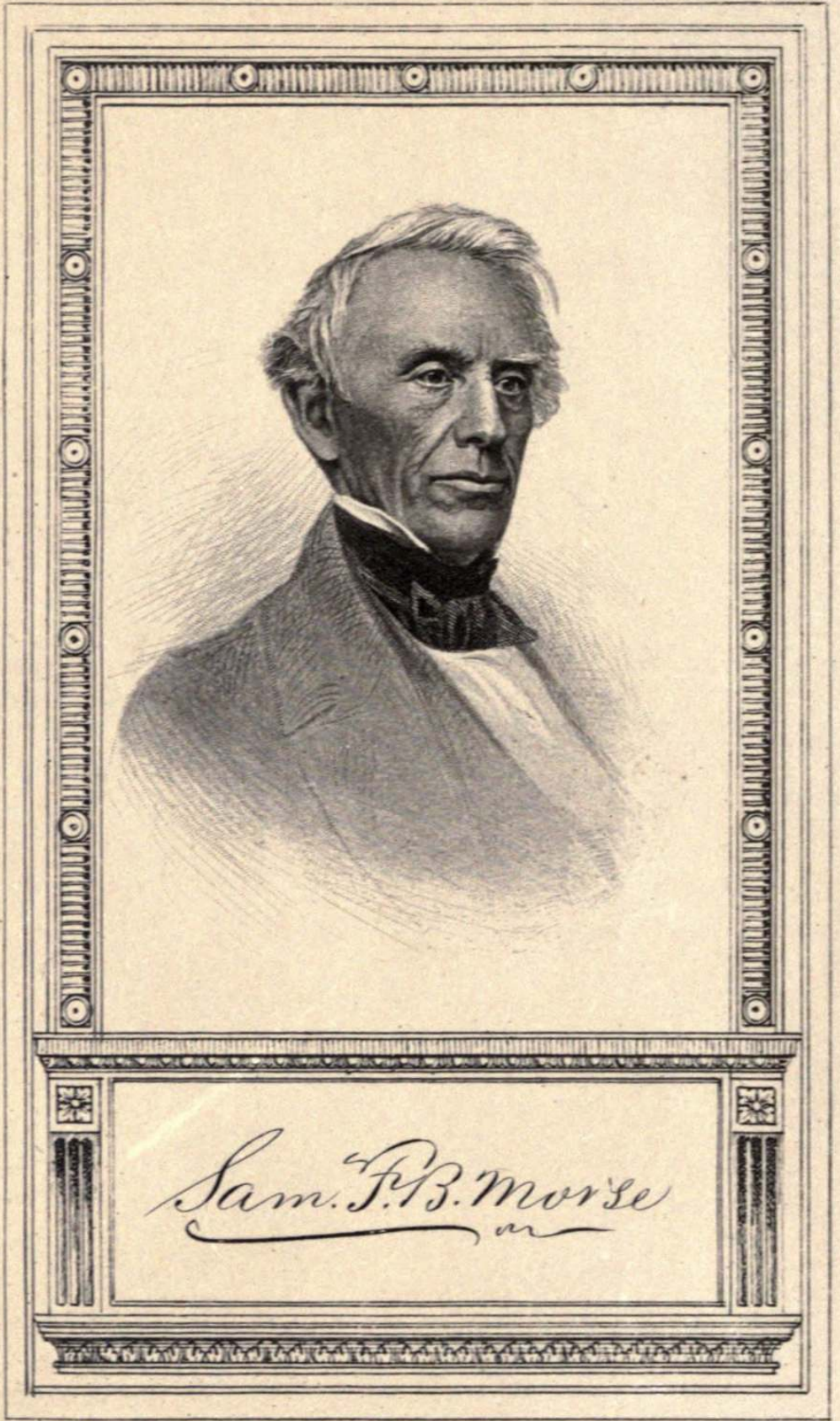


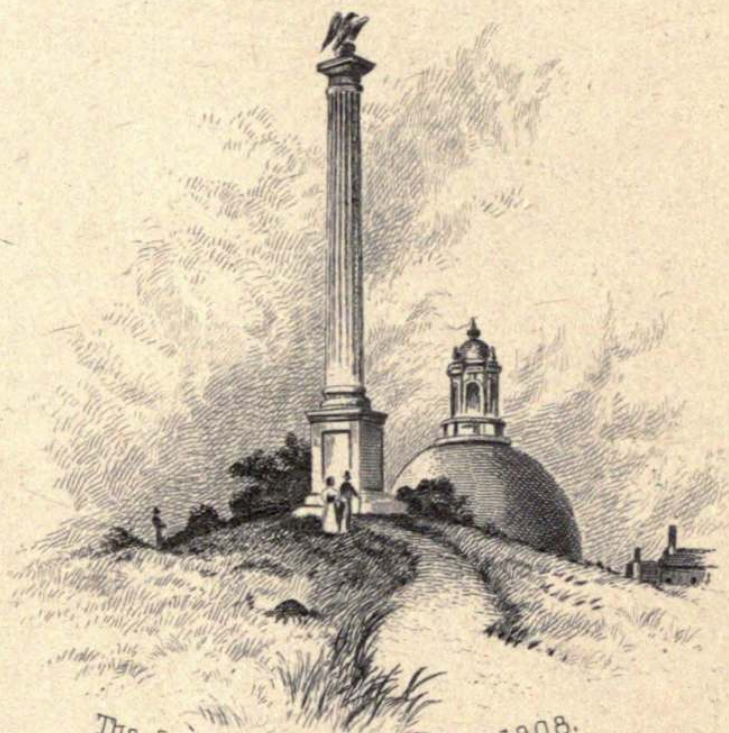


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THE
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OF
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The Summit of Beacon Hill, 1808.

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SAMUEL FINLEY BREESE MORSE

BY

JOHN TROWBRIDGE



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PREFACE.

I invite the attention of the reader to the record of a man who spent the first half of his life as an artist and the last half as an electrician. The vast storehouse of Nature was opened to him, and he was given honours and gold. He changed the world more than Cæsar or Napoleon. He took away the occupation of great merchants who went down to the sea in great ships. He bound together the states of this great continent with bands of iron. While an artist, no canvas seemed to him large enough upon which to express his ideas; and, as an electrician, he was given the whole surface of the globe whereon to inscribe his name. Is there not food for thought in the study of this life? The historian will find therein a stronger impulse to study the effect of science upon human affairs, and will be led to regard its influence more important and lasting, perchance, than that exerted by the greatest military hero. The electrician will

wonder why a man who had not fully imbibed even the electrical knowledge of his time, and who had no knowledge of mathematics, should have been chosen to do this thing. The psychologist will find problems in this life in regard to the assimilation of ideas, the importance of suggestion, the value of initiative, and, in considering these, may perhaps decide whether he can be called a genius. The student of economics can find in the story of telegraph litigation a picture of the grasping men who adopt the principles of socialism in order to prey on the labors of an inventor under the pretence of public utility.

J. T.

CAMBRIDGE, MASSACHUSETTS, October, 1901.

CHRONOLOGY.

1791

April 27. Samuel Finley Breese Morse was born at Charlestown, Massachusetts.

1801

September. Entered Andover Academy.

1807

September. Entered Yale College.

1811

July 13. Sailed for Europe to study painting.

1813

May. Contributed a picture of the *Dying Hercules* to the Royal Academy Exhibition, London.

1815

August 21. Returned to America.

1817

January. Engaged to Miss Lucretia P. Walker of Concord, New Hampshire.

June. Went to Washington to take out

patents on a flexible piston pump, the invention of his brothers and himself.

1818

October 1. Married Miss Lucretia P. Walker.

1823

August 1. Took out a caveat for a machine for cutting marble.

1825

February 8. Death of his wife.

1826

January 15. Organised, in company with others, the National Academy of Design.

1827

May 3. Delivered president's address on the first anniversary of the Academy of Design.

Winter. Renewed his early interest in experiments in electricity.

1829

November 8. Sailed for Europe to perfect himself in his profession as an artist.

1832

October 1. Returned to America in the packet ship *Sully*, on which he first thought of the telegraph.

1835

Autumn. Was appointed Professor of the Literature of the Arts of Design in New York City University.

1836

January. Exhibited to Professor L. D. Gale models of his electric telegraph, including a relay.

1837

September 2. Showed his apparatus in successful operation to Alfred Vail.

October 3. Applied for a caveat on the American Electro-magnetic Telegraph.

1838

January 6. First experiment with three miles of coiled copper wire stretched around a room of the factory in Speedwell, New Jersey.

April 7. Applied for patent.

1838 (*continued*)

May 16. Went to Europe to obtain foreign patents.

1839

April 15. Returned to America, having failed to obtain patents in England.

1840

May 24. First message sent over the trial line between Baltimore and Washington.

June 20. Issue of the first patent on the American Electro-magnetic Telegraph to Samuel F. B. Morse.

1843

March 3. Congress appropriated \$30,000 to test the value of the Morse telegraph.

1845

August 6. Sailed for Europe to introduce his telegraph.

1846

April 11. Reissue of Morse's patent.

June. Yale College conferred the degree of LL.D.

1847

Married Miss Sarah E. Griswold of Poughkeepsie, New York.

1848

March 1. The Sultan of Turkey recognised by a decoration in diamonds the inventor. This was the first recognition by a foreign government.

August 24. Claim of Morse as the original inventor of the telegraph brought into the courts.

Decision of the Supreme bench in his favor.

1855

Great gold medal of Science and Art sent by Emperor of Austria.

1856

Order of the Chevalier of the Legion of Honour conferred by the Emperor of France.

June 5. Sailed for Europe.

October 2. Engaged on experiments with submarine cable between Newfoundland and Ireland.

1856 (*continued*)

October 9. Banquet to Mr. Morse in London.

1858

July 24. Sailed for Europe.

September 1. Received testimonial of four hundred thousand francs from France, Austria, Belgium, Netherlands, Piedmont, Russia, Holy See, Sweden, Tuscany, and Turkey.

1866

June. Last visit to Europe.

1868

December 30. Banquet in his honour in New York.

1871

June 10. Ceremonies at the erection of a statue to Morse in Central Park.

1872

April 2. Samuel Finley Breese Morse died at Poughkeepsie, New York.

SAMUEL FINLEY BREESE MORSE.

SAMUEL F. B. MORSE.

I.

IT is said that Keats, the poet, confessed that he had never felt the exhilaration of a great success. The lives of most men are like the scoring in a musical composition, which fills in the periods between the entrances of the maestro: well done it may be, but often uninteresting. Samuel Finley Breese Morse was selected by the Ruler of the universe to give to the world a method of communication of thoughts and ideas which was destined to create a greater revolution than any military hero has caused among nations. Why was this man selected? Why was he given this great success—a success which must have filled his soul with an exaltation for which poets have longed in vain?

It surely will be of interest even to the non-scientific reader to study briefly the career of one who realised Puck's

boast — who could indeed put a girdle around the earth in forty minutes, and who seemed to be an incarnation of the Greek god whose disciples handed on swiftly the torch of progress as they ran.

Samuel Finley Breese Morse was born in Charlestown, Massachusetts, April 27, 1791. His ancestor on the father's side came from Wiltshire, England, in 1635, and settled in Newbury, Massachusetts. His descendants were of the typical stock which characterised the early people of New England, sturdy — most of them lived beyond their eightieth year — and religious. The father of the inventor was a clergyman of high standing, a graduate of Yale College, and once a tutor there. He studied theology under Dr. Jonathan Edwards, the son of the great Edwards, and was settled over the First Congregational Church in Charlestown, April 30, 1789, the date of Washington's inauguration in New York as President of the United States.

He was prominent all his life in affairs connected with the Congregational belief, and occupies a distinguished place in the annals of this sect as establisher of the religious paper, the *Panoplist*, and as one of the founders of the Congregational strongholds — the Theological Seminary at Andover, the American Board of Foreign Missions, the American Bible Society, and the American Tract Society.

He is sometimes called the Father of American Geography, having published many school-books on this subject. This progenitor also had, it is said, a leaning toward invention. He was a man of great energy and persistence, two of the essential qualities in a successful inventor; and, in marking these qualities, we get an inkling of one of the causes of success of the son. It is said that Daniel Webster once spoke of him as “always thinking, always writing, always talking, always acting.”

Out of the loins of this sturdy Puritan came a new light into the world, which was destined by the quick interchange of ideas to modify profoundly New England theology. In the Rev. Jedediah Morse we see sturdy qualities which might lead to success in any of the professions; but he never, apparently, became strongly possessed with an idea. He was not an imaginative man. From whom, then, did the son obtain his artistic side and that combination of the faculty of conceiving forms impalpable to others, with the qualities which made Dr. Eliot say of the Rev. Jedediah, "What an astonishing impetus that man has"? Let us see what manner of woman the mother was.

