheet-iron. He supposed that these might be navigated by their common sails. It was his idea, that if a man-of-war of the largest size were attacked by ten or twelve such vessels assailing her from all quarters, she could not defend herself so as to prevent the approach of all of them: if only one of them got sufficiently near, the destruction of the vessel attacked would be inevitable. The torpedo-vessels would not be affected by the explosion, because, according to his theory, the correctness of which was proved by what happened in the attack on the French vessels in the roads of Boulogne, and by other experiments, the force of powder exploded under water is always perpendicularly to the surface: the lateral pressure of the mass of waters of the sea or of a river, opposes an infinite resistance to a sudden impulse, and confines the course of an explosion in a line at right angles to the surface, as certainly as the sides of a cannon direct the force of a discharge in the course of its calibre.

If ten or twelve such vessels were in our harbors or on our coasts, a match for a man-of-war, we should be able to make a maritime defence at much less expense of men and money than it would cost to attack us; for ten or twelve of these torpedo-vessels, and their equipment, would require much less of men and money than a man-of-war.

But to return to Mr. Fulton's proceedings before the commissioners appointed by the Government. At the first interview, above-mentioned, he explained to them his stationary torpedoes, as he has described them in his "Torpedo War." These were to be carcasses of powder, like those before described. Having levers attached to the triggers of the locks, numbers of them were to be anchored in the channel through which vessels, to make an attack, must pass: the hostile vessel, in passing over a torpedo, would press the lever and cause an explosion.

Another machine which Mr. Fulton exhibited and explained to the commissioners, was one which he had invented subsequently to his publication of the "Torpedo War." He called it a cable-cutter.³ On this he placed great reliance, even in the state in which it then was; but which he afterwards greatly improved.

This machine consisted of a large iron hook,

upon the shaft or haft of which was placed a small piece of ordnance charged with powder, as in the common mode, and an instrument with a chisel or cutter at the outward end, of a crescent form: the piece was to be discharged by a water-proof lock, like those used for the torpedoes: to the iron part of this machinery was attached a sufficient quantity of wood or buoyant matter to support it: from the buoyant matter, the iron was to be supported, by chains or cords, at any required depth: to the extreme end of the shaft of the hook was attached a long line, to the other end of which was fastened a floating body: thus prepared, the machine, for an attack upon a vessel at anchor in a tideway, was to be thrown into the current at any distance above the object: the hook with its appurtenances on one side of her, and the buoy at the other extremity of the line on the other side: the current would then carry them both down the stream, till the line was intercepted by the cable of the vessel: when in this position, the buoy at the one end of the line, which was to be of such size as to present a greater resistance to the water than was at the other end, would draw the line across the cable till the hook embraced it, and would bring the cable immediately before the muzzle of the piece of ordnance, and of course directly in opposition

to the chisel or cutter: at the moment the cable was in this position, it pressed against a lever which crossed the hook, and which communicated with the trigger of the lock: by this means, the piece was fired, and the cable separated by the cutter.

In these attacks, so much of the machinery was permitted to be seen on the surface of the water, that they could only be made with a chance of success at night; but Mr. Fulton thought the buoyancy of the machine was so arranged as to keep the whole below the surface of the water, and thus render the attack at all times invisible.

In the months of September and October, the commissioners assembled several times at the Navy-yard to witness Mr. Fulton's experiments. The sloop-of-war *Argus*, which was then commanded by the gallant Captain Lawrence, was to have been the subject of them: she had been prepared to defend herself against them, under the orders of Commodore Rodgers, after Mr. Fulton had explained to him his proposed mode of attack. She had a strong netting suspended from her spritsail-yard, which was anchored at the bottom: she was surrounded by spars lashed together, which floated on the surface of the water, so as to place her completely in a pen: she had grappling-irons and

heavy pieces of the same metal suspended from her yards and rigging, ready to be plunged in any boat that came beneath them: she had swords or scythes fastened to the ends of long spars, moving like sweeps, which unquestionably would have mowed off as many heads as came within their reach. Whatever might have been the ingenuity of the proposed mode of attack, there was certainly no little in the dispositions for defence. It was instantly seen by every one that these were not to be encountered with success by any means which Mr. Fulton had then prepared. This he at once acknowledged, but expressed his confidence that he should find means of surmounting them. One of the gentlemen appointed by the Government to attend these experiments, in his report to the Secretary of the Navy, says:

“A vessel of war, surrounded by large booms and spars, with nets as deep as the water hanging from her bows, with her rigging loaded with weighty pieces of iron, and with grapnel and shot suspended from her yards to guard against torpedoes, and with chains to guard her cables, must be much less wieldy, and of course much less formidable for attack or defence, than she would be without such incumbrances.”

The report adds:

“An invention which will oblige every hostile vessel that enters our ports to guard herself by such means, cannot but be of great importance in a system of defence.”

Mr. Fulton contented himself, for that time, with exhibiting a torpedo, and trying some experiments with his harpoon and cable-cutter, neither of which entirely answered his expectations. The harpoon, fired from a small piece of ordnance at a target, did not take effect at so great a distance as he supposed it would do, and there was more difficulty in bringing the cable-cutter in contact with the cable to be cut, than he had anticipated; but at that time he had not made his last improvements on this machine.

There was no contrivance by which it would explode itself at the proper moment, as before described; neither was it calculated to fix itself upon the cable by means of a float at the opposite end of the line attached to the hook. In the experiment which Mr. Fulton exhibited at this time, he attempted to produce an explosion by a long string which led from the trigger of the piece to a boat, which, after dropping the machine in the water at a distance from the vessel, on the one side, was to row across her bows to the other side, and then down the stream till the line, one end of which was fastened to the machine and the other end to the boat, brought the cable-cutter in its proper position; and then the string connected with the trigger was to be pulled by a person in

the boat. All this was certainly too complicated, and the assailants were too much exposed, to raise any expectations that this mode of attack could be practised with any effect; but Mr. Fulton was persuaded that the improvements he afterwards made on this machine, and which we have attempted to describe, rendered it very practicable.

After several attempts, however, Mr. Fulton succeeded in placing his machine, and with it cut off, several feet below the surface, a fourteen inch cable, which was attached to a vessel that had been anchored in the stream for the purpose.

This experiment was satisfactory, so far as not only to show that a cable might be cut under water by these means; but it proved that a gun might be fired in that situation with effect, and from this Mr. Fulton took the idea of firing under water cannon charged with bombs or balls, which he afterwards attempted.

Chancellor Livingston, after a long examination of each particular subject which the experiments had suggested, expresses himself as follows:

“Upon the whole, *I view this application of powder as one of the most important military discoveries which some centuries have produced.* It appears to me to be capable of effecting the absolute security of your ports against naval aggression; provided, that, in conjunction with it, the usual means necessary to occupy the attention of the enemy are not neglected.”

The rest of the gentlemen of the committee could not agree with those who made separate reports, farther than to unite with them in a statement which was but little more than a detail of facts.

These reports were forwarded to the Secretary of the Navy by Mr. Fulton, with a letter from himself. *His buoyant mind was never to be depressed*: he gives his own views of the experiments, and writes with increased confidence in his ultimate success. He expresses himself satisfied with the report of the committee, and thinks their opinions were as favourable to the infant art as, under all circumstances, could have been expected.

It is due to Mr. Fulton to give some extracts from this letter. He says :

“It is proved and admitted, first, that the water-proof locks will ignite gunpowder under water; secondly, it is proved that seventy pounds of powder, exploded under the bottom of a vessel of two hundred tons, will blow her up; hence, it is admitted that if a sufficient quantity of powder—and which I believe need not be more than two hundred pounds—be ignited under the bottom of a first-rate man-of-war, it would instantly destroy her; thirdly, it is proved and admitted, by all parties concerned in the experiments, that a gun can be fired under water, and that a cable of any size may be cut by that means, at any required depth.

“With these immensely important principles proved and admitted, the question naturally occurs, whether there be, within the genius or inventive faculties of man, the means of placing a torpedo under a ship in defiance of her powers of resistance. He who says that there is not, and that

consequently torpedoes never can be rendered useful, must of course believe that he has penetrated to the limits of man's inventive powers, and that he has contemplated all the combinations and arrangements which present or future ingenuity can devise, to place a torpedo under a ship.

“I will do justice to the talents of Commodore Rodgers. The nets, booms, kentledge, and grapnels, which he arranged around the *Argus*, made a formidable appearance against one torpedo-boat and eight bad oarsmen: I was taken unawares: I had explained to the officers of the navy my means of attack; they did not inform me of their means of defence: the nets were put down to the ground, otherwise I should have sent the torpedoes under them. In this situation, the means which I was provided with being imperfect, insignificant, and inadequate to the effect to be produced, I might be compared to what the inventor of gunpowder would have appeared had he lived in the time of Julius Cæsar, and presented himself before the gates of Rome with a 4-pounder, and had endeavoured to convince the Roman people that, by means of such machines, he could batter down their walls. They would have told him that a few catapultas, casting arrows and stones upon his men, would cause them to retreat; that a shower of rain would destroy his ill-guarded powder; and the Roman centurions, who would have been unable to conceive the various modes in which gunpowder has since been used to destroy the then art of war, would very naturally conclude that it was an useless invention; while the manufacturers of catapultas, bows, arrows, and shields, would be the most vehement against further experiments.

“I had not one man instructed in the use of the machines, nor had I time to reflect on this mode of defending a vessel. I have now, however, had time, and I feel confident that I have discovered a means which will render nets to the ground, booms, kentledge, grapnel, oars with sword-blades, through the port-holes, and all such kinds of operations, totally useless.”

It would not be doing justice to Mr. Fulton to pass over these transactions without noticing the industry, perseverance, indefatigability, presence of mind, and command of temper, which they gave him an opportunity of displaying. Throughout the whole course of the experiments, no opposition or contradiction, no failure or disappointment, irritated or discomposed him. When his machines were broken or disordered, he, with the utmost calmness and composure, pointed out their defects or the causes of his disappointment. If an experiment failed, though it had cost him great pains and labour in the preparation, and although the failure was frequently and obviously owing to the awkwardness or unskilfulness of those who assisted him, his temper could not be disturbed: he would not hear the scoffs of some of the bystanders, which were frequently expressed in whispers intended to reach his ear. *Not a fretful or angry word ever escaped him*; and after a disappointment he recommenced his preparations with the same ardour, and with the same calmness, with which he first began: even when his physical strength must have been exhausted by his corporeal exertions and the excessive fatigue he would sometimes undergo through a sultry day, his spirits were never for a moment depressed. On these occasions, he showed him-

self as much a moral as a mechanical philosopher.

After the conclusion of these experiments, he does not appear to have turned his attention to torpedoes or submarine explosions until the late war was declared between Great Britain and the United States. His mind was engaged by other great and interesting objects. He had in the meantime brought his system of navigation by steam to such perfection, that steamboats were established and running as regular packets upon the Hudson, between New York and Albany, and as ferry-boats across the bays and rivers.

But Mr. Fulton's thoughts upon submarine war took another direction. Having ascertained, by the experiments he had made with his cable-cutter, that powder might be discharged from a piece of ordnance under water with effect, he conceived the idea of forming submarine batteries. With this view, he instituted a number of experiments, to try the practicability and effect of discharging cannon loaded with ball at different depths under water.

He made a number of calculations on this subject: his desire to ascertain what resistance a ball of given dimensions, propelled with a certain velocity, would meet with in passing through a body

of water at a certain depth. The basis he took for these calculations, and the calculations themselves, mark both his ingenuity and his science.

He assumed that a body passing through water would meet with a resistance equal to the force of a column of water of the same diameter as the body moving with the given velocity. He then ascertained what head or height of water would be required to discharge a stream of water, from an orifice at the foot of a perpendicular tube, with the same velocity with which the boat was supposed to be propelled. He then, by the well-known rules of hydraulics, found what force or power the ascertained head of water would give, and thence formed his estimates as to the resistance with which a body projected in water would meet.

In this instance, as in others, he is not satisfied with obtaining the information necessary for his particular purpose, but he establishes, from his calculations, a rule which may, by a very brief and simple arithmetical process, afford all the information and accuracy generally necessary for practical purposes.

His first experiment was with a 4-pounder, having the breech, and as much of the gun as is usually within the sides of a vessel, in a water-

tight box, and the muzzle stopped with a tompon: the box and gun were then submerged three feet in the Hudson: the gun was fired by dropping a live coal through a tin tube which penetrated the box immediately above the vent of the gun, and rose above the surface of the water: the ball was found to have struck the sand at the bottom of the river, at the distance of forty-one feet from the muzzle. The gun was uninjured. This experiment satisfied him that guns might be placed in a ship, below her water-line, with their breech on board and their muzzles in the water, without any more danger of their bursting than there is when they are fired in the air. This gave him the idea of arming ships with guns to be fired in this way.

He proposed that the muzzle of the gun made for this purpose should recoil through a stuffing-box, and be followed by a valve which would exclude the water when the gun was not protruded. An elegant model of this construction is now in possession of his family.

He next tried the same piece with a pound and a half of powder, and fired it, by means of one of his water-tight locks, when it was entirely in water, three feet below the surface: the ball penetrated eleven and a half inches into a target of pine logs, which had been prepared for the purpose,

and placed beneath the water at the distance of twelve feet from the piece.

His next experiment was with a columbiad carrying an hundred pound ball, fired at the target, as in the last instance: all that we know is that the ball tore the target in pieces, and that the cannon was uninjured.

We have not information that will enable us to give any further details of this experiment; but we know that Mr. Fulton was entirely satisfied with the result. He proposed to use cannon in this way by suspending them, two for instance, from the bows of the vessel. A single shot, as he demonstrates, from a piece of large calibre, which should break into the side of a ship at any considerable depth beneath the water-line, must be fatal to her. And though the range of shot fired through water, may be but a few feet, yet conflicting vessels, whenever they engage yard-arm and yard-arm, with accounts of which our naval heroes have made us so familiar, must be so near as to give effect to a submarine discharge.

Mr. Fulton did not propose that these guns should be always in the water; but that they should be suspended so as to be raised when the vessel was not in action.

The plans for the submarine use of cannon were

submitted to one of our most distinguished naval commanders, who gave them his decided approbation.

He expressed a strong opinion that such an attack would be fatal to any vessel exposed to it, and that it would be extremely difficult for an enemy to evade an attempt, made with sufficient resolution, to destroy her by these means.

In 1813, Mr. Fulton took out a patent "for several improvements in the art of maritime warfare, and means of injuring and destroying ships and vessels of war by igniting gunpowder under water, or by igniting gunpowder below a line horizontal to the surface of the water, or so igniting gunpowder that the explosion which causes injury to the vessel attacked shall be under water."

He communicated to Mr. Jefferson an account of his experiments on submarine firing, with drawings of his various plans. Mr. Jefferson expressed himself much pleased with this novel mode of maritime warfare, and assured Mr. Fulton that he would recommend it to the attention of Government.

It is curious to observe how Mr. Fulton's projects grew one out of another: the submarine guns gave rise to the steam man-of-war.

It having been suggested, by the distinguished naval officer before alluded to, that, in approaching an enemy so near as was necessary to give effect to submarine cannon, the vessel, if she were rigged in the ordinary way, would be liable to be entangled with her adversary. To meet this objection, Mr. Fulton proposed to move the vessel by steam. His reflections on this project, and what he saw of the performance of so large a vessel as the "Fulton,"—her speed, and the facility with which she was managed—led him to conceive that a vessel of war might be constructed, in which, to all the advantages possessed by those now in use, might be added the very important ones which she would derive from being propelled by steam as well as by the winds.

CHAPTER VII.

SUBMARINE NAVIGATION, AND PLUNGING-BOAT.

IN December, 1797, he made an experiment, in company with Mr. Barlow, on the Seine, with a machine which he had constructed, and by which he designed to impart to carcasses of gunpowder a progressive motion under water, to a given point, and there to explode them. But he was disappointed in the performance of this machine.

He continued, however, to employ his mind and talents on this subject, and to make a variety of experiments, with a view to the accomplishment of his object,—of which experiments very interesting particulars are preserved among his papers,—until he had perfected the plan for his submarine boat, as it was afterwards executed.

A want of funds to enable him to carry his plans into execution, induced him to apply to the French Directory. They at first gave him great reason to expect their countenance and encouragement; but, after a long and irksome attendance on

the public offices, to his great surprise and disappointment, he received a note from the Minister of War, informing him that the Directory had totally rejected his plan.

Mr. Fulton was never to be discouraged; and he proposed to build submarine boats — “*to deliver France and the whole world from British oppression.*”

But the French government changed. Bonaparte placed himself at the head of it, with the title of First Consul.

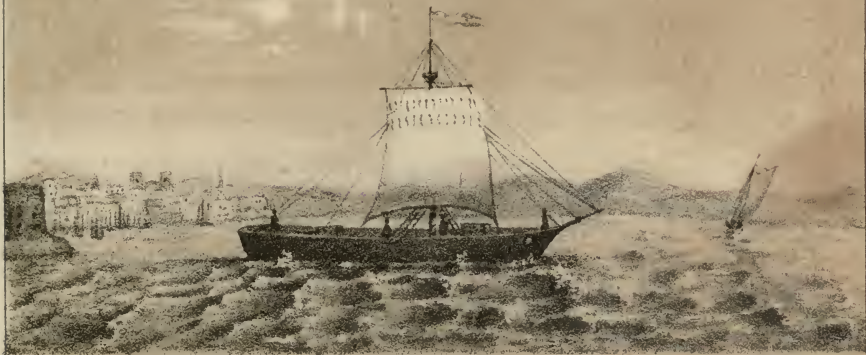
Mr. Fulton soon presented an address to him, soliciting him to patronize the project of submarine navigation, and praying him to appoint a commission, with sufficient funds and powers, to give the necessary assistance.

This request was immediately granted, and the citizens Volney, La Place, and Monge, were named the commissioners.

In the spring of the year 1801, Mr. Fulton repaired to Brest, to make experiments with the plunging-boat he had constructed the preceding winter. This, as he says, had many imperfections, natural to a first machine of such complicated combinations. Added to this, it had suffered much injury from rust, in consequence of his having been obliged to use iron, instead of brass or copper, for bolts and arbours.

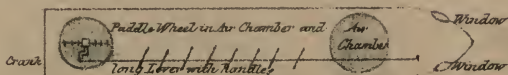
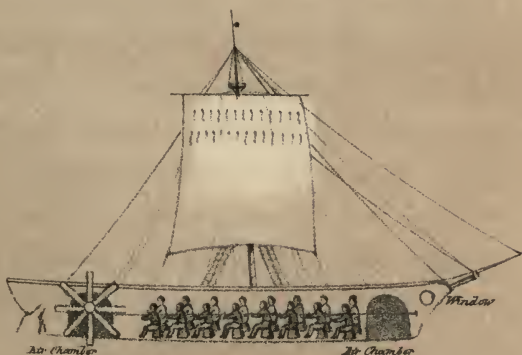
Notwithstanding these disadvantages, he engaged in a course of experiments with the machine, which required no less courage than energy and perseverance. Of his proceedings, he made a report; from which report we learn the following interesting facts:

On the 3d of July, 1801, he embarked with three companions on board his plunging-boat, in the harbor of Brest, and descended in it to the depth of five, ten, fifteen, and so on to twenty-five feet; but he did not attempt to go lower, because he found that his imperfect machine would not bear the pressure of a greater depth. He remained below the surface one hour. During this time, they were in utter darkness. Afterwards he descended with candles; but finding a great disadvantage from their consumption of vital air, he caused, previously to his next experiment, a small window of thick glass to be made near the bow of his boat, and he again descended with her on the 24th of July, 1801. He found that he received from his window, or rather aperture covered with glass,—for it was no more than an inch and a half in diameter,—sufficient light to enable him to count the minutes on his watch. Having satisfied himself that he could have sufficient light when under water; that he could do without fresh air for a



The Nautilus

plunged with Mast and Sails, struck, as it moved between the upper and lower waters in the harbour of Brest, July 1801.



The following is a list of the names of the persons who have been admitted to the membership of the Society since the last meeting of the Council, and the names of those who have been expelled from the Society since the last meeting of the Council.

Admitted to membership since the last meeting of the Council:

Mr. John Smith, Mr. James Brown, Mr. Robert White, Mr. Thomas Green, Mr. Charles Black, Mr. William Grey, Mr. Henry Gold, Mr. George Silver, Mr. Edward Wood, Mr. Richard Stone, Mr. Benjamin Hill, Mr. Samuel Young, Mr. Daniel King, Mr. Joseph Lee, Mr. Matthew Walker, Mr. George Hall, Mr. Thomas Adams, Mr. Charles Baker, Mr. William Clark, Mr. Henry Evans, Mr. George Fisher, Mr. Edward Grant, Mr. Richard Harris, Mr. Benjamin Jones, Mr. Samuel King, Mr. Daniel Lee, Mr. Joseph Miller, Mr. Matthew Norman, Mr. George Owen, Mr. Thomas Parker, Mr. Charles Quinn, Mr. William Reed, Mr. Henry Scott, Mr. George Taylor, Mr. Edward Turner, Mr. Richard Underhill, Mr. Benjamin Walker, Mr. Samuel Young, Mr. Daniel Zane.

Expelled from membership since the last meeting of the Council:

Mr. John Doe, Mr. James Roe, Mr. Robert King, Mr. Thomas Green, Mr. Charles Black, Mr. William Grey, Mr. Henry Gold, Mr. George Silver, Mr. Edward Wood, Mr. Richard Stone, Mr. Benjamin Hill, Mr. Samuel Young, Mr. Daniel King, Mr. Joseph Lee, Mr. Matthew Walker, Mr. George Hall, Mr. Thomas Adams, Mr. Charles Baker, Mr. William Clark, Mr. Henry Evans, Mr. George Fisher, Mr. Edward Grant, Mr. Richard Harris, Mr. Benjamin Jones, Mr. Samuel King, Mr. Daniel Lee, Mr. Joseph Miller, Mr. Matthew Norman, Mr. George Owen, Mr. Thomas Parker, Mr. Charles Quinn, Mr. William Reed, Mr. Henry Scott, Mr. George Taylor, Mr. Edward Turner, Mr. Richard Underhill, Mr. Benjamin Walker, Mr. Samuel Young, Mr. Daniel Zane.

considerable time; that he could descend to any depth, and rise to the surface with facility, his next object was to try her movements, as well on the surface as beneath it. On the 26th of July, he weighed his anchor and hoisted his sails: his boat had one mast, a mainsail, and a jib. There was only a light breeze, and therefore she did not move on the surface at more than the rate of two miles an hour; but it was found that she would tack and steer, and sail on a wind or before it, as well as any common sailing boat. He then struck her mast and sails; to do which, and perfectly to prepare the boat for plunging, required about two minutes. Having plunged to a certain depth, he placed two men at the engine which was intended to give her progressive motion, and one at the helm, while he, with a barometer before him, governed the machine which kept her balanced between the upper and lower waters. He found that, with the exertion of one hand only, he could keep her at any depth he pleased. The propelling engine was then put in motion, and he found, upon coming to the surface, that he had, in about seven minutes, made a progress of four hundred meters, or about five hundred yards. He then again plunged, turned her round while under water, and returned to near the place he began to move from.

Robert Fulton

He repeated his experiment several days successively, until he became familiar with the operation of the machinery and the movements of the boat. He found that she was as obedient to her helm, under water, as any boat could be on the surface, and that the magnetic needle traversed as well in the one situation as in the other.

On the 7th of August, Mr. Fulton again descended, with a store of atmospheric air compressed into a copper globe of a cubic foot capacity, into which two hundred atmospheres were forced. Thus prepared, he descended with three companions to the depth of about five feet. At the expiration of an hour and forty minutes, he began to take small supplies of pure air from his reservoir, and did so, as he found occasion, for four hours and twenty minutes. At the expiration of this time, he came to the surface, without having experienced any inconvenience from having been so long under water.

Mr. Fulton was highly satisfied with the success of these experiments: it determined him to try the effects of these inventions on the English ships which were then blockading the coast of France, and were daily near the harbor of Brest.

His boat at this time he called the *submarine boat*, or the *plunging-boat*: he afterwards gave it

the name of the "NAUTILUS:" connected with this machine were what he then called submarine bombs, to which he subsequently gave the name of *torpedoes*. This invention preceded the "NAUTILUS." It was, indeed, his desire of discovering the means of applying his torpedoes that turned his thoughts to a submarine boat. Satisfied with the performance of his boat, his next object was to make some experiments with his torpedoes. A small shallop was anchored in the roads, with a bomb containing about twenty pounds of powder: he approached to about within two hundred yards of the anchored vessel, struck her with the torpedo, and blew her into atoms. A column of water and fragments was *thrown* or blown from eighty to one hundred feet in the air. This experiment was made in the presence of the prefect of the department, Admiral Villaret, and a multitude of spectators.

St. Aubin, a member of the Tribunate, gives, in the Journal of Commerce of the 20th of January, 1802, an account of a submarine boat which he says Mr. Fulton was then constructing. In this, however, there is a mistake. Mr. Fulton had projected another boat of this description, upon a larger and an improved plan; but he had not the means of executing it, and all his experiments

were made with the small boat he first constructed, and which, as we have before remarked, he found, at the end of the winter, much impaired by the rusting of some parts of the machinery. St. Aubin's account is as follows :

“The diving-boat, in the construction of which he is now employed, will be capacious enough to contain eight men and provision for twenty days, and will be of sufficient strength and power to enable him to plunge one hundred feet under water, if necessary. He has contrived a reservoir of air, which will enable eight men to remain under water eight hours. When the boat is above water, it has two sails, and looks just like a common boat; when it is to dive, the mast and sails are struck.

“In making his experiments, Mr. Fulton not only remained a whole hour under water, with three of his companions, but had the boat parallel to the horizon at any given distance. He proved that the compass points as correctly under water as on the surface, and that, while under water, the boat made way at the rate of half a league an hour, by means contrived for that purpose.

“It is not twenty years since all Europe was astonished at the first ascension of men in balloons: perhaps, in a few years, they will not be less surprised to see a flotilla of diving-boats, which, on a given signal, shall, to avoid the pursuit of an enemy, plunge under water, and rise again several leagues from the place where they descended!

“But if we have not succeeded in steering the balloon, and even were it impossible to attain that object, the case is different with the diving-boat, which can be conducted under water in the same manner as upon the surface. It has the advantage of sailing like the common boat, and also of diving when it is pursued. With these qualities, it

is fit for carrying secret orders, to succour a blockaded fort, and to examine the force and position of an enemy in their harbors. These are sure and evident benefits which the diving-boat at present promises. But who can see all the consequences of this discovery, or the improvements of which it is susceptible? Mr. Fulton has already added to his boat a machine by means of which he blew up a large boat in the port of Brest; and if, by future experiments, the same effect could be produced in frigates or ships of the line, what will become of maritime wars, and where will sailors be found to man ships of war, when it is a physical certainty that they may at any moment be blown into the air by means of diving-boats, against which no human foresight can guard them?"

