American Electro-Magnetic Telegraph

Its Early History as Shown by Extracts From the Records of

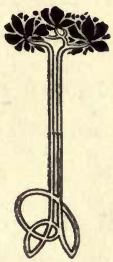
:: :: ALFRED VAIL :: ::

1914

Early History of the

Electro-Magnetic Telegraph

From Letters and Journals of Alfred Vail
Arranged by His Son, J. Cummings Vail



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IN LOVING MEMORY OF

MY FATHER

Born September 25, 1807 Died January 18, 1859

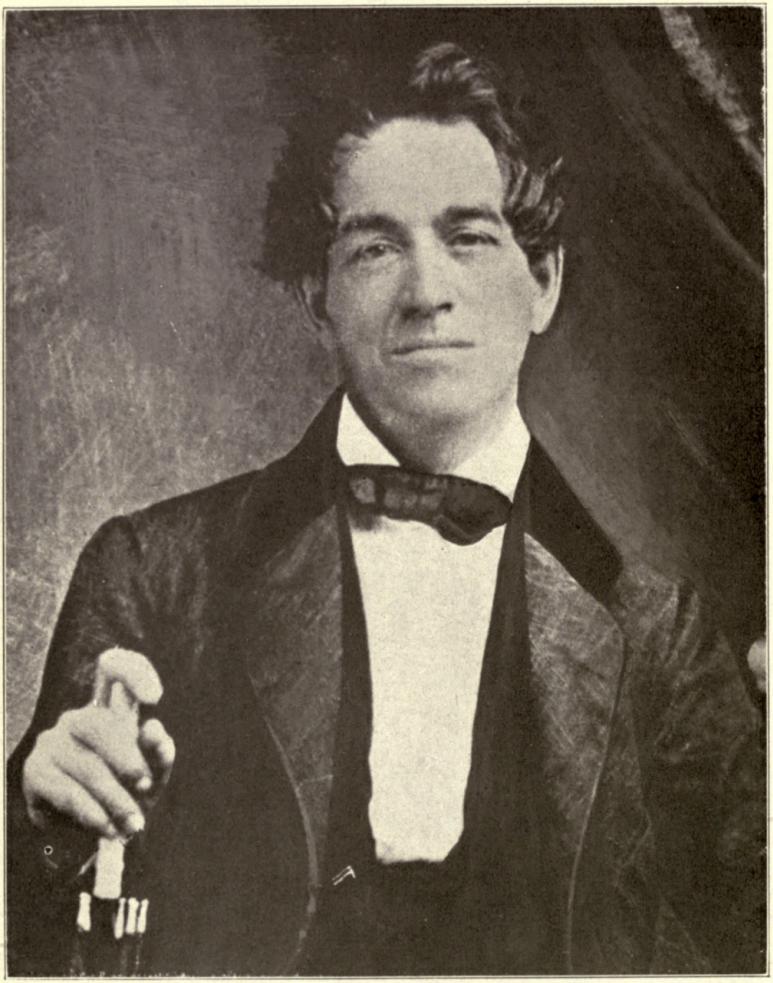
PREFACE

On his forty-sixth birthday Vail's diary records: "Riches and honor I care not for." Riches he did not have, and this pamphlet, the labor of my declining years, will, I trust, show his share in bringing the telegraph into successful use.

It is not claimed that Vail invented the telegraph, but this work shows Morse invented "A *System* of Telegraphs," not "The Telegraph."

Vail's records now belong to the Smithsonian Institution at Washington, D. C., and are open to the public.

MORRISTOWN, N. J.
1914.



ALFRED VAIL

ALFRED VAIL

His connection with the Electro-Magnetic Telegraph

The Electric Telegraph had, properly speaking, no inventor. It grew little by little, each inventor adding his little to advance it towards perfection.

About 1617, Famianus Strada of Rome claimed to have signalled without wires by means of two sympathetic compasses.

Sparks of electricity were sent through wire in 1729 and 1730.

About 1750, Mechanical Electricity was first suggested.

1753, it was proposed to send signals through insulated wires on poles.

1774, Lesage used 24 insulated wires and claimed to have contemplated for thirty years corresponding by electricity.