She was of Scotch descent, her grandfather, Dr. Finley, being of Scotch parentage, but born in Ireland. He became president of Princeton College, and was also a distinguished Presbyterian clergyman. It was said that she pos-

sessed a judicial mind, which was in marked contrast to the sanguine and impulsive spirit of her husband. She was evidently a feminine balance wheel, one of those women of Scotch descent whom we have all known,—a woman with business qualities judiciously concealed by attractive feminine traits. One of her sons, in speaking of the grave debates at the house of his father over the much-mooted plan of the Middlesex Canal—a project which strongly appealed to the sanguine spirit of the Rev. Jedediah—relates this commendation of the distinguished engineer, Loammi Baldwin: “Mrs. Morse was present, not merely as a listener, but occasionally spoke; and her words elicited from Baldwin the remark that Madam’s conversation and cup of tea removed mountains in the way of making the canal.” The pictures we get of this good mother—of eleven children—is that of a wise provider and economiser of a preacher’s

sparse living in those days. She stands out from the records, a Copley portrait, with a shrewd, motherly face, undoubtedly of Scotch lineament, set off by a sober snood and ample sleeves. A portrait of her by her distinguished son represents her reading by candle-light. She was said to be fond of literature, and this portrait emphasises this love; but where was the artistic temperament?

Of the eleven children of this woman, only three survived infancy. These were sons who were good citizens, noted as men of good parts. Sidney Morse was an inventor, and the author of a school geography which had a great circulation, and which many of us remember to have thumbed in our youth. Through these brothers of Samuel Finley Breese Morse we see a strain of the same qualities which distinguished him, and which they received as a direct inheritance from the father. The imaginative

and the artistic element was not developed in any of them with the exception of the subject of this sketch. The fates seemed to be propitious and to be preparing a career for this chosen of men; for, in the very year of Morse's birth, Galvani, like a high priest observing the entrails and prognosticating the future, investigated the twitching of a frog's leg when it was touched with a scalpel, and led Volta in 1800 to invent the battery which was to be Morse's servant. What legend in classical times is more laden with omens in regard to the birth of a hero? Here is what lends an uncommon interest to our study of this man. Why was he selected to hand on the torch of progress—a man in a new world, untrained in science, far from the great intellectual centres, London, Berlin and Paris, new in a subject in which there were such giants as Faraday and Gauss? We are reminded of singular growths in the plant world.

A seed escaping from overpowering shade and falling on a suitable soil can convert a desert reef into an island of delight. The American environment seems to have been especially fitted for the reception of electrical ideas. There is something in electricity especially congenial to the spirit of the race.

Dr. Belknap of Boston, writing to Postmaster-general Hazard, said: "Congratulate the Monmouth Judge [Mr. Breese, the grandfather] on the birth of a grandson. Next Sunday he is to be loaded with names, not quite so many as the Spanish ambassador who signed the treaty of peace of 1783, but only four! As to the child, I saw him asleep, so can say nothing of his eye or his genius peeping through it. He may have the sagacity of a Jewish rabbi or the profundity of a Calvin or the sublimity of a Homer for aught I know. But time will bring forth all things."

At seven years of age Morse attended

a school at Andover, Massachusetts, preparatory for Phillips Academy. In this latter school he was fitted for Yale College, which he entered in his fifteenth year. When a student, his letters to his parents indicate an interest in science, and especially in electricity. The instruction in physical science in those days was very meagre. Jeremiah Day was then professor of natural philosophy in Yale College. The learned professor has given (with evident satisfaction) this record of his lectures :—

“In my lectures on Natural Philosophy the subject of electricity was specially illustrated and experimented upon. Enfield’s work was the text-book.

“The terms of the twenty-first proposition of Book V. of ‘Enfield’s Philosophy’ are these : ‘If the circuit be interrupted, the fluid will become visible, and when it passes, it will leave an impression upon any intermediate body.’

“I lectured upon and illustrated the

first two experiments propounded by the twenty-first proposition, and I recollect the fact with certainty by memoranda now in my possession. The experiments referred to are in terms as follows:—

“ ‘*Experiment 1.* Let the fluid pass through a chain or through any metallic bodies placed at small distances from each other, the fluid in a dark room will be visible between the links of the chain or between the metallic bodies.’ ”

“ ‘*Experiment 2.* If the circuit be interrupted by several folds of paper, a perforation will be made through it, and each of the leaves will be protruded by the stroke from the middle to the outward leaves.’ ”

Writing in 1867, Morse said: “The fact that the presence of electricity can be made visible in any desired part of the circuit was the crude seed which took root in my mind, and grew into form, and ripened into the invention of the telegraph.”

In a letter home February 27, 1809, he writes : —

“Mr. Day’s lectures are very interesting. They are upon electricity. He has given us some very fine experiments. The whole class, taking hold of hands, form the circuit of communication, and we all received the shock apparently at the same moment. I never took an electric shock before. It felt as if some person had struck me a slight blow across the arms.”

It is probable that there was greater scientific activity at that time in Yale College than in any other American college. Benjamin Silliman was then professor of chemistry ; and the brilliant researches of Sir Humphry Davy with the electric battery which led to the discovery of the metal potassium, naturally attracted the attention of a brother chemist to electricity.

Professor Silliman, in speaking of Morse’s early interest in that subject,

said : "S. F. B. Morse was an attendant on my lectures in the years 1808, 1809, and 1810. I delivered lectures on chemistry and galvanic electricity. The batteries then in use were the pile of Volta, the battery of Cruikshank, and the *Couronne des tasses*, well known to the cultivators of that science. I always exhibited these batteries to my classes. They were dissected before them ; and their members and the arrangement of the parts, and the mode of exciting them, were always shown."

At the same time lectures were given at Harvard College on electricity by Professor Frisbie. These lectures were always referred to with great enthusiasm by those who heard them, and Professor Frisbie exists still as a great traditional teacher. He also, doubtless, had modifications of the Voltaic pile, Dr. Hare's deflagrator, which was simply a battery with large metallic plates, the invention of which seems a small matter to us now,

but which excited great interest in the infancy of the subject. All the apparatus on the subject of electricity in those days in Harvard College could be contained in a small cupboard, if we except a massive electrical machine, ordered for the college by Benjamin Franklin. I cannot help thinking that Morse was fortunate in attending Yale College, for there was no one in Harvard College at that time in physical science of the weight of Benjamin Silliman. Morse evidently got all there was to be had at that time on the subject of electricity. He acquired a smattering of chemistry, and speaks of studying optics, dialing, and Homer. It is interesting to speculate upon the future of young Morse if he had not been thrown at a formative period into an academic life where the latest discoveries in electricity were commented upon and the fundamental experiments in science repeated.

In studying Morse's career in college

the most prominent feature, after all, is not his love for electricity or invention. If he had never invented the telegraph, I doubt whether his letters home on the subject of electricity would have been thought significant. The heat of litigation over his patents in after years brought them to light, and invested them with interest. Many a boy has written from his school fuller accounts of his experiments in chemistry, and has ended by becoming a dry-goods merchant. No, Morse's love for electricity was entirely subordinate to his love for painting. Perhaps, like Goethe, he mistook his vocation, and longed to excel in directions which were really paths of greatest resistance for him. This striving for excellence in the great art of painting has been a characteristic of inventors and mechanics. I remember that Alvan Clark, the maker of great telescopes, cut short his explanation of the processes by which he

ground and tested his lenses, in order to show me the portraits he painted and to dwell lovingly upon the values and the chiaro-oscuro. A little encouragement, an imprimatur from the constituted critics of art, would have changed his career from a discoverer of new worlds to a painter of the fleeting ghosts of men. Our thoughts, too, go back to the great Tuscan, Leonardo da Vinci, who was a renowned painter, and who also invented the wheelbarrow, together with many other devices. He too was fortunate in his environment.

The letters from Morse's classmates dwell upon his taste for drawing and painting. He speaks in 1809 of employing all his leisure time upon painting. He took orders for profiles at one dollar a head and for miniatures on ivory at five dollars. In 1810 he writes to his parents on the eve of graduation :

“I am now released from college, and am attending to painting. As to my

choice of a profession, I still think I was made for a painter, and would be obliged to you to make such arrangements with Mr. Allston for my studying with him as you shall think expedient. I should desire to study with him during the winter ; and, as he expects to return to England in the spring, I should admire to be able to go with him. But of this we will talk when we meet at home.”

One is struck by the fact that his parents did not object to their son adopting what was then considered a visionary profession. The Rev. Jedediah Morse was a practical divine—a man of affairs in so far as a clergyman can be ; and he had given his son, at considerable cost, a liberal education, to fit him for the learned professions. We hear, however, of no remonstrance from the father or mother. His mother gives directions in regard to his costume at the coming Commencement, and his

father permits him to be one of the managers at the Commencement ball. The winter after Morse's graduation was spent in Boston, where he attended a course of anatomical and surgical lectures under Dr. Warren, evidently with the intention of fitting himself for the profession of an artist. He also made the acquaintance of Washington Allston, who was destined to influence greatly the artistic epoch of his life. One at the present day, with the multiplication of illustrated journals and periodicals, the great increase of art collections, and the opportunities for foreign travel, cannot realise the surroundings of an artistic young man in Boston in 1810. Even in 1850 I remember that I was taken, while a small boy, into a room in the Boston Athenæum to see a great unfinished picture by Washington Allston, *Belshazzar's Feast*. This, with a few other pictures by Allston and Copley, were all that a boy fond of art could

see ; and it was considered an event to be taken to Boston, up Beacon Street, into the modest building dignified by the name of "Athenæum." Steam and the telegraph have been potent elements in the change that has come to us. Washington Allston was a great name to conjure by in those days ; and the young Morse, aspirant for fame, evidently was stirred to the depths by his intercourse with the great man. There is little of this hero-worship to-day, and Morse's invention has much to do with the absence of it. His invention, however, probably has had less effect on the career that he began life with than on any other field of human effort.

July 13, 1811, Morse sailed for Europe on the vessel *Lydia*, in company with Washington Allston and his wife. The voyage occupied twenty-six days. There were premonitions of the War of 1812 ; but Americans were apparently

well received in England and subjected to no annoyances. Benjamin West was then at the height of his reputation ; and Morse, the young aspirant for artistic fame, was introduced to him by Washington Allston. Truly, a distinguished audience and a distinguished introducer ! West was then in his seventy-fourth year. He had become, perhaps, the foremost painter of his time in England. A man of indefatigable industry, his paintings numbered more than six hundred ; and Morse's letters are full of admiration of his countryman and of desires of emulation. In after years he said to a friend : "I called upon Mr. West at his house in Newman Street one morning ; and, in conformity with the order given to his servant Robert, always to admit Mr. Leslie and myself even if he was engaged in his private studies, I was shown into his studio. As I entered, a half-length portrait of George III. stood before me upon an easel, and Mr. West was sitting

with his back toward me, copying from it upon canvas. My name having been mentioned to him, he did not turn, but, pointing with the pencil he had in his hand to the portrait from which he was copying, he said,—

“ ‘Do you see that picture, Mr. Morse?’ ”

“ ‘Yes, sir,’ I said. ‘I perceive it is the portrait of the king.’ ”

“ ‘Well,’ said Mr. West, ‘the king was sitting to me for that portrait when the box containing the American Declaration of Independence was handed to him.’ ”

“ ‘Indeed,’ I answered; ‘and what appeared to be the emotions of the king? What did he say?’ ”

“ ‘Well, sir,’ said Mr. West, ‘he made a reply characteristic of the goodness of his heart,’ or words to that effect. ‘Well, if they can be happier under the government they have chosen than under mine, I shall be happy.’ ”

The art life of Morse in London seems to have filled all his desires. An intimate friend was Leslie, the artist. He met Wilberforce, Coleridge, and Rogers, and was in constant intercourse with Allston and West. He says in a letter to his parents, September 20, 1812 : "My passion for my art is so firmly rooted that I am confident no human power could destroy it. The more I study, the greater I think is its claim to the appellation of divine ; and I never shall be able sufficiently to show my gratitude to my parents for enabling me to pursue that profession, without which, I am sure, I should be miserable." A model in clay of a *Dying Hercules* was highly commended at this time both by Allston and West, and their praise excited this artistic exuberance of feeling.

Electricity in later life was destined to supplant art and to pervade his whole being, while the colours dried on his palette and lost their bloom. Surely

this man seemed bound irrevocably to art; and there was something extremely mysterious in the influences which were destined in middle life to give him another career, totally different from that which he entered upon in enthusiastic youth. During the four or five years of his artist apprenticeship in London there is not an inkling of a turn for science. We do not hear of any visits to the Royal Institution, where Sir Humphry Davy had made his brilliant discoveries by the aid of the electrical current. There was no effort to become acquainted with the men prominent in electrical science. Art engrossed all his tastes and faculties. She was his mistress, whom he one day was destined to leave. This complete absence of interest in science during those years in London, the centre of science in those days, is remarkable.