In all Fulton's negotiations with the British Government, he presented himself as an American; and when it was proposed that he should, for a considerable reward, suppress his inventions, so that they might be buried, and that neither his own country nor the rest of the world could derive from them those advantages which he thought they would afford, he indignantly rejected the overture. This will appear from his written communication with the British ministry, extracts from which we shall now present, though by doing so the order of events will be a little anticipated.

In a paper which Mr. Fulton read to certain gentlemen who were appointed by the British Ministry, in the month of August, 1806, to confer with him, he says:

“At all events, whatever may be your award, I never will consent to let these inventions lie dormant should my country at any time have need of them. Were you to grant me the annuity of twenty thousand pounds a-year, I would sacrifice all to the safety and independence of my country.”

He concludes a letter to Lord Grenville in the following words :

“It never has been my intention to hide these inventions from the world, on any consideration. On the contrary, it has ever been my intention to make them public as soon as may be consistent with strict justice to all with whom I am concerned. For myself, I have ever considered the interest of America, free commerce, the interest of mankind, the magnitude of the object in view, and the rational reputation connected with it, superior to all calculations of a pecuniary nature.”

These are the sentiments of a man who had confidence in the rectitude of his conduct. It is very possible that Mr. Fulton, on withdrawing from France, was also in some measure influenced by an aversion to the new character which the government assumed on the accession of Napoleon to the consular dignity.

In a letter to Lord Melville, Mr. Fulton expressed himself as follows :

“There is no project, flattering to vanity, which is too extravagant for men who consider conquest and military fame as the most estimable of all acquirements. Alexander, Ginghis Khan, and Bonaparte, have been guided by similar sentiments. In writing this letter, I feel no en-

mity to the people of France, or any other people; on the contrary, I wish their happiness; for my principle is that every nation profits by the prosperity of its neighbours, provided the governments of its neighbours be humane and just. What is here said is directed against the tyrannic principles of Bonaparte—a man who has set himself against all law: he is, therefore, in that state which Lord Somers compares to that of a wild beast, unrestrained by any rule, and he should be hunted down as the enemy of mankind. This, however, is the business of Frenchmen. With regard to the nations of Europe, they can only hold him in governable limits by fencing him round with bayonets.”

CHAPTER VIII.

HISTORY OF ORIGINAL INVENTORS.

“Dear bought the experiment, and hard the strife
Of social man, that rear’d his arts to life.”

BEFORE giving a description of Mr. Fulton’s inventions in steam navigation, it may not be amiss to show that numerous individuals had endeavoured to accomplish that which only Mr. Fulton’s gigantic mind could properly conceive and practically perfect. The different modes of propelling vessels on the seas form a striking and peculiar picture in the eventful history of man: levers in the shape of oars, paddle-wheels, condensed air, horse-power, explosive force of gunpowder, and the fall of water, were proposed; but all have vanished before the triumphant use of steam. Many controversies have existed, and much paper wasted, respecting the nature and construction of the various steam-boats; and whilst each inventor has deservedly received the highest praise and applause for his own wonderful invention, it was Fulton, and Ful-

ton only, who grasped hold of the reins of the all-powerful STEAM-ENGINE OF WATT, and harnessing it, like a snorting steed, to his leviathan car, he lashed its foaming sides, and giving it liberty, it

“Rode the waters like a thing of life,”

and startled old Neptune from the lowest depths of the ocean, to yield his trident to the boldest commander of the waves.

We now live in a new age, and the day has gone by that an inventor can be ridiculed with impunity. Mind, genius, and talent, have produced the most extraordinary results :

“That teach the temper'd soul, at one vast view,
To glance o'er time and look existence thro'.”

The mountains have been levelled, the valleys filled up, and the fiery chariot drives along our plains ; and, for business or pleasure, the traveller mounts the “lightning-trains,” to convey him from place to place ; and whilst the modest, unassuming Morse, by the lightning's flash delivers the messages of nations from pole to pole, the enterprising merchants of the East are crowding the swiftest, boldest steamers of the seas, that madden with the strength they gain, bound the billowy main, and onward sweep, between the rising and the setting sun, to heap their treasures in the Western World,

and establish the truth that England, France, and America, with one accord, proclaim the glory of Fulton.

Many eminent and ingenious men proposed to propel vessels by steam power; and amongst the number were Dr. Papin, a Frenchman, Savery, the Marquis of Worcester, and Dr. John Allen, of London, in 1726. In 1786, Oliver Evans, of Philadelphia, and about the same time Dr. Benjamin Franklin proposed to propel a vessel by the immediate action of the steam upon water, forcing a column of water through a channel, for that purpose, in the keel out at the stern.

In justice to the more successful inventors who left some lasting testimony of their contrivances, it affords us pleasure to represent their inventions as correctly as it was possible for us to obtain the same; and whatever ideas they may have had, they perseveringly endeavoured to exhibit. They proved that steam power could be applied to navigation, but they did not succeed in accomplishing the application to perfection. They evinced, in a manner, great practical knowledge, and their experiments were of such vast importance as to command the respect and honour of their countrymen; but still they did not possess that rare union of genius and science so as to attain and achieve

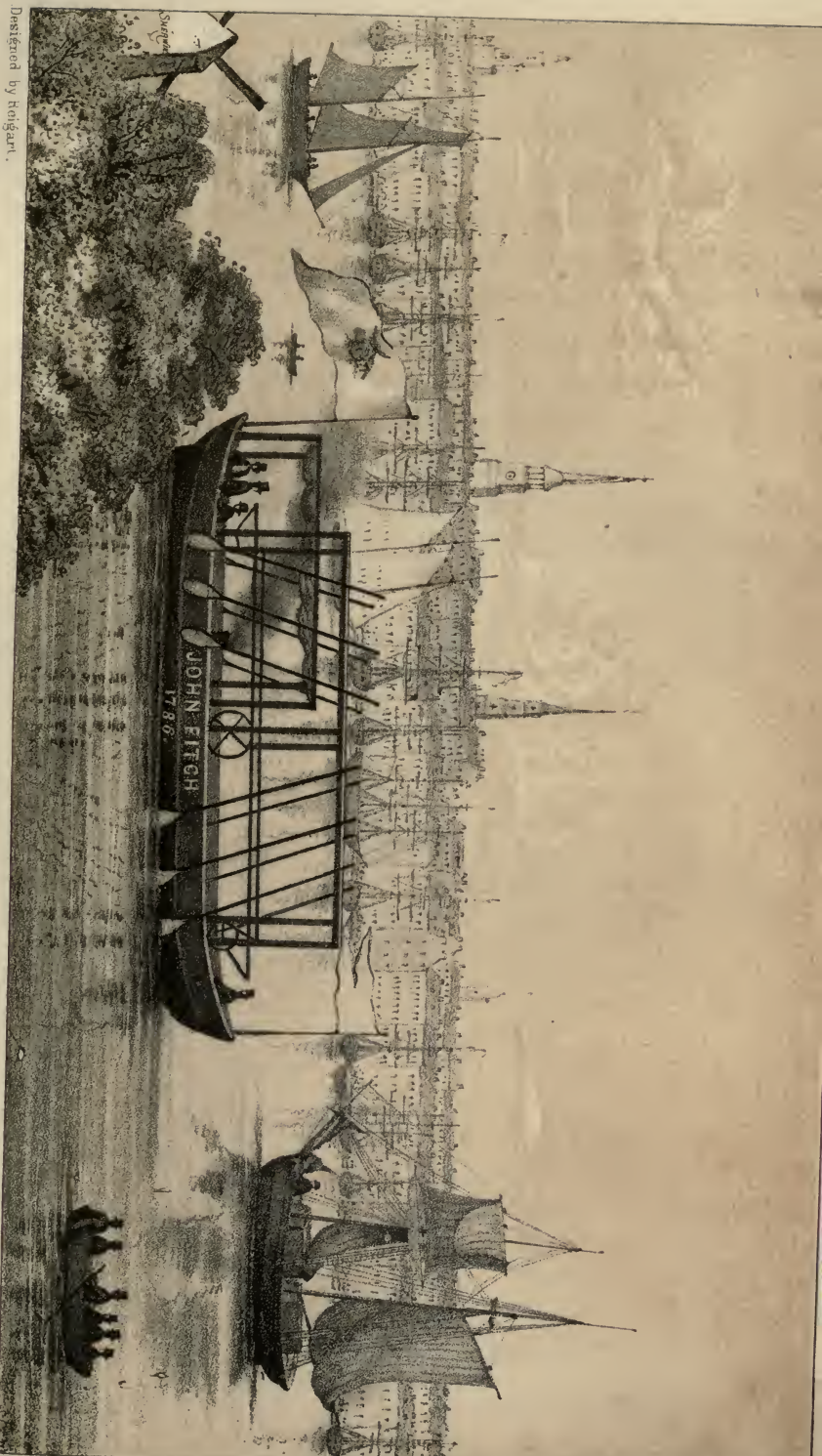
the great triumph of steamboat navigation. The first patent on record to propel a vessel by steam power, is that of JONATHAN HULLS, who published a pamphlet, in 1737, describing it as a means of towing other vessels out of harbor against tide and winds. This was the first paddle-wheel driven by steam power, and the idea of placing the wheel in the stern occurred to the inventor as being the proper place for it, because that water-fowl, ducks and geese, pushed their web feet behind them.

In 1787, MR. JAMES RUMSEY, of Sheppardstown, Virginia, made a public experiment on the Potomac river. His boat was about eighty feet long, and was propelled by a steam-engine which worked a vertical pump in the middle of the vessel, by which the water was drawn in at the bow, and expelled at the stern through a horizontal trunk in her bottom. The reaction of the effluent water carried her at the rate of four miles an hour when loaded with three tons, in addition to the weight of her engine, of about one-third of a ton. The boiler held no more than five gallons of water, and needed only a pint of water at a time; and the whole machinery did not occupy a space greater than that required for four barrels of flour. It seems that he and Dr. Franklin entertained similar ideas about the same time. Mr. Rumsey went

to England to put a vessel afloat on the Thames, and died there in 1793. A steamboat one hundred feet long was tried on the Loire, at Lyons, by the Marquis de Joffrey. He used paddles revolving on an endless chain. It was unsuccessful.

MR. JOHN FITCH'S steamboat was built in Philadelphia, and made several experimental excursions on the Delaware. The following is Mr. Fitch's own account of it, in December, 1786 :

“The cylinder is to be horizontal, and the steam to work with equal force at each end. The mode by which we obtain what I term a vacuum is, it is believed, entirely new, as is also the method of letting the water into it, and throwing it off against the atmosphere without any friction. It is expected that the cylinder, which is of twelve inches diameter, will move a clear force of eleven or twelve cwt. after the frictions are deducted: this force is to be directed against a wheel of eighteen inches diameter. The piston moves about three feet, and each vibration of it gives the axis about forty evolutions. Each evolution of the axis moves twelve oars or paddles five and a half feet: they work perpendicularly, and are represented by the strokes of a paddle of a canoe. As six of the paddles are raised from the water, six more are entered, and the two sets of paddles make their strokes of about eleven feet in each evolution. The crank of the axis acts upon the paddles about one-third of their length from their lower ends, on which part of the oar the whole force of the axis is applied. The engine is placed in the bottom of the boat about one-third from the stern, and both the action and reaction turn the wheel the same way.”

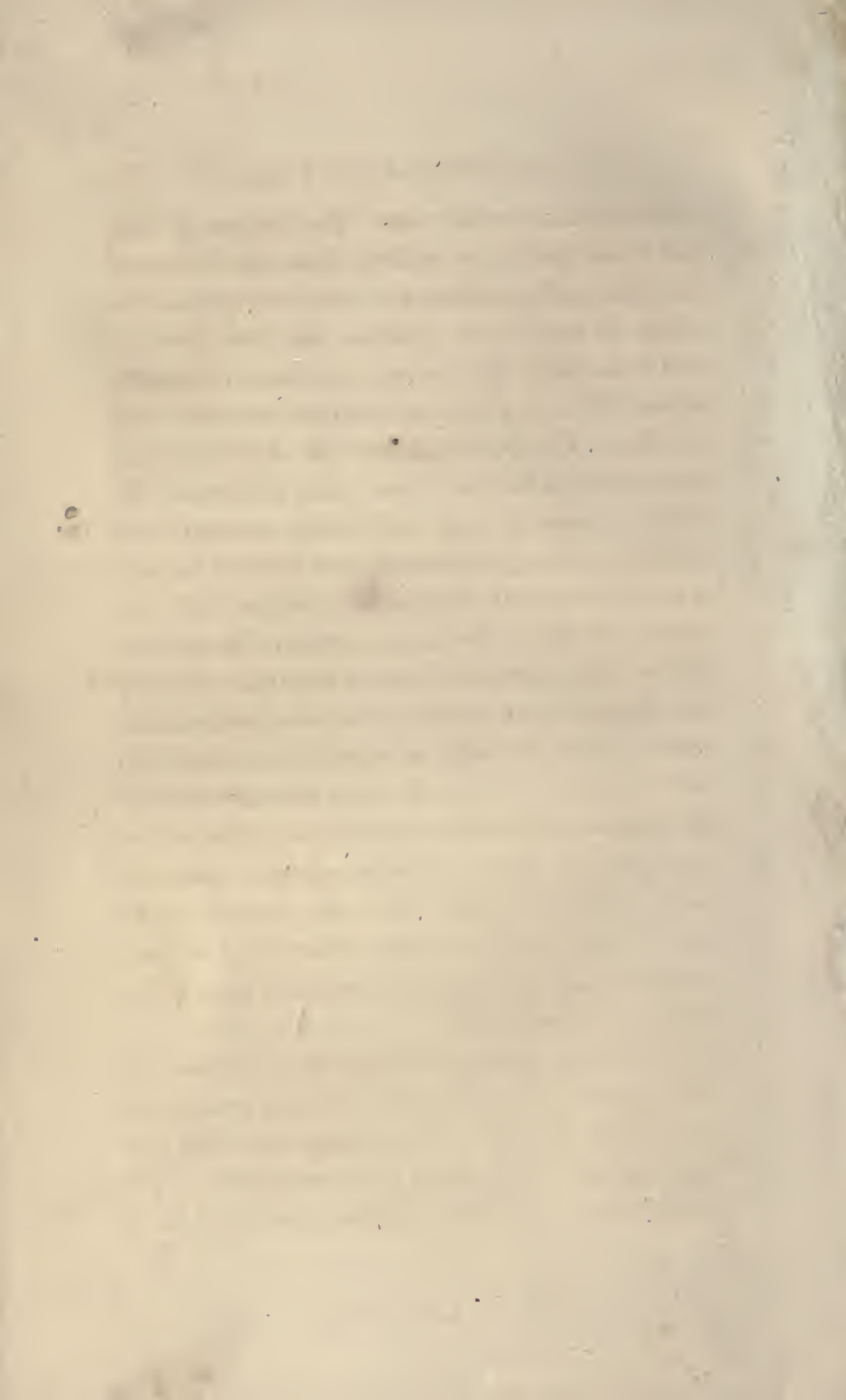


Designed by Rongart.

FITCH'S STEAMBOAT.

On the Delaware River, opposite Philadelphia.

L. N. Rosenthal's Lith. Philad.



He was an ill-used man. The distress of mind and mortification he suffered from the failure of his protracted exertions, and his poverty, were too much for him; and to drown his reflections, he had recourse to the common but deceptive remedy, strong drink, in which he indulged to excess; and retiring to Pittsburg, he ended his days by plunging into the Allegheny river: thus terminated the life of a man of great mechanical resources and inventive powers, who should have received honours where he met with coldness and neglect. He confidently predicted the future success of steam navigation. He prophesied that in less than a century the Western rivers would be swarming with steam-boats. It is said that *he expressed the wish to be buried on the shores of the Ohio, where the song of the boatmen might enliven the stillness of his resting-place, and the music of the steam-engine soothe his spirit.* What an idea! Yet how natural to the mind of an ardent projector, whose life had been devoted to one darling object, which it was not his destiny to accomplish!

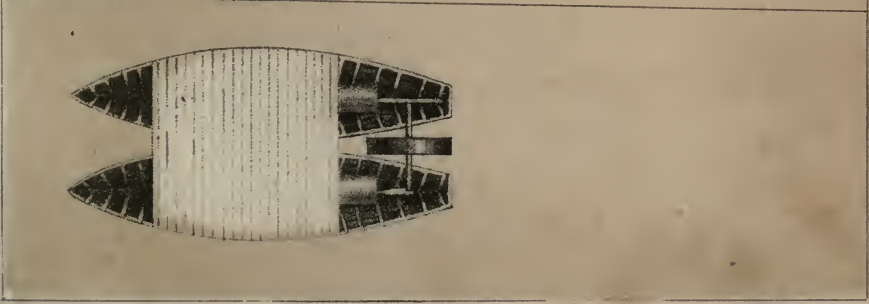
Mr. Patrick Miller, of Dalwinston, Scotland, in 1787, applied steam to propel a double vessel with a wheel in the stern. The steam-engine for this boat was made and fitted up by an ingenious mechanic named William Symington, and which, it is

said, is carefully preserved to the present day. The success of this boat was very gratifying, but it was only on a small scale, the cylinder being only four inches in diameter. In 1789, Mr. Symington again, under the direction of Mr. Miller, fitted up an engine on a double boat sixty feet long. This canal-boat, on the Forth and Clyde canal, went at the rate of seven miles per hour, and was very promising, as an experiment, on the canal, a placid water, but could not be employed on the river; for unfortunately the boat was too weak for the machinery, which was taken out, and Mr. Miller tried no more experiments. A work published by his son states that out of his private fortune Mr. Miller spent no less than \$150,000, making experiments for which he never received in return a single cent. He was a patriot in mechanical science.

Das Schiff Reingart



Zahn by Rosenfeld



CHAPTER IX.

STEAM NAVIGATION, AND FULTON'S SUCCESS.

“Then FULTON look'd: beneath his wondering eyes
Gay streamers lengthen round the seas and skies;
The countless nations open all their stores,
Load every wave and crowd the lively shores;
STEAMERS in mingling mazes streak the air,
And COMMERCE triumphs o'er the rage of war.

From Baltic streams, from Elba's opening side,
From Rhine's long course and Texel's labouring tide,
From Gaul, from Albion, tired of fruitless fight,
From green Hibernia, clothed in recent light,
Hispania's strand, that two broad oceans lave,
From Senegal and Gambia's golden wave,
Tago the rich, and Douro's viny shores,
The sweet Canaries and the soft Azores,
Commingling barks their mutual banners hail,
And drink by turns the same distending gale.
Thro' Calpe's strait that leads the Midland main,
From Adria, Pontus, Nile's resurgent reign,
The sails look forth and wave their bandrols high,
And ask their breezes from a broader sky.
Where Asia's isles and utmost shorelands bend,
Like rising suns the sheeted masts ascend;
Coast after coast their flowing flags unroll,
From Diemen's rocks to Zembla's ice-propped pole,
Where Behring's pass collapsing worlds divides,
Where California breaks the billowy tides,

Peruvian streams their golden margins boast,
 Or Chili bluffs or Plata flats the coast.
 Where, clothed in splendour, his Atlantic way
 Spreads the blue borders of Hesperian day,
 From all his havens, with majestic sweep,
 The swiftest, boldest STEAMSHIPS of the deep
 Swarm forth before him, till the cloudlike train
 From pole to pole o'ersheet the whitening main."

WE must now revert to an early period of Mr. Fulton's life, to trace from the beginning the progress of that great improvement in the arts for which we and all the world are so much indebted to him — we mean the practical establishment of navigation by steam.

At what time his attention was first directed to this subject, we do not know; but it is ascertained that, in the year 1793, he had matured a plan in which, even at that early day, he had great confidence. The evidence of this is his letter to the Earl of Stanhope, to which we have before adverted. This letter is dated the 30th of September, 1793. The answer from Lord Stanhope is dated the 7th of the following October, at Holdsworth, Devon, and is as follows:

"SIR: — I have received yours of the 30th of September, in which you propose to communicate to me the principles of an invention which you say you have discovered, respecting the moving of ships by the means of steam. It is a subject on which I have made important discoveries.

I shall be glad to receive the communication which you intend, as I have made the principles of mechanics my particular study," etc.

The history of the discovery of the power of steam, and of its application to engines which have been made for its use, and the progress of their improvement, might be very interesting, but would be inapplicable here. *Mr. Fulton had indeed given to Watt and Bolton instructions for constructing the FIRST ENGINE WHICH WAS SUCCESSFULLY USED IN A BOAT, and had directed the parts to be made so that it might be arranged in a manner and within a compass suited to his purpose, which no one with a less mechanical genius than himself would have been able to do so accurately as it had been done by him; yet he made no pretensions as an inventor with respect to the engine.*

Mr. Fulton, when he conceived a mechanical invention, not only perceived the effect it would produce, but he could ascertain, by calculation, the power his combination would afford, how far it would be adequate to his purpose, and what would be the requisite strength of every part of the machine.

To Mr. Fulton belongs the great honour of having been the first who endeavoured to investigate, on principle, the difficulties of the subject. His

method of proceeding was, in principle, this: having determined the resistance of the vessel, he inferred that the paddles must experience the same resistance, and that the engine must exert a force at the centre of effort of the paddles equal to the resistance of the paddles. Assuming then the velocities of the piston and paddles as known, and equivalent to V and v , and the forces on the same as equivalent to F and f , he formed the proportion $V v, f F$; and by dividing the whole force on the piston, by the force exerted by the steam on any given portion of its surface, he obtained the surface of the piston itself, and thence its diameter.

Knowing then the whole resistance on the paddles, and supposing only one paddle on each side to act at the same instant, the area corresponding to that resistance becomes known, the half of which determines the surface of one paddle. Knowing also from the number of strokes made by the piston the number of strokes made by the paddle-wheels, the diameter of the wheel may be determined so as to ensure to the paddle the velocity originally assumed. Fulton having in this manner determined the force necessary to propel his boat, and accurately considered the mode by which it might be most successfully applied, avoided the great error of his predecessors, viz., attempting too

much with an inadequate power, and gave to steam navigation that splendid and triumphant character which it now possesses.

In none of those who have attempted this great object were united those qualities and acquirements to which Mr. Fulton owed his success; that is to say, a genius for invention, mathematical and philosophical science, mechanical knowledge, and, what is rare in combination with these, considerable practice.

None of the projectors, prior to him, whose claims have been set up to rival his, have left any traces of calculations, or even an account of the principles upon which their machines were contrived. They were among the multitude that thought steam might be applied to navigation. They went to work to form a machine, upon a crude notion that it might be made to do something, without having attempted to calculate what, and without having any precise plan for its execution: when it did not answer their expectations, it was abandoned, because they could not perceive the cause of its failure, or any mode of making improvements upon it.

On the contrary, he never attempted to put in practice any improvements in mechanics without having made his calculations, drawn his plans, and executed his models.

A society in Rotterdam had applied to the American Philosophical Society to be informed whether any and what improvements had been made in the construction of steam-engines in America. The subject was referred to Mr. Benjamin H. Latrobe, who, on the 20th of May, 1803, read to the Philadelphia Society a report; from which, as it is recorded in their Transactions, the following are extracts :

“During the general lassitude of mechanical exertion which succeeded the American Revolution, the utility of steam-engines appears to have been forgotten; but the subject afterwards started into very general notice in a form in which it could not possibly be attended with success. A sort of mania began to prevail, which indeed has not yet entirely subsided, for impelling boats by steam-engines. Dr. Franklin proposed to force forward the boat by the immediate application of the steam upon the water. Many attempts to simplify the working of the engine, and more to employ a means of dispensing with the beam in converting the *libratory* into a rotatory motion, were made. For a short time, a passage-boat, rowed by a steam-engine, was established between Bordentown and Philadelphia, but it was soon laid aside. The best and most powerful steam-engine which has been employed for this purpose—excepting perhaps one constructed by Dr. Kinsey, with the performance of which I am not sufficiently acquainted—belonged to a gentleman of New York. It was made to act, by way of experiment, upon oars, upon paddles, and upon flutter-wheels: nothing in the success of any of these experiments appeared to be sufficient compensation for the expense and the extreme inconvenience of the steam-engine in the vessel.

“There are, indeed, general objections to the use of the steam-engine for impelling boats, from which no particular mode of application can be free. These are:

“First: the weight of the engine and of the fuel.

“Second: the large space it occupies.

“Third: the tendency of its action to rack the vessel, and render it leaky.

“Fourth: the expense of maintenance.

“Fifth: the irregularity of its motion, and the motion of the water in the boiler and cistern, and of the fuel-vessel in rough water.

“Sixth: the difficulty arising from the liability of the paddles and oars to break, if light, and from the weight, if made strong.

“Nor have I ever heard of an instance, verified by other testimony than that of the inventor, of a speedy and agreeable voyage having been performed in a steamboat of any construction.

“I am well aware that there are still many very respectable and ingenious men who consider the application of the steam-engine to the purpose of navigation as highly important, and as very practicable, especially on the rapid waters of the Mississippi; and who would feel themselves almost offended at the expression of an opposite opinion. And perhaps some of the objections against it may be avoided. That founded on the expense and weight of the fuel may not, for some years, exist on the Mississippi, where there is a redundancy of wood on the banks; but the cutting and loading will be almost as great an evil.”

In speaking of what had been done in this country prior to the running of his boats, it would be great injustice not to notice, with due respect and commendation, the enterprises of the late Chancellor Livingston, who had so intimate a con-

nection with him in the progress and establishment of this public benefit.

While Mr. Livingston devoted much of his own time and talents to the advancement of science and the promotion of the public good, he was fond of fostering the discoveries of others. The resources of his ample fortune were afforded with great liberality, whenever he could apply them to the support and encouragement of genius.

He entertained very clear conceptions of what would be the great advantages of steamboats on the large and extensive rivers of the United States. He had applied himself, with uncommon perseverance and at great expense, to constructing vessels and machinery for that kind of navigation. As early as 1798, he believed that he had accomplished his object, and represented to the Legislature of the State of New York that he was possessed of a mode of applying the steam-engine to propel a boat on new and advantageous principles, but that he was deterred from carrying it into effect by the uncertainty and hazard of a very expensive experiment, unless he could be assured of an exclusive advantage from it, should it be found successful.

The Legislature, in March, 1798, passed an act vesting Mr. Livingston with the exclusive right and privilege of navigating all kinds of boats

which might be propelled by the force of steam or fire, on all the waters within the territory or jurisdiction of the State of New York, for the term of twenty years from the passing of the act; upon condition that he should, within a twelvemonth, build such a boat the mean of whose progress should not be less than four miles an hour.