He was in London during the War of 1812 and during the War of the Allies, which culminated in the battle of Water-

loo. His letters home give an interesting picture of those stirring times. He remarks in 1813 that the expenses of his first year were two hundred pounds, and he hopes that the same sum will carry him through a second. He was obliged to deny himself every luxury. His breakfast was bread and butter and two cups of coffee ; his dinner, one kind of meat with potatoes — warm twice a week, the rest of the week cold ; his tea, bread and butter, with two cups of tea. A pound at that time went no farther than a dollar in America. His painting materials were very expensive. England was at war with America, and there were no quick steamship lines to bring beef and breadstuffs from the western continent. London was almost archaic in its methods of transportation. A curious picture of this is presented in a note of invitation to young Morse from a Mr. Zachary Macaulay : “Mr. M.’s house is five doors beyond the Plough, at the entrance

to Clapham Common. A coach goes daily to Clapham from the Ship at Charing Cross, at a quarter-past three; and several leave Grace Church Street in the City every day at four. The distance from London Bridge to Mr. Macaulay's house is about four miles."

The method of transportation in the city was by means of miserable hackney coaches with straw in the bottom and by cabs painted yellow, with drivers on little boxes at the side. These, however, were soon superseded by four-wheelers and the hansom. Still, London was then, as it is now, the centre of the civilised world; and Morse's residence there must have been a course of liberal education and a great stimulant of the faculties of observation. He saw the entrée of Louis XVIII. into London in 1814, with his splendid band of music of fifty pieces, his carriage drawn by eight Arabian cream-coloured horses, the king a corpulent little man, with

round face, dark eyes, prominent features, "hands extended sometimes as if in adoration to heaven, at others as if blessing the people." He saw the great Emperor Alexander and Marshal Blücher, "a veteran-looking soldier, a very fine head, monstrous moustaches." Meanwhile he was making progress in his art. He painted a picture of the *Dying Hercules* of great size, which was exhibited in the Royal Academy at Somerset House. The *London Globe*, May 14, 1813, has this notice: "The great feature in this exhibition is that it presents several works of very high merit by artists with whose performances, and even with whose names, we were hitherto unacquainted. At the head of this class are Messrs. Monro and Morse." A plaster model of this figure was sent to the Society of Arts, and received a gold medal. The picture received much praise; and a critic in the British press, May 4, 1813, placed it

among the nine best paintings in a gallery which contained pictures by Turner, Northcote, Lawrence, and Wilkie.

The first years of enthusiasm in the pursuit of his art were delightful. He had made influential friends, he was at the centre of the universe, and the times were stirring. As the term of his residence and apprenticeship drew to a close, he was naturally desirous of earning something ; and he set out for Bristol, where he had been led to think he might obtain commissions. His experience there is significant; for he received, in the old slave port and thoroughly commercial town of the west of England, the first dampening of his artistic enthusiasm. This discouragement, followed by others when he returned to America, had much to do with the turning of his attention to invention. He had received some pressing letters from a Mr. Visscher to visit Bristol to reap a promised harvest of sitters. This quondam friend was

reputed to be worth a hundred thousand pounds, and liked to play the rôle of a Mæcenas without the necessary gesture of putting his hand in his pocket. Morse had with him some picture frames which pleased Visscher's fancy, and the latter desired the artist to paint some pictures to fill them. Accordingly Morse spent three months time in executing what he believed was a commission. When the pictures were finished, Visscher was pleased with them, but declined to take them, saying that he already had more pictures than he knew what to do with. Not a single commission was received in Bristol. Washington Allston was with Morse on this unsuccessful trip. He too received no encouragement; and the two artists, impoverished in purse and spirit, returned to London. A germ of discontent at the world's treatment of artists must have been implanted at that time in Morse's breast. It was destined to grow on his return to America, and

nothing short of the possession of great genius in art could have stifled it. The faculty of invention was stronger than that of art, and it was lying dormant. If Washington Allston was unsuccessful, what hope could there be for Morse? The Fates were spinning iron cobwebs for him, bands which were destined in time to encircle the world, and to hold treasures such as he did not dream of in his wildest flight of imagination. He writes thus to his parents in the spring, before his return to America :—

“I live on as plain food, and as little, as is for my health. Less and plainer would make me ill, for I have given it a fair experiment. As for clothes, I have been decent, and that is all. If I visited a great deal, this would be a heavy expense ; but the less I go out, the less need I care for clothes, except for cleanliness. My only heavy expenses are colours, canvas, frames, etc. ; and these are heavy.”

I have sometimes thought that history could be written on a new plan. Instead of dwelling upon the doings of the puppets of the time during which young Morse spent his apprenticeship in London — Blücher, the Czar, Napoleon — it might be well to pick out the men who were destined to affect permanently the face of the globe. When Napoleon was the principal figure on the world's stage, about to end a strenuous life, which resulted in consolidating Germany and leading to the subsequent disaster at Sedan, the inventor of the telegraph, which was destined to bind together the remote States of California and Massachusetts in one great confederacy of civilisation, was unknown in London. There too was young Faraday, whose researches on electricity were destined to light the cities of the world and revolutionise methods of travel; and greater factors in changing the face of the world were there also, James Watt and Rob-

ert Stevenson. These men, in this new plan of writing history, were the real actors behind the scenes. The others strutted a little day, and caused some stains of blood. The development of the world is due to science; and this development, properly speaking, traced throughout its economic and even its spiritual aspect, should be the true function of history rather than the relation of acts of prowess and schemes of futile diplomacy. But I fear such histories would find few readers; for Pope's epigram, "The proper study of mankind is man," seems to be still considered an expression of wisdom.

It is probable that the unsettled state of the continent and the state of his finances prevented Morse from studying out of England. He apparently did not visit Rome or Venice; and there is no reference to any pictures save those of Benjamin West, Washington Allston, and others of the English school of por-

trait and historical painters. Travel at that time was a serious matter, and there was an excuse for the provincialism of English art. Steam has had its influence on painting. It may not have been a beneficent one, but it has been potent.

During the last year of Morse's residence in England, 1815, Napoleon had returned from Elba. Louis XVIII. had again fled from the capital — doubtless with chubby hands extended to heaven — and Blücher was retwisting that heavy moustache. On June 18, 1815, the battle of Waterloo was fought; and the news did not reach London for two days. Morse's telegraph would have sent it in a few seconds. The young painter's account of the reception of the news of the entrance of the allied armies into Paris is interesting.

“As I passed through Hyde Park on my way to Kensington Grove, I observed great crowds had gathered, and rumours were rife that the allied armies had en-

tered Paris, that Napoleon was a prisoner, and that the war was virtually at an end. . . . On entering the drawing-room at Mr. Wilberforce's, I found the company, consisting of Mr. Thornton, Mr. Macaulay, Mr. Grant, the father and his two sons Robert and Charles, and Robert Owen of Lanark, in quite excited conversation respecting the rumours that prevailed. Mr. Wilberforce expatiated largely on the prospects of a universal peace in consequence of the probable overthrow of Napoleon. . . . I sat near a window which looked out in the direction of the distant park. Presently a flash and a distant dull report of a gun attracted my attention, but was unnoticed by the rest of the company. Presently another flash and report assured me that the park guns were firing, and at once I called Mr. Wilberforce's attention to the fact. Running to the window, he threw it up in time to see the next flash and hear the next report.

Clasping his hands in silence, with the tears rolling down his cheeks, he stood for a few moments perfectly absorbed in thought, and, before uttering a word, embraced his wife and daughter, and shook hands with every one in the room.”

Beside Wilberforce the reformer, stood at that moment a man whose invention was destined to have a greater influence on the abolition of slavery than the voice of even the great English champion. It was destined to revolutionise the conduct of wars, to make impossible another secret passage of the Alps by a Napoleon, and to render nugatory forced marches over wide extent of country. How much it was destined to nip in the bud future military heroes we can best judge by considering what it might have prevented in the career of Napoleon.

II.

AUGUST 21, 1815, Morse returned to America to practise his profession. He set up a studio in Boston. His picture, *The Judgment of Jupiter*, was on exhibition, and, being the production of the pupil of Allston and West, attracted much attention. But the young artist found little to do. His picture was not bought, and he had no orders for new ones. The Bristol experience seemed to be repeated, and the inventive spirit within him asserted itself. If success was denied in one direction, it might be obtained in another. The art in him was destined to receive severe blows; but what a future was to be given to the vanquished! He invented, together with his brother, Sidney E. Morse, during the winter of 1816, an improvement in a pump for a fire-engine. A patent was secured, and the inventors had great hopes for a while. In a notice of it we

find that four men could work it with ease and deliver three hundred and sixty gallons in one minute. Eli Whitney, the inventor of the cotton-gin, said of it: "Having examined the model of a fire-engine invented by Mr. Morse, with pistons of a new construction, I am of opinion that an engine may be made on that principle (being more simple and much less expensive) which would have a preference to those in common use."

For several years Morse endeavoured to bring his invention into use, and had his first experience in this arduous and vexatious work. It was destined to be a failure.

During the autumn of 1816 and the winter of 1816-17 he became an itinerant artist, and painted portraits at fifteen dollars a head in several towns in New Hampshire and Vermont. At Concord, New Hampshire, he met with considerable success, and wrote to his par-

ents that he believed that he could make an independent fortune in a few years if he devoted himself exclusively to portrait painting, so great was the desire of his countrymen to have their portraits painted. In Concord that winter he met Miss Lucretia P. Walker, whom he afterward married. Their engagement, in 1817, made it all the more obligatory upon him to make a success in his art; but the field of invention seemed the quicker way to a competence, and much of his time was taken up in endeavouring to interest people in his pump. Men ran to fires in those days with antiquated engines, which were worked by hand racks; and the streams of water which they threw were ridiculously inadequate. Morse's pump could deliver a large stream, and he had great hopes that many cities and towns would buy his invention. The town of Concord, New Hampshire, bought one; and the *New Hampshire Patriot* of April 14, 1818,

spoke well of it. But other towns did not follow the example of Concord ; and in 1818 he writes to his parents: "The machine business (between ourselves) I am heartily sick of. It yields much vexation, labour, and expense, and no profit. Yet I will not abandon it. I will do as well as I can with it ; but I will make it subservient to my painting, as I am sure of a support, and even independence, if I pursue it diligently, and I am sure I am disposed to do it." If he had been seized with the idea of a telegraph at that time, the idea would have been vanquished also by the genius of painting ; for the time was not ripe. Henry had not begun his researches, and even the exaltation of spirits of the engagement to an attractive woman could not hasten the appointed time. The man's spirit must be chastened by years of trial. Others must work for this appointed high priest of electricity.

While the affair of the pump was

pushed by his brother, Morse set out for Charleston, South Carolina, on a painting tour. His uncle, Dr. Finley, introduced him in the southern city, sat for his portrait, and thus opened the way to a greater success than had been previously obtained. Many portraits were painted at sixty dollars a head. He could not fill his orders, and visions of a happy future filled his letters to the young woman who was waiting for him at the North. In May, 1818, he returned to Boston, having painted fifty-three portraits and taken orders for nine others which were to be completed. In the autumn of that year he was married, and set out on a bridal tour with horse and gig. His account of this tour is an interesting picture of the times when methods of communication were primitive. The roads were bad, and so were the taverns at the end of the day's journey. The happy couple reached Amherst after a jolting trip,

continued their journey through Wilton to New Ipswich, and, having found that there were many cross-roads on the way to Northampton, which they intended to reach, and no taverns, they returned with a worn-out horse to Concord. Early in November the young married couple embarked on a sailing vessel for Charleston, to work out the lode previously opened. Morse found that several other artists, attracted by his success, had set up their easels in that city. And even a waiter in one of the hotels had discovered that he too was an artist. The field, however, was not entirely worked out; and Morse was soon fully occupied. In a letter to Washington Allston, full of high spirits, he says that he is painting from morning to night, and feels that in a few years, at the rate he is progressing, he will be independent of public patronage. He states that he feels as much enthusiasm as ever for his art, and loves it more

and more. He asks the great painter's opinion on the following point:—

“I have been using a compound, or rather mixture, in flesh, on which I wish your opinion. Yellow ochre has heretofore been the best yellow I could use, but it always appeared to me to want brilliancy. Chrome yellow, on the contrary, is too bright, or eggy; but these two I have mixed half and half, and find it excellent flesh yellow. I find this mixture also excellent in the shadows of white drapery and in reflected lights, when properly tempered with blue and red. A very strong tint of this yellow, laid on boldly in a shadow, gives a clearness and liquidness to it which no other yellow that I have used can give, and gives a warmth and glow to the picture, without being hot. I should like to know the result of your experiment with it.” Here was invention in the art of colour. This extract, too, shows that he was

working hard at what he considered his life's work, bending all his thoughts toward painting, and striving for excellence in it. His interest in art was also shown by his activity in establishing, with others, the South Carolina Academy of Fine Arts, which, however, soon died a natural death.