The bill was introduced into the House of Assembly by Dr. Mitchell, then being a representative from the city. Dr. Mitchell said :

“Upon this occasion, the wags and the lawyers in the House were generally opposed to my bill. I had to encounter all their jokes, and the whole of their logic. One main ground of their objection was, that it was an idle and whimsical project, unworthy of legislative attention.”

A venerable friend, the late Senator L’Homme-dieu, who was a member of the Senate at that time, has described the manner in which this application from Mr. Livingston was received by the Legislature. He said it was a standing subject of ridicule throughout the session; and whenever there was a disposition among the younger members to indulge a little levity, they would call up the steamboat bill, that they might divert themselves at the expense of the project and its advocates.

In the American Medical and Philosophical Register, there is a piece published under the title of

“An Historical Account of the Application of Steam for the propelling of Boats.” This was drawn up by Mr. Livingston, and addressed to Drs. Hosack and Francis, the editors of that journal. He very candidly acknowledges that all his efforts had been unavailing. He explains the nature of the connection between him and Mr. Fulton, and shows what part that gentleman performed in the experiment which led to the accomplishment of their object. As this account, from Chancellor Livingston himself, must be very satisfactory, we shall present a part of it, in an extract from the learned and valuable work we have just mentioned :

“Robert R. Livingston, Esq., when Minister in France, met with Mr. Fulton, and they formed that friendship and connection with each other to which a similarity of pursuits generally gives birth. He communicated to Mr. Fulton the importance of steamboats to their common country, informed him of what had been attempted in America, and of his resolution to resume the pursuit on his return, and advised him to turn his attention to the subject. It was agreed between them to embark in the enterprise, and immediately to make such experiments as would enable them to determine how far, in spite of former failures, the object was attainable: the principal direction of these experiments was left to Mr. Fulton, who united, in a very considerable degree, practical to a theoretical knowledge of mechanics. After trying a variety of experiments, on a small scale, on models of his own invention, it was understood that he had developed the true principles upon

which steamboats should be built, and for the want of knowing which all previous experiments had failed. But as these two gentlemen both knew that many things, which were apparently perfect when tried on a small scale, failed when reduced to practice upon a large one, they determined to go to the expense of building an operating boat upon the Seine. This was done in the year 1803, at their joint expense, under the direction of Mr. Fulton; and so fully evinced the justice of his principles, that it was immediately determined to enrich their country by the valuable discovery as soon as they should meet there, and in the meantime to order an engine to be made in England. On the arrival at New York of Mr. Fulton, which was not till 1806, they immediately engaged in building a boat of, what was then considered, very considerable dimensions.

“This boat began to navigate the Hudson river in 1807: its progress through the water was at the rate of five miles an hour.”

We have seen that Mr. Fulton’s mind, previously to his return to this country, had long been directed to the project of propelling vessels by steam: we know that, prior to 1793, he had exercised his thoughts on this subject.

“The application of steam to navigation had been thought of by all artists, but the means of executing it were wanting, and Fulton furnished them.”

It may be well to remark here, that the idea of propelling vessels by water-wheels, which at present are believed to be essential to the success of steamboats, had occurred to Dr. Franklin; but he rejected them as impracticable, and with his essay

read before the American Philosophical Society, referred to by Mr. Latrobe in his answers to the Rotterdam Society, which we have before noticed, Dr. Franklin gives a drawing of a water-wheel, accompanied with what he supposes to be a demonstration that they cannot be used to any advantage.

The experimental boat of Mr. Livingston and Mr. Fulton was completed early in the spring of 1803, to be propelled with paddle-wheels, on the Seine, in France: they were on the point of making an experiment with her, when one morning, as Mr. Fulton was rising from a bed in which anxiety had given him but little rest, a messenger from the boat, whose precipitation and apparent consternation announced that he was the bearer of bad tidings, presented himself to him, and exclaimed, in accents of despair: "Oh, sir! the boat has broken in pieces, and gone to the bottom!" Mr. Fulton, who himself related the anecdote, declared that this news created a despondency which he had never felt on any other occasion; but this was only a momentary sensation.

Upon examination, he found that the boat had been too weakly framed to bear the great weight of the machinery, and that, in consequence of an agitation of the river by wind the preceding night,

what the messenger had represented had literally happened. The boat had broken in two, and the weight of her machinery had carried her fragments to the bottom. It appeared to him, as he said, that the fruits of so many months' labour, and so much expense, were annihilated; and an opportunity of demonstrating the efficacy of his plan was denied him at the moment he had promised it should be displayed. His disappointment and feelings may easily be imagined, but they did not check his perseverance. On the very day that this misfortune happened, he commenced repairing it. He did not sit down idly to repine at misfortune which his manly exertions might remedy, or waste in fruitless lamentations a moment of that time in which the accident might be repaired. Without returning to his lodgings, he immediately began to labour with his own hands to raise the boat, and worked twenty-four hours incessantly, without allowing himself rest or taking refreshment—an imprudence which, as he always supposed, had a permanent bad effect on his constitution, and to which he imputed much of his subsequent bad health.

The accident did the machinery very little injury; but they were obliged to build the boat almost entirely new: she was completed in July: her length

was sixty-six feet, and she was eight feet wide. Early in August, Mr. Fulton addressed a letter to the French National Institute, inviting them to witness a trial of his boat, which was made in their presence, and in the presence of a great multitude of the Parisians. The experiment was entirely satisfactory to Mr. Fulton, though the boat did not move altogether with as much speed as he expected. But he imputed her moving so slowly to the extremely defective fabrication of the machinery, and to imperfections which were to be expected in the first experiment with so complicated a machine, but which he saw might be easily remedied.

Such entire confidence did he acquire from this experiment, that immediately afterwards he wrote to Messrs. Watt and Bolton, of Birmingham, England, ordering certain parts of a steam-engine to be made for him, and sent to America. He did not disclose to them for what purpose the engine was intended; but his directions were such as would produce the parts of an engine, that might be put together within a compass suited for a boat. Mr. Fulton then designed to return to America immediately; but, as we have seen, he first visited England, and then probably gave new orders on this subject, as the engine which was employed in the first American Fulton boat was of the manu-

facture of Messrs. Watt and Bolton; but it did not arrive in America till long after the time we are speaking of.

Very soon after Mr. Fulton's arrival in New York city, he commenced building his first American boat: while she was constructing, he found that her expenses would greatly exceed his calculation. He endeavoured to lessen the pressure on his own finances by offering one-third of the exclusive right which was secured to him and Mr. Livingston by the laws of New York, and of his patent rights, for a proportionate contribution to the expense. He made this offer to several gentlemen, and it was very generally known that he had made such propositions; but no one was then willing to afford this aid to his enterprise.

In the spring of 1807, the first Fulton boat built in this country was launched from the ship-yards of Charles Brown, on the East river. The engine from England was put on board of her: in August, she was completed, and was moved by her machinery from her birthplace to the Jersey shore. Mr. Livingston and Mr. Fulton had invited many of their friends to witness the first trial: among them were the learned Drs. Mitchell and M'Nevin, to whom the country is indebted for some account of what passed on that occasion. Nothing could

exceed the surprise and admiration of all who witnessed the experiment. The minds of the most incredulous, who had styled the boat "Fulton's Folly," were changed in a few minutes. Before the boat had made the progress of a quarter of a mile, the greatest unbeliever must have been converted. The man who, while he looked on the expensive machine, thanked his stars that he had more wisdom than to waste his money on such idle schemes, changed the expression of his features as the boat moved from the wharf and gained her speed: his complacent smile gradually stiffened into an expression of wonder.

The jeers of the ignorant, who had neither sense nor feeling enough to suppress their contemptuous ridicule and rude jokes, were silenced for a moment by a vulgar astonishment which deprived them of the power of utterance, till the triumph of genius extorted from the incredulous multitude which crowded the shores, shouts and acclamations of congratulation and applause.

The boat had not been long under way, when Fulton ordered her engine to be stopped. Though her performance so far exceeded the expectations of every other person, and no one but himself thought she could be improved, he immediately perceived that there was a defect in the construc-



J. S. GARDNER

Designed by Redburn

September 1807.—The 'CLERMONT,' the first Steam Packet
Of the World sailed from New York to Albany.

J. N. Rose

The following is a list of the names of the persons who have been elected to the office of Justice of the Peace for the year 1880. The names are given in alphabetical order of their surnames. The names of the persons who have been elected to the office of Justice of the Peace for the year 1880 are: [illegible text]

tion of her water-wheels: he had their diameter lessened, so that the buckets took less hold of the water; and when they were again put in motion, it was manifest that the alteration had increased the speed of the boat. It may well be said that the man of genius and knowledge has a sense beyond those which are common to others, or that he sees with different eyes. How many would have gazed on these ill-proportioned wheels without perceiving that they were imperfect!

This boat, which was called the "CLERMONT," soon after sailed, from a dock near the State Prison, for Albany. It is announced, in the newspapers of that date, that the boat built by Messrs. Livingston and Fulton, with a view to the navigation of the Mississippi river from New Orleans upwards, would depart for Albany in the afternoon. Indeed, this was according to the general impression at the time. For though the performance of this boat had been witnessed in New York harbor, yet it was not conceived that steamboats could be employed as packet-boats between that city and Albany.

The "CLERMONT," was 160 tons. The cylinder was twenty-four inches in diameter and four feet stroke, and on her first voyage, arrived at her destination without any accident. She excited

the astonishment of the inhabitants of the shores of the Hudson, many of whom had not heard of an engine, much less of a steamboat. There were many descriptions of the effects of her appearance upon the people of the banks of the river: some of these were ridiculous, but some of them were of such a character as nothing but an object of real grandeur could have excited. She was described, by some who had indistinctly seen her passing in the night to those who had not had a view of her, as a monster moving on the waters, defying the wind and tide, and breathing flames and smoke.

She had the most terrific appearance, from other vessels which were navigating the river, when she was making her passage. The first steamboats, as others yet do, used dry pine wood for fuel, which sends forth a column of ignited vapour many feet above the flue, and whenever the fire is stirred, a galaxy of sparks flies off, and in the night have a very brilliant and beautiful appearance.

This uncommon light first attracted the attention of the crews of other vessels. Notwithstanding the wind and tide were adverse to its approach, they saw with astonishment that it was rapidly coming towards them; and when it came so near as that the noise of the machinery and paddles were heard, the crews—if what was said in the

newspapers of the time be true—in some instances shrunk beneath their decks from the terrific sight, and left their vessels to go on shore, while others prostrated themselves, and besought Providence to protect them from the approaches of the horrible monster which was marching on the tides, and lighting its path by the fires which it vomited.

Mr. Fulton was himself a passenger on this voyage, and upon his return published an account of it, which deserves to be preserved. It is as follows

To the Editor of the "American Citizen."

NEW YORK, September 15, 1807.

SIR:—“I arrived this afternoon, at four o'clock, in the steamboat from Albany. As the success of my experiment gives me great hopes that such boats may be rendered of great importance to my country, to prevent erroneous opinions and give some satisfaction to the friends of useful improvements, you will have the goodness to publish the following statement of facts:

“I left New York on Monday at one o'clock, and arrived at Clermont, the seat of Chancellor Livingston, at one o'clock on Tuesday—time, twenty-four hours, distance, one hundred and ten miles. On Wednesday, I departed from the Chancellor's at nine in the morning, and arrived at Albany at five in the afternoon—distance, forty miles, time, eight hours. The sum is one hundred and fifty miles in thirty-two hours, equal to near five miles an hour.

“On Thursday, at nine o'clock in the morning, I left Albany, and arrived at the Chancellor's at six in the evening: I started from thence at seven, and arrived at

New York at four in the afternoon—time, thirty hours, space run through, one hundred and fifty miles, equal to five miles an hour. Throughout my whole way, both going and returning, the wind was ahead: no advantage could be derived from my sails: the whole has, therefore, been performed by the power of the steam-engine.

“I am, sir, your obedient servant,

“ROBERT FULTON.”

He gives the following account of the same voyage in a letter to his friend Mr. Barlow :

My steamboat voyage to Albany and back has turned out rather more favourable than I had calculated. The distance from New York to Albany is one hundred and fifty miles: I ran it up in thirty-two hours, and down in thirty. I had a light breeze against me the whole way, both going and coming, and the voyage has been performed wholly by the power of the steam-engine. I overtook many sloops and schooners beating to windward, and parted with them as if they had been at anchor.

“The power of propelling boats by steam is now fully proved. The morning I left New York, there were not perhaps thirty persons in the city who believed that the boat would ever move one mile an hour, or be of the least utility; and while we were putting off from the wharf, which was crowded with spectators, I heard a number of sarcastic remarks. This is the way in which ignorant men compliment what they call philosophers and projectors.

“Having employed much time, money, and zeal, in accomplishing this work, it gives me, as it will you, great pleasure to see it fully answer my expectations. It will give a cheap and quick conveyance to the merchandise on the Mississippi, Missouri, and other great rivers, which are now laying open their treasures to the enterprise of our countrymen; and although the prospect of personal emolument has been some inducement to me, yet I feel infinitely more pleasure in reflecting on the immense advantage my country will derive from the invention,” etc.

The passengers on board the boat, on her first passage as a Packet, thought it but just to publish a statement, over their signatures, that the accommodations and conveniences on board far exceeded their most sanguine expectations.

To J. Franklin Reigart, Esq.

“SOUDESBURG, LANCASTER COUNTY, *January 4th, 1856.*”

“DEAR SIR:—Having been informed that you are about to publish a history of Robert Fulton, Esq., who was distinguished for many noble inventions, allow me to state that the publication of the narrative of facts as they happened, and the description of his productions, would be exceedingly interesting to the admirers of genius and every lover of the arts and sciences. The works of Fulton are now justly appreciated, and the citizens of this matchless county will for ever honor the name and birthplace of his genius.

“It was in the early autumn of the year 1807, that a knot of villagers was gathered on a high bluff just opposite Poughkeepsie, on the west bank of the Hudson, attracted by the appearance of a strange dark-looking craft, which was slowly making its way up the river. Some imagined it to be a sea-monster, whilst others did not hesitate to express their belief that it was a sign of the approaching judgment. What seemed strange in the vessel was the substitution of lofty and straight black smoke-pipes, rising from the deck, instead of the gracefully tapered masts that commonly stood on the vessels navigating the stream, and, in place of the spars and rigging, the curious play of the working-beam and pistons, and the slow turning and splashing of the huge and naked paddle-wheels, met the astonished gaze. The dense clouds of smoke, as they rose wave upon wave, added still more to the wonderment of the rustics.

“This strange-looking craft was the “CLERMONT,” on her trial trip to Albany; and of the little knot of villagers mentioned above, the writer, then a boy in his eighth year, with his parents, formed a part; and I well remember the scene, one so well fitted to impress a lasting picture upon the mind of a child accustomed to watch the vessels that passed up and down the river.

“The forms of four persons were distinctly visible on the deck, as she passed the bluff—one of whom, doubtless, was Robert Fulton, who had on board with him all the cherished hopes of years, the most precious cargo the wonderful boat could carry.

“On her return trip, the curiosity she excited was scarcely less intense—the whole country talked of nothing but the sea-monster, belching forth fire and smoke. The fishermen became terrified, and rowed homewards, and they saw nothing but destruction devastating their fishing-grounds; whilst the wreaths of black vapour, and rushing noise of the paddle-wheels, foaming with the stirred-up waters, produced great excitement amongst the boatmen, until it was more intelligent than before; for the character of that curious boat, and the nature of the enterprise which she was pioneering, had been ascertained. From that time, Robert Fulton, Esq., became known and respected as the author and builder of the *first* STEAM PACKET; from which we plainly see the rapid improvement in commerce and civilization. Who can doubt that Fulton’s first packet boat has been the model steamer? Except in finer finish and greater size, there is no difference between it and the splendid steamships now crossing the Atlantic. Who can doubt that Fulton saw the meeting of all nations upon his boats, gathering together in unity and harmony, that the “freedom of the seas would be the happiness of the earth?” Who can doubt that Fulton saw the world circumnavigated by steam, and that his invention was carrying the messages of freedom to every land, that no man could tell all its benefits, or describe all its wonders? What a wonder-

ful achievement! What a splendid triumph! Fulton was a man of unparalleled foresight und perseverance. His character and genius rise higher in our estimation, and still more grandly before our minds, the more we contemplate him. To write his history requires the noblest effort, and I trust you will be able to accomplish it. With my best wishes for your success, I subscribe myself,

“Very respectfully yours,

“H. FREELAND.”

But it was not only to accidents arising from defects in the machinery that the boat was exposed: it was soon perceived that she would interfere with the interests of those who were engaged in the ordinary navigation of the river. By many of these, Mr. Fulton was spoken of and treated as if he had introduced some project baneful to society. Many attempts were made to run the “CLERMONT” down by captains of sloops, who thought their trade would soon be gone. The boat became an object of their enmity: she was several times damaged by vessels running foul of her, if we may credit the testimony which was published in the newspapers of the time.

It is not unimportant to notice these facts; they illustrate the character of Mr. Fulton. They show what embarrassments are to be expected by those who introduce improvements in the arts which interfere with established interests or prejudices; and they evince the perseverance and resolution

which were necessary to surmount the physical and moral difficulties which Mr. Fulton encountered. Sneered at by his own countrymen, called knave, fool, and enthusiast, yet he bravely lived all opposition down.

The spirit of hostility to the boat had so far manifested itself, that the Legislature thought it necessary, by this act, to declare combinations to destroy her, or wilful attempts to injure her, public offences, punishable by fine and imprisonment.

Notwithstanding her misfortunes, the boat continued to run as a Packet, always loaded with passengers, for the remainder of the summer. In the course of the winter, she was enlarged; and in the spring of 1808, she again commenced her run as a Packet-boat, and continued it through the season. Since then, steam navigation has not ceased for a single day: its progress has been onward, and, to the praise of Robert Fulton, we are indebted to him for the perfect establishment of STEAM NAVIGATION.

In 1811 and 1812, two steamboats were built, under Mr. Fulton's directions, as ferry-boats for crossing the Hudson river, and, soon after, one of the same description for the East river. Of the former, Mr. Fulton wrote and published a descrip-

tion in the American Medical and Philosophical Register for October, 1812.

These boats were what are called twin-boats; each of them being two complete hulls united by a deck or bridge: they are sharp at both ends, and move equally well with either end foremost, so that they cross and recross without losing any time by turning about. He contrived, with great ingenuity, floating docks for the reception of these boats, and a means by which they are brought to them without a shock.

In his publications respecting the Hudson river ferry-boats, which we have noticed, he has the following observations:

“In a new combination of this kind, it is not to be expected that everything should work to the best advantage in a first experiment, or that every requisite should be foreseen. The boat which I am now constructing will have some important improvements, particularly in the power of the engine to overcome strong ebb-tides; from which again other improvements will be made, as in all other new inventions. The present boat crosses the river, which is a mile and a half broad, when it is calm, in fifteen minutes: the average time is twenty minutes. She has had in her at one time eight four-wheel carriages, twenty-nine horses, and one hundred passengers, and could have taken three hundred persons more.”

If steam navigation could have been applied to no other purpose than to move these floating bridges over such streams as they cross, where other bridges

are impracticable, he who introduced it well deserved to be ranked among the benefactors of mankind.

A number of other boats were built, under the direction of Mr. Fulton and according to his plans, for steamboat companies formed in different parts of the United States: several of these were for the Ohio and Mississippi.

Let us for a moment consider what must be the consequences of introducing this species of navigation on these great rivers. Previously, they were in a great measure unnavigable, except in the direction of their currents; but now their streams may be ascended with less labour, and in less time, than they were formerly descended. Never before was there so extraordinary a demonstration that knowledge is power. The mind of an individual has contended with nature in her grandest form, and subdued what appeared to be her irresistible opposition.

If he could have created other rivers like the Mississippi and its tributary streams, to wind their thousands of miles through fertile valleys, he could not have done so great a good as he has done by furnishing the means of navigating her waters against their currents.

At the commencement of the year 1814, a number of the citizens of New York, alarmed at the

exposed situation of the harbor, had assembled with a view to consider whether some measures might not be taken to aid the Government in its protection. This assembly had, in fact, been invited by some knowledge of Mr. Fulton's plans for submarine attack, and of his contemplating other means of defence.

They deputed a number of gentlemen to act for them, and these were called the coast and harbor-defence committee.

Mr. Fulton exhibited to this committee the model and plans for a vessel-of-war, to be propelled by steam, capable of carrying a strong battery, with furnaces for redhot shot, and which, he represented, would move at the rate of four miles an hour.

The confidence of the committee in this design was confirmed by the opinions of many of our most distinguished naval commanders, which he had obtained in writing, and exhibited to the committee.

In this document—which is signed by Commodore Decatur, Captain Jones, Captain Evans, Captain Biddle, Commodore Perry, Captain Warrington, and Captain Lewis—these gallant and experienced seamen enumerate the following advantages that such a vessel would possess: In a calm or light

breeze, she could make choice of position or distance. If she could move at the rate of four miles an hour, she could, in the harbors, bays, and rivers, be rendered more formidable than any kind of engine hitherto invented; and, in such case, she would be equal to the destruction of one or more seventy-fours, or of compelling them to depart from our waters. They, therefore, gave it as their decided opinion, that it was among the best interests of the United States to carry Mr. Fulton's plan into immediate execution.

It was contemplated that this vessel, besides carrying her proposed armament on deck, should also be furnished with submarine guns.

The committee, without delay, addressed a memorial to Congress, recommending the invention of Mr. Fulton, and praying that measures might be adopted for executing his plan. With this memorial, the committee addressed a letter to the Secretary of the Navy, soliciting, in a very earnest manner, his patronage and influence with the Government. Without the skill and talents, they say, of Mr. Fulton, the machine cannot be constructed.

It was apprehended that there would be great difficulty about funds. On the one hand, there was a disinclination to make the project public by

inducing a discussion on the subject in Congress; and, on the other, it was doubtful whether the Executive was authorized to make the necessary appropriations without a law for the purpose. To obviate these difficulties, the committee offered, in behalf of the association which they represented, to construct the vessel at their expense and risk, if assurances were given that the Government, which alone could give employment to her, would receive and pay for her after she was built, and her utility demonstrated. It was estimated that she would cost about \$320,000, nearly the sum requisite for a frigate of the first class.

This activity of private citizens for their own protection; this voluntary offer to risk their funds, first, upon the success of the project, and then upon a bare assurance of the Executive of the Government; and this intimate intercourse between the rulers and the people, present a view of a state of society of which, it is believed, there are few examples.

The project was zealously embraced by the Executive; and the National Legislature, in March, 1814, passed a law authorizing the President of the United States to cause to be built, equipped, and employed, one or more floating batteries, for the defence of the waters of the United States.

The building of this vessel was committed, by the coast and harbor-defence association, to a sub-committee of five gentlemen: they were General Dearborn, who then commanded in this district, Colonel Henry Rutgers, Oliver Wolcott, Samuel L. Mitchell, and Thomas Morris, Esquires, who were recognized by the Government as its agents for this purpose.

Mr. Fulton, whose soul indeed animated the whole enterprise, was appointed the engineer.

On the 20th of June, 1814, the keel of this novel and mighty engine was laid, and in little more than four months, that is, on the 31st of October, she was launched from the yard of Adam and Noah Brown, her able and active architects.

The scene exhibited on that occasion was magnificent. It happened on one of our bright autumnal days. Multitudes of spectators crowded the surrounding shores, and were seen upon the hills which limited the beautiful prospect. The river and bay were filled with vessels-of-war, dressed in all their variety of colours, in compliment to the occasion. In the midst of these was the enormous floating mass, whose bulk and unwieldy form seemed to render it as unfit for motion as the land batteries which were saluting her. Through the fleet of

vessels which occupied this part of the harbor, were seen gliding in every direction several of our large steamboats, of the burden of three or four hundred tons. These, with bands of music, and crowds of gay and joyous company, were winding through passages left by the anchored vessels, as if they were moved by enchantment. The heart could not have been human that did not share in the general enthusiasm expressed by the loud shouts of the multitude. He could not have been a worthy citizen who did not then say to himself, with pride and exultation: "This is my country!" and when he looked on the man whose single genius had created the most interesting objects of the scene: "This is my countryman!"

By May, 1815, her engine was put on board, and she was so far completed as to afford an opportunity of trying her machinery.

But, unhappily, before this period, the mind that had *combined* and *conceived* it was gone. It was the pleasure of the Almighty that Fulton should live to serve mankind, and be taken to a better world for his reward.

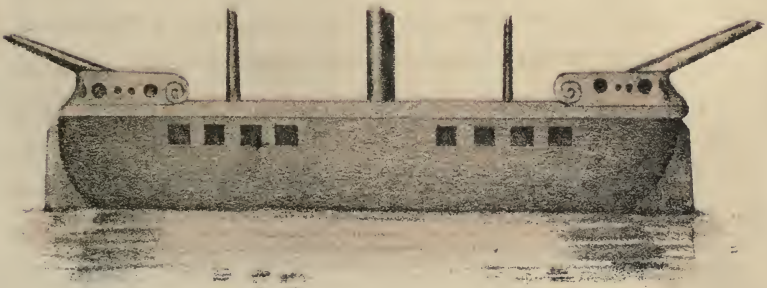
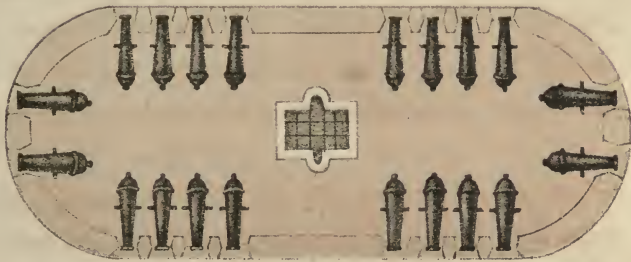
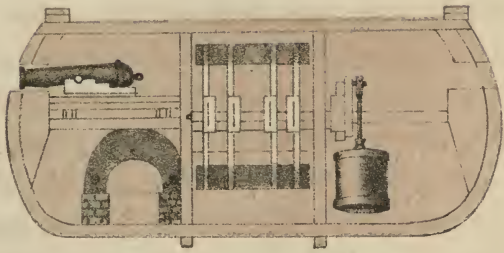
On the 4th of July, in the same year, the steam frigate made a passage to the ocean and back, and went the distance—which, going and returning, is fifty-three miles—in eight hours and twenty mi-

nutes, by the mere force of her engine. These trials suggested the correction of some errors, and the supplying of some defects in her machinery. In September, she made another passage to the sea, and having at this time the weight of her whole armament on board, she went at an average of five and a half miles an hour with and against the tide. When stemming the tide, which ran at the rate of three miles an hour, she advanced at the rate of two and a half miles an hour.