In the winter of 1821, on his return to the North, reaching out evidently for greater things, he made studies for an immense picture of the House of Representatives at Washington, with portraits of each of the members. He obtained the use of one of the rooms in the Capitol, and often spent sixteen hours a day on his work. The canvas was eleven feet by seven and a half, and there were eighty portraits. He realised nothing from this arduous undertaking. When the picture was placed on exhibition, the public did not go to see it; and it was finally sold to an Englishman, who took it to London.

It afterward was sent to New York, where it was found in 1847 by a friend of the artist, nailed against a board partition in the third story of a downtown store, covered with dirt and dust. It became finally the property of Daniel Huntington. Washington Allston once said of it to Morse, "It is a magnificent picture." The elder painter evidently had a love for his pupil, and was inclined to regard him more highly than the world did. We often find men of genius holding their critical faculty in abeyance and praising without stint men whose personality pleases them. Having failed in his ambitious venture and receiving no orders for great historical or allegorical pictures, Morse again became an itinerant artist, this time in upper New York State. Again, with failure to achieve his highest ideals in art, his mind turned to invention, which is said to be the resort of all unsuccessful Americans at some period

of their lives. He devised a machine this time for cutting marble and producing copies of works of sculpture. Again his hopes ran high, and he wrote affectionate letters to his wife, expressing the earnest desire that fortune would enable him to give up his peripatetic life in search of sitters, and allow him to settle down in peace and comfort with his family about him. This invention came to nothing. It was said to be mechanically successful, but the world did not want it. While Morse was endeavouring to find occupation in Albany, Joseph Henry, a teacher in an academy there, was occupied in researches which were destined to make his name famous, and, while contributing nothing to his own purse, gave Morse both a name and a fortune.

The days in Albany were full of discouragement; and, after a summer spent there, he returned to New Haven for a brief visit to his family. He had come

to the conclusion to settle in New York, and make the struggle of his life in a metropolis. There were to be no more back districts, no more itinerancy, for him. Like hundreds of others, he sought a great city, and, like hundreds of others, came near being merged in the mass and finally thrown out of the maelstrom, worn and stranded. The pictures presented by his letters to his faithful wife, waiting for the ship to come in — alas ! she was destined never to see it — are pathetic. He obtained a room at two dollars and twenty-five cents a week, and hired a studio on Broadway, opposite Trinity churchyard. He wrote that there were many artists, all poor and complaining. New York seemed given wholly to commerce. Money-making then was the chief end of man. He was reduced to great straits. At a reception a sneak thief stole his hat ; and he was obliged to pay four dollars for a new one, which broke his last five dollar bill.

He had been five weeks in New York, his board bill amounted to thirty-three dollars, and he had nothing in his pocket. He had advertised and visited and hinted and pleaded, but without success. The marble-cutting machine, too, contributed nothing. Life seemed as hard as the stone which he sought to fashion. In despair the artist clutched at a prospect of going to Mexico as an attaché of a legation which was in contemplation. He was to have the bitter experience of "waiting on princes," or sitting at the politician's door, which in America amount to the same thing. He actually set out for Washington to join the commission, only to find that it had been abandoned ; and he returned to his family in New Haven. There was nothing to do but paint portraits ; and he spent the summer of 1824 in Concord, Portsmouth, and Portland, returning in the autumn to New York. The clouds began to lighten that winter. He had made

many friends, who were exerting themselves in his behalf. The corporation of the city gave him a commission to paint General Lafayette, who was then on a visit to America. The price would probably be seven hundred dollars, perhaps a thousand. Among the competitors for this prize were Vanderlyn, Sully, Peale, Jarvis, Waldo, Inman, Ingham, and others. In his letter to his wife he says : —

“Events are not under our own control. When I consider how wonderfully things are working for the promotion of the great and long-desired event — that of being constantly with my dear family — all unpleasant feelings are absorbed in this joyful anticipation ; and I look forward to the spring of the year with delightful prospects of seeing my dear family permanently settled with me in our own hired house here. There are more encouraging prospects than I can trust to paper at present, which must be

left for your private ear, and which in magnitude are far more valuable than any encouragement yet made known to you. Let us look with thankful hearts to the Giver of all these blessings.”

The day of success, however, was still far distant; and his wife was destined never to see it. His letters describe the sittings of Lafayette:—

“The general is very agreeable. He introduced me to his son, saying: ‘This is Mr. Morse, the painter. He has come to Washington to take the topography of my face.’” The reflections of the artist while he painted Lafayette were profound. He was before the man who stood for freedom, who suffered in the dungeon of Olmütz, who gave his time and fortune to the cause of America—the friend of Washington!

The final sitting was interrupted by the news of the death of Mrs. Morse, at the age of twenty-five. This was the great calamity of those years of strug-

gle, and for a time the artist gave himself up to despondency. She had been a very help in time of trouble, and all his visions of success had her in them as the partaker. The letter of the father of Morse, full of condolence and sympathy, illustrates the character of the old divine. It was as tender as that of a woman and, withal, full of hope. This father had sacrificed himself for his son, giving him the best education that America then afforded, supporting him in Europe out of the scanty income of a preacher of the gospel, entering into all his hopes and aspirations, and sympathizing with him in adversity.

The Rev. Jedediah Morse is an exemplar, and must not be forgotten when we think of the qualities of patient industry, indomitable will, alertness of perception, and Christian character. In the cemetery at New Haven there is a long epitaph to Lucretia Pickering, wife of Samuel F. B. Morse, written by Pro-

fessor Benjamin Silliman. She, like her husband, evidently had many qualities which made friends.

After the death of his wife, Morse resumed his artistic career in New York. He was active in the formation of the National Academy of Design, and became its president.

The history of the academy is told by Thomas S. Cummings, late professor of the arts of design in New York University, in his *Historic Annals of the National Academy of Design*; and we find therein an interesting recital of the struggles of artists to obtain a proper recognition of their noble guild and adequate instruction in art. In this treatise, too, can be found specimens of Morse's facility with the pen. It contains his address to the students at the end of the first academic season, in 1826, and his discourse on "Academies of Art," delivered in the chapel of Columbia College in 1827. These addresses

are full of the spirit of devotion to art, and are the product of a man of liberal training. There is no evidence of that narrowness which sometimes is noticeable in the utterances of inventors. During four years after his wife's death, from 1825 to 1829, he continued his life in New York, meeting with considerable success. It was said that his studio was crowded with works in progress, and that he was compelled to turn away would-be sitters. In 1829 he determined to visit the continent of Europe, where he had never been. This determination shows the late beginning of art education in America. It had become essential that the president of the National Academy of Design should study in Italy. Accordingly, eighteen years after his first visit to England he set sail again for Liverpool, taking several thousand dollars' worth of commissions for copies of the great masters. None of these commissions exceeded

five hundred dollars, and most of them were not over one hundred dollars. Morse was then thirty-eight years of age, and his first letters were full of the enthusiasm of youth. They show powers of observation and a remarkable toleration in one brought up in the rigid school of New England theology. He went by stage from Liverpool to London, and it is interesting to notice how little the salient characteristics of the people and the landscape have changed since the November of 1829. He notes: "The spires and towers of some ancient village church rose out of the leafless trees, beautifully simple in their forms, and sometimes clothed to the very tops with the evergreen ivy. . . . The whole appearance of the villages was neat and venerable, like some aged matron, who, with all her wrinkles, her stooping form, and gray locks, preserves the dignity of cleanliness in her ancient but becoming costume."

In London he met his old friend, Leslie the artist; and he was introduced to the literary and artistic circles of the metropolis. He breakfasted with Samuel Rogers, the author of *Pleasures of Memory*, and visited Turner, the celebrated painter. Washington Irving was then secretary of legation, and at the beginning of his fame. Morse, however, did not linger long in London, which at that time of the year was enveloped in fog and smoke. On November 22 he pursued his way to Paris. The Louvre was the first place he visited, and the sensation was evidently too much for words. He speaks of the grand gallery of pictures, the long hall, "the end of which, from the opposite end, is scarcely visible, but is lost in the mist of distance." In Paris he saw Lafayette, who greeted him with great cordiality, and invited him to his *soirée*, where he met Benjamin Constant, "one of the most distinguished of the liberal party

in France." The stay in Paris was short; for Rome was his ultimate destination, and the Louvre was to be studied on his return. The route to Rome was through Lyons, Avignon, Marseilles, and along the Cornice road to Genoa, then to Pisa, to Florence, and to the Celestial City. He began to work immediately upon a copy of Raphael's *School of Athens* in the Vatican, and his letters are full of the great ceremonies in St. Peter's. He saw the delivery of the cardinals' hats. "The pope's dress was a plain mitre of gold tissue, a rich garment of gold and crimson, embroidered, a splendid clasp of gold, about six inches long by four wide, set with precious stones, upon his breast. He is very decrepit, limping or tottering along, has a defect in one eye, and his countenance has an expression of pain, especially as the new cardinals approached his toe. The cardinals followed the pope, two and two, with their

train-bearers." He describes the procession of cardinals and the ceremony of kissing the toe of the bronze statue of Saint Peter's, the ceremonies of Palm Sunday, Holy Thursday, and the other great observances of the Church during Holy Week. The letters are those of a man who could have excelled with his pen ; and, as I have said, they breathe a singular toleration for the observances of a church which was especially repugnant to his Puritan ancestors. Our future electrician was not a narrow specialist : he could take broad views ; and he was therefore a companionable man whose society was sought. He met Horace Vernet the great painter. He became acquainted with Gibson and Wyett the sculptors. He painted the portrait of Thorwaldsen, and was intimate with Greenough, the American sculptor. Fenimore Cooper, too, seemed to have cherished an affection for him ; and they visited many places of interest

together, and exchanged philosophical views on the strange phases of life they saw and the habits of the people they encountered. The life of an artist completely absorbed Morse. His diaries are full of notes on pictures and methods of painting. Of a portrait of one of the Colonna family by Paul Veronese, called the Green Picture, he remarks: this portrait "proves that harmony may be produced in one colour: curtain in the background, hot green, middle tint; sleeves of the arms, cool; vest, which is in the mass of light, as well as the lights of the curtain, warm; white collar, which is the highest light, cool!!" The faculty of invention was at that time fully occupied with chiaro-oscuro and colour schemes. He observes in another picture of Paul Veronese that the highest light was cold; the mass of light, warm; the middle tint, cool; the shadow, negative; and the reflections, hot. He tested this theory by placing

a white ball in a box lined with white. Balls of orange or of blue, so placed, give the same relative results. The high light of the ball is uniformly cold in comparison with the local colour of the ball. He observed in a picture by Rubens that it had a foxy tone, and found that the shadow, instead of being, according to his theory, negative, was hot.

Allston once said to him, "I have painted that piece of drapery of every colour, and it will not harmonise with the rest of the picture."

Morse replied: "According to my theory, it must be warm. Paint it flesh colour."

"What do you mean by your theory?"

On hearing Morse's explanation, Allston said:—

"It is so, it is in nature," and afterward acknowledged to Morse, "Your theory has saved me many an hour's labour."

Other men have invented schemes of colour. They have not, however, been great artists ; or, at least, it can be said that great painters have not given their schemes of colour to the world. Shall we, then, conclude that Morse had not the making of a great artist in him ? We certainly should be rash to reach this conclusion from the fact of his theorising on chromatics. But we believe that there are other indications which point to the conclusion that he had not yet found his true vocation. Nevertheless, Allston and West thought highly of his efforts ; and Horatio Greenough, the sculptor, writing to him from Florence in 1832, said : “ Let me beg of you to hang on to the conception of the departure and return of Columbus. You are perfectly qualified to do honour to the country in such works, and should never give up the plan. Hang on like Columbus himself. You could make the first a grand picture in character and effect

of composition. You would embody in the second all your scheme of colour and chiaro-oscuro. These subjects are yours, you are theirs. Have faith, and fear not." A critical notice of Morse's artistic career, prepared by Daniel Huntington, president of the National Academy of Design, is contained in Prime's Life of Morse. The artist's theories of colour are dwelt upon, and the critic concludes: "He had a true painter's eye; but he was hindered from reaching the fame his genius promised as a painter by various distractions, such as the early battles of the Academy of Design in its struggle for life, domestic afflictions, and, more than all, the engrossing cares of his invention. . . . If his paintings, in the various fields of history, portrait, and landscape, could be brought together, it would be found that he deserved an honoured place among the foremost American artists."

In the autumn of 1831 Morse left

Rome and went to Paris, where he occupied himself in making copies of pictures in the Louvre. He also undertook a large picture of the interior of the Louvre, including copies of the great pictures there. This attempt is curiously like the undertaking of the picture of the House of Representatives. Both attempts indicate great energy and industry, but hardly an artistic soul. His life in Paris was brightened by the friendship of remarkable men. He saw much of Lafayette, he received affectionate letters from Fenimore Cooper, who was then travelling in Germany, and he became intimate with many noted people who sympathised with the Poles, then struggling for freedom. He joined a committee which was organised to aid the Polish cause, and was instrumental, with others, in causing the liberation of Dr. S. G. Howe, who had been intrusted with twenty thousand francs for the Poles, and had been thrown into prison

in Berlin. Morse also became acquainted with Humboldt, and it is said that the two had long and congenial talks together in their strolls through the galleries.