The substance of the following description of the "FULTON THE FIRST," the honoured name this vessel bore, is extracted from the report of the gentlemen who were the commissioners for building her.

She is a structure resting on two boats and keels, separated from end to end by a channel fifteen feet wide and sixty feet long: one boat contains the caldrons of copper to prepare her steam. The cylinder of iron, its piston, levers, and wheels, occupy part of the other. The water-wheel revolves in the space between them. The main or gun-deck supports her armament, and is protected by a parapet four feet ten inches thick, of solid timber, pierced by embrasures. Through thirty port-holes as many thirty-two pounders are intended to fire redhot shot, which can be heated

THE DEMOLOGOS OR FULTON THE FIRST.



The first Steam Vessel of War in the World.

with great safety and convenience. Her upper or spar-deck, upon which several thousand men might parade, is encompassed with a bulwark, which affords safe quarters: she is rigged with two stout masts, each of which supports a large lateen-yard and sails: she has two bowsprits and jibs, and four rudders, one at each extremity of each boat, so that she can be steered with either end foremost: her machinery is calculated for the addition of an engine, which will discharge an immense column of water, which it is intended to throw upon the decks and through the port-holes of an enemy, and thereby deluge her armament and ammunition. If, in addition to all this, we suppose her to be finished, according to Mr. Fulton's intention, with 100-pound columbiads, two suspended from each bow, so as to discharge a ball of that size into an enemy's ship at ten or twelve feet below the water-line, it must be allowed that she has the appearance, at least, of being the most formidable engine for warfare that human ingenuity has contrived.

The English were not uninformed as to these preparations which were making for them, nor inattentive to their progress. It is certain that the steam frigate lost none of her terrors in the report or imaginations of the enemy. In the treatise on steam vessels, published in Scotland, which

we have before noticed, the author of which assures us that he has taken great pains to procure full and accurate information, we have a description of a steam frigate said to have been launched in New York, in the following words :

“Length on deck three hundred feet, breadth two hundred feet, thickness of her sides, thirteen feet, of alternate oak plank and corkwood, carries forty-four guns, four of which are 100-pounders, quarter-deck and forecastle guns, 44-pounders; and further, to annoy an enemy attempting to board, can discharge one hundred gallons of boiling water in a minute, and by mechanism brandishes three hundred cutlasses, with the utmost regularity, over her gunwales; works also an equal number of heavy iron pikes of great length, darting them from her sides with prodigious force, and withdrawing them every quarter of a minute!”

The committee that superintended the building of the “FULTON THE FIRST,” who had, from the various experiments they made, the best opportunity of judging of her usefulness, speak, in their last report to the Government, with the highest confidence in her powers. They congratulate the Navy Department and the nation on the event of this noble project, honourable alike, as they truly say, to its author and its patrons, by which the city of New York has the power to make itself invulnerable, and every bay and harbor in the nation may be protected. The committee strongly recommend the vessel to the care of the Govern-

ment. Without due attention, her machinery will very soon become useless. But, as they very justly remark, it is not enough to preserve her. To derive from such a machine, in time of war, all the advantages it is capable of affording, we should be practised in the use of it in time of peace. The expense of completely arming, equipping, and employing her sufficiently to afford the necessary practice, would not exceed that of a frigate, and it certainly would be beneficially bestowed. But, to many minds, it seems waste to expend money on anything so long as it has the character of an experiment.

We now come to mention the last work in which the active and ingenious mind of Mr. Fulton was engaged. This was a project for the modification of his submarine boat. He had contrived a vessel which was to have a capacity, by means of an air-chamber, like that which was in his "NAUTILUS," to be kept at a greater or less depth in the water, but so that her deck should not be submerged. That chamber communicated with the water, and was shaped like a diving-bell; but it could at pleasure, by an air-pump, be exhausted of air—then it would, of course, fill with water, or any requisite quantity of air could be forced into it, so as to expel the water from it entirely.

The sides of the vessel were to be of the ordinary thickness, but her deck was to be stout, and plated with iron, so as to render it ball-proof, which would not require so much strength as might be at first imagined; because, as no shot could strike it from a vessel but at a very great angle, the ball would *recouché* on a slight resistance from a hard substance. She was to be of a size capable of sheltering a hundred men under her deck, and was to be moved by a wheel placed in another air-chamber near the stern, so that, when the vessel was to be propelled, only a part of the under paddles should be in water; at least the upper half of the wheel or more moving in air. The wheel was to be turned by a crank attached to a shaft, that should penetrate the stern to the air-chamber through a stuffing-box, and run along the middle of the boat until it approached her bows. Through this shaft rungs were to be passed, of which the crew were to take hold as they were seated on each side of it on benches. By merely pushing the shaft backward and forward, the water-wheel would be turned, and the boat be propelled with a velocity equal to the force of a hundred men. By means of the air-chamber, she was to be kept, when not in hostile action, upon the surface, as common boats are. But when in reach of an

enemy, she was to sink, so that nothing but her deck would be exposed to his view or to his fire. Her motion when in this situation would be perfectly silent, and therefore he called this contrivance a *mute*. His design was that she should approach an enemy, which he supposed she might do in fogs or in the night, without being heard or discovered, and do execution by means of his torpedoes or submarine guns.

He presented a model of this vessel to the Government, by which it was approved; and under the authority of the Executive, he commenced building one in this port; but before the hull was entirely finished, his country had to lament his death, and the mechanics he had employed were incapable of proceeding without him.

CHAPTER X.

CONCLUSION.

DURING the whole time that Mr. Fulton had been devoting his talents to the service of his country, he had been harassed by lawsuits and controversies with those who were violating his patent-rights or intruding upon his exclusive grants. The State of New Jersey had been prevailed upon to enlist herself on the side of individuals who were desirous of destroying the grant made to Messrs. Livingston and Fulton by the State of New York, that they might share in their profits.

A bold attempt was therefore made to induce the Legislature of the State of New York to repeal the laws which they had passed for the protection of their exclusive grants to Livingston and Fulton.

The petitioner for this repeal founded his claim to this concession—First: on his having purchased the right of John Fitch to exclusive grants which had been made to him by New Jersey and New York, in 1786 and 1787, for fourteen years, which time had expired thirteen years before this appli-

cation was made, without Fitch's ever having even attempted to move a steamboat on the waters of the States of New York or New Jersey, or having succeeded, as we have seen, in establishing a steamboat anywhere. It appeared afterwards that the petitioner had purchased this exclusive right of a person who said he was a remote relation of Fitch, and his legal representative, for ten dollars.

Secondly: it was represented that one Daniel Dod was entitled to the favour of the Legislature, on account of his having invented a method of uniting, by what he called a parallel link, parts of the machinery differently from that adopted by Mr. Fulton. Upon these merits, the petitioners had obtained their exclusive grant from New Jersey, and upon these grounds, while that exclusive grant was existing in their favour, they came to ask a repeal of the laws of the State of New York which had been enacted to reward Messrs. Livingston and Fulton, who, after years of experiment and labour, and the expenditure of a fortune, had been the first to bring steamboats into successful operation.

The committee concluded their report by proposing a bill containing such provisions as might, in their opinion, be passed consistently with the faith, honour, and justice of the State.

Upon this report's being made to the House, it was prevailed upon to be less precipitate than the committee had been. It gave time, which the committee would not do, for Mr. Fulton to be sent for from New York. The Senate and Assembly, in joint session, examined witnesses, and heard him and the petitioner by counsel. The result was that the Legislature refused to repeal the prior law, or to pass any act on the subject.

It was upon this occasion that his friend Mr. Emmet, who appeared as his counsel at the bar of the House, at the conclusion of his speech made that address to Fulton which has been so much spoken of, and which was at once such an evidence of warmth of heart, rectitude of principle, and of superior abilities.

Mr. Emmet, having said that he had concluded the observations which he proposed to make, as well against the petition as the report of the committee, and that he submitted their force with respectful confidence to the deliberation of the Legislature, turned towards Mr. Fulton, and addressed him as follows :

“I know and feel, and I rejoice in the conviction, that, for the present at least, your interests, my friend, are perfectly secure ; but do not therefore flatter yourself that you will be involved in no future difficulties on the same account. Those whom I have just addressed will certainly

decide with enlightened liberality and a scrupulous regard to public faith; but their power and authority will pass away. Your present antagonist, I also hope, will become convinced by this discussion of the impropriety of his application, and refrain from repeating it; but interest and avarice will still raise up against you many enemies. You rely too implicitly on the strength of your rights, and the sanctity of the obligations on which they are founded. You expect too much from your well-earned reputation, and the acknowledged utility to mankind of your life and labours. You permit your mind to be engrossed with vast and noble plans for the public good. You are inconsiderately sinking your present income in the extension of public accommodation by steamboats. You are gratuitously giving your time and talents to the construction of that great national object, your stupendous invention for maritime defence, which in itself is calculated to effect a revolution in naval warfare. You are profusely lavishing what the intense and unremitting study of years has acquired for you, in investigations and experiments tending to the same purpose. Your knowledge and your fortune are freely bestowed upon everything that can contribute to the advancement of science, or of the elegant and useful arts. I admire and applaud you for your readiness to devote to the service of the public the opulence you derive from its grateful remuneration. Let me remind you, however, that you have other and closer ties—I know the pain I am about to give, and I see the tears I make you shed—but by that love I speak—by that love which, like the light of Heaven, is refracted in rays of different strength upon your wife and children; which, when collected and combined, forms the sunshine of your soul—by that love I do adjure you, provide in time for those dearest objects of your care. Think not I would instil into your generous mind a mean or sordid notion; but now that wealth is passing through your hands, let me entreat you hoard it while you have it. Artful specula-

tors will assuredly arise, with patriotism on their tongues and selfishness in their hearts, who may mislead some future Legislature by false and crafty declamations against the prodigality of their predecessors; who, calumniating or concealing your merits, will talk loudly of your monopoly; who will represent it as a grievous burden on the community, and not a compensation for signal benefits; who will exaggerate your fortune, and propose, in the language of Marat to the French Convention: 'Let the scythe of equality move over the republic.' In a moment of delusion — unless some department of our Government shall constitutionally interpose an adamant barrier against national perfidy and injustice, — such men may give your property to the winds, and your person to your creditors. Then, indeed, those who know your worth and services will speak of your downfall as of that portentous omen which marked a people's degradation, and the successful crime of an intruder:

"A falcon, towering in his pride of place,
Was by a mousing owl hawked at and killed."

"Yes, my friend! my heart bleeds while I utter it; but I have fearful forebodings that you may hereafter find in public faith a broken staff for your support, and receive from public gratitude a broken heart for your reward."

In January, 1815, Mr. John R. Livingston, who owned the steamboat which plied between New York and New Jersey, but which was stopped by the operation of the Jersey laws, petitioned the Legislature of that State for their repeal. After hearing witnesses and counsel for several days, the laws were rescinded. It was upon this occasion that Mr. Fulton was examined as a witness. The weather, while he was at Trenton, where he was

much exposed in attending the hall of the Legislature, was uncommonly cold. When he was crossing the Hudson, to return to his house and family, the river was very full of ice, which occasioned his being several hours on the water, in a very severe day. Mr. Fulton had not a constitution to encounter such exposure, and upon his return he found himself much indisposed from the effects of it. He had at that time great anxiety about the steam frigate; and, after confining himself for a few days, when he was convalescent, he went to give his superintendance to the artificers employed about her: he forgot his debilitated state of health in the interest he took in what was doing on the frigate, and was a long time, in a bad day, exposed to the weather on her decks. He soon found the effects of this imprudence. His indisposition returned upon him with such violence as to confine him to his bed: his disorder increased, and on the 24th of February, 1815, terminated his valuable life.

It was not known that Mr. Fulton's illness was dangerous till a very short time before his death, which was unexpected by his friends, and still less so by the community. As soon as it was known, all means were taken to testify publicly the universal regret at his loss, and respect for his me-

mory. The newspapers that announced the event had those marks of mourning which are used in our country when they notice the death of public characters. The corporation of the city, the different literary institutions, and other societies, assembled and passed resolutions expressing their estimation of his worth and regret at his loss. They also determined to attend his funeral, and that the members should wear badges of mourning for a certain time.

As soon as the Legislature, which was then in session at Albany, heard of the death of Mr. Fulton, they expressed their participation in the general sentiment by resolving that the members of both Houses should wear mourning for some weeks.

This is the only instance, we believe, of such public testimonials of regret, esteem, and respect, being offered on the death of a private citizen, who never held any office, and was only distinguished by his virtues, genius, and the employment of his talents.

He was buried on the 25th day of February, 1815. His corpse was attended from his last residence—No. 1 State street—by all the officers of the National and State Governments then in the city, by the magistracy, the common council, a number of societies, and a greater number of citi-

zens than had been collected on any similar occasion. From the time the procession began to move till it arrived at Trinity Church, minute-guns were fired from the steam frigate and the West Battery. His body, in a leaden coffin, covered with plain mahogany, on which is a metal plate engraved with his name and age, was deposited in a vault belonging to the Livingston family.

Mr. Colden, in his address before the Historical and Scientific Society of New York, said :

“We have all witnessed with what zeal Mr. Fulton bestowed his time, his talents, and his purse, for the promotion of the useful and the fine arts. One of the last acts of his life manifested this disposition. By his will, which was made but a few days before his death, he devised that, in certain events, his pictures, and one-half of his property not otherwise disposed of, should go to an academy of fine arts, when such an academy should be established at the place which may be the seat of the National Government.

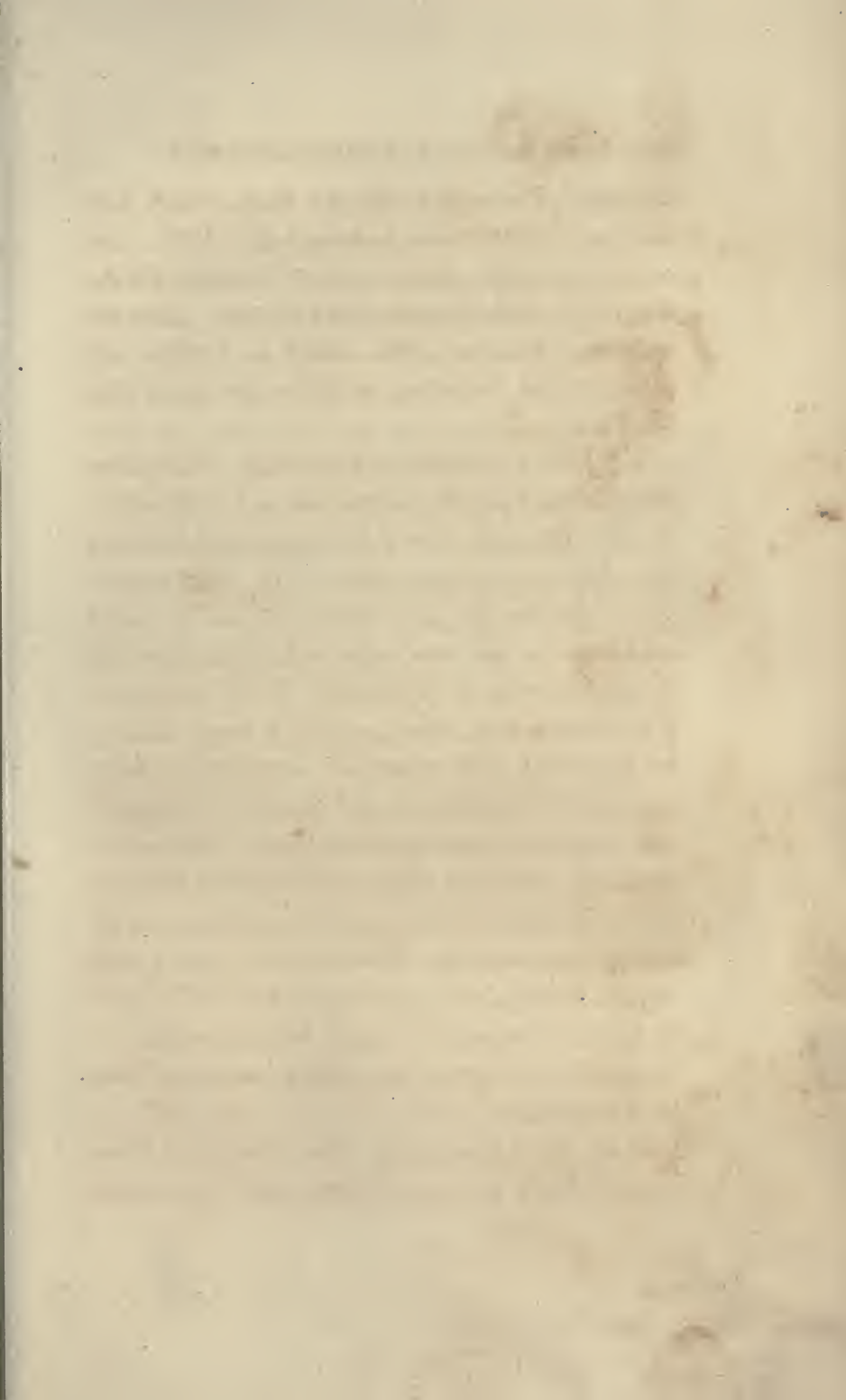
“In 1816, a principal street, which is the great thoroughfare across the city of New York, from the Fulton Boat-Ferry on the one river to a similar ferry on the other, was opened. This the corporation of the city, always the patrons of science and the friends of its votaries, have called Fulton street.”

In the year 1806, Mr. Fulton married Miss Harriet Livingston, a daughter of Walter Livingston, Esq., a relative of his enterprising associate, Chancellor Livingston. His widow and four children, one son and three daughters, were left to mourn

his loss. The widow did not long survive him. His son, Robert Barlow Fulton, died in 1841. One of his daughters, Julia, wife of Charles Blythe, Esq., of Philadelphia city, died in 1848. The two surviving daughters, Mrs. Mary L. Ludlow and Mrs. Cornelia L. Creary, reside at present in New York city.

Mr. Fulton was about six feet high. His person was slender, but well-proportioned and well-formed. Nature had made him a gentleman, and bestowed upon him ease and gracefulness. He had too much good sense for the least affectation, and a modest confidence in his own worth and talents gave him an unembarrassed deportment in all companies. His features were strong, and of a manly beauty: he had large dark eyes, and a projecting brow, expressive of intelligence and thought: his temper was mild, and his disposition lively: he was fond of society, which he always enlivened by cheerful, cordial manners, and instructed or pleased by his sensible conversation. He expressed himself with energy, fluency, and correctness; and as he owed more to his experience and reflections than to books, his sentiments were often interesting from their originality.

In all his domestic and social relations, he was zealous, kind, generous, liberal, and affectionate.





Designed by Peigart

L. N. Rosenthal's 10th. Philad^a

THE GRAVE OF FULTON.
Trinity Churchyard.—Broadway New York.

He knew of no use for money but as it was subservient to charity, hospitality, and the sciences. But what was most conspicuous in his character was his calm constancy, his industry, and that indefatigable patience and perseverance which always enabled him to overcome difficulties.

He was decidedly a republican. The determination which he always avowed, that he would never accept an office, is an evidence of the disinterestedness of his politics; but his zeal for his opinions or party did not extinguish his kindness for the merits of his opponents. Society will long remember and regret him; but he will be most remembered by those by whom he was best known.

We are well acquainted with that charming spot, the birthplace of Robert Fulton, and we felt a desire to see his tomb; and during a late visit to New York city, through the politeness of Dr. Theodore F. Engelbrecht and the sexton of Trinity churchyard, we were conducted to the spot where his remains are deposited. A brown sandstone, two by three feet square, covers the vault, upon which is inscribed: "The vault of Walter and Robert C. Livingston, sons of Robert Livingston, of the Manor of Livingston."

The vault has lately been repaired, and the coffin, with the inscription of Fulton's name upon

it, is still in a good state of preservation; and whilst we stood beside the grave, which had not even a stone to mark the resting-place of this far-famed inventor, we were forcibly reminded of the words the talented Emmet addressed to Mr. Fulton :

“Yes, my friend! my heart bleeds while I utter it, but I have fearful forebodings that you may hereafter find in public faith a broken staff for your support, and receive from public gratitude a broken heart for your reward.”

Ay! the grass is higher than the Fulton monument! and what became of all the proceeds of Fulton's labour, and of his useful inventions? His talents; his industry, his perseverance, his indefatigable application, have promoted the good of his country and the prosperity of the world; but who now possess the reward of his superhuman labours? And what has become of his magnificent gallery of paintings, which the United States Government should have secured at any price? It is the general impression, throughout the country and the world, that Robert Fulton, Esq., died penniless; and it is well known that his worthy heirs have never enjoyed the fruits of his extraordinary talents. That a great wrong has been committed somewhere is evident; and by reference to his last will and testament, and other public documents, hereto annexed, it will be seen.

Robert Fulton died whilst in the service of the United States Government, and although he had been engaged for years in devoting his time and talents to what he and the Government officers knew and believed to be the best interests of our country, still the public records show that this Government was indebted to his estate upwards of \$100,000, for moneys actually expended and services rendered by him, agreeably to contract.

The bill, which was for the relief of the heirs of Robert Fulton, Esq., was ten years in Congress before it finally became a law, although it had repeatedly passed both Houses of Congress; and when this bill was under discussion in the House of Representatives, on its final passage, in July, 1846, the American Aristides, the venerable sage of Quincy, rose in his seat, and stated to the House that "he had thoroughly examined the bill and the proof in support of it, and the claim was founded both in law and justice, and that it was a disgrace to the nation that it had not long before been paid."

The Hon. John Strohm, the member from Lancaster county, Pa., had also carefully examined the bill, and urged its passage, as a just claim against the Government; because the steamboat "VESUVIUS," owned by Robert Fulton, plying between New Orleans and Louisville, in Kentucky, whilst

pursuing a most profitable business, — being the only steamboat then upon the Mississippi — was forcibly seized by General Jackson, during the war, and taken into the service for the defence of New Orleans; nor had Mr. Fulton ever received any compensation for the use of his patent for the floating battery, or his services in the construction of this great defensive structure.

Congress passed a joint resolution referring the subject to the Secretary of the Navy, who made report, allowing the heirs, as a balance due the estate, \$100,000. The committee of claims brought in a bill for \$76,300, to carry into effect the Secretary's report; and the bill allowing the heirs their just claim for \$76,300 was passed in the House by a vote of ninety to sixty-seven, and in the Senate by eighteen majority, thirty-one years after the death of Fulton, although honestly due him at the time of his death.

Mr. Fulton had secured to himself the right of a patent for constructing steam frigates, *the whole benefit of which resulted to the United States*; and yet the extraordinary efforts of the great and successful inventor were disparaged, whilst the authors of a revolver or California speculation have been promoted and protected in the enjoyment of millions of dollars; and the poorest specimen of hu-

manity, with a tinselled epaulette on his shoulder, for having butchered a few poor Indians, had received a pension for life, been honored with the richest offices, and at his death a conspicuous monument was erected to his memory. Is it possible that Robert Fulton died penniless, although he was the inventor and builder of some fifteen or twenty steamboats, which cost from fifty to eighty thousand dollars each, and which were in successful operation?—that the hero of inventors, who displayed so much talent, industry, perseverance, and interest for his country's good, in steam and inland navigation, should die in poverty, destitution, and want, and his family impoverished? It is not true. By his superhuman efforts he did amass a fortune, he did accumulate wealth; but the ungrateful and envious robbed him of it; whilst his discoveries and the result of his labours survive for the benefit of mankind, and will extend to unborn generations, to upbraid their ingratitude; and the great legacy which the immortal Fulton entailed upon his countrymen—“*to be a great inventor*”—will some day be shown upon a towering monument, emblazoned with his unparalleled and eternal motto: “THE FREEDOM OF THE SEAS WILL BE THE HAPPINESS OF THE EARTH!”

CHAPTER XI.

THE LAST WILL AND TESTAMENT OF ROBERT FULTON.

NEW YORK, *December* 13, 1814.—I, Robert Fulton, being in good health and possessing my usual understanding, make this, my last will, hereby revoking all other wills which I have made :

Out of the annual profits arising from my steamboats, and, in case of that not proving sufficient, then out of any other property or profits arising from my real or personal—

I leave to my wife, Harriet Fulton, born Livingston, nine thousand dollars a-year during her life, and then devolve to my heirs, as hereinafter stated.

Out of the profits of my steamboats, or any other of my property, real or personal, I leave to my said wife five hundred dollars a-year for each of my children, until they respectively attain the age of twelve years ; and from that age until each in succession attains the age of twenty-one years,

one thousand dollars a-year for each, which sum shall be made use of as his or her legal right to pay for education, clothing, boarding, lodging, and all other expenses.

All my household furniture, carriages, horses, plate, pictures, and everything which constitutes my household establishment, as also my town house, should I purchase or build one for my residence, I leave to my said wife during her life: at her death, my house, with its fixtures, pictures, library, and plate, shall go to the eldest son which I shall then have living, and the residue of said establishment may be disposed of as my said wife may think proper, in her will. Should I not have a son then living, my PICTURES shall go to an academy of arts, when such academy shall be established at the place which shall be the seat of the Government of the United States; and all my other property, connected with my household establishment, may be disposed of by my said wife as she shall think proper. My said wife's annuity, and the annuities for the maintenance of my children, being permanently settled, then, out of the surplus of my estate, if any—

I leave to my brother, Abraham Smith Fulton, three thousand dollars.

To my sister, Elizabeth Scott, I leave one thou-

sand dollars and the farm on which she now lives, with all my stock in horses or cattle, implements of husbandry, and furniture, and everything belonging to me thereon, during her life: at her death, the farm, and all my property thereon, shall be sold, and the proceeds be equally divided among her children.

To my sister, Isabella Cooke, I leave two thousand dollars; and to each child of my deceased sister, Mary Morris, I leave five hundred dollars, which sums to be paid within one year after my death, and after the legacies to my said wife and children shall have been fixed and secured; and to my said brother and sisters, I relinquish all sums of money which I have at different times lent them or paid on their account.

All my other property shall accumulate, the interest of each year be added to the capital, until the eldest of my children arrive at the age of twenty-one years; and it is my will that a son or daughter of mine shall not be considered of age until he or she shall have the age of twenty-one years. On the eldest arriving at that age, the accumulated property shall be divided into as many portions as there shall be children, and the eldest shall receive his or her portion, and then each one's portion shall accumulate until he or she

attains the age of twenty-one years, to receive it. In case of the death of any child of mine before of age, or before marriage, his or her portion shall be divided among my surviving children, in equal portions; but if married before of age, his or her portion shall be disposed of as hereafter stated. A son may will his portion as he shall think proper, but a girl must be guarded against the misfortune or imprudence of a husband. It is, therefore, my will that whatever sum shall by this will become the portion of a daughter, she shall have only the interest of it during her life: at her death, three-fourths of the capital shall be divided among her children, as she may determine, in such portions as they may respectively merit. But the said three-fourths shall be divided among them, and the other fourth she may dispose of as she shall think proper: should she not have a child, she may will the whole capital as may please her, to be disposed of after her death.

Should the whole of my children die before my said wife, half of all my property not hereby otherwise disposed of, *shall go to the promotion of an academy of FINE ARTS, for HISTORICAL and SCIENTIFIC PAINTINGS*, which academy shall be established at the seat of the Government of the United States; and, in such case, the other half

of my property may be disposed of as my said wife shall think proper.

Having paid about five thousand dollars for the engravings, printing of plates and letterpress, of the POEM called the "COLUMBIAD," written by my late friend, Joel Barlow, and which gave me a property in the publication of that work, I hereby leave the whole copies of that work to his widow, Mrs. Ruth Barlow, except fifty of the proof and embellished copies in quarto, printed at Philadelphia; for all others, I relinquish every claim on the estate or property of the heirs of said Barlow; and I also will that all sums of money due to me from the said Joel Barlow's estate, in amount about seven thousand dollars, shall not be demanded from his widow during her lifetime, but shall be left to her option to pay at any time during her life: at her death, the principal, with interest, will be the legal right of my heirs, to be paid to or recovered by them.

And I hereby appoint my said wife and her brother-in-law, William Cutting, trustees to manage my estate, to fulfil the terms and conditions of this my will, and to be guardians to my children.

ROBERT FULTON, [L.S.]

Signed in the presence of witnesses :

CORNELIA LIVINGSTON.

SARAH LIVINGSTON.

L. A. RIGAIL.

Afterwards proved and entered of record, February 27th, 1815, in the surrogate's office, city of New York.

CHAPTER XII.

THE AMERICAN STEAMSHIP "SAVANNAH," THE FIRST OCEAN STEAMER—EXTRACT FROM "THE PEOPLE'S JOURNAL."

ON nearing Liverpool, the more effectually to "astonish the natives," the wheels were restored, and, at the completion of her voyage, the "SAVANNAH" was divested of her steam apparatus, and used as a packet between Savannah and New York. She subsequently went ashore on Long Island, and broke up.

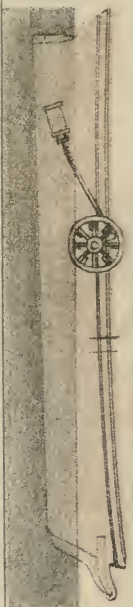
Although Captain Rogers was offered \$100,000 for her by the King of Sweden, to be paid in hemp and iron, delivered at New York, Boston, and Philadelphia, the offer was not accepted, the cash being wanted.

It was currently reported at the time, that upwards of \$50,000 was sunk in this transaction.

In those days, coal had not been introduced into steamers. The fuel used on the "SAVANNAH" consisted of pine wood. This accounts for the great smoke from her pipe, and also shows the reason



J.N.S.



THE AMERICAN STEAMSHIP, SAVANNAH THE FIRST OCEAN STEAMER.

The first part of the document is a letter from the Secretary of the Board of Education to the Board of Trustees of the University of the State of New York. The letter is dated January 10, 1892, and is addressed to the Board of Trustees at the University of the State of New York, Albany. The letter is signed by the Secretary, John W. Alderson.

The letter contains the following text:

Sir: I have the honor to acknowledge the receipt of your letter of the 7th inst. in relation to the proposed amendment to the Constitution of the State of New York, which provides for the establishment of a Board of Education for the State of New York. I have the honor to inform you that the Board of Education has been organized and is now in session. The Board of Education is composed of the following members:

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why she had difficulty to carry the requisite quantity of fuel.

In addition to the above somewhat curt but comprehensive narrative, we have been enabled to pick out, here and there, from the dusty newspaper files of that period, several notices in which justice is done to the ingenious construction of the "SAVANNAH" and the beauty of her appearance on the water. Yet the press of those days was by no means as active or eager as at the present time; and hence the extracts we can give are comparatively brief, although they will serve sufficiently well to show that the new steamship was regarded with great interest and curiosity.

The "Gazette and General Advertiser" of April 11th, 1819, mentions that

"Captain Marsh, of the sloop Nimrod, arrived at Georgetown, S.C., informs us that, on Saturday, March 3d, he saw the new and elegant steamship 'SAVANNAH' off Romain Island, performing her first trip from New York to Savannah. Captain Marsh was at a considerable distance from her, and represents her as forming the most majestic appearance of any vessel of her tonnage he ever saw, and making the most astonishing progress."

The "SAVANNAH" was seen several times during the progress of this trip, eliciting the admiration and, in several instances, exciting the alarm of the simple-hearted mariners, who still knew no other

aid to cross the seas than the good old-fashioned canvass wings, covering and spreading over the moving hulk they bore onward, accordingly as fresh breezes invited their expansion or fierce tempests bade them be furled.

At length, after buffeting and tossing on the stormy billows that heave against the American coast, the gallant steamer, thoroughly tried and tested by this ordeal, and the ease and safety of her motion surpassing all that her commander had dared to hope for, made her appearance in the port to which she had been originally despatched. Her arrival is thus noticed in the "Savannah Republican" of March 7th, 1819 :

"The steamship 'SAVANNAH' arrived at our port last evening, after a boisterous passage of seven days from New York. On her approach to the city, hundreds of citizens flocked to the banks of the river, and, while she ascended, saluted her with long and loud huzzas! The utmost confidence is placed in her security. It redounds much to the honour of Savannah when it is said that it was owing to the enterprise of some of her spirited citizens that the first attempt was made to cross the Atlantic ocean in a vessel propelled by steam. The 'SAVANNAH,' we understand, will make a trip between this and Charleston, and then perhaps go to Havana and New Orleans, and immediately return to this place. She will then proceed to Liverpool, via New York, unless a sufficiency of passengers should offer direct. We sincerely hope the owners may reap a rich reward for their splendid and laudable undertaking."

During her passage, she worked the engine eighteen days. Her model is beautiful, and her accommodations for passengers elegant and complete. This is the first ship, on this construction, that has undertaken a voyage across the Atlantic.

Her departure is subsequently noticed, in warm terms of encomium and compliment, by the "N. Y. Gazette and General Advertiser" of Sept. 10th, 1819 :

"The steamship 'SAVANNAH' sailed from Liverpool, on July 23d, for St. Petersburg, her original destination. Liverpool, July 31st, yesterday week, the weather being uncommonly fine, the shores of our river were more than usually crowded, to witness the most striking exhibition of steam navigation which has yet been seen in our port."

The "SAVANNAH" sped on her northern course, awakening the echoes of the distant Scandinavian shores with sounds even stranger than the shouts and battle-songs of the ancient Vikings. The approach of this beautiful messenger from the young civilization of the New World to the still half-sleeping monarchies of the Elder Hemisphere, only just shaken in their slumber by the iron hand of Napoleon, was an event in their history full of instruction and prophecy.

However, the poverty or the distrust of the Northern Courts prevented the anticipated purchase of the "SAVANNAH;" or, it may be, that

they sagely inquired how she was to be manned and officered when she had been bought, as it was hardly probable that Rogers and his crew would remain in foreign service, when great advantages awaited them at home. At all events, no sale was effected, and the bold little ship returned to the United States, where her arrival is quoted with evident satisfaction in the "Commercial Advertiser" of New York, December 9th, 1819 :

"The steamship 'SAVANNAH,' Capt. Rogers, has arrived at Savannah, in fifty days from St. Petersburg, Russia, by way of Copenhagen, Arundel, and Norway, and thirty-three days from the offings: all well, and, to use Capt. Rogers' own phrase, neither a screw, bolt, nor ropeyarn parted, although she experienced very rough weather."

The "Commercial Advertiser," of Dec. 20th, then copies from the "National Intelligencer" the following account of the trip to Washington city :

"Arrived at this port, the 16th inst., the elegant steamship 'SAVANNAH,' Capt. Rogers, from St. Petersburg, Russia, via Savannah, in fifty days from the former place, having touched, on her passage home, four days at Copenhagen, and four days at Arundel and Norway. She encountered a very heavy gale in the North sea, and two from Savannah to this port — one from the north-west, on this side of Cape Hatteras — having only ten hours fair wind on her passage from Savannah, which place she left on the 4th inst. She also encountered many other gales on her passage out, and has met with no accident excepting the loss of a small boat and anchors. The machinery has met with no accident: her wheels are so constructed

as to be taken all on board in from ten to twenty minutes, which leaves the vessel in the same situation as any other ordinary ship, and as capable of resisting the action of the waves. From twenty miles this side of Cape Hatteras, she came with the power of steam only, against the severe north-west gale we have had the last three days."

After this recital of the sea-worthiness and fine performance of the "SAVANNAH," it may not be amiss to state the characteristic features of her structure.

She was full rigged for mast and sail, and propelled by one inclined, direct-acting, low pressure engine, similar to those now in use. The size of her cylinder was forty inches diameter, with six feet stroke. The water-wheels were of wrought iron, with only one flange, and entirely uncovered, while so attached that their removal and shipment on deck were attended with scarcely any inconvenience or delay.

Her subsequent fate has been already stated. On her transformation into a sailing-packet, her engines and boiler were sold to the proprietors of the Allaire Works, in New York, for the sum of \$1600. The engine was put to other uses, and has been running constantly ever since, until a recent period. On the opening of the Crystal Palace, the proprietors of the Allaire establishment deposited the identical cylinder of the "SAVANNAH" as one of their contributions.

The cylinder now on exhibition at the Crystal Palace is the only part of her in existence at the present time, and in making a careful examination of it, and the model of the whole vessel, we are tempted to inquire whether they may not have been devised upon sounder principles than many that have been applied to similar constructions of these later days. IN GIVING THIS HINT, WE WOULD REMARK THAT MUCH OF FULTON'S BEST CONCEPTIONS MAY BE TRACED IN THE SPLENDID STEAMER NOW IN PROCESS OF BUILDING BY MESSRS. NORRIS & GRIFFITH, AND DESTINED, SO WE ARE ASSURED, TO TRAVERSE THE ATLANTIC BETWEEN NEW YORK AND LIVERPOOL IN SIX DAYS.

The "SAVANNAH'S" log-book is also to be seen at the Crystal Palace, and it is our desire to furnish our readers with some extracts from it, as nothing, certainly, can be uninteresting that relates to the beginning of the new era which has brought to our beloved country such vast wealth, and such limitless power for the emancipation and the enlightenment of mankind.

The "SAVANNAH" was provided with side paddle-wheels, which were so arranged as to be easily taken off from their shafts and taken on deck.

The following extract, which we have copied from the log-book, shows the facility with which the wheels were shipped and unshipped :

Remarks on board, June 16th, 1819.

Hour.	Knots.
"1.	3.—Course of wind, S.E. by E., W.N. W.
2.	3.—
3.	3.—These twenty-four hours begin with light
4.	3.—breezes and cloudy.
5.	2.—
6.	2.—
7.	2.—
8.	0.—At 8 P. M. calm and heavy sea. Got
9.	4.—steam up, and set the wheels to going :
10.	5.—took in all sail.
11.	5.—
12.	5.—
1.	5.—
2.	5.—
3.	5.—
4.	5.—
5.	5.—
6.	5.—
7.	5.—At 8 A. M. saw Mizen Head, on Ireland,
8.	5.—bearing east, six leagues distant.
9.	5.—At 9, took in the wheels and set sail.
10.	3.—At meridian, light breezes and pleasant.
11.	3.—Variation, $2\frac{1}{2}$ westerly.
12.	3.—Lat. by obs. 51° , $22'$ N."

The above record, it will be observed, was made four days prior to the arrival of the steamer at Liverpool. It would appear that the vessel's ave-

rage speed, with fair wind, without steam, was three knots an hour, and that with steam alone, sails furled, five knots. Captain Rogers seems to have been careful of his fuel, and to have used steam when the wind failed.

We make another extract from the log-book, showing the record made on the day of her arrival at Liverpool, as follows :

Remarks on board, Sunday, 20th June, 1819.

“Wind N. W. These twenty-four hours begin calm and clear: at 8 P.M. the Bardsey Islands, in Wales, bore east by compass, five leagues distant.

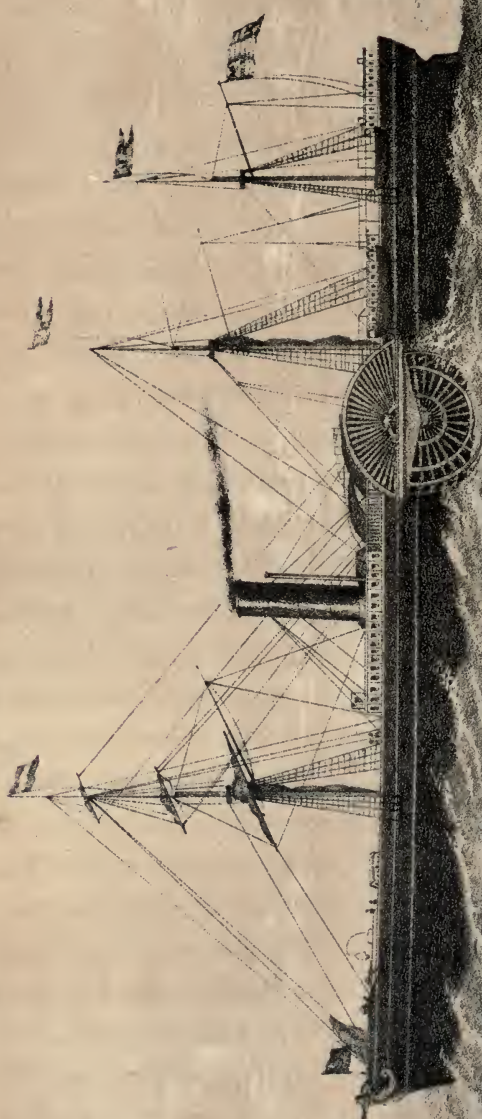
“At 4 A.M. see Holyhead Light, bearing N. E. by compass, six leagues distant.

“At 8 A.M. took pilot on board out of boat No. 10. At meridian pleasant.

“At 2 P.M. hove-to off the bar for the tide to rise. At 5 P.M. shipped the wheels and furled the sails, and run into the river Mersey.

“At 6 P.M. came to anchor off Liverpool with the small bower anchor.”

Steamships with the glorious “stars and stripes” at their peak have furrowed the ice and streaked with their smoke the perennial snows of the farthest polar latitudes accessible to man, and now shake, with the thunder of their republican cannon and their shriek of onset, the most distant waters of Japan!



J. H. S.
L. N. Kosenthal's Lith. Phil.

The "Atlantic" steamship in 1854.

The accompanying engraving is a view of the "ATLANTIC," the pioneer steamship of "Collins' United States Mail Line." The hull of this ship was built by William Brown, of New York, and the engines were planned and constructed by Allen and Stillman, of the "Novelty Works." Her length is two hundred and seventy-six feet, breadth of beam forty-five, across the paddle-boxes seventy-five, depth of hold thirty-one feet seven inches, and the diameter of her wheels is thirty-six feet. Her burden is 2,860 tons. Her form is peculiar. She has doffed the bowsprit as an useless appendage, and her paddles are placed as far behind the middle of the hull as those of other steamships are, in general, before it. Her figure-head is a huge, bearded Triton, blowing a sea-horn. Owing to the absence of the bowsprit, and her great bulk out of the water, she looks clumsy at the first sight; but a closer inspection will soon undeceive the observer. Her model is fine: the bow being sharp and wave-line, like a razor, while her stern is finely rounded, and her water-run below is clean and graceful. Her interior arrangements and decorations are unique, convenient, and luxurious. There is a pastry-room and barber's-shop on board,

replete with every convenience. There is a great saloon sixty-seven feet long, and the dining-saloon is sixty by twenty feet broad. These saloons are fitted up in superb style. Some of the table-covers are of beautiful variagated marble, and the panels around are finely decorated with emblems of the various American States. The cabin-windows are of beautiful painted glass, embellished with the arms of various American cities. There are large circular glass ventilators reaching from the deck to the lower saloon. There is a rich and elegant ladies' drawing-room near the chief saloon, and there are berths for one hundred and fifty passengers. Each berth has a bell-rope communicating with one of Jackson's patented American annunciators. The convenience, elegance, and comfort for passengers, are unsurpassed by those of any other steamship whatever: to cross the ocean in such a vessel is no *cross* at all.

The steamers composing the Collins line are the "ATLANTIC," "BALTIC," and "ADRIATIC." The two first have been running now about three years, and have made their passages with almost railroad precision. Leaving Liverpool on every alternate Wednesday, they almost universally reach New York on the second succeeding Sunday. Every other Monday morning the city papers announce

the receipt of foreign news, by one of these vessels, with a regularity that is really remarkable. *In respect to regularity, speed, and safety, the Collins boats have heretofore surpassed all others; and it was only after years of the most strenuous exertion that Great Britain was enabled to produce a steamship (the "Persia") that could compare with them.*

CHAPTER XIII.

EXTRACTS FROM THE PUBLIC RECORDS.

Report of the Secretary of the Navy on the joint resolution, (which became a law,) allowing certain specified items, and directing a credit of the same commensurate to their value.

NAVY DEPARTMENT, *January 3, 1837.*

SIR:—On a resolution of the Senate and House of Representatives, of the 9th of April last, referring the petition and papers of the heirs of Robert Fulton, deceased, to the Secretary of the Navy, to report thereon to Congress, I beg leave to submit the following report:

1. By the resolution, the Secretary of the Navy is required to state an account between the United States and said heirs, by debiting them with all the moneys paid to the said Robert Fulton, and not settled on the books of the Treasury Department.

2. To credit the said heirs with all moneys advanced or expended by the said Fulton on and

about the business of the United States committed to his care, or about which he had an agency.

3. To credit the said heirs a compensation *commensurate with the value and importance* of the services rendered by the said Robert Fulton to the United States, in inventing a system of coast and harbor defence, and in testing its utility, so far as he was employed or engaged to render such services by the authorities of the United States, or when such services were recognised as having been rendered for the United States previous to or during the late war with Great Britain.

4. To credit the said heirs with the *like compensation* for the services of the said Robert Fulton, for inventing and superintending the construction of a steam frigate at New York during and after the said war.

5. To credit the said heirs with a just and equitable compensation for the detention of the steam-boat "VESUVIUS" at New Orleans, from the 30th of December, 1814, to the 12th of March, 1815, both days inclusive, being the time said boat remained aground by reason of her being impressed into the service of the United States, and grounded when in said service.

Under this resolution, I have given a most careful consideration to the subjects referred.

The charges on the part of the United States against the estate of Mr. Fulton are specific and certain, but those on the part of the estate against the United States are vague and uncertain. In their support, estimates, believed from all the evidence in the case to be just and equitable, must be substituted for facts proved by legal evidence. The nature and terms of the reference imply a wide range of discretion in stating the account required.

The first item of account on the part of the United States against the estate of Mr. Fulton, is the sum of \$5,000, advanced to him in the year 1810, to enable him to make experiments for the purpose of testing the efficiency of his torpedoes, as a part of a system of coast and harbor defence.

The exact amount of money expended by Mr. Fulton in making these experiments is not known; but, from what appears in the case, no doubt can be entertained that he expended the whole of the \$5,000 in those experiments, and probably more; but, as he was limited by the appropriation to that sum, no more can be allowed in stating the account. And I have no doubt, from reading the report on those experiments and the correspondence respecting them, that an equal amount ought to be allowed for his personal services in making those experiments.

The second charge on the part of the United States against the estate of Mr. Fulton, is for the sum of \$40,000, advanced on a contract made on the 27th day of December, 1814, to put the steamboats "VESUVIUS," "ÆTNA," "NEW ORLEANS," and "NATCHEZ," in operation, for the purpose of transporting troops and munitions of war on the Mississippi river, and the "BUFFALO" steamboat, intended to trade on the Ohio river: to be employed by the United States at certain rates of freight fixed by the contract, by which the money advanced was to be paid.

The return of peace soon after making this contract, prevented its fulfilment. Three days after it was made, and before it could be known at New Orleans, the steamboat "VESUVIUS" was impressed and taken into the service of the United States, for transporting troops, when that city was threatened with invasion, but not according to the terms of the contract, nor in fulfilment of the same. And while thus in the service of the United States, the said steamboat was run aground, and, from a fall of the water in the river, remained in that situation for nearly three months; for which Mr. Fulton claimed a remuneration equal to the profits he might have made in that time, in the peculiar circumstances of the country, by his steamboat, if

she had not been impressed and taken for the service of the United States. It is impossible to ascertain, with any degree of accuracy, what those profits might have been.

The opinion of Robeson De Hart, who commanded the steamboat "VESUVIUS" in the years 1813, 1814, and 1815, and during the time she was aground, as he has expressed it under oath, is, that, as the steamboat "VESUVIUS" was the only steamboat between Louisville, in Kentucky, and New Orleans, in the winter of 1814 and 1815, and as she arrived at New Orleans during the great alarm occasioned by the appearance of the British army before the city, her services might have been worth to her owner, during the campaign, which lasted between three and four months, from eight to nine hundred dollars per day. According to the opinion of John De Hart, Jasper Lynch, and others, the estimate should have been much higher. But it appears to me that this estimate, as an average for the whole time the boat was aground, is too high. We have, however, lately been paying at the rate of \$500 a day, in some instances, for a steamboat, in the present campaign against the Indians, when steamboats are much more easily procured than they were in 1814 and 1815; and I think that \$600 per day for the use of the steam-

boat "VESUVIUS," and the damage she sustained during the time she was aground, is not an unreasonable charge for the same. This, with such allowance for the damage done to the steamboat, will amount to about \$50,000, exceeding the sum advanced upon the contract by \$10,000.

A suit was brought in the Southern District of New York, on the part of the United States, against the representatives of Robert Fulton, deceased, which was tried in February, 1826. I have endeavoured to discover what composed the items of set-off to the claims of the United States; but very little information in this case can be obtained, in addition to that found in the papers and documents referred.

William M. Price and John Anthon, Esquires, were counsel for the defendants in the suit; but, from the lapse of time, they have no distinct recollection of the defence. Mr. Price, in his letter of the 5th November last, says that his best impression is, that the set-off of the defendants in this suit consisted of some \$2,000 for the transportation of the munitions of war, and about \$70,000 as a loss sustained by Mr. Fulton by the seizure by the Government of his steamboat "VESUVIUS." The jury was of opinion that the United States was indebted to the defendants, and was about to cer-

tify a balance; but on being informed that this would be irregular, they found a general verdict in favour of the defendants. Mr. Anthon's recollection does not enable him to throw any further light upon this subject. What balance the jury would have given the defendants, if permitted, cannot now be known.

There is much difficulty in ascertaining the sum which should be allowed as a compensation commensurate with the value and importance of Mr. Fulton's services, in inventing and constructing a steam frigate at New York during and after the late war with Great Britain.

Mr. Fulton secured to himself the right of a patent for this invention, the whole benefit of which has resulted to the United States. A liberal estimate of the value and importance of his services in this invention should be adopted.

The opinions expressed in the papers referred are in favour of a very high estimate of the value and importance of this invention; and the Messrs. Robert and George L. Schuyler, in their letter of the 3d of last month, express their opinion that the sum of \$100,000 should be awarded to the heirs of Fulton, for the use of his patent right and improvements for the construction of steam frigates. Although I place great confidence in the opinion

of these gentlemen, yet I think their estimate is too high; but I am satisfied, from the best consideration I can give to the case, that \$60,000 would be no more than a reasonable allowance for the use of this patent right and improvements.

The Messrs. Robert and George L. Schuyler also state, in their letter, that, in their opinion, the sum of \$25,000 should be allowed as a compensation for the services of Mr. Fulton as superintendent in the construction of the steam frigate at New York; and as this opinion is corroborated by much testimony in the case, I consider that sum as a liberal, and, at the same time, no more than an adequate, allowance for these services.

These principles, above stated, I have adopted as the basis of the account which it is my duty to state; agreeably to which, the account will stand thus:

*United States in account with the heirs of Robert
Fulton, deceased.*

	DR.
1810. To money expended by Robert Fulton in making experiments for coast and harbor defence, by means of torpedoes	\$5,000
Services in making experiments in the same.....	5,000
1815. Damages for the detention of the steam-boat "VESUVIUS," from 30th December, 1814, to 12th March, 1815.....	50,000

The use of Mr. Fulton's patent right for constructing steam frigates.....	60,000
Services as superintendent in building a steam frigate at New York.....	25,000
	<u>\$145,000</u>
Balance in favour of the heirs of Robert Fulton.....	\$100,000
	CR.
1810. By cash advanced for making experiments for coast and harbor defence, by torpedoes.....	\$5,000
1814. By cash advanced on contract to fit out steamboats (as per contract).....	40,000
Balance in favour of the heirs of Robert Fulton.....	100,000
	<u>\$145,000</u>

The papers and documents referred are herewith returned, together with the letters of Mr. Price, Mr. Anthon, and of Messrs. R. and G. L. Schuyler, mentioned in this report.

I have the honour to be your obedient, humble servant,

MAHLON DICKERSON.

HON. JAMES K. POLK,

Speaker of the House of Representatives.

Affidavit of Charles Harrod, Assistant Deputy Quartermaster General.

I, Charles Harrod, of the city of New Orleans, do depose and say:—That, in the year 1814, in

December, the steamboat "VESUVIUS," then navigating the Mississippi river, was taken into the public service by order of the commanding general (Jackson). Being at that time Assistant Deputy Quartermaster General, I executed the order, and she was prepared for the service; that, shortly after, whilst in the performance of some public duty, she grounded, and remained aground about three months.

CHARLES HARROD.

Sworn and subscribed before me, this 3d January, 1834.

J. N. DUNCAN, *Judge.*

A true copy of the original.

JAMES YOUNG,

Clerk of Committee of Claims, H. R. U. S.

*Affidavit of Jasper Lynch, Esq., agent of the steamboat
"Vesuvius."*

I, Jasper Lynch, of the city of New York, having been requested, in behalf of the heirs of the late Robert Fulton, to state, under oath, first, the facts within my knowledge as to the seizure and impressment of the steamboat "VESUVIUS," for the use of the Government, at the invasion of New Orleans, in 1814; and, second, my opinion as to the probable loss to her owners by the detention

occasioned in consequence of her grounding while in the public service; and, being duly sworn, do depose and say;—That I visited New Orleans, for the first time, in the spring of 1816, and, of course, know nothing personally in respect to the fact of the seizure and detention of the boat in 1814.