After three years of residence abroad Morse left England for his native land with his mind enriched by foreign travel and intercourse with great men. He fully intended to pursue his career as an artist, coming now to it with greater maturity of power and with a better acquaintance of the old masters. He was forty years of age, and seemed fixed in the career which he had chosen. There are few examples of men who, having reached this age, have achieved renown in an entirely new field of effort. While he, however, was working in his art, completely absorbed apparently by it, other men were getting ready his implements for his new craft. Joseph Henry, at Albany, was making experiments with magnets and discovering

the conditions which were essential to Morse's subsequent invention.

III.

THE idea of an electro-magnetic telegraph came to Morse in mid-ocean. He was a passenger on the packet ship *Sully*, Captain Pell, which left Havre October 1, 1832, for New York. Among the passengers was Dr. Charles T. Jackson, of Boston, who afterward disputed Morse's claim to the great invention. One day at the dinner-table, conversation turned upon recent investigations in electricity; and Dr. Jackson seems to have been the principal speaker. He laid down the laws of electro-magnetism so far as they were known at the time, and explained the method of increasing the force of a magnet by passing the electric current many times around a bar of soft iron. Questions arose in regard to the velocity of electricity and in regard to the distance the strange influence could be transmitted. The speaker said that electricity was transmitted instantaneously,

no appreciable time having been observed by Franklin between the instant of closing the circuit and the appearance of the electric spark at a distance.

It is reported that Morse then said, "If the presence of electricity can be made visible in any part of the circuit, I see no reason why intelligence may not be transmitted instantaneously by electricity." Dr. Jackson afterward claimed that he then and there developed a plan for accomplishing this great end which was substantially that which Morse afterward used. Morse persistently refused to give Dr. Jackson any credit whatever for the suggestion. Dr. Jackson was a man of varied information, and his friends firmly believed that his fertile mind was capable of conceiving of the idea of an electro-magnetic telegraph. It does not appear that he had a mechanical turn or that he was endowed with great persistence in carrying his brilliant ideas to a practical conclusion. He also

claimed the discovery of the use of ether. Here, too, he met a man of a practical turn, Morton, who tried the effect of ether on himself. In a recent conversation with a distinguished physician, a contemporary of Jackson, I asked about the merit of Jackson's claim to the discovery of ether ; and the reply was : "Many of us — students of medicine at that time — were accustomed to sniff ether and experiment on its benumbing and soothing qualities. The wonder is that none of us thought of the simple experiment of pricking ourselves with a pin while under the temporary influence of ether." The successful inventor seems to be a man who, having conceived or received an idea, becomes thoroughly possessed by it and proceeds immediately to make models and try experiments. We shall never know how much Dr. Jackson suggested to Morse. All that is certainly known is this : he was a man capable of suggesting new ideas. In the

litigation which arose in subsequent years the conversations on the packet ship *Sully* were repeated by various hearers, and all the circumstances connected with the birth of the invention were sifted. Morse submitted notes from his diary, showing arrangement of dots, lines, and spaces, which could be used as an alphabet. It was said, also, that he made a drawing of a printing instrument, probably an arrangement by means of which a tape could be drawn automatically along to receive dots and lines from a rod of iron which was moved by an electromagnet. All that Morse had at that time was evidently the strong belief that the transmission of intelligence by electricity could be accomplished by suitable mechanical contrivances — this, together with a scheme for an alphabet. Other men had had a similar idea, and codes of signals had already been devised. Morse's ideas at that time, however, would not have advanced the subject,

for he did not know then of the researches of Joseph Henry ; and without the use of the latter's intensifying magnet and quantity magnet, and the idea of the relay, the alphabet was only a code such as a man of ordinary powers could have conceived. The voyage of the *Sully*, it seems to me, simply marks the epoch when the idea possessed Morse's soul, and when the Yankee's practical turn for the adaptation of means to ends was aroused. He had the faculty of seeing the value of corner lots when other men were lost in contemplation of the surrounding scenery.

Let us consider, however, what was his scientific training. While in Yale College, we have seen that he attended the lectures of Professors Day and Silliman. I have said that little was known of electricity at that time, and the knowledge he gained contributed nothing more than an idea of the transmission of the mysterious influence along wires a com-

paratively short distance. While he was pursuing his art in New York, in 1827, he attended the lectures of Professor James Freeman Dana before the New York Athenæum, and saw the experiment of making a piece of soft iron magnetic by inserting it in a coil, or helix, of wire, the ends of which were connected to a battery. He also saw a horse-shoe electro-magnet, and probably witnessed the attraction of a piece of soft iron by this magnet. The manuscript copies of these lectures are in the library of Harvard University, and it is astonishing how much the fact of increasing the magnetic effect by increasing the windings of wire on the spools of the horse-shoe magnet is dwelt upon. This fact is the material, indeed, for the entire course of lectures. Here we have the entire training of Morse in the subject which was destined to turn him from the art he had so assiduously cultivated. In the subject of electricity we have often

seen men spring suddenly into notice and grasp the prizes which the philosophers have overlooked. Edison once said to me, as if reflecting upon this psychological problem, "You are too much loaded up with mathematics." Morse certainly did not carry a mathematical load, and electricity then was not the mathematical science it is to-day.

During the litigation over Morse's patents every incident which occurred during the voyage of the *Sully* was carefully considered.

Captain Pell said, "Before the vessel was in port, Mr. Morse addressed me in these words: 'Well, Captain, should you hear of the telegraph one of these days as the wonder of the world, remember the discovery was made on board the good ship *Sully*.'" A passenger, Mr. Fisher, counsellor-at-law in Philadelphia, testified to hearing Morse describe his alphabet; and he had no remembrance of Dr. Charles T. Jackson's sug-

gestions. The history of all inventions has a certain sameness. The times are ripe, the steps have been taken, the invention is sure to come. Some one man of quick practical perception takes advantage of the researches of others : his mind is not absorbed by trains of thought suggested by scientific investigation. The history of the invention of the telegraph and the telephone could be presented in parallel columns. The historian should not rely overmuch on the testimony of bystanders where electricity is concerned. There are always men who, after the invention is made, believe they were capable of making it. These men remember some suggestion which they have given the inventor. Their friends and possibly their wives state their conviction that the invention was due to the suggestion ; and this conviction grows with time, and soon a claimant comes forward—a product of the native egotism of man and the adula-

tion of friends. The truth seems to be that Morse was more fully possessed with the idea of the practicability of an electro-magnetic telegraph than any other man at that time in America, and as soon as he landed in New York he set about making some moulds for an arrangement which would serve to interrupt an electric current and thus transmit his alphabet consisting of dots and lines.

He took a room at his brother Richard's house, and began a long struggle with poverty. His residence abroad had left him poor, notwithstanding the commissions he had executed. He had three children, and it was necessary for him to work hard at his profession. There was little time to perfect the idea which had seized him. He worked at intervals, however, on the invention in a small room in his brother's house, which was provided with a lathe. Here he made some of his models. His artist life was

unsuccessful ; and this want of success led him probably, as it had done several times before during his life, to incline to invention. At one time he had strong hopes of being selected by Congress to paint a great historical picture for the rotunda of the Capitol at Washington. There might be placed the departure or the return of Columbus — subjects which had long filled his mind. John Quincy Adams, then a member of a committee of the House of Representatives to which the subject of the picture was referred, recommended that the competition be opened to foreign artists ; for, in his opinion, there were no American artists competent to undertake the decoration of the rotunda. James Fenimore Cooper wrote in the *New York Evening Post* a severe reply to the remarks of ex-President Adams. This article was attributed to Morse, and perhaps contributed to the rejection of his name by the committee. This was a severe blow

to Morse. It may, however, have been a blessing in disguise ; for it led him to turn again to his invention. Washington Allston in a letter to him at this time said : “ I know what your disappointment must have been at this result, and most sincerely do I sympathise with you. . . . You have it still in your power to let the world know what you can do. Dismiss it, then, from your mind, and determine to paint all the better for it. God bless you ! ”

This and similar letters, which he received at this time, show the affection which he had inspired in his friends. A meeting of artists was called to protest at the action of the government, and an association was formed entitled “ A Joint Stock Association of Artists for procuring Morse to paint an Historical Picture. ” In a short time three thousand dollars was raised ; and, in addition to this, a gentleman of Brooklyn offered to contribute canvas and all the

materials for the picture. Morse was greatly inspired by this most gratifying effort of his friends. He exclaimed that never had he read or known of such an act of professional generosity, and he resolved to paint a picture to be entitled *The Signing of the First Compact on Board the Mayflower*. The association had suggested a small picture; but Morse — who all his artistic life found no canvas large enough — declared that he would paint one the size of the panels in the rotunda. The picture, however, was never painted; for the invention of the telegraph and the business entanglements were destined to occupy all his time. He finally returned to the members of the association the amount they had contributed, with interest.

In 1835 he was appointed Professor of the Literature of the Arts of Design in the New York City University. He moved to a building on Washington Square (the University), and immedi-

ately set up portions of his telegraphic apparatus. It was generally remarked at the time, with doubtful shakes of the head, that the professor was occupied more with invention than with art. It was fortunate for the university that he was not dismissed — a peril which might even now meet a professor with a vocation and an avocation. The work on his invention was certainly much retarded by his professional work; and he probably enjoyed to the full, as the phrase is, the experience of a professor who is filled with thoughts of a great investigation and must devote his time to the cultivation of mediocre minds. At first, apparently, he made a complicated apparatus, with a keyboard similar to that of a piano, and with a mechanical arrangement for moving along sets of types, for making and breaking the electric circuit. The complicated devices gave way to simpler ones, and finally he adopted the single key which is now in

common use. Instead of a pencil or pen to record the message, he began to use a single hard point, which rested upon a ribbon of paper which was moved along by clock-work over a groove in a cylinder. Many gentlemen testified in the subsequent litigation to seeing Morse's apparatus at that time. Among these observers was the Rev. Henry B. Tappan, subsequently president of the University of Michigan. He testified to seeing the first transmission and recording of words by lightning in Morse's room in 1835. He stated that a short telegraphic line had been strung around a long room in the university; and he says, "I recollect well my delight at hearing the words which I silently gave in at one end accurately read off from the strip of paper at the other." Daniel Huntington, subsequently president of the National Academy of Design, was at that time a pupil of Morse; and he testified to seeing Morse's instrument in operation in the

year 1835. The Hon. Hamilton Fish said that he witnessed the telegraph in operation in 1836, "recording messages transmitted through some mile or more of wire suspended in successive turns around the walls; there was a small battery in one corner of the room and a sort of clock-work machinery in the other, and the mysterious little click, click, click of the former produced a simultaneous record on the other." Commodore Shubrick of the United States Navy also testified to seeing the telegraphic instruments in actual operation in the winter of 1835.

A very important point in regard to this early work of Morse on an electromagnetic telegraph now arises. Did he invent the relay which made the telegraph a success? He undoubtedly had perfected an alphabet, and had set up an experimental line representing a short distance. Henry, in 1835 or early in 1836, had extended wires across the yard

of the college grounds at Princeton, from the upper story of the library building to the Philosophical Hall on the opposite side, through which he sent signals which were distinguished by the number of taps on an electro-magnetic bell. He had shown that, in order to transmit the current to a great distance, it was necessary to use a large number of galvanised cells, and to wind the transmitting wire many times around the receiving magnet, which he therefore called an intensity magnet. He proved that an operator could thus produce the most energetic actions at any required distance by providing this intensity magnet with an oscillating armature with a suitable prolongation to open and close an adjoining circuit with a smaller number of cells and what he called a quantity magnet; in other words, a magnet with a small number of turns of wire so arranged that the electrical resistance of the relay battery should approximately equal the

resistance of the wire around the magnet. This closing of a relay circuit, he showed, could be accomplished by the swing of the most delicate galvanometer needle ; and he exhibited a large electromagnet, which, being set in action by such a relay device, could lift more than three thousand pounds. Here was evidently the principle of the relay. It is said that on a visit to London with Professor Bache in 1837, Henry met Wheatstone, then professor of experimental philosophy in King's College ; and he freely explained his arrangement of a local circuit which was set in action by a main circuit. Henry had the pleasure of describing his own device, which was substantially the same and which had been used the year previous. Wheatstone, in conjunction with W. F. Cooke, secured a patent on June 12, 1837, which included the device of the relay. Morse, in a pamphlet published in Paris, 1867, relating the history of his invention,

states that between 1835 and 1837 there was a very important addition to his telegraphic system which he did not dwell upon at that epoch ; for it was not necessary in the exhibitions which he made at that time, but which was essential when the telegraph line was extended beyond the limits of a hall. He states that he knew that the electromagnet at great distances would become so enfeebled that it would be inoperative for printing. He says that he had already conceived of a plan for extending the operation of the telegraph, which was so simple that it hardly needed a drawing to exhibit it ; and he goes on to describe the relay, and calls his colleague Professor Gale to witness that in January, 1836, he had imparted to him the plan of the relay.