I went to New Orleans as sole agent of the steamboat "NEW ORLEANS," trading between New Orleans and Natchez, and shortly after my arrival there, became the sole agent of the steamboat "VESUVIUS," above-mentioned; which two boats I employed on the river until the autumn of 1818, with the exception of an interval of about eight months, during which I rebuilt the "VESUVIUS," which was burned in 1816, after she came into my possession, and the ownership thereby cast on me.

It would, in my opinion, be difficult to assign a limit, preserving the appearance of credibility, to the amount of money which the steamboat "VESUVIUS" might have earned, if afloat during the season of navigation and business, from November, 1814, to July, 1815, before and after the scene of bustle growing out of the invasion of New Orleans. I should not estimate it at less than \$100,000. This, I am aware, will appear extravagant to those unacquainted with the prices of freight and passage

on the Mississippi, and the situation of New Orleans at that time. Application has been made to me, for the last two or three years, for a written statement, under oath, on this subject. I have been averse to making it, because I knew, unaccompanied by the facts and reasons from which I deduced my estimate or conclusion, it might bear the stamp of extravagance or improbability. I had hoped that an opportunity might be afforded of giving testimony orally, and of explaining them more fully and satisfactorily than could be done on paper. In justice, therefore, to myself, as well as for the information of those whom it may concern, I will now state them. On my arrival in New Orleans, in 1816, I found the following prices of freight in steamboats on the Mississippi, established, I believe, by the Legislature of Louisiana, in 1812:

From New Orleans to Louisville, four and a half cents per pound for heavy goods, and six cents for light: averaging five cents per pound, or per ton.....	\$112,05
From New Orleans to Natchez, three-fourths of a cent per pound, or \$1,50 per barrel; and the same rates were charged for all the intermediate landings—Donaldsonville seventy-five miles, Baton Rouge one hundred and twenty, etc., or per ton.....	15,00
From New Orleans to Louisville, passage.....	125,00
From New Orleans to Natchez.....	30,00
And half price for passage down.	

These rates continued uniform: I never received less, and they were not reduced till 1819.

The tonnage of the "VESUVIUS" was, as nearly as I can recollect, three hundred and ninety-four tons, (custom-house,) and she carried over one thousand three hundred bales of cotton, averaging four hundred pounds each. She was at that time (1814) a new boat, just from Pittsburg, and the only steamboat at New Orleans, or indeed on the river, and of course without competition as to freight or price: her speed through the water eight miles per hour. From these facts, an estimate may be made of the amount she could have earned. A boat of the same tonnage, at the above rates, without competition, and under like circumstances, in the Hudson, would, I have no doubt, greatly exceed the estimate I have made. The cases are not dissimilar. I employed this boat between New Orleans and Louisville, during the seasons of 1817 and 1818, at the above rates. I have not at present the advantage of reference to my books, which are in the city of New York; but I well recollect that, in one trip, made in the spring of 1817, from New Orleans to Louisville and back, she was absent from New Orleans about forty days, and her returns were about \$800 a day for the whole time.

Dated Rome, Oneida co., N. Y., February 29, 1836.

JASPER LYNCH.

Personally appeared before me, this 29th day of February, 1836, Jasper Lynch, Esq., and made oath to and subscribed the foregoing deposition.

B. P. JOHNSON,

Supreme Court Commissioner.

Deposition of Mr. Thomas Morris.

Thomas Morris, of the city of New York, being duly sworn, deposeth and saith :—That, some time during the late war with Great Britain, this deponent, at the instance of the late Robert Fulton, and in connection with several other persons whose names he does not now recollect, submitted to the Navy Department a proposition to build a steam frigate, to be employed by the Government as a ship-of-war: that they offered either to build the said frigate at their own expense and that of their associates, the Government giving to them the avails of all captures that the said frigate might make, and paying them for such of the enemy's vessels as she might destroy; or to superintend the construction of said frigate without compensation to themselves, but at the expense of the Government: that the latter alternative was adopted by the Navy Department, and that General Dearborn, Henry Rutgers, Samuel L. Mitchell, and this deponent, were appointed by said Department to

superintend and equip the said frigate: that the commissioners thus appointed employed the late Robert Fulton as their engineer: that all the difficulties (which were numerous) attending the construction of the said frigate devolved on the said Robert Fulton: that the commissioners relied entirely on the said R. Fulton for all the draughts, plans, and calculations; for the procuring and presenting to them, for their approbation, contracts for the supplying the timber, the copper, the iron, and all the other materials relative to the construction of said vessel: that your deponent believes that the said Fulton was employed almost entirely between twelve and eighteen months in the construction of the said frigate, having had numerous difficulties to encounter, owing to the great difficulty of procuring the castings, some of which were on so large a scale that many experiments were made before such could be procured as were required. And this deponent further says, that the said Robert Fulton never received from the said commissioners any compensation whatever, nor does he believe that he received any from the Navy Department, for all his trouble, labour, and anxiety in and about this business. And this deponent further says, that, while the said Robert Fulton was thus engaged in devoting his time and talents

to what he and others believed to be the best interests of our country, this deponent is convinced that he might, if the same industry and talent had been employed in his own private pursuits, and for his own emolument, secured to himself and family a very handsome independency. And further this deponent saith not.

THOMAS MORRIS.

Sworn this 21st day of January, 1829, before me :

SAMUEL R. BETTS,

Judge of the U. S. for the Southern District of New York.

Affidavit of William Norris, Esq., of Philadelphia, a distinguished steam-engine manufacturer, and from whom a report was obtained by the Navy Commissioners preparatory to building the steam frigate "Fulton," as vide House document No. 423, 25th Congress, 2d Session.

I, William Norris, of Philadelphia, in the State of Pennsylvania, steam-engine constructor, do testify, in relation to the sum due Robert Fulton's heirs for construction of the steam frigate, and also for the patent for steam batteries, as follows :

When Mr. Fulton superintended the CONSTRUCTION of the steam battery "FULTON," in 1815, steam vessels and steam machinery were in their infancy; consequently, he, as their *originator*, was compelled to give all his thoughts, his time, and

experience, solely to that one subject, viz., the construction of the steam battery; therefore a value should be placed on his services as designer, as well as superintendent of construction. A skilful engineer is now paid five per cent. for his services as superintendent of construction, with every convenience at his hand; whereas Mr. Fulton had to originate everything, and was compelled to make himself the plans, proportions, and general arrangements: then, if the superintendent of construction of the present day receives a compensation of five per cent. for merely sending an order to a steam-engine builder, (for now all engines can be made to order,) what compensation should be allowed to Mr. Fulton for his undivided attention and care in superintending every detail in the construction of the steam battery? There can be no comparison in the two duties; and, in my opinion, a compensation of ten per cent. on amount of cost would be but a small remuneration for the actual duties performed by Mr. Fulton.

The PATENT of the steam battery, it must be evident, is of immense value to the United States; and I think that the sum of one hundred thousand dollars, paid by the United States, would be, in reality, but *one-tenth* part of its value.

WILLIAM NORRIS.

Extract from Report of the Secretary of War (Governor Cass) to Congress, dated April 7, 1836, through the President, specially approved by the message of General Jackson.— Vide Executive Docs. 1835-'36, vol. 6.

There can be little doubt that floating batteries, propelled by this agent, will be among the most efficient means of coast defence. A hostile fleet, about to enter the Chesapeake, would certainly calculate the means of annoyance to which it would be exposed by these *formidable vessels*. During a calm, they would take a distant position, insuring their own safety, while, with their heavy guns, they might cripple and destroy the enemy; and their power of motion would enable them, under almost all circumstances, to approach the fleet, and to retire, when necessary, where they could not be pursued. These vessels, properly constructed, may become *floating forts*, almost equal to permanent fortifications in their power of annoyance and defence, and in other *advantages FAR SUPERIOR TO THEM*. Being transferable defences, they can be *united upon any point*, and a few of them be thus enabled to protect various places.

Extract from Report of the Chief Engineer of the United States, dated January 13, 1836, to the Secretary of War, and by him transmitted to the Senate of the United States, with his approval thereof.—Vide Senate Doc. vol. 2, 1835-'36.

That steam batteries would be *most effective and powerful auxiliaries* to the other means of defence now existing, and to be created for the protection of our seaboard, there can be no doubt; and the almost *necessity of their construction* is evident, when the length and extent of our bays and harbors are considered. Vessels of this description would possess the advantages of being able to change their position, regardless of shoals and bars always to be met with in our harbors, placing them beyond the reach of a pursuing enemy; and, in case of calms or storms, or any other cause obliging the enemy to anchor, might select such positions as to place their opponents at their mercy. They would likewise be efficient in preventing marauding excursions in boats, so often attended with distress and ruin to the peaceful and unoffending citizen.

Captain M. C. Perry, commander of the present steam battery "FULTON," in a report made to the Secretary of the Navy, on February 17, 1838, and communicated to Congress by him, (vide House

Doc., 25th Congress, 2d Session, No. 423, page 121,) states that, under certain circumstances, she could annoy a *whole squadron*; and, by taking advantage of the vicissitudes of winds and weather, render the anchorage of enemy's vessels in our waters *extremely hazardous*, moving as she can in every direction, with astonishing rapidity for so heavy a body, *regardless of winds or tides*. Turning to starboard or port, going ahead or astern, she could select the most desirable positions for attack, and change them at pleasure.

Lieutenant Carter, in the same report, states that he looked upon her, in point of efficiency, as equal to almost *any number* of armed vessels not propelled by steam.

Affidavit of Paul A. Sabbaton, Esq., of New York, a very eminent steam-engine constructor, to whom the Navy Commissioners were referred as the most competent to give information preparatory to the building of the present steam frigate "Fulton."

I, Paul A. Sabbaton, of the city and State of New York, steam-engine constructor, depose, on the value of Robert Fulton's, Esq., services in constructing the steam battery "FULTON," in 1814, and on the value of the patent right of the steam battery, as follows:

I shall briefly state that, as early as 1810, I was intrusted with the general superintendence of the late Mr. John Youle's foundry establishment; that, shortly after that period, Mr. Fulton came to the foundry with drawings of parts of engines, to have patterns made to cast from; and that the difficulty at that time to obtain workmen who understood to work from drawings, was such as to require from Mr. Fulton continual exertions, night and day, in travelling from one shop to another, either to alter mistakes or prevent others; and, even after the patterns were finished, many delays and perplexities took place in casting them, that branch being then in its infancy in this country: all this, however, relates only to small engines, etc.

But when the battery was in progress of construction, not having at his disposal any person in whom he could confide to superintend some of the plans, his exertions became laborious in the extreme, and required almost supernatural efforts to meet exigencies: of these great labours in constructing the steam battery, I was a witness, and had personal knowledge.

I understand that five per cent. is usually paid for superintending the construction of steamboats, *at this time*, which requires the mere looking on of the superintendent to see that the work is well

done; therefore, if to estimate the services rendered by the present engineers, and those of Mr. Fulton be reduced to per centage, I should say that, to allow Mr. Fulton ten per cent.* on the whole cost, is not only moderate, but scarcely just.

As to the value of the patent right for steam batteries, being an object of a national character, and the result it would produce in case of war, can be best appreciated by those conversant in maritime affairs; but, merely viewing it as a patent right of the first importance, I am of opinion that \$100,000 for the same is such an amount as no one ought to refuse to pay.

I shall merely take the liberty to add, that, when the celebrated Mr. Watt applied to his Government for a renewal of his patent, then pending before Parliament, one of the right honourable members, in discussing the justness of the application, stated that if Mr. Watt, in the first instance, had chosen not to disclose the secret of his invention, the Government would have purchased the secret cheaply at ten millions: this is somewhat a parallel case.

In giving my judgment above, as to the amount which should be allowed for each item, a purely practical and business view only is taken.

PAUL A. SABBATON.

* Ten per cent. on \$250,000, equal to \$25,000.

City and county of New York, ss.

I do hereby certify that, on the 19th day of December, 1838, before me, came and appeared Paul A. Sabbaton, who, being by me duly sworn, on his oath, declared that the matters set forth in the above certificate, subscribed by him, are true.

PETER DE WITT,

Commissioner of Deeds.

Receipt of Superintendent of Patent Office of specification of steam battery.

Robert Fulton, Esq., by Mr. Delacy, his agent, deposited this day a drawing of a floating steam battery in the patent office, including a description thereof.

Given under my hand, this 15th day of March, 1814.

W. THORNTON.

Report of the Commissioners superintending the construction of a steam vessel-of-war, to the Secretary of the Navy.

NEW YORK, December 28, 1815.

SIR:—The war which was terminated by the treaty of Ghent afforded, during its short continuance, a glorious display of the valour of the United

States, both by land and sea. It made them better known to foreign nations, and, what is of much greater importance, it contributed to make them better acquainted with themselves—it excited new enterprises—it educed latent talents—it stimulated to exertions unknown to our people before. A long extent of coast was exposed to an enemy powerful above every other on the ocean. His commanders threatened to lay waste our country with fire and sword, and actually, in various instances, carried their menaces into execution. It became necessary, for our defence, to resist, by every practicable method, such a formidable foe.

It was conceived, by a most ingenious and enterprising citizen, that the power of steam could be employed in propelling a floating battery, carrying heavy guns, to the destruction of any hostile force that should hover on the shores, or enter the ports, of our Atlantic frontiers. The perfect and admirable success of his project for moving boats, containing travellers and baggage, by the same elastic agent, opened the way to its employment for carrying warriors and the apparatus for fighting.

The plan was submitted to the consideration of the Executive of an enlightened Government. Congress, influenced by the most liberal and patriotic spirit, appropriated money for the experi-

ment; and the Navy Department, then conducted by the Hon. William Jones, appointed commissioners to superintend the construction of a convenient vessel, under the direction of Robert Fulton, Esq., the inventor, as engineer, and Messrs. Adam and Noah Brown as naval constructors.

The keels of this steam frigate were laid on the 20th day of June, 1814. The strictest blockade the enemy could enforce interrupted the coasting trade, and greatly enhanced the price of timber. The vigilance with which he guarded our coast against intercourse with foreign nations, rendered difficult the importation of copper and iron. The same impediment attended the supplies of coal, heretofore brought to New York from Richmond and Liverpool. Lead, in like manner, was procured under additional disadvantages. These attempts of the enemy to frustrate the design were vain and impotent. All the obstacles were surmounted. Scarcity of the necessary woods and metals was overcome by strenuous exertions; and all the blockading squadron could achieve was, not a disappointment in the undertaking, but merely an increase of the expense.

So, in respect to tradesmen and labourers, there was an extraordinary difficulty. Shipwrights had repaired to the lakes, for repelling the enemy, in

such numbers that comparatively few were left on the seaboard. A large proportion of the men who had been engaged in daily work had enlisted as soldiers, and had marched under the banners of the nation to the defence of its rights. Yet, amidst the scarcity of hands, a sufficient number was procured for the purpose which the commissioners had in charge. An increase of wages was the chief impediment, and this they were enabled practically to overcome.

By the exemplary combination of diligence and skill on the part of Mr. Fulton and the constructors, the business was so accelerated that the vessel was launched on the 29th day of October, amidst the plaudits of an unusual number of citizens.

Measures were immediately taken to complete her equipment: the boilers, the engine, and the machinery, were put on board with all possible expedition. Their weight and size far surpassed anything that had been witnessed before among us. The stores of artillery of New York not furnishing the number and kind of cannon which she was destined to carry, it became necessary to transport guns from Philadelphia. A prize taken from the enemy put some fit and excellent pieces at the disposition of the Navy Department. To avoid the danger of capture by the enemy's cruisers,

they were carted over the miry roads of New Jersey. Twenty heavy cannon were thus conveyed by strength of horses, though the performance was attended with a proportionate expense. Carriages of the most approved model were constructed, and everything was done to bring her into prompt action as an efficient instrument of war.

About this time an officer, præminent for bravery and discipline, (Commodore Porter,) was commissioned by the Government to her command. She is finished conformably to the plan submitted to the Executive. She is a structure resting upon two boats and keels, separated from end to end by a canal fifteen feet wide, and one hundred and fifty-six feet long. One boat contains the capacious cauldrons of copper to prepare her steam. The vast cylinder of iron, with its pistons, levers, and wheels, occupies a part of its fellow. The great water-wheel revolves in the space between them. The main or gun-deck supported her armament, and was protected by a bulwark four feet ten inches thick, of solid timber: this is pierced by thirty port-holes, to enable as many 32-pounders to fire redhot balls. With the expectation of being able to raise the blockade of New London, by destroying, taking, or routing the enemy's ships,

and, under the opinion of Mr. Fulton and Commodore Porter, the following additions were incorporated with the vessel, viz.: her upper or spar-deck is surrounded by a bulwark and stanchions, two stout masts are erected to support lateen-sails, and two bowsprits for jibs, and a corresponding rigging.

It must here be observed that, under the exhaustion of the treasury and the temporary depression of public credit, the commissioners were exceedingly embarrassed: their payments were made in treasury notes, which they were positively instructed to negotiate at par. On several occasions, even these were so long withheld that the persons who had furnished labour and materials for the vessel were importunate for payment, or silently discontented. To a certain extent, the commissioners pledged their private credit. The men actually broke off, notwithstanding all this, at one time: the work was retarded, and her completion unavoidably deferred, to the great disappointment of the commissioners, until winter rendered it impossible for her to act.

Under all this pressure, they persevered in the great object confided to them. Their exertions, however, were retarded by the premature and unexpected death of Mr. Fulton. The world was deprived of his invaluable labours before he had

completed this favourite undertaking. We will not inquire wherefore, in the dispensation of Divine Providence, he was not permitted to behold his grand conception realized. *But his discoveries survive for the benefit of mankind*, and will extend to unborn generations.

At length, all matters were prepared for a trial of the machinery to urge such an extraordinary vessel through the water. This essay was made on the 1st day of June, 1815: she proved herself capable of opposing the wind and of stemming the tide, of crossing currents, and of being steered among vessels lying at anchor, though the weather was boisterous and the water rough. Her performance demonstrated that the project was successful: no doubt was entertained on the principal subject—that a floating battery, carrying heavy cannon, could be moved by steam. The commissioners returned from the exercise of the day satisfied that the vessel would answer the intended purpose, and consoled themselves that their care had been bestowed upon a worthy object. She was prepared for a second voyage with all convenient speed. On the 4th day of July, the vessel was ready for a second experiment. She performed a trip to the sea, eastward of Sandy Hook, and back again, a distance of fifty-three miles, in eight hours and

twenty-six minutes: a part of this time she had the tide against her, and had no assistance whatever from sails. Of the gentlemen, civil and military, who formed the company invited to witness the experiment, not one entertained a doubt of her fitness for her intended purpose.

These arrangements having been made, a third trial of her powers was attempted on the 11th day of September, with the weight of twenty-six of her long and ponderous guns, and a considerable quantity of ammunition and stores on board: her draught of water was short of eleven feet. She changed her course, by inverting the motion of the wheel, without the necessity of putting about. She fired salutes as she passed the forts, and she overcame the resistance of the wind and tide in her progress down the bay. She performed beautiful manoeuvres around the United States frigate "JAVA," then at anchor near the light-house. She moved with remarkable celerity, and she was perfectly obedient to her double helm. It was observed that the explosion of powder produced very little concussion. The machinery was not affected by it in the smallest degree. Her progress during the firing was steady and uninterrupted. On the most accurate calculations, derived from heaving the log, her average velocity was five miles and a half per hour.

Notwithstanding the resistance of currents, she was found to make headway at the rate of two miles an hour against the ebb of East river, running three and a half knots. The day's exercise was satisfactory to the respectable company who attended, beyond their utmost expectations. It was universally agreed that we now possessed a new auxiliary against every maritime invader.

The city of New York, exposed as it is, was now considered as having the means of rendering itself invulnerable. The Delaware, Chesapeake, Long Island Sound, and every other bay and harbor in the nation, may be protected by the same tremendous power.

Among the inconveniences observable during the experiment, was the heat endured by the men who attended the fires. To enable a correct judgment to be formed on this point, one of the commissioners (Dr. Mitchell) descended, and examined by a thermometer the temperature of the hold between the two boilers. The quicksilver, exposed to the radiant heat of the burning fuel, rose to one hundred and sixteen degrees of Fahrenheit's scale. Though exposed thus to its intensity, he experienced no indisposition afterwards. The analogy of potteries, forges, glass-houses, kitchens, and other places where labourers are habitually exposed to

high heats, is familiar to persons of business and reflection. In all such occupations, the men, by proper relays, perform their services perfectly well.

The Government, however, will understand that the hold of the present vessel could be rendered cooler by other apertures for the admission of air; and that, on building another steam frigate, the comfort of the firemen might be provided for as in the ordinary steamboat.

The commissioners congratulate the Government and the nation on the event of this noble project. Honourable alike to its authors and its patrons, it constitutes an era in warfare and the arts. The arrival of peace, indeed, has disappointed the expectations of conducting her to battle: that last and conclusive act, of showing her superiority in combat, it has not been in the power of the commissioners to make.

If a continuance of tranquillity should be our lot, and this steam vessel-of-war be not required for the public defence, the nation may rejoice that the fact we have ascertained is of incalculably greater value than the expenditure; and that, if the present structure should perish, we have the information, never to perish, how, on a future emergency, others may be built. The requisite variations will be dictated by circumstances.

Owing to the cessation of hostilities, it has been deemed inexpedient to finish and equip her as for immediate and active employ. In a few weeks, everything that is incomplete could receive the proper adjustment.

After so much has been done, and with such encouraging results, it becomes the commissioners to recommend that the steam frigate be officered and manned for discipline and practice. A discreet commander, with a selected crew, would acquire experience in the mode of navigating this peculiar vessel. The supplies of fuel, the tending of the fire, the replenishing of the expended water, the management of the mechanism, the heating of shot, the exercise of the guns, and various other matters, can only become familiar by use. It is highly important that a portion of seamen and marines should be versed in the order and economy of the steam frigate. They will augment, diffuse, and perpetuate knowledge. When, in process of time, another war shall call for more structures of this kind, men regularly trained to her tactics may be dispatched to the several stations where they may be wanted. If, on any such disposition, the Government should desire a good and faithful agent, the commissioners recommend Captain Obed Smith to notice, as a person who has ably performed the

duties of inspector, from the beginning to the end of the concern.

Annexed to the report, you will find, sir, several statements explanatory of the subject. A separate report of our colleague, the Honourable Oliver Wolcott, whose removal from New York precluded him from attending to the latter part of the business with his accustomed zeal and fidelity, is herewith presented. A drawing of her form and appearance, by Mr. Morgan, as being likely to give satisfaction to the Department, is also subjoined; as, likewise, an inventory of her furniture and effects, and an account of the timber and metals consolidated in her fabric.

It is hoped these communications will evince the pains taken by the commissioners to execute the honourable and responsible trust reposed in them by the Government.

SAMUEL L. MITCHELL,
THOMAS MORRIS,
HENRY RUTGERS.

Extracts from the Records.

WE subjoin the following copies of Documents, from amongst the many communications, entered of Record, which exhibit Mr. Fulton's connection with the most important men and measures of his country. As an Engineer, he evinced the most extensive knowledge of Internal Improvements, and publicly suggested almost every practicable improvement of his day,—whilst the ablest and wisest officers of our Government were pleased to solicit and secure his statements, and profit by the information which his experience and good sense as a writer rendered so plain and intelligible.

ROBERT FULTON'S LETTER TO GOVERNOR MIFFLIN,
DATED 1796.

*To Thomas Mifflin, Governor of the Commonwealth
of Pennsylvania.*

LONDON, *March* 1796.

“SIR:—During the prosecution of my experiments on canal operations, which are exhibited in the preceding treatise, I frequently contemplated their great importance to the States of America, and much wish to awaken the public mind to a full sense of the subject; but, on considering the habits of the people of the interior country, accustomed only to land-carriage, I feared much difficulty would arise in removing the prejudice in favor of wagoning, and in raising a sum of money adequate to the first expense of a canal of importance. In deliberating on the mode of surmounting these obstacles, I was so fortunate as to meet with your address to the House of Representatives, in 1795, and particularly happy to find your ideas of the importance of easy communications between remote parts of the country, so consonant to my own, and at the same time so earnestly recommended to the public attention: which circumstance has urged me to address this chapter to you, convinced that your sense of the subject will not suffer any observations which may be useful, to lie dormant.

I must, therefore, request you deliberately to peruse the system laid down, which you will find, by chapter 7, totally explodes the whole practice, for two reasons: *First*, because they may be constructed for half the sum necessary to a lock canal; and, *Secondly*, because on them you may perform dispatch, and pass through the most mountainous country

at the speed of 6 miles per hour,—an advantage which lock canals can never give, and which precludes an immensity of carriage; yet the small canal takes in every kind of conveyance, and performs the double office of canal and road; therefore, if founded and governed by sound principles, a mountainous country may have all the blessings of a water conveyance, so celebrated in the level and fertile plains of Egypt. But how to extend these conveyances into every corner and district of America, is now to be considered.

While the mind hovers over the immense continent of America, and views its vast interior, inhabited, in various districts remote from the marts of trade, with infinite scenes for the improvement and nourishment of millions of human beings, philanthropy seeks, to combine the exertions of the present inhabitants to facilitate their labor, extend their interests, invite population, and give a cultivating hand to every acre of that extensive territory.

To such a wish, in one point of view, is presented a great and fertile country, interspersed with luxuriant vales, and numerous mountains—nourishing infinite rivulets, which, meandering the country, feed long and rugged rivers, diminishing to naked shoals in dry seasons, or swelling to roaring torrents in time of rain,—pressing their way through stupendous cliffs and infinite rocks, present objects hostile to navigating the streams of nature.

But such are the materials which art must bring into unison; the performance of which is a subject the most benevolent and important, and worthy the serious contemplation of the penetrating members of society, as a great national question.

On this head, it must be evident, that in proportion as produce is remote from market its value is diminished, in consequence of the expense of carriage; and, hence, remote parts are excluded the market, or, a facility of ex-

changing their surplus produce for necessaries which they may require,—thus the nerves of exertion are cramped, the faculties of body and mind are not called forth, and the country remains a dreary and inhospitable waste. But, to encourage population, and increase the value of the lands, the cheapest possible conveyance of the produce must be established on sound principles; for, exactly in proportion to the ease of reaching the market, the remote countries of equal fertility will be of more or less consequence in the scale of society; therefore, to sum up the idea, would not the lands about Fort Pitt be as valuable as those around Lancaster, if the produce could be brought to market for the same sum; and would not population consequently be encouraged?