We therefore turn our attention to Professor L. D. Gale, who was a colleague professor in the University of the City of New York, and who afterward was

admitted to a fourth interest in the invention by Professor Morse. Gale, in the litigation which arose over Morse's patents, gives a very circumstantial account of the state of the telegraph in 1836. The fact that he was subsequently interested pecuniarily in the invention destroys, to my mind, much of the value of his testimony. He says that they had frequent consultations on methods of extending the distance to which signals could be transmitted. Morse often explained his plans by which this could be accomplished.

“Suppose,” said Professor Morse, “that in experimenting on twenty miles of wire we should find that the power of magnetism is so feeble that it will not move a lever with certainty a hair's breadth : that would be insufficient, it may be, to write or print ; yet it would be sufficient to close and break another or a second circuit twenty miles farther, and this second circuit could be made,

in the same manner, to break and close a third circuit twenty miles farther, and so on around the globe." Gale then goes on to describe circumstantially the relay, giving drawings of a magnet on the main circuit drawing down an armature or rod of iron and closing a local or relay circuit in which there is a supplementary battery. Professor Gale is very circumstantial with his dates, for they were all-important for the purposes of the patent lawyers who conducted the subsequent litigation. He mentions an exhibition in the cabinet of the university on September 2, 1837, when Professor Danberry of Oxford University, England, together with Mr. Alfred Vail, were present, and witnessed the action of the telegraph over a circuit of 1,700 feet of copper wire. The presence of Mr. Vail was an important fact, for he had hesitated to put money into the invention until it could be shown that the action of the telegraph could be extended to

great distances. Immediately after this interview, Alfred Vail and his brother George Vail furnished Morse with the means for an experiment on a larger scale. This was in 1837, and Morse could have been informed of Henry's experiments. Indeed, it is stated in an address on Joseph Henry delivered at Princeton College June 16, 1885, by Edward W. Dickerson, LL.D., the distinguished patent lawyer, that Professor Gale went to Henry to discover how the electric current could be strengthened to operate stations at a distance. In this address, Dickerson dwells upon Henry's devotion to pure science, and says: "It must have occurred to him at times, when he needed money for his experiments, and when he saw the fruits of his labour enriching the world, that he might have taken some share of the wealth; but he would not taint with selfishness his generous gift. How valuable in money it was he knew full well. Even for that

fragment of it, then for six years by him given to the public, which was carried to Morse in 1837 to enable him to construct his special plan of a recording telegraph in that year, now practically obsolete, Dr. Gale, who carried it, secured a share in the patent which was founded upon it, and without which it could not have existed. For that share fifteen thousand in cash was subsequently paid to him.”

While I was working in the rooms devoted to physical experiments in Harvard University in the winter of 1873, a dignified elderly gentleman was ushered into the rooms. He had a remarkable philosophic countenance, which recalled in its massiveness that of Humboldt and Helmholtz. The visitor was Joseph Henry, and I showed him the electrical apparatus which was in use at the time. He listened with great gravity to my account of the experiments which were in progress, and on his departure, turn-

ing toward a table covered with magnets and telegraphic relays, remarked, "If I had patented those devices, I should have reaped a large fortune."

Let us follow the career of the man who was destined to receive great rewards, and whose name has been inscribed among those who shall shine forever like the stars in the firmament. During those strenuous years of professorship in the University of the City of New York, Morse was very poor. He lodged and ate his food in his studio, generally preparing it with his own hands. In order to conceal his manner of life from his friends, he brought his food to his rooms at night. It was difficult at that time to obtain electrical supplies. Insulated wire was costly. The batteries were poor and inconstant, and therefore failed when they were needed most. Morse was compelled to go to a blacksmith to have his wire shaped into cores for his electrical magnets, and he wound

these cores himself. Henry also laboured under even greater difficulties in regard to the construction of his electrical apparatus. These difficulties must be weighed when we wonder why men halted so long over the steps which now seem so simple. Morse was often asked why he did not speedily construct a duplicate instrument for returning an answer from a distant station. He exhibited in 1835 only a sending instrument. He answered that he had not the means to construct it. The cost of such a duplicate instrument to-day would not exceed five dollars. It was suggested that he might have borrowed the requisite sum. He says : "My reply must be that I preferred the delay, and the hazards of a delay, to the hazard of being unable to repay the loan. I must be pardoned if I state that, even from my earliest youth, I ever had the deepest repugnance to incur debt by borrowing, even from my own relatives."

In 1837 Mr. Alfred Vail, son of Judge Stephen Vail, entered into partnership with Morse, and provided him with the means for pushing his invention. The Vails were owners of iron and brass works at Speedwell, Morris County, New Jersey; and Alfred Vail was interested in mechanical engineering, especially in connection with the working of iron and brass. He was allotted one-fourth interest in Morse's patents, and Morse was given the superior facilities of the Vails' manufactory. Just about the time of the formation of this partnership, the Hon. Levi Woodbury, Secretary of the Treasury of the United States, in consequence of the reports in regard to methods of telegraphing in Europe, issued a circular to "certain collectors of the customs, commanders of revenue cutters, and other persons," asking for information in regard to the various systems proposed. He particularly wished to know how far communi-

cation could be established, with what rapidity it could be worked, and what would be the probable expense. He says: "It would add to the interest of the subject if you would offer views as to the practicability of writing, with a system of telegraphs for communication in clear weather and in the daytime, another for communication in fogs, by cannon or otherwise, and in the night by the same mode, or by rockets, fires, etc."

Morse immediately replied to this circular, stating that he had made arrangements to demonstrate at Washington by January 1, 1838, his superior plan for accomplishing telegraphic communication. He enters into many particulars in regard to the probable expense of the system and in respect to the disposition of the wires. He evidently thought at that time that it would be better to bury them underground. He says that, if the wires are stretched above ground, on

poles, they might be a temptation to mischievous persons ; but he points out that the same objection had been made to water pipes, gas pipes, and railroads. He remarks that, if his system of telegraphing should be established, it would have little rest day or night. “The advantage of communicating intelligence instantaneously, in hundreds of instances of daily occurrence, would warrant such a rate of postage (if it may be so called) as would amply defray all expenses of the first cost of establishing the system and of guarding it and keeping it in repair.” Immediately on sending this letter, Morse filed a caveat in Washington, September 28, 1837, in which is to be found a careful description of his method, embraced under the following heads :—

1. A system of signs, by which numbers, and consequently words and sentences, are signified.

2. A set of type, adapted to regulate

and communicate the signs, with cases for convenient keeping of the type, and rules in which to set up the type.

3. An apparatus called the portrule, for regulating the movement of the type rules, which rules, by means of the type, in their turn regulate the times and intervals of the passage of electricity.

4. A register which records the signs permanently.

5. A dictionary or vocabulary of words numbered and adapted to this system of telegraph.

6. Modes of laying conductors to preserve them from injury.

In reading the specifications of the patent, we are struck with the fact that it contained only the germ of the alphabet subsequently adopted. The types, the portrule, the register, the dictionary, and the mode of laying conductors to preserve them from injury were destined to pass out of use. No reference is made to a relay. With the exception of the

alphabet, Henry could have obtained a more comprehensive patent.

In a letter to Alfred Vail at the time of obtaining this caveat, Morse says: "Professor Gale's services will be invaluable to us, and I am glad he is disposed to enter into the matter with zeal. The more I think of the whole matter, the more I am convinced that, if it is perseveringly pushed at the moment (so favourable on many accounts to its adoption by government), the result will be all that we ought to wish for. We want the wire. We are ready for some important experiments necessary to establish with certainty some points not yet established by experiments. The law of the magnetic influence at a distance is not yet discovered; and your twenty miles of wire may enable us to make this discovery, and to keep ahead of our European rivals, as well as to proceed with certainty in our other arrangements." This letter shows that he did

not yet appreciate the law of the relay. In November, 1837, Professor Gale, by increasing the battery power and also increasing the turns of wire on the electromagnet—that is, by using Henry's intensity magnet—succeeded in sending signals ten miles. Morse immediately communicated this result to the Secretary of the Treasury. On January 24, 1838, he gave an exhibition of his telegraph to some friends in New York; and the *Journal of Commerce* of January 29 said of it: "Intelligence was instantaneously transmitted through a circuit of ten miles, and legibly written on a cylinder at the extremity of the circuit. . . . Professor Morse has recently improved on his mode of marking, by which he can dispense altogether with the telegraphic dictionary, using letters instead of number; and he can transmit ten words per minute, which is more than double the number which can be transmitted by means of the dictionary." Thus it is

seen that the great labour which was bestowed on the compilation of a dictionary had been thrown away. Soon the type arrangement was destined to go, and in time the Morse register. Morse considered that his method of recording or printing the messages was one of the principal features of his invention which distinguished it from the European methods. It is a curious fact that it is not used at all in America. The operator reads by Henry's method, that of sound. The recording or printing methods are still in vogue in Europe. Once, in visiting the offices of the London telegraphic system, I was shown a room where the future operator was learning to read messages by sound. In America it was found that the operator had learned the method almost instinctively, and disregarded the printed records of the register upon the clock-work and other mechanical arrangements on which Morse had spent so much invention. Nothing

to-day is left of Morse's invention but the alphabet and a few mechanical points. The tendency of the time seems to be toward sound rather than to printing, and even the Morse alphabet seems to be doomed.

Let us, however, study more closely the action of Morse's mind at the time he pressed his invention upon the attention of the government. It is evident that he was fully possessed with the value of his invention and the ultimate practicability of it. He had the sanguine nature of an inventor. He was alert, moreover, quick to seize ideas which might aid him in his main object—quick, possibly, to assimilate such ideas so thoroughly that they often appeared to have emanated from his own mind. This cerebation of thoughts, which contribute to the making of a great design, is a striking peculiarity of some minds. Most professors have had students who honestly believe that the

investigation which has been suggested to them, and which has been aided by the ideas and long experience of the teacher, is entirely their own. Such students have a peculiar hospitality of mind. Morse was so strongly possessed with the idea of an electro-magnetic telegraph that all the work of Henry and Wheatstone seemed necessarily tributary. He was alert, I have said, and business-like. Writing to his partners on receiving news that his papers had been favourably received at the Patent Office, he says, "If you intend to do anything in England or France, no time is to be lost." He was approached by certain men who desired to erect private lines for the furtherance of business purposes. He writes of this to his partners, enjoining secrecy: "But be close on the subject, for it is essential to its success that it be secret. *Verbum sat.* I am not idle, I assure you." He writes again: "We have just heard that Professor

Wheatstone has tried an experiment with his method — twenty miles — with success. We have therefore nothing to fear. We also learn that he has sent to take out a patent, to this country. My caveat will be in his way. Professor Locke, of Cincinnati, who has just returned, tells us all this; and he knows Wheatstone and his whole plan, and says that there are no less than six disputants for the priority of the invention in England. He also says that no one of the European plans pretends to record *permanently*; that mine is decidedly superior in that respect, and *peculiar*.”

Here we see evidences of alertness and business ability. This man was a type of the modern business electrician rather than of the philosopher of which Henry and Faraday were such exemplars. We are reminded of the remark made of Morse's father: “He had such an impetus!” He apparently recognised the value of cautious publicity

in leading people to connect his name with the electro-magnetic telegraph; for, in response to an invitation from the Franklin Institute of Philadelphia, he exhibited his apparatus when on his way to Washington. Among his audience was Joseph Saxton, subsequently at the head of the department of weights and measures under the superintendent of the Coast Survey. There were also present other prominent mechanics. Arriving in Washington, Morse set up his apparatus in a room occupied by the Committee on Commerce in the Capitol. At first his visitors went away with little belief in the practical nature of the invention. On February 21, 1838, President Van Buren and his entire cabinet visited the room, and Morse exhibited his telegraph in operation through ten miles of wire contained on a reel. The Hon. F. O. J. Smith, chairman of the Committee on Commerce, had been previously interested by Morse in his inven-

tion ; and Morse had written a long letter to Smith, showing how desirable it would be for the government to own the invention, and to have the sole right to grant its use under important restrictions to the public. The invention was of such importance to the government that it could well afford to aid the inventor by providing means for an extended trial of one hundred miles ; and, in return for suitable aid, he promised "to enter into no arrangement to dispose of his patent rights to any individual or company previous to offering it to the government for a just and reasonable compensation." Again, after the exhibition of February 21, he writes to Mr. Smith, giving an estimate of the probable cost of such a trial. He concludes that a trial of fifty miles would be sufficiently satisfactory, and that such a trial would cost twenty-six thousand dollars. A table of items of expense was given. The most interesting item

was one of twelve hundred dollars for preparation of the wire by the use of such things as "caoutchouc, wax, resin, tar, with reels for winding, soldering, etc., say six dollars per mile."