For this purpose,—as I have the strongest conviction operating on my mind, that canals are the only effectual means of producing easy communications, and that they are consequently of the utmost importance,—I much wish that the public may be made thoroughly sensible of their utility, and that each state might establish a society to investigate the propriety of forming them in such districts as the present state of population and trade may most require them,—keeping one important object in view, that all future canals may be constructed on one scale and principle, in order that when the various branches meet the boats, one may navigate the other wherever canals extend. This, you will observe, has been my wish throughout, and in which, I hope, I have been so fortunate as to succeed; if so, canals appear in a new light, and are still more important than formerly, because they may now be fitted to every kind of country, and, by their cheapness, approach near to the expense of constructing turnpike roads.

At a period when a country is improving by turnpike roads, the question is, whether it is not best to adopt canals; and the criterion to judge of the propriety of the canal

will depend on simple calculation, to the following effect: 1st, what is the expense of the road; 2d, what is the expense of the canal; 3d, what is the expense of carriage by the road; 4th, what is the expense of carriage by the canal,—and probably it will be found that the canal will perform the work so cheap as to justify three or four times the sum being expended on the canal, that would be necessary to construct a road of the same length; to which one consideration must be added in favor of the canal, viz., on all roads, however good, the great expense of carriage is the number of horses; but on canals, the principal expense is the tonnage or tolls to the proprietors, as interest for the money advanced in forming the canal; yet this tonnage by a judicious arrangement, may be reduced, *if not liquidated*, and the carriage on a canal may be so regulated, that goods conveyed 400 or more miles, will not cost more than those which are navigated eighty or one hundred miles; yet the eighty or one hundred miles canal conveyance will not cost half the sum necessary to land carriage, on the best roads.

To elucidate this, I will suppose a canal from Philadelphia to Fort Pitt, or any other long line, to say, three hundred and fifty miles: on such a canal, a man, boy, and horse, would convey 40 tons 20 miles per day, and arrive in Philadelphia, in—*say* eighteen days, at 10 shillings per day, amounting to 180 shillings for forty tons, or 4s 6d per ton, the expense of boating, independent of tolls. By a road of the same length, four horses—perhaps five, would set out with not more than two tons, and, travelling at the rate of twenty-five miles per day, arrive at Philadelphia in 14 days, and, to say only two dollars, or 15 shillings per day, amounting to 210 shillings, or 5£ 5s per ton for wagoning, independent of turnpike. This, I hope, will exhibit the immense disparity between the two modes, and show that roads, however good, can never effectually relieve

a remote country. The question then is, how to construct a canal in order to reduce the tolls, and completely assist the distant districts; this, I conceive, will totally depend on the mode of raising and appropriating a sum of money to the first fifty or one hundred miles of canal.

In this country, canals are paid by companies of subscribers, who receive a toll on the carriage of goods as an interest for the money advanced; and the immense quantity of carriage throughout every part of this compact kingdom usually produces a considerable interest for the money expended, while the expense of carriage is reduced below that of land conveyance; but as England is environed with water—with numerous sea-ports, there is no part very remote from the market, and hence, they never will have canals of any comparative length with those necessary in America—to say seven or eight hundred miles; therefore, the mode of proprietors receiving tonnage at so much per mile, although it will ever be much below land carriage, yet even that tonnage would preclude the market from the remote country, and by no means answer for American canals: for instance,

	£	s.	d.
A constructs a canal fifty miles long, and receives two-pence per ton per mile	}	0	8 4
B. Ditto .....				0	8	4
C. Ditto	0	8	4
D. Ditto	0	8	4
E. Ditto	0	8	4
F. Ditto	0	8	4
G. Ditto	0	8	4
350 miles.	£2 18 4 per ton		

tolls, independent of boating; and hence, I conceive, the produce could not bear the expense of carriage by this method.

But as it is, the produce of the interior country, which

must be drawn forth, the leading canals should be national works, perhaps, by the following system :

First, that the legislature, by such duties or imposts as they conceive most eligible, raise a sum of money adequate to the expense of the first 60 or 70 miles of canal,—to say from Philadelphia to Lancaster, which, perhaps, may cost £150,000, of which, £30,000 per annum may be required till the canal is finished. On this canal, 60 miles long, if I suppose fifty tons per day to be navigated at two pence per ton per mile, allowing two hundred and eighty working days per year, it would amount to £7000 per annum, which should be applied to extending the canal,—the tolls on such extension being appropriated in like manner to further extensions, and so on,—the toll to be continually devoted to forming more canal, till canals would pervade the whole country, by virtue of their own produce arising from the tolls.

If this mode of extending the canal by appropriating the tolls should be deemed too tedious for the speedy relief to the interior country, and the funds of the state would admit of the advance of a further sum, they might immediately extend the canal two hundred miles, and receive the tolls till the last advanced sum was liquidated ; or, as the proprietors of the lands in the interior would be much benefited by their property being raised in value, probably they might raise the sum, and receive the tolls till such sum was liquidated ; the lands being increased in value, might be deemed sufficient interest till the principal was discharged, which would diminish every year.

If by either of these modes, or any better which can be devised, I suppose the first 200 miles of canal to be formed, the trade will be more in proportion to the length than on the first sixty miles before estimated : because, being more remote from the metropolis, the interior inhabitants will be necessitated to fly to the canal,—the tonnage

will also be greater; therefore, if I allow on the 200 miles 100 tons per day, to be navigated at twenty shillings per ton for the whole length, or in proportion, for a shorter distance, the annual produce would be £28,000; and having arrived at such annual income, canals would proceed with dispatch, and progressively increase, both in riches and extension; each year the produce of tonnage would increase, and each year a greater length of canal might be constructed.

Therefore, if I proceed with this progressive and creative system, till a canal reached Fort Pitt, which, with some bends, I will call 360 miles, the country which such canal would accommodate, would widen as it was more remote from Philadelphia. For instance, the man who lived 20 miles from Philadelphia might convey his goods seven to the canal; the man at forty miles distance might go 14 or 15 to the canal; at sixty miles, 20 to the canal; and so on, till at the extremity of 360 miles, they probably would go fifty on each side to the canal; hence, if I average the whole, such canal may be said to accommodate a country 360 miles long, and fifty miles wide; on which the tonnage must now be regulated.

The man who resides 20 miles from Philadelphia, and seven from the canal, should he convey a ton of goods by land, it would be worth at least fifteen shillings, as it would employ a man and two horses two days.*

	s.	d.
The carriage to the canal, seven miles, in like proportion.....	5	0
Carriage on the canal.....	4	0
Total.....	9	0

* The English reader, who may look over this chapter, may perhaps be surprised at stating the land carriage of America so low. But as I do not know the average expense of that country, I estimate it low in order to give it every advantage, in a comparative view with the canal. In England, it would cost at least one guinea, with all the advantage of good turnpike roads.

Thus the saving would be six shillings, and the tonnage should increase to a certain sum on the first hundred miles of canal, keeping much within the limits of land-carriage; then decrease as the boating increased, in order to draw the trade of the back country into the canal.

The expense of boating a ton 20 miles will be as follows: a man, boy, and horse, will convey 40 tons twenty miles for ten shillings, which is three pence per ton for 20 miles; but to allow contingencies, say 4 pence per ton, for boating 20 miles; the tonnage and boating on the 360 miles should then be regulated, perhaps, in the following order:

Miles.	Tonnage.		Boating.		Amount.	
	s.	d.	s.	d.	s.	d.
20	4	0	0	4	4	4
40	8	0	0	8	8	8
60	12	0	1	0	13	0
80	16	0	1	4	17	4
* 100	20	0	1	8	21	8
120	19	8	2	0	21	8
140	19	4	2	4	21	8
160	19	0	2	8	21	8
180	18	8	3	0	21	8
200	18	4	3	4	21	8
220	18	0	3	8	21	8
240	17	8	4	0	21	8
260	17	4	4	4	21	8
280	17	0	4	8	21	8
300	16	8	5	0	21	8
320	16	4	5	4	21	8
340	16	0	5	8	21	8
† 360	15	8	6	0	21	8

By this system, the country at the extremity of 360 miles, would deliver goods at Philadelphia for twenty-one

* This being within the limits of land-carriage, the tonnage must now begin to decrease as the boating is increased.

† If the boats return without back-carriage, the expense of boating, which on the 360 miles is six shillings, must be deducted from the tolls; and in proportion on the various parts of the canal.

shillings and eight pence ; which is the same as paid at the distance of one hundred miles ; to which the land carriage to the canal must be added. But as such a system would open a market to the remote country, every acre of ground within reach of the canal would become more valuable, and the carriage to the canal must be borne for some years. But as population increased, and the tonnage on the main line became productive, lateral branches would be cut from the canal, and thus further improve the country ; the tonnage on such branches being proportioned, as before stated, according to the distance from the city.

The carriage on such canal would consequently be immense ; for, as I before stated, it would accommodate a country 360 miles long, fifty miles wide in the main, containing eighteen thousand square miles, or eleven million five hundred and twenty thousand acres. If, by further improvement, I allow that only every fiftieth acre will produce one ton of carriage per annum, the amount would be two hundred and thirty thousand four hundred tons ; which appears, by averaging the preceding tonnage, would cost 15 shillings per ton, in tolls, to the canal, amounting to £172,800 per annum, in order to construct further canals ; a sum adequate to forming, perhaps, eighty or one hundred miles per year ; having arrived at such a length, it is evident, canals would increase with astonishing rapidity, and produce conveniences, even beyond the limits of calculation ; for it must be observed, and strictly adhered to, that by canals you may equalize the carriage of the near and remote country, as before exhibited by the mode of regulating the boating with the tonnage, in proportion to the extent ; inasmuch as that a ton of goods may be carried 360 miles for £1. 1. 8. Yet was I to extend the idea to a still more distant district, by reducing the tonnage as the boating increased, till the tolls were annihilated, and the boating amounted to £1. 1. 8 ; a ton of goods might be

boated thirteen hundred miles for that sum; yet a ton could not be wagoned the same distance for less than £38. 10s., so great is the disparity between land and water-carriage.

Hence it must be evident, that roads, however good, can never effectually assist the remote country; each mile is attended with a heavy expense on carriage, till penetrating so far, that the value of the produce is consumed in carriage; it terminates in a luxuriant wilderness, sable and uncultivated as the interior of Africa. But by canals, the conveyance may be so easy, that they may penetrate the most remote districts, draw down the produce to the ports of trade, and bear up the various conveniences of life; thus each man may exchange his surplus labor for the necessities or luxuries which he may require; hence his faculties will be put into action, cultivation will flourish, and enjoyment be more equally diffused; canals will pass through every vale, meander round each hill, and bind the whole country in the bonds of social intercourse; hence population will be increased, each acre of land will become valuable, industry will be stimulated, and the nation, gaining strength, will rise to unparalleled importance, by virtue of so powerful an ally as canals.

Having exhibited the immense disparity between canals and roads, with the mode of extending canals in every direction, by appropriating the tolls; it is evident, that such a system will produce infinite navigation. But the mode of constructing them must be maturely considered; and in this two things must be scrupulously adhered to.

First, that canals may truly benefit a country, it is necessary the passage should be performed with equal ease each way. Second, that the nearest course should be taken to the principal points of the country; and for both these reasons, the beds of the rivers, beyond tide, must

almost universally be forsaken;* because torrents, in time of rain, which is extremely injurious to the works of art, with the shoals in dry seasons, together with the current ever-standing one way, will very frequently interrupt free intercourse, and render fresh-water river navigations precarious.

The rivers, creeks, and rivulets, which are numerous in all parts, must be considered as the feeders of canals; and in this respect, having an abundance of water, America is very fortunate; land is also cheap and timber plenty, so that the great expense of an American canal would be labor.

Therefore, as it is the channels of art which can only effectually assist the country, I have constantly endeavored to find a system which might pass by the straightest line to a given point; hence you will observe the mode of mounting hills, crossing valleys, rivers, and defiles, by the various machines; which, I hope, will display an easy means of extending water communications through a great continent, and bear the mind to those days, when a well directed economy in manual labor will give enlightened and rational enjoyment to many millions of inhabitants: hoping, that this important subject will make a part of the deliberation of a wise legislature,

I remain, with all possible respect,

Your's sincerely,

ROBERT FULTON.

* By forsaking the beds of rivers, I mean, that they should not compose or make a principal part of a leading canal; yet, however numerous canals may be, it will frequently happen that some miles of a river will afford easy navigation in particular seasons, and probably touch the leading canals into which the goods, or perhaps boats, may be transferred from the river; for small boats will live on the American rivers in particular parts and seasons, of which there are innumerable instances by the batteaus and even canoes.

ROBERT FULTON'S LETTER TO ALBERT GALLATIN—1807.

In the Report of the Hon. Albert Gallatin, Secretary of the U. S. Treasury, transmitted to the U. S. Senate, April 4, 1808, we find the following communication from Mr. Fulton.

WASHINGTON, December 8th, 1807.

“SIR:—By your letter of the 29th of July, I am happy to find that the attention of Congress is directing itself towards the opening of communications through the United States, by means of roads and canals; and it would give me particular pleasure to aid you, with useful information on such works, as I have long been contemplating their importance in many points of view.

But a year has not yet elapsed since I returned to America, and my private concerns occupied so much of my time, that, as yet, I have acquired but very little local information on the several canals which have been commenced.

Such information, however, is, perhaps, at present, not the most important branch of the subject, particularly as it can be obtained in a few months at a small expense, whenever the public mind shall be impressed with a sense of the vast advantages of a general system of cheap conveyance. I hope, indeed, that every intelligent American will, in a few years, be fully convinced of the necessity of such works to promote the national wealth, and his individual interest. Such conviction must arise from that habit of reflection which accompanies the republican principle, and points out their true interest on subjects of po-

litical economy. From such reflection arises their love of agriculture, and the useful arts, knowing them to augment the riches and happiness of the nation; hence also their dislike to standing armies and military navies, as being the means of increasing the proportion of non-productive individuals, whose labor is not only lost, but who must be supported out of the produce of the industrious inhabitants, and diminish their enjoyments.

Such right thinking does great honor to our nation, and leads forward to the highest possible state of civilization, by directing the powers of man from useless and destructive occupations to pursuits which multiply the productions of useful labor, and create abundance.

Though such principles actuate our citizens, they are not yet, in every instance, aware of their best interests; nor can it be expected that they should perceive, at once, the advantages of those plans of improvement which are still new in this country. Hence the most useful works have sometimes been opposed, and we are not without examples of men being elected into the State Legislatures for the express purpose of preventing roads, canals, and bridges being constructed. But in such errors of judgment our countrymen have not been singular.

When a bill was brought into the British Parliament, 50 years ago, to establish turnpike-roads throughout the kingdom, the inhabitants for forty miles around London, petitioned against such roads; their arguments were, that good roads would enable the farmers of the interior country to bring their produce to the London markets cheaper than they who lived nearer the city, and paid higher rents; that the market would be overstocked, the prices diminished, and they unable to pay their rents or obtain a living. The good sense of Parliament, however, prevailed, the roads were made, the population and commerce of London increased, the demand for produce increased, and he who

lived nearest to London still had a superior advantage in the market.

In like manner, I hope the good sense of our Legislature will prevail over the ignorance and prejudice which may still exist against canals. And here an important question occurs, which it may be proper to examine with some attention,—in this early stage of our public improvements, whether, as a system, we should prefer canals to turnpike roads. Our habits are in favor of roads, and few of us have conceived any better method of opening communications to the various parts of the States. But in China and Holland, canals are more numerous than roads; in those countries the inhabitants are accustomed to see all their productions carried either on natural or artificial canals; and they would be as much at a loss to know how we, as a civilized people, could do without such means of conveyance, as we are surprised at their perseverance and ingenuity in making them.* England, France, and the principal states of Europe, commenced their improvements with roads; but as the science of the engineer improved, and civilization advanced, canals were introduced, and England and France are now making every exertion to get the whole of their heavy productions water-borne; for they have become sensible of the vast superiority of canals over roads.

Our system, perhaps, ought to embrace them both,—canals for the long carriage of the whole materials of agriculture and manufactures, and roads for travelling, and the more numerous communications of the country. With these two modes in contemplation, when public money is to be expended with a view to the greatest good, we should now consider which object is entitled to our first attention.

* The Royal Canal from Canton to Peking is 825 miles long; its breadth, 50 feet; its depth, nine feet.

Shall we begin with canals, which will carry the farmer's produce cheap to market, and return him merchandise at reduced prices? Or shall we first make roads to accommodate travellers, and let the produce of our mines and forests labor under such heavy expenses that they cannot come to market?

To throw some light on this interesting question, I will base my calculations on the Lancaster turnpike road. There the fair experiment has been made to penetrate from Philadelphia to the interior country,* and the mode of calculation here given will serve for drawing comparisons on the utility of roads and canals for all the great leading communications of America.

From Philadelphia to the Susquehanna, at Columbia, is seventy-four miles; that road, if I am rightly informed, cost, on an average, 6000 dollars a mile, or 444,000 dollars for the whole. On it, from Columbia to Philadelphia, a barrel of flour, say 200cwt, pays one dollar carriage. A broad-wheel wagon carries 30 barrels, or 3 tons, and pays for turnpike three dollars; thus, for each ton carried, the turnpike company receives only one dollar.

April 9, 1792.—The Legislature of Pennsylvania appointed Elliston Perot, Henry Drinker, Jr., Owen Jones, Jr., Israel Whelen, and Cadwallader Evans, of Philadelphia, and Edward Hand, John Hubley, Paul Zantinger, Matthias Slough, and Abraham Witmer, of Lancaster, the Commissioners to make an Artificial Road from Philadelphia to Lancaster. This was the first extensive turnpike that was completed in the United States, and was the first link of the great western communication from Philadelphia. The distance from the Schuylkil river, along said Road to Lancaster, is sixty-two miles and a quarter. Exclusively of the side or summer-roads, twenty-four feet of the bed of the road are covered with a stratum of pounded stones eighteen inches thick in the middle of the road, and decreasing each way to twelve inches. The *Valley* hills are the most elevated and steep on the road, but the angle of ascent nowhere exceeds four degrees. Stone bridges were erected across all the intervening streams. That across the river Conestoga, consisting of nine arches of solid masonry, was erected by Mr. Abraham Witmer, as his private property, by an Act of the Legislature of 1798;

I will now suppose a canal to have been cut from Philadelphia to Columbia, and, with its windings, to make 100 miles, at \$15,000 a mile;* or, for the whole, \$1,500,000. On such canal, *one man, one boy, and horse* would convey twenty-five tons 20 miles a day,† on which the following would be the expenses :

	\$	cts.
One man.....	1	00
One horse	1	00
One boy.....	50	
Tolls for repairing the canal.....	1	00
Tolls for passing locks, inclined planes, tunnels, and aqueducts...	1	00
Interest on the wear of the boat.....	50	
Total.....	\$5	00

This is equal to 20 cents a ton for 20 miles, and no more than one dollar a ton for one hundred miles, instead of \$10, paid by the road. Consequently, for each ton carried from Columbia to Philadelphia on the canal, the Company might take a toll of \$6, instead of one, which is now got by the road; and then the flour would

and cost him about \$30,000, and it is well known as "Witmer's permanent bridge." Another bridge was erected by the Company across the Brandywine, consisting of three arches of solid masonry, and which cost them \$12,000. The capital of the Company amounted to \$360,000; but this being insufficient, it became necessary to apply a considerable portion of the tolls to the completion of the work. In 1798 a Company was incorporated to build a bridge across the Schuylkill River, to connect the Turnpike with the City, and the most expensive, and the first in the United States, was the Permanent Schuylkill Bridge, near Philadelphia, erected by the Company at an expense of 300,000 dollars. Its length was 750 feet, and width 42 feet.

* On averaging the canals of America, \$15,000 a mile will be abundantly sufficient to construct them in the best manner, particularly if made upon the inclined plane principle, with small boats, each carrying six tons.

† One horse will draw, on a canal, from 25 to 50 tons, 20 miles in one day. I have stated the least they ever do, and the highest rate of charges, that no deception may enter into their calculations.

arrive at Philadelphia for \$7 a ton, instead of ten, which it now pays. The merchandise would also arrive at Columbia, from Philadelphia, for \$3 a ton less than is now paid, which cheap carriage, both ways, would not only benefit the farmer and merchant, but would draw more commerce on the canal than now moves on the road, and thereby add to the profits of the Company.

But to proceed with my calculation. I will suppose that exactly the same number of tons would move on the canal that are now transported by the road. Again, let it be supposed, that at one dollar a ton, the Turnpike Company gains 5 per cent. per annum, on their capital of \$444,000, or, \$22,900; consequently, 22,200 tons must be carried, which, at \$6 a ton to the Canal Company, would have given \$133,300 a year, or eight and a half per cent. for their capital of \$1,500,000.

The reason of this vast difference in the expense of carriage by roads or canals, will be obvious to any one who will take the trouble to reflect that, on a road of the best kind, four horses, and sometimes five, are necessary to transport only three tons. On a canal one horse will draw twenty-five tons, and thus perform the work of forty horses. The saving, therefore, is in the value of the horses, their feeding, shoeing, gear, wagons, and attendance. These facts should induce companies to consider well their interests, when contemplating an enterprise of this sort, and what would be their profits, not only in interest for their capital, but the benefit which their lands would receive by the cheap carriage of manure and of their productions.

In considering the profit to accrue to a company, from a canal instead of roads, there is another important calculation to be made; and for that purpose I will proceed with the Lancaster turnpike, supposing it to extend to Pittsburg, 320 miles, on which, the carriage being at the rate now paid from Columbia to Philadelphia, that is, \$10

a ton for 74 miles, the ton from Pittsburg would amount to \$42, at which price, a barrel of flour would cost \$4 in carriage, an expense which excludes it from the market. Thus, grain, the most important and abundant production of our interior country, and which should give vigour to our manufactures, is shut up in the districts most favourable to its culture; or, to render it portable, and convert it into cash, it must be distilled, to brutalize and poison society. In like manner, all heavy articles of little monied value can only move within the narrow limits of one hundred miles; but were a canal made the whole distance, and by one or more companies, they might arrange the tolls in the following manner, so as to favor the long carriage of heavy articles:

The expense of man, boy, and horse, as before stated, would cost only three dollars to boat one ton of flour 300 miles; this is thirty cents a barrel. Suppose, then, that the company received seventy cents a barrel, or \$7 a ton, flour could then come from Pittsburg to Philadelphia for \$1 a barrel, the sum which is now paid from Columbia. Thus, the canal company would gain \$7 a ton by a trade which could never move through a road of equal length. Here we see that on canals the tolls may be so arranged as to draw to them articles of little monied value; and it would be the interest of the company or companies to make such regulations. But on turnpike-roads no such accomodation of charges, in proportion to distance, can be effected, because of the number of horses, which cannot be dispensed with.* Even were the roads made at the public expense, and toll free, still the carriage of one ton for three hundred

* In my work on small canals, published in 1796, page 140, there is a table showing a mode of regulating the boating and tonnage in such a manner that a ton may be transported one thousand three hundred miles for \$5, yet by this method canal companies would gain more toll than by any other means yet practised.

miles would cost, at least \$35. But were canals made at the public expense, and no other toll demanded than should be sufficient to keep them in repair, a ton in boating and tolls would only cost \$3 for 300 miles, and for \$35, the sum which must be paid to carry one ton 300 miles on the best of roads, it could be boated 3,500 miles, and draw resources from the centre of this vast continent.

But, striking as this comparison is, I will still extend it. The merchandize which can bear the expense of the carriage on our present roads to Pittsburg, Kentucky, Tennessee, or any other distance of 300 miles, and which for that distance pays \$100 a ton, could be boated on canals 10,000 miles for that sum.

As these calculations are founded on facts which will not be denied by any one acquainted with the advantages of canals, it is the interest of every man of landed property, and particularly of the farmers of the back countries, that canals should be immediately constructed, and rendered as numerous as the funds of the Nation will permit, and the present population requires; and, as inhabitants multiply most toward the interior and must extend westward, still moving more distant from the sea-coast and the market for their produce, it is good policy and right that canals should follow them.

In 25 years, our population will amount to 14 millions, two-thirds of whom will spread over the Western countries. Suppose, then, that 3,500,000 dollars were annually appropriated to canals: such a sum would pay for 300 miles of canals, each year, and in 20 years we should have 6000 miles circulating through, and penetrating into the interior of the different states. Such sums, though seemingly large, and such works, though apparently stupendous, are not more than sufficient to keep pace with the rapid increase of our population, to open a market, and carry to every district such foreign articles as we, near the coast,

enjoy. With this view of the subject arises a political question of the utmost magnitude, to these states, which is, that, as our national debt diminishes, and the treasury increases in surplus revenue, will it not be the best interest of the people to continue the present duties on imports, and expend the products in national improvements?

To illustrate this question, I will state some examples of the rate of duties, and the expense of carriage, to prove that, by keeping on the duties, and making canals with the revenue, goods, in a great number of instances, will be cheaper to the consumer than by taking off the duties, and leaving the transport to roads.

FIRST EXAMPLE.

Brown sugar pays in duty $2\frac{1}{2}$ cents per lb., or for 100 lbs.....	\$2.50
It pays for wagoning 300 miles	5.00
	<hr/>
Total	\$7.50

By the canal, it would cost, in boating, 15 cents for 300 miles; consequently, the boating and duty would amount to \$2.65; therefore, by keeping on the duty, and making the canal, sugar would arrive at the interior, 300 miles, \$2.35 the cwt. cheaper than if the duties were taken off, and the transport left to roads.

SECOND EXAMPLE.

One bushel of salt, weighing 56 lbs., paid in duty.....	\$0.20
To carry it 300 miles by roads, the expenses are.....	2.50
	<hr/>
Total	\$2.70

By the canal, it would cost, for boating 300 miles, seven and a half cents. By keeping on the duties, and making the canals, it would arrive to the interior consumer six and a half cents the bushel cheaper than were the duties taken off, and the transport left to roads.

THIRD EXAMPLE.

Molasses pays 5 cents a gallon duty, this is, for 100 lbs.....	\$0.75
It pays for wagoning 300 miles.....	5.00
Total.....	<u>\$5.75</u>

By the canal, the carriage would cost 15 cents, and it would arrive at the interior at \$4.10 the cwt., or 27 cents a gallon cheaper than were the duties taken off, and the transport left to roads.

Numerous other articles might be stated to show that the real mode of rendering them cheap to the interior-consumer is to keep on the duties, and facilitate the carriage with the funds so raised.

These, however, may be considered as partial benefits, and not sufficiently general to warrant keeping on the duties; but there is a point of view in which I hope it will appear that the advantages are general, and will be felt throughout every part of the states. It is by reducing the expense of all kinds of carriage, and thus economise to each individual more than he now pays in duty on the foreign articles he consumes; for example, wood for fuel is an article of the first necessity; it cannot bear the expense of transport 20 miles, on roads; at that distance it is shut out from the market, and the price of fuel is, consequently, raised to the amount of carriage; were a cord of wood carried 20 miles on roads, it would pay, for wagoning, at least \$3; on a canal it would pay 20 cents; thus, on only one cord of wood, there is an economy of \$2.80.

Which economy would pay the duty on 14 pounds of tea, at 20 cents the pound duty; or 140 pounds of sugar, at 2 cents the pound duty; or 56 pounds of coffee, at 5 cents the pound duty; or 14 bushels of salt, at 20 cents the bushel duty; or 56 gallons of molasses, at 5 cents the gallon duty.

I will now suppose a city of 50,000 inhabitants, who, for their household and other uses, will consume 50,000 cords a year, on which there would be an economy of \$140,000; a sum, in all, probably equal to the duties paid by the inhabitants; for the duties divided on the whole of the American people, is but \$2.28 to each individual; here I have estimated each person to pay \$2.80; yet this estimate is made on one cord of wood to each inhabitant of a city; were I to calculate the economy on the carriage of building timber, lime, sand, bricks, stone, iron, flour, corn, provisions, and materials of all kinds which enter or go out of a city, it would be five times this sum; and thus the towns and cities are to be benefited. The farmer or miller who lives 20 miles from a market, pays at least 22 cents to wagon a barrel of flour that distance; by the canal it would cost two cents, the economy would be 20 cents; at 100 miles the economy would be 100 cents, and at 150 miles it would be 150 cents; beyond this distance the flour cannot come to market by roads; yet at this distance, the economy of 150 cents on the carriage of one barrel of flour would pay the duty on $7\frac{1}{2}$ pounds of tea; or 75 pounds of sugar; or 30 pounds of coffee; or $7\frac{1}{2}$ bushels of salt; or 30 gallons of molasses.

Thus it is, that the benefits arising from a good system of canals are general and mutual; therefore, should peace and the reduction of the national debt give an overflowing treasury, I hope you and the majority of Americans will think with me that the duties should not be taken off, nor diminished; for such an act, instead of relieving the people, would really oppress them, by destroying the means of reducing the expense of transport, and of opening to them a cheap mode of arriving at good markets. To proceed with these demonstrations, let us look at the rich productions of our interior country: wheat, flour, oats, barley, beans, grain, and pulse of all kinds, cider, apples, and

fruits of all kinds, salt, salted beef, pork and other meats,* hides, tallow, bees'-wax, cast and forged iron, pot and pearl ashes, tanners' bark, tar, pitch, rosin and turpentine, hemp, flax and wool, plaster-of-paris, so necessary to our agriculture, coals and potters' earth for our manufactures, marble, lime, and timber for our buildings.

All of these articles are of the first necessity, but none of them can bear the expense of \$5 the cwt., to be transported 300 miles on roads; yet, on canals, they would cost, in boating, only 15 cents the cwt. for that distance.

There is another great advantage to individuals and the nation, arising from canals, which roads can never give. It is, that when a canal runs through a long line of mountainous country, such as the greater part of the interior of America, all the grounds below for half a mile or more may be watered and converted into meadows, and other profitable culture. How much these conveniences of irrigation will add to the produce of agriculture, and the beauties of nature, I leave to experienced farmers and agricultural societies to calculate. In Italy and Spain it is the practice to sell water out of the canals, for watering meadows and other lands. In such cases, tubes are put into the canal, under the pressure of a certain head of water, and suffered to run a given time for a fixed price; the monies thus gained add much to the emoluments of the canal companies.

But, with all these immense advantages which canals give, it may be a question with many individuals, whether they can be constructed in great leading lines, from our coasts and navigable rivers, to the frontiers of the several states, or pass our mountains, and penetrate to the remote parts of our interior country. Should doubts arise on this

* Animals are now driven to market, 300 or more miles, at a considerable expense and loss of flesh, principally for two reasons, first, the expense of transporting the salt to the interior, and secondly, the expense of carrying the salted meats to market.

part of the plan, I beg leave to assure you that there is no difficulty in carrying canals over our highest mountains, and even where nature has denied us water, for water is always to be found in the valleys, and the canal can be constructed to the foot of the mountain, carrying the water to that situation. Should there be no water on the mountain or its sides, there will be wood or coals, either, or both of which can be brought cheap to the works, by means of the canal. Then, with steam engines, the upper ponds of canals can be filled from the lower levels, and, with the engines, the boats can, on inclined planes, be drawn from the lower to the upper canal; for this mode of operating, it is necessary to have small boats of 6 tons each. As the steam engines are to draw up and let down the boats on inclined planes, no water is drawn from the upper level of canal, as when locks are used; consequently, when the upper ponds have been once filled, it is only necessary that the engine should supply leakage and evaporation. There is another mode of supplying the leakage and evaporation of the higher levels: on the tops and sides of mountains there are hollows or ravines, which can be banked at the lower extremity, thus forming a reservoir to catch the rain or melted snow. From such reservoirs, the ponds of canals can be replenished in the dry months of summer. This mode of reserving water is in practice in England for canals, and in Spain for irrigation. In this manner, I will suppose it necessary to pass a mountain 800 feet high; then four inclined planes, each of two hundred feet rise, would gain the summit, and four would descend on the other side. Total, eight inclined planes, and eight steam engines. Each steam engine, of 12 horse power, would cost about 10,000 dollars, in all, 80,000 dollars; each would burn 12 bushels of coals in 12 hours, or 96 bushels for the 8 engines, for one day's work.

The coals in such situations may be } estimated at 12 cents a bushel, or }	.....	\$11.52
At each engine and inclined plane, there } must be five men, total 40, at \$1 each }	.....	40.00
Total.....	.....	<u>\$51.52</u>
For this sum they would pass 500 tons in one day, over } the eight inclined planes which for each ton is only }	....	10 cts
Suppose the mountain to be twenty miles } wide, boating for each ton would cost }	.....	20 cts
Total.....	.....	<u>30 cts</u>

a ton, for passing over the mountain, which will be more or less, according to circumstances,—these calculations being only intended to remove any doubts which may arise on the practicability of passing our mountains.

Having thus, in some degree, considered the advantages which canals will produce in point of wealth to individuals, and the nation, I will now consider their importance to the Union, and their political consequences.

First, their effect on raising the value of the public lands, and thereby augmenting the revenue.

In all cases where canals shall pass through the lands of the United States, and open a cheap communication to a good market, such lands will rise in value for 20 miles on each side of the canal. The farmer who will reside 20 miles from the canal can, in one day, carry a load of produce to its borders; and were the lands 600 miles from one of our sea-port towns, his barrel of flour, in weight 200 pounds, could be carried that distance for 60 cents, the price which is now paid to carry a barrel 50 miles on the Lancaster turnpike. Consequently, as relates to cheapness of carriage, and easy access to market, the new lands, which lie 600 miles from the seaports, would be of equal value with lands of equal fertility, which are 50 miles from the seaports. But, not to insist on their being of so great a value, until population is as great, it is evident that they must rise in value, in a three or four-fold degree; every

lineal mile of canal would accommodate 25,600 acres; the lands sold by the United States, in 1806, averaged about two dollars an acre, and certainly every acre accommodated with a canal would produce \$6; thus, only 20 miles of canal, each year, running through national lands, would raise the value of 512,000 acres of land, at least \$4 an acre, giving two million and forty-three dollars to the treasury, — a sum sufficient to make 136 miles of canal. Had an individual such a property, and funds to construct canals to its centre, he certainly would do it for his own interest. The nation has the property. And the nation possesses ample funds for such undertakings.

Second. On their effect in cementing the Union, and extending the principles of confederated republican government, numerous have been the speculations on the duration of our union, and intrigues have been practised to sever the western from the eastern states. The opinion endeavored to be inculcated was, that the inhabitants behind the mountains were cut off from the market of the Atlantic states; that, consequently, they had a separate interest, and should use their resources to open a communication to a market of their own; that, remote from the seat of government, they could not enjoy their portion of advantages arising from the union, and that, sooner or later, they must separate and govern for themselves.

Others, by drawing their examples from European governments, and the Monarchies which have grown out of the feudal habits of nations of warriors, whose minds were bent to the absolute power of the few, and the servile obedience of the many, have conceived these states of too great an extent to continue united under a republican form of government, and that the time is not distant when they will divide into little kingdoms, retrograding from common sense to ignorance, adopting all the follies and barbarities which are every day practised in the kingdoms and petty

states of Europe. But those who have reasoned in this way have not reflected, that men are the creatures of habit, and that their habits as well as their interests may be so combined, as to make it impossible to separate them without falling back into a state of barbarism. Although in ancient times some specks of civilization have been effaced by hordes of uncultivated men, yet, it is remarkable that since the invention of printing, and general diffusion of knowledge, no nation has retrograded in science or improvements; nor is it reasonable to suppose that the Americans, who have as much if not more information in general than any other people, will ever abandon an advantage which they have once gained. England, which at one time was seven petty kingdoms, has, by habit, long been united into one. Scotland, by succession, became united to England, and is now bound to her by habit, by turnpike-roads, canals, and reciprocal interests. In like manner all the counties of England, or departments of France, are bound to each other; and when the United States shall be bound together by canals, by cheap and easy access to markets in all directions, by a sense of mutual interest arising from mutual intercourse and mingled commerce, it will be no more possible to split them into independent and separate governments, each lining its frontiers with fortifications and troops, to shackle their own exports and imports to and from the neighboring states, than it is now possible for the government of England to divide and form again into seven kingdoms.

But it is necessary to bind the states together by the people's interest, one of which is to enable every man to sell the produce of his labor at the best market, and purchase at the cheapest. This accords with the idea of Hume, "that the government of a wise people would be little more than a system of civil police; for the best inte-

rest of man is industry, and a free exchange of the produce of his labor for the things which he may require."

On this humane principle, what stronger bonds of union can be invented, than those which enable each individual to transport the produce of his industry 1,200 miles for 60 cents the cwt.? Here, then, is a certain method of securing the union of the states, and of rendering it as lasting as the continent we inhabit.

It is now eleven years that I have had this plan in contemplation for the good of our country. At the conclusion of my work on small canals, there is a letter to Thomas Mifflin, then Governor of the State of Pennsylvania, on a system of canals for America. In it I contemplated the time when "canals should pass through every vale, wind around each hill, and bind the whole country together in the bonds of social intercourse," and I am happy to find that, through the good management of a wise administration, a period has arrived when an overflowing treasury exhibits abundant resources, and points the mind to works of such immense importance. Hoping speedily to see them become favorite objects with the whole American people,

I have the honour to be

Your most obedient servant,

ROBERT FULTON.

To Albert Gallatin, Esq., Sec. U. S. Treasury.

ROBERT FULTON'S LETTER TO GOUVERNEUR MORRIS,
DATED 1814.

*To Gouverneur Morris, Esq., President of the Board
of Commissioners of the Western Canal.*

NEW YORK, February 22d, 1814.

“SIR:—Numerous engagements have hitherto prevented my paying that attention to the report of the Commissioners, which the importance of the subject merits; but that you may have evidence of my desire to give all the aid in my power to an enterprise so sublime (for I deem that a sublime national work, which will secure wealth and happiness to millions), I have committed to writing, some observations, which, should you consider them of any utility, you will make use of, as you think proper.

In the report of March, 1812, page 9, the Commissioners gave calculations on the expense of conveyance by canals, which calculations were drawn from the experience acquired on canals in England, as to the quantity of work that two horses and three men could do in eight hours; to which, adding the wear and tear of the boat and canal, the decay of horses, and interest on the capital expended in purchasing horses and boats,—also the profit on the boat, and the wages, which are higher in this country than in England, it is shown that the total expense amounts to no more than one cent per ton per mile. As I passed three years at various canals in England, to obtain practical knowledge on the manner of constructing them, and to make myself familiar with their advantages, and was well acquainted with some of the best engineers, I know this calculation to be correct. Hence, one cent per ton per mile is one dollar

a ton for a hundred miles, while the usual cost of wagoning is one dollar and sixty cents per cwt. for 100 miles, or thirty-two dollars a ton. It consequently follows, that on a canal, a ton weight could be boated 3200 miles for the sum now paid to wagon it 100 miles; and the persons at 3200 miles from a good seaport would have all the advantages of trade, or of bringing their produce to market, which those who reside only 100 miles from market now enjoy, provided the canal were toll free.

Therefore, as cheapness of transport, united to safety and certainty, are the great objects of all public improvements, in canals, railways, and roads, the one cent per ton per mile is the most powerful argument in favor of canals, and must ever be present in the mind of the political economist, in all his reflections and reasonings on the advantages of such works. From this one cent per ton per mile, I will draw some interesting calculations on the present price of freight in sloops on Hudson's river, between New York and Albany, and show that it could be done much cheaper by a canal: the proof of them will be conclusive, that if a canal can give advantages superior to sloop navigation on Hudson's river, which is one of the most rectilinear and best in the world, the benefits to be derived from the one contemplated must be vastly superior to every kind of road, river, or lake communication, from Lake Erie to Hudson's river.

The usual price of freight from Albany to New York is,

For a barrel of flour, from.....	2s. to 2s. 6d.
do. do. pot-ashes	3
do. do. pork	3

To avoid errors, I will state the average charge at 2s. 6d. the barrel, and allow ten barrels to one ton weight.* Thus,

* Potash and beef barrels weigh more than flour; but cotton-bags and bales of dry goods weigh less: for equal bulk, the flour-barrel is a fair average.

a canal boat of fifty tons would carry five hundred barrels, which, at ten dollars a day in expense, and twenty miles in speed, would arrive from Albany in eight days, for eighty dollars, and, as stated in the report referred to, would amount to one cent per ton per mile, or one hundred and sixty cents for ten barrels, from Albany to New York, equal sixteen cents a barrel, instead of thirty, paid to sloops, thereby producing a saving of fourteen cents a barrel, or one hundred and forty cents a ton.

It is now to be seen what this economy would amount to on the whole number of tons carried on Hudson's river, in one season. From the returns of the Custom-House, I find that four hundred sloops, or vessels of every description are employed, averaging sixty tons burden; those that trade to Albany make eleven trips up, and eleven trips down, in a season; those that trade to Newburgh, Poughkeepsie, and other landings, make more voyages; and hence, the whole may be averaged as equal to twenty-one trips between New York and Albany. Each sixty tons a trip, would amount to one thousand two hundred and sixty tons a year, and the four hundred vessels would carry five hundred and four thousand tons of every kind of material. But as they return from New York not more than half loaded, I will estimate the average trips at forty-five tons, or a total freight of thirty-nine thousand three hundred tons; on which, the economy of one hundred and forty cents a ton gives five hundred and fifty thousand two hundred dollars in favor of the canal,—which is interest, at ten per cent., for five millions five hundred and two thousand dollars, equal thirty-four thousand three hundred and twenty-seven dollars a mile for constructing the canal,—a sum more than sufficient for that purpose.

If it be admitted that the four hundred sloops cost, on an average, each three thousand dollars, their capital is one million two hundred thousand dollars, on which the

wear and tear, at fifteen per cent. is one hundred and eighty thousand dollars a year.

Admitting the captain's wages to be, superior captains having more }	\$400 00
Pilot.....	300 00
Boy.....	200 00
Wear on the sloop, at fifteen per cent.....	450 00
Total	<u>\$1350 00</u>

for the maintenance of three persons and their families, also interest on the capital, and the wear of the sloop.

But if the present population gives this important trade to 160 miles of sloop navigation, may we not look forward with perfect confidence to that of the next twenty years, for producing a trade, which, if required, will pay ample interest on the capital to be expended in executing the canal.

Had it pleased the Author of the Universe to have drawn Hudson's river from Lake Erie, a calm and gentle stream of 10 feet water, the reflecting mind would contemplate with gratitude the Divine munificence; and he who feels that a hundred and sixty miles of navigation on Hudson's river is a blessing to this state, would compare the successive range of extended benefits, and draw exact estimates of national wealth from 160 miles of easy communication to the western extremity of Lake Superior.

For, if Hudson's river, collecting freight from its surrounding country, and an interior not more distant than Cayuga or Ontario, now bears on its waters near 400,000 tons per annum, where shall the mind be arrested? on what number of tons shall it dwell, when coming from the population of the next 20 years, and the countries which surround Lake Superior, Michigan, Huron, and a canal of 300 miles through a fertile country? Compared with the trade now on the Hudson's river, it cannot be less than a million of tons each year; *and for the following reasons:*

where the canal unites to the Hudson's river, the man who lives 10 miles from the river, and 10 from the canal, will, when he has his produce in a wagon, go directly to the river; but he who lives 30 miles from the river, and 5 from the canal, will carry it to the canal; and he who lives 50 miles from the river will go 30 to the canal; he who lives 300 miles from the river will wagon his produce 100 miles to the canal; thus the canal would draw in the trade of a country forming a triangle, with a base line 200 miles long, and from thence to the apex, 300 miles, equal a range of country 300 miles long, 100 miles wide, or 30,000 square miles, equal acres, 19,200,000

Lake Erie will draw in the trade for 100 miles round its margin; Huron and Michigan from a long distance; Lake Superior from 150 miles; all of which may be estimated at 30,000,000

Total, Acres, 49,000,000

a quantity, if I recollect right, not far short of the whole of England. (Arthur Young states England, Ireland, and Scotland to contain 90 millions of acres.)

The population of England is about one soul to 6 acres, and there can be no doubt that the time will come, when the population in the countries here indicated will be one to 10 acres, or 4,920,000 persons, a number equal to half the population of England, whose industry and necessities must cause more than one million of tons to move through the canal in a season; which million of tons, carried at so low a rate as to enable everything useful to come to market, would produce abundant interest on the capital expended: for, at one cent a ton per mile in expenses, the transport on 300 miles of canal would

Cost.....	\$3 00
And from Albany to New York.....	2 50
Total.....	\$5 50
25 *	

or 55 cents a barrel. If, then, 50 cents for toll were charged on each barrel, or 25 cents a hundred on merchandise and other materials, for passing through the canal, still the barrel, or 200 weight, would arrive at New York for one dollar fifty cents, which 50 cents toll, or 5 dollars a ton, would, on one million of tons, give 5 millions of dollars a year, or 50 per cent. for 10 millions to make the canal. Admitting that from Lake Superior to the commencement of the canal at Lake Erie, the expense should be one dollar a barrel, it would arrive at New York, from that distant region, 1600 miles, for two dollars, the price which it now costs to wagon a barrel of flour about 130 miles, at which distance, the expense of coming to market checks agriculture, and the improvement of the country. Therefore, this canal and passage through Lake Erie into Lake Superior will ever be cheaper than transport on our much admired river Mississippi, even when she shall have the advantage of steamboats. For from Louisville to New Orleans, a distance of 1545 miles, the freight is one dollar 50 cents a barrel, but to come up from New Orleans to Louisville, it is four and a half dollars a hundred weight, or 9 dollars a barrel.

Hence, this great work would, as a lucrative speculation for a company of subscribers, be superior to any banking association, or incorporated body now known, and in every point of view is worthy of this great state: by drawing forth its resources and those of other states into and through this state,—as a source of abundant revenue, obtained by the economy of labor, and consequently a clear gain to the state,—as a means of strength, by consolidating population,—as an immense object of real glory,—a vast and noble example to our sister states. Such are the conquests worthy of a great and enlightened people—conquests as lasting as the waters that nourish them, and of which we could never be deprived.

All that is honorable of the fame of Louis the 14th is the canal of Languedoc, and his public highways. His military conquests were lost before he died; his canal and roads alone remain blessings to France.

Not more than 40 years ago, the Duke of Bridgewater, regardless of public prejudice, constructed the first canal in England, in length about 30 miles; it gave him immortality and \$130,000 a year. His success and good example have been the cause of many hundred miles being since executed in various parts of the kingdom, on which the easy conveyance of the ponderous articles of agriculture, manufactures, and commerce, has greatly promoted the improvements of that country, and added to her wealth and power.

It is a curious fact, that his canal runs nearly parallel to the river Mersey, the former channel of communication from Manchester to Liverpool; it was, therefore, thought absurd to contend that a canal should rival river navigation; as some persons now believe it visionary to cut a canal anywhere bordering on our lakes. The river was an imperfect navigation, embarrassed by uncertainty and risk; the canal was without risk, and certain to deliver the goods at a given place in the appointed time; it therefore drew the trade from the river, and left it a deserted stream. In fact, that a communication may be perfect, the trade must pass with equal ease each way; it must not be subject to the impediments of calms or contrary winds on the lakes; or what is worse, to *freshets*, *floods*, or *shoals*, which are common to fresh water rivers.

But seeing our vast lakes and rivers, there is nothing more natural, than to associate the idea of navigation with them, and lead the mind on through locks to Ontario, and along the St. Lawrence to Quebec. The best of all practice, however, the practice of English and Dutch canals, has proved how vastly inferior such communications are to

the one contemplated; and the calculations which I here submit, will, I hope, make it clear to every unbiassed mind. But were the conveyance by the lakes and St. Lawrence more perfect than it ever can be, *and Canada ours*, it could never be good policy in New York, to let so immense a trade go by that course, to the infinite injury of this state. I have shown, and I hope clearly, that were the intended canal to cost ten millions of dollars, it would in a few years, produce five millions. Then it would pay its capital in less than four years, and give a revenue to this state without a tax of from 3 to 5 millions a year; with which income this state might proceed with other and greater improvements to its own glory, and incalculable benefit. A canal is in reality like a great labor-saving machine in the possession of a prudent and skilful manufacturer; the economy and profits of which are applied to extending his works and increasing his capital. Here the state is proprietor, and possesses the capital to execute a work, which I do not hesitate to say would be an inexhaustible mine of wealth, that in a few years would give to this state the most refined order of public improvement. For if my calculations be correct, and I challenge any one to confute them on principles of increasing population and industry, the canal yielding 5 millions a year, would, in twenty years, give one hundred millions, to be expended in other canals, bridges, roads, and improvements. What could be done with 100 millions of dollars? All reflecting men can conceive and calculate.

By this statement you will perceive, that I am not for a canal free of toll. My reason is, that the whole inhabitants of the state being responsible for the necessary funds to construct it, or the interest thereon, they who benefit by the canal should pay such toll as will return the interest; and not only so, but they should pay at least as much toll as I have stated, which still leaves them an immense ad-

vantage in coming to market, yet produces an ample fund for other improvements. It is therefore, I think, evident, that if a reasonable toll can produce an annual income, which in time will improve the whole state, it is the interest of the whole state that the canal should be made and the toll laid.

My estimate of one million of tons a year is, for 9 months, equal 3703 tons a day, or 74 boats a day. To pass the locks at 12 minutes for each boat will require from 14 to 15 hours, or a double range of locks. On this subject and the manner of executing the canal, I will perhaps, at a future day, trouble you with another letter.

I am, Sir,

Respectfully,

Your most obedient,

ROBERT FULTON.

THE END.

THE HISTORY OF THE

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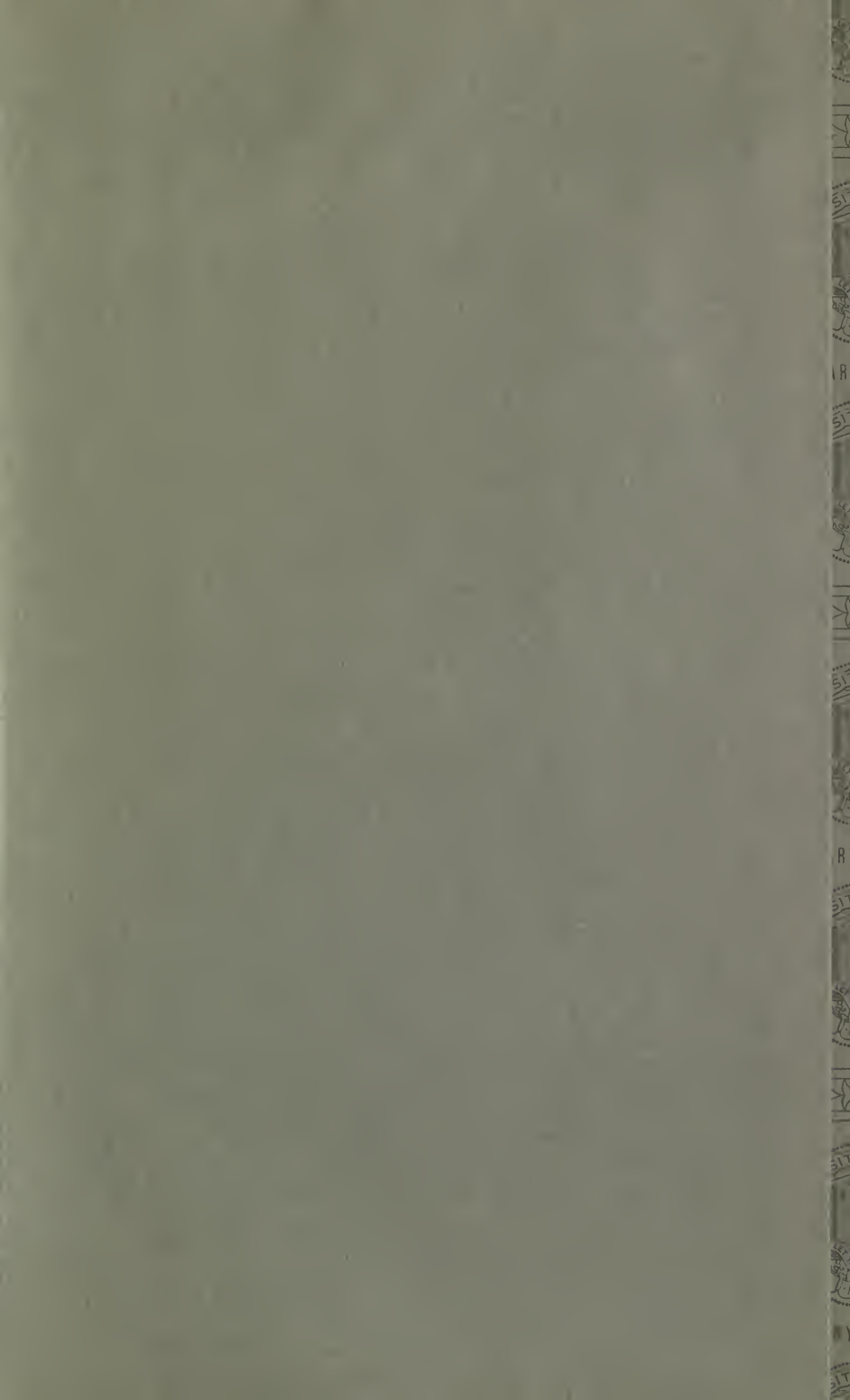
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