The experiment was to be tried on a metallic circuit, with wires above ground. But it was evidently contemplated ultimately to bury the wires, for it is expressly stated that the estimate of twenty-six thousand dollars did not include the expense necessary to lay the wires underground. Having sent this letter, Morse then drew up a respectful memorial to Congress, asking it set terms for an appropriation. One sees the directing hand of the Hon. F. O. J. Smith in all this, and the business ability of Morse in using Mr. Smith. On April 6, 1838, Mr. Smith, as chairman of the Committee of Commerce, made a long report, arguing that the government, in view of the importance of Professor Morse's invention, should make an appropriation

of thirty thousand dollars for a trial of fifty miles. Mr. Smith dilates upon the importance of the invention. It was evident that Morse had made a complete convert of him. He says in the report : “ With the means of almost instantaneous communication of intelligence between the most distant points of the country, and simultaneously between any given number of intermediate points which this invention contemplates, space will be to all practical purposes of information completely annihilated between the states of the Union, as also between the individual citizens thereof. The citizens will be invested with, and reduce to daily and familiar use, an approach to the High Attribute of Ubiquity, in a degree that the human mind until recently has hardly dared to contemplate seriously as belonging to human agency, from an instinctive feeling of religious reverence and reserve on a power of such awful grandeur.”

After this burst of religious feeling, Mr. Smith intimated to Mr. Morse his willingness to take an interest in the invention. He accordingly resigned his seat in Congress, and became a partner in the enterprise, which was divided into sixteen shares. Morse held nine; Mr. Smith, four; Mr. Alfred Vail, two; and Professor Gale, one. Again one sees in this distribution no diminution of business ability. One had to do with an alert inventor.

IV.

ON May 16, 1838, Morse sailed for Europe to secure foreign patents. His third European trip was destined to be a melancholy failure from a pecuniary point of view. The English authorities were apparently persuaded of the priority and superior value of Wheatstone's invention, for the American inventor was denied even a hearing. It was claimed that his invention had been published in the London *Mechanic's Magazine* of February 10, 1838. The article had been copied from *Silliman's Journal of Science* of October, 1837. This article merely stated that the distinguishing features of Morse's invention were a register which permanently recorded the message in characters easily legible, and a single wire. It spoke, too, of points or marks to be read and of a pencil that marks. The English authorities considered this a prior publication, and

therefore refused to issue a patent. Morse bitterly condemned this attitude, and in able letters requested a fuller hearing. This, however, was refused; and the only alternative was to appeal to Parliament for a special act. This was a long and doubtful proceeding, and Morse was not inclined to it, and accordingly proceeded to try his fortunes on the Continent. While in England, he satisfied himself that Wheatstone's telegraph was manifestly inferior to his own. Wheatstone required "six conductors between the points of intercommunication for a single instrument at each of the two termini." The receiver consisted of five magnetic needles which served to point to letters upon a dial plate. It was not, therefore, a recording telegraph.

Morse was more successful in Paris, and obtained a patent; and he was gratified at the interest in his invention displayed by the many distinguished Frenchmen. He exhibited the telegraph at the French

Institute. Baron Humboldt expressed the opinion that it was the best of all the plans that had been devised. The administrator in chief of the French bureau of telegraphs, M. Alphonse Foy, also expressed the same opinion. The telegraph was exhibited to M. Arago, the great physicist, who was delighted with it, and proposed that it should be exhibited to the Academy of Sciences. Among those present at the séance were Arago, Humboldt, Gay-Lussac. Morse says in a letter to Mr. Vail: "Arago described it to them, and I showed its action. A buzz of admiration and approbation filled the whole hall; and the exclamations, '*Extraordinaire!*' '*Tres bien!*' '*Très admirable!*' I heard on all sides. The sentiment was universal." Truly, this reception was most gratifying, and augured well for the future. Morse was at first full of hope, but he was destined to a fresh disappointment. He was received everywhere with great

politeness. His invention was lauded, but he seemed no nearer to any practical results. By the French law an inventor is obliged to put his invention in practical operation within two years from the issue of his patent. Morse tried to effect this along the St. Germain Railroad Company's lines, a distance of seven miles from Paris to St. Germain, but was unsuccessful. He was told that, if the telegraph was to be a government matter, he could not enter into relations with private individuals; and the government did not act. Altogether, he was having an experience of French politeness, which was no more productive of practical results than his experience with English brusqueness. He wrote to the Hon. F. O. J. Smith, lamenting his own lack of business ability in pushing matters to a conclusion. He thought of proposing that, in case the government would do nothing to form a company, he should take the right at one thousand

francs per mile, paying the proprietors fifty per cent. in stock and fifty per cent. in cash, raising about fifty thousand francs for a preliminary trial. He remarks again that he is a child in business matters. "I can invent and perfect the invention, but further the deponent saith not." The critic of his life labours, however, feels that he underrated himself in this respect. He had pushed his invention in an energetic manner and had already enlisted capital. His visit to Europe gave great publicity to his invention. It was a lecture on an extended scale and on an elevated platform, and was not without ultimate results, notwithstanding that he failed in England and never received anything from his French patent. While in Paris, Morse also enlisted the interest of Baron Meyendorf, the agent of the Emperor of Russia for reporting useful discoveries to the Russian government. In this case he was filled with alternate hope and de-

spair, and finally concluded to return to America to push the matter before Congress.

During his absence, Dr. Charles T. Jackson, his fellow-passenger on board the *Sully*, had laid public claim to the invention. In a letter to Mr. Smith, Paris, July 13, 1839, Morse indignantly refutes the claims of Jackson, and says that he has sent a letter to him, "calling on him to save his character by a total disclaimer of his presumptuous claim within one week from the receipt of the letter, and giving him the plea of a 'mistake' and misconception of my invention by which he may retreat." He scores Jackson, speaks of his consummate self-conceit, and says that he knows that he has not the claim to a point of any kind. The letter is that of an indignant honest man. This controversy with Dr. Jackson was most unfortunate, and how much Jackson had to do with firmly planting the idea in suitable ground will never be

known until Morse and Jackson stand together where all things will be brought to light. Time certainly will never reveal any evidence which will decide who originated the fertile idea. If Jackson, like Alexander Graham Bell, the inventor of the telephone, had immediately availed himself of the services of a skilful mechanic, there might have been a closer race between him and Morse. The latter had the mechanical skill which Dr. Jackson apparently lacked. The painter had all his life used implements and made models. He could conceive and also execute. Jackson's mind was capable of conceiving the idea, and he knew the literature of the subject. Both men were doubtless honest in their public professions of the ownership of the great idea. The historian who says the last word on this controversy must also be a psychologist who has studied the subject of cerebration, the unconscious assimilation of ideas which makes them forever

a part of the assimilator. Joseph Henry knew that an electro-magnetic telegraph was possible ; but scientific researches seemed to him more important than invention of electrical devices. It is interesting to notice that he did not put in a claim, as he well might, for an electro-magnetic telegraph. When Morse consulted him in regard to the practicability of the extension of the telegraph to great distances, Henry wrote, February 24, 1842 : —

“The idea of transmitting intelligence to a distance by means of electrical action has been suggested by various persons, from the time of Franklin to the present ; but until within the last few years, or since the principal discoveries in electro-magnetism, all attempts to reduce it to practice were necessarily unsuccessful. The mere suggestion, however, of a scheme of this kind is a matter for which little credit can be claimed,

since it is one which would naturally arise in the mind of almost any person familiar with the phenomena of electricity ; but the bringing it forward at the proper moment, when the developments of science are able to furnish the means of certain success, and the devising a plan for carrying it into practical operation, are the grounds of a just claim to scientific reputation, as well as to public patronage.

“About the same time with yourself Professor Wheatstone, of London, and Dr. Steinheil, of Germany, proposed plans of the electro-magnetic telegraph; but these differ as much from yours as the nature of the common principle would well permit, and, unless some essential improvements have lately been made in these European plans, I should prefer the one invented by yourself.

“With my best wishes for your success, I remain, with much esteem, yours truly,
JOSEPH HENRY.”

This letter shows a generous appreciation of Morse's practical invention and a lofty indifference to the money value of his own contributions to the theory of the telegraph. Morse sent a copy of this letter to the Hon. W. W. Boardman, member of Congress, urging action of Congress, in which he says, speaking of Henry: "He is not of an enthusiastic temperament, but exceedingly cautious in giving an opinion on scientific inventions; yet in this case he expressed himself in the warmest terms, and told my friend Dr. Chilton (who informed me of it) that he had just been witnessing the operation of the most beautiful and ingenious instrument he had ever seen."

Morse found on his return from his unsuccessful European trip that nothing had been done by Congress. He was very poor, and at times thought of throwing up the invention and returning to his profession of an artist. General Strother, of Virginia, "Porte Crayon," testifies to

the inventor's poverty. He took painting lessons of Morse ; and, on one occasion, Morse asked for a portion of his fee, and the two dined together. Morse said : "This is my first meal for twenty-four hours. Strother, don't be an artist. It means beggary. Your life depends upon people who know nothing of your art and care nothing for you. A house dog lives better, and the very sensitiveness that stimulates an artist to work keeps him alive to suffering."

The Patent Office issued Morse's patent in 1840, the delay having been caused by Morse's request that the issue might be postponed until the foreign patents had been secured. Morse had before him the usual fate of inventors — the necessity of fighting for his patent. The unscrupulous, too, are great assimilators of other men's ideas. He had yet, however, to show that there was money in the invention ; and he had no money to do this. Apparently, he received very little

help from his partners. The resources of the Hon. F. O. J. Smith were exhausted by the European trip. Mr. Vail seemed reluctant to give further aid, and Professor Gale was a professor. The partners were widely separated. Morse says in a letter, 1841, to Vail: "All the burden now rests on my shoulders, after years of time and attention to the enterprise; and I am willing, so far as I am able, to bear my share if the other proprietors will lend a helping hand and give me facilities to act, and a reasonable recompense for my services in case of success." In another letter he says, "I have to do all the labour of the whole enterprise at present, and have not a cent of money in the world." In a letter to Mr. Smith in 1842 he repeats the same sentiment: "The depressed situation of all my associates in the invention has thrown the whole burden of again attempting a movement entirely on me. . . . You must perceive at what disadvantage I do

business when, before I can make any answer to queries from persons who feel disposed to take hold of the enterprise, I must write two or three letters of particulars to different parts of the country, and wait days for an answer. The necessity of our telegraph is made evident in this very case. If you had in your parlour one of my registers, there would be no need of a long journey, or of waiting three or four days for an answer." It is difficult to realise to-day Morse's inability to enlist capital in his enterprise. Electricity now is used by all sorts of promoters; and there are numberless cases of organisation of business men who "chip in," as the expression runs, or "take flyers" in more or less chimerical plans. Morse can claim to have been the first man to show the money value of electricity; and he endured the privations similar to that of a prospector who toils through the wilderness and over the mountains to a rich placer, where, hav-

ing shown the way, he must defend himself from thieves and the unscrupulous.

Even the men whom he was destined to enrich failed him at the pinch. He applied to the Vails for a small sum to go to Washington to make one last attempt to obtain the assistance of the government. He met with a polite refusal to advance further sums. All now depended on Morse, and he exerted that "impetus" which was a family characteristic. He wrote a very able letter to the Hon. C. G. Ferris of New York, one of the House Committee on Commerce, detailing at great length the advantages of his telegraph, and submitting very business-like estimates of cost of construction and of revenues that might be reasonably expected. This letter shows that Morse could use the pen as well as the pencil, and it resulted in Mr. Ferris's submitting a report to Congress which at last resulted in favourable action. The debate on the resolution to give aid to Morse

has not been preserved ; but, if we can judge from a brief abstract of the discussion in the *Congressional Globe* of February 21, 1843, certain members wrote themselves out, to use Shakespearian language, "as asses."

The Hon. Cave Johnson came out of his adumbration with an amendment proposing that one-half of the appropriation be given to a Mr. Fisk to enable him to carry on mesmeric experiments. The same sapient gentleman became Postmaster-general under Polk, and expressed an official opinion "that the operation of the telegraph between Washington and Baltimore had not satisfied him that, under any rate of postage that could be adopted, its revenues could be made equal to its expenditures." The Hon. Sam Houston thought that Millerism should receive an appropriation. The amendment was rejected ; and on February 23, 1843, the bill providing for the appropriation was passed

by a majority of six. An analysis of the votes of the members shows that the states which voted for the appropriation were those in which the average of education was highest. Only two slaveholding states voted for it. Morse sat in the gallery of the Senate at the Capitol during the entire day and evening of the session, and, being assured that there was no possibility of a vote being reached, retired, worn out and dispirited. In the morning a young lady told him that her father was present at the close of the session, and that the bill had been passed. Morse, overjoyed, said that she should send the first message over the first line of telegraph that should be opened. Morse immediately set to work on the experimental line. His assistants were Professor L. D. Gale, Professor J. C. Fisher, and Mr. Vail. At the same time Mr. Ezra Cornell, the subsequent founder of Cornell University, became associated with the enterprise. He had invented

a machine for laying an underground pipe which contained insulated wires; for it was then considered essential that the wires should be placed in the earth, and not overhead. Almost immediately it was found that there were practical as well as electrical difficulties in thus enclosing the wires, and it was decided to adopt the overhead method. No sooner was this done than the principal difficulties seemed to vanish. Mr. Vail had a plan of fixing the wires to the poles which Morse was about to adopt in preference to one proposed by Cornell. On consultation with Professor Henry he concluded to adopt the plan of Cornell. Many months during 1843 and the early part of 1844 were spent in experimental trials on the necessary battery strength to operate the line between Baltimore and Washington.

On May 24, 1844, everything was in readiness for the final trial. Morse's friends were assembled in the Supreme

Court room at Washington, which was one of the termini of the line. Miss Ellsworth, the young lady who had announced the welcome news to Morse of the passing of his appropriation by Congress, and who had been promised the sending of the first telegraphic message, was present. Her mother suggested a line from Numbers xxiii. 23 — “What hath God wrought.” Morse sent the message. It was instantaneously received by Vail, who did not know of its choice, and was telegraphed back to Washington. A conversation over the line then followed. Morse said, “Stop a few minutes.” Vail replied, “Yes.” Then the conversation went on: “Have you any news?” “No.” “Mr. Seaton’s respects to you.” “My respects to him.” “What is your time?” “Nine o’clock, twenty-eight minutes.” “What weather have you?” “Cloudy.” “Separate your words more.” “Oil your clock-work.” “Buchanan stock said to be

rising.” “I have a great crowd at my window.” “Van Buren cannon in front, with a fox tail on it.” The carping politicians and statesmen, however, soon received further evidence of the success of the experiments with the telegraph. The National Democratic Convention for the nomination of presidential candidates assembled in Baltimore, May 29. There was a long and exciting struggle over the nominees. Van Buren was finally dropped, and James K. Polk received the nomination. A struggle then arose over the candidates for Vice-President. Silas Wright, of New York, was nominated. Mr. Wright was then in Washington; and Vail telegraphed the news of the nomination to Morse, who communicated it to Wright. The convention was astonished at receiving a telegraphic message from Mr. Wright declining the nomination, and refused to believe it. The convention adjourned until a committee could go to

Washington and get reliable information on the subject.

The experimental line was a success, and the question now arose in regard to selling the telegraph to the government. The sum named was only one hundred thousand dollars. The Hon. Cave Johnson, as we have already said, reported against it. At the present time the capitalisation of the Western Union Telegraph Company is one hundred million dollars. On May 15, 1845, a private company was formed, which included the names of Hon. Amos Kendall, formerly Postmaster-general under Jackson, Ezra Cornell, Hon. F. O. J. Smith, Alfred Vail, and twenty-two other stockholders.

Morse again started for Europe, August 6, 1845, to enlist foreign capital. He was again unsuccessful in England, and also on the Continent; and he returned to America with a stronger feeling of patriotism than ever. There his affairs at last were in able business hands, and

lines were being rapidly constructed. Then, the way having been pointed out, the modern highwayman and the nineteenth-century type of the robbers of the Rhine began their attacks on the validity of Morse's patents. The first lawsuit is especially interesting, since it shows the evidence of a socialistic movement which strives to fatten on other people's brains, and which is not absent as we enter upon a new century. A contract had been made June 13, 1845, with Henry O'Rielly, who had been prominent in the construction of the lines between Philadelphia and Washington, to construct a line from Philadelphia to St. Louis, and to certain other points which were carefully specified. The line to St. Louis was finished in December, 1847. O'Rielly then, without authority, began a line to New Orleans, which was entitled the People's Line, and on which he claimed to use instruments which differed essentially

from the Morse instruments. The Morse company immediately applied for an injunction. The would-be robbers represented to the great American public that the Morse company was a dangerous monopoly; perhaps the word "trust" was used by the newspapers and the politicians of that day. The title "The People's Line" was captivating, and many of the good people found reasons for believing that Morse was not the real inventor of the telegraph. It was maintained that Wheatstone in England and Steinheil of Bavaria had preceded Morse. It was urged that Joseph Henry had invented the relay. The O'Rielly case was tried in Louisville, Kentucky, August 24, 1848, and was decided in favour of Morse. An appeal was taken to the Supreme Court at Washington. Salmon P. Chase, afterwards Chief Justice of the United States, was one of the lawyers retained by O'Rielly. The Supreme Bench gave a decision in favour

of Morse, and Chief Justice Taney delivered a very full opinion.

There are many scientific men even to-day who think that Joseph Henry was the real inventor of the telegraph, since his researches clearly embody the principles which underlie its action. It is sometimes difficult for a professor to understand the principles which guide the legal profession in their conduct of patent cases. A method of procedure has grown up which is probably justified by experience and public exigency. The question of dates and records is extremely important, since men are prone "to think more highly of themselves than they ought to do," and their words and opinions undergo strange changes in the presence of a glittering prize. A clear light upon the standpoint of the legal profession in such matters is shown by the following extract from an opinion of Judge Kane, delivered in Philadelphia September, 1851, in the case of

Morse's company, the Magnetic Telegraph Company *versus* the "Bain Line" :—

"It is only to make the first approach to a controversy on this point, to prove to us that Professor Henry had, as early as 1828, made the intensity magnet, with which the scientific world is now familiar, or that he afterwards, and before Mr. Morse's first application for a patent, had illustrated before his classes at Princeton the manner in which one circuit could operate to hold another closed or to break it at pleasure, or that he had foreseen the applicability of his discoveries to the purposes of a telegraph. The question is not one of scientific precedence; and, if it were, this is not the forum that could add to or detract from the eminent fame of Mr. Henry. It is purely a question of invention applied in a practical form to a specific use; and so regarded, it admits but a single answer." In other words, Morse had

invented a new and useful art. It is interesting to note that no scientific experts were employed by the litigants. The subject was young, and all the literature on the subject of electricity could be understood by even those not trained in science. There was, therefore, less tergiversation in the records of this litigation than in the case of subsequent electrical cases. The library of the New York Historical Society contains more than one hundred volumes devoted to the history of telegraphic litigation in the United States.

Morse was at last successful. The great invention had been made, and a fortune was his. He took for a second wife Miss Sarah E. Griswold of Poughkeepsie, New York, the daughter of his cousin. She was twenty-five years of age, and he was now fifty-six. He purchased two hundred acres of land near Poughkeepsie, and entered upon the final period of prosperity and distinc-

tion. The *Sturm und Drang* of life was over. His serenity was only disturbed by occasional incursions into his telegraphic fields of the robber barons whom we have mentioned. It is probable that the repelling of these attacks and the increasing business due to his telegraphic interests prevented his resuming the brush. I am inclined to think that he had found his true vocation, that of an inventor. His great impetus was in this direction rather than in art. Honours now became his. He received the degree of LL.D. from Yale College. Various gold medals were bestowed upon him by foreign governments. The King of Denmark bestowed upon him the cross of the order of Dannebrog. He was elected a member of the Royal Academy of Sciences of Sweden. Isabella II., Queen of Spain, conferred the order of knighthood and Commander of the first class of the Royal Order of Isabella the Catholic. Victor Emmanuel

II., King of Italy, gave him the brevet and insignia of Chevalier of the Royal Order of SS. Maurizio et Lazare. The Société de Physique et d'Histoire Naturelle of Geneva, Switzerland, elected him an honorary member.

In 1857 Morse had issued a memorial to several of the diplomatic representatives of the United States government in Europe, setting forth his claims to the great invention and his claims for indemnity for the use of his telegraph. The American minister in Paris, the Hon. John Y. Mason, was influential in bringing this memorial to the attention of the French government and to other representatives of the powers; and a convention formed of members from France, Austria, Belgium, Netherlands, Piedmont, Russia, the Holy See, Sweden, Tuscany, and Turkey, recommended a testimonial of four hundred thousand francs, which was remitted in four annuities. It is noticeable that Great Britain

did not join in this testimonial. His native country honoured him with banquets ; and, when he was eighty years of age, a bronze statue of him was placed, with imposing ceremonies, in Central Park, New York. He died at Poughkeepsie, New York, April 2, 1872.

Morse was fortunate in entering the field of electrical invention when researches had been made which rendered the success of a telegraph possible. He had few competitors. Where to-day there are a thousand electricians, then there was only one. The invention of the telegraph was sure to come, and he was the chosen torch-bearer. He was fortunate in having received a liberal education, which, together with his natural urbanity, gave him influential friends.

During his severe struggle, Morse exhibited the strong moral qualities of courage and persistence. When great success came to him, he forgot his in-

debtedness to Joseph Henry. Morse in 1855 published a pamphlet in which he announced : —

“First : I certainly shall show that I have not only manifested every disposition to give due credit to Professor Henry, but, under the hasty impression that he deserved credit for discoveries in science bearing upon the telegraph, I did actually give him a degree of credit not only beyond what he had received at that time from the scientific world, but a degree of credit to which subsequent research has proved him not to be entitled. Second : I shall show that I am not indebted to him for any discoveries in science bearing on the telegraph, and that all discoveries of principles having this bearing were made not by Professor Henry, but by others, and prior to any experiments of Professor Henry in the science of electromagnetism. Third : I shall further show that the claim set up for Professor

Henry to the invention of an important part of my telegraph system has no validity in fact.”

Joseph Henry, in a dignified communication to the Regents of the Smithsonian, says in reference to his statements in court: “It was my wish, in every statement, to render Mr. Morse full and scrupulous justice. While I was constrained, therefore, to state that he had made no discoveries in science, I distinctly declared that he was entitled to the merit of combining and applying the discoveries of others in the invention of the best practical form of the magnetic telegraph. My testimony tended to establish the fact that, though not entitled to the exclusive use of the electromagnet for telegraphic purposes, he was entitled to his particular machine, register, alphabet, etc.”

A select committee of the Board of Regents took up this assault of Morse upon their distinguished secretary.

The chairman of this committee was President Felton of Harvard University, and it characterised the attack of Morse as a "disingenuous piece of sophistical argument," and stated their conviction that Morse had failed to substantiate any one of the charges he had made against Professor Henry.

Nevertheless, to Morse must be given the credit of the adaptation of Henry's investigations to the needs of mankind. He was a pioneer in the subject of the practical applications of electricity; and, since his time, other men have attained great popular reputation as inventors in electricity, who like him had not distinguished themselves by scientific investigations, and, indeed, had in general very little knowledge of science. The world, however, recognises its debt to them for their perception of the practical value of scientific work and their courage, persistence, and energy in achieving practical results.

BIBLIOGRAPHY.

The general reader will find many short essays in various periodicals and cyclopædias which give the main incidents in the life of Morse. There is also one extended biography — that of Prime. The short bibliography given below includes the articles written by Morse, which throw light upon his artistic career and the subsequent development of his powers as an inventor. In the prolonged litigation which followed his great invention there were many points raised in regard to his merits as an original discoverer ; and the principal authorities which discuss these points have been included in this short list.

I. THE AMERICAN ELECTRO-MAGNETIC TELEGRAPH : With the Reports of Congress and a Description of all Telegraphs known employing Electricity or Galvanism. By Alfred Vail. (Philadelphia, 1845 : Lee & Blanchard.)

The treatise was written by the partner of Morse in the latter's early struggles to bring his invention to the attention of the public, and contains a good description of Morse's apparatus.

II. MORSE'S PATENT : FULL EXPOSURE OF CHAS. T. JACKSON'S PRETENSIONS TO THE INVENTION OF THE AMERICAN ELECTRO-MAGNETIC TELEGRAPH. By Amos Kendall. (New York, 1849.)

This is an exposition of the view taken by the partisans of Morse in regard to the claim of Dr. Jackson, and those who are curious in regard to the origin of the idea of the telegraph in Morse's mind will find a full criticism of Dr. Jackson's claims.

III. HISTORIC ANNALS OF THE NATIONAL ACADEMY OF DESIGN. By Thomas S. Cummings, N.A. (Philadelphia, 1865 : George W. Childs.) This interesting treatise by a professor of the arts of design in the New York Univer-

sity contains a full account of Morse's connection with the National Academy of Design, and is therefore illustrative of his artist's career.

IV. MEMORIAL OF S. F. B. MORSE. Order of City Council. (Boston, 1872.) A collection of addresses in honour of Morse.

V. LIFE OF SAMUEL FINLAY BREESE MORSE. By Samuel Irenæus Prime. (New York, 1875 : D. Appleton & Co.) The most complete biography of Morse which has been printed.

VI. A MEMORIAL OF JOSEPH HENRY. Published by order of Congress. (Washington, 1880 : Government Printing Office.) This includes Henry's letters to Morse, and the history of Morse's attack upon Henry, in which Morse disclaims having received any assistance from the original investigations of Henry in electricity and magnetism.



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