1787, Lomond used a single brass wire of some length.

1791, Samuel F. B. Morse was born.

1794, Rieser used 36 wires.

1795, Cavello used a Leyden jar and about 200 feet of copper wire.

1798, Salva successfully signalled 26 miles.

1807, Alfred Vail was born.

1808, Chemical Electricity used for signalling by Von Soemmering of Munich.

1812, Schilling exploded powder mines by electricity across the river Neva near St. Petersburg.

1816, Ronalds signalled through 8 miles of wire and his principle was successfully used by Wheatstone, 1839, by House, 1846, and by Hughes in 1850, and in same year (1816) Dr. Coxe of Philadelphia suggested communication by electricity.

1820, Oersted also suggested the same means of communication, and Ampere discovered galvanic magnetism.

1823, Baron Schilling signalled by electricity.

1824, Peter Barlow signalled with a Sturgeon's magnet and the Edinburg Philosophical Journal for January, 1825, published his conclusions as follows:

"The details of this contrivance are so obvious and the principle on which it was founded so *well understood* that there was only one question which could render the result doubtful, and this was 'is there any diminution of effect by lengthening the wire'? Two hundred feet of wire so reduced the effect that he gave it up."

In 1828, Dyer, an American, strung wires on poles, with glass insulators.

1828 to 1831, Prof. Joseph Henry sent electric signals at Albany, N. Y.

Prof. Chas. A. Joy, Ph.D., writes in Frank Leslie's *Popular Monthly* for August, 1878, as follows:

"Prof. Morse in his report of the Paris Exhibition of 1867 lays claim to the following inventions and discoveries as having been made by him:

1. The recording telegraph, operated either electro-magnetically or electro-chemically.

2. The telegraphic relay circuit, or the opening and closing of a secondary circuit by means of a primary circuit.

3. The dot and line alphabet.

4. The use of sounds as a medium of receiving telegraphic communications.

5. The system of automatic transmission by the use of metallic type, or of the embossed paper strip from the register, as a means of opening and closing the circuit.

6. The use of a printing wheel and ink as a mode of recording, generally known as the "ink writer."

On page 159 of Alfred Vail's book "The American Electro-Magnetic Telegraph," 1845, is a chapter headed "Electro-Magnetic Printing Telegraph invented by Alfred Vail Sept. 1837."

Baxter Vail's mechanical assistant in 1837 and 1838, says: Alfred was exceedingly modest . . . As the weak points developed . . . Alfred began to draw upon the resources of his own wonderful power of invention . . . We constructed the new lever . . . and . . . produced a register capable of making dots, dashes, and spaces. He saw in these new characters the elements of an alphabetical code . . . and . . . instantly set himself . . . to construct such a code.

The history of trials and discouragements of the pioneers in the development of electric signalling can be read by those interested, in the Annual Report of the Smithsonian Institute for 1878 containing an exhaustive article by W. B. Taylor; and some account of Alfred Vail's connection therewith, is given in an article by Franklin L. Pope published in the *Century Magazine* for April, 1888.

"What Alfred Vail did for the Electric Telegraph?" is shown by extracts from his records, arranged to give the story of his work from 1837 to 1849, when he retired, as he writes from Washington, September 21, 1848, to S. F. B. Morse. . . . I shall in a few months leave Washington for New Jersey, family, kit and all, and bid adieu to the subject of the telegraph, for some more profitable business. . . . I have finished a most beautiful register with a pen lever key and an expanding reel.

And on October 5, 1848, to his brother George:

"The reason why I must give up remaining here is, that I am wearing myself out in the telegraph, for the interest of the patentees, without compensation, and the care and study is accumulating every day."

All notes here given are copied from his records, unless otherwise stated.

For a full understanding of Vail's connection with the Telegraph, I give here the original contract between Morse and Vail, followed by extracts from a contract made in March, 1838, between Morse, Smith, Gale and Vail, showing the part he agreed to assume in the mechanical development of the invention.

This contract is dated two days before Vail's thirtieth birthday; Morse was forty-six.

Articles of agreement made this 23d day of September, in the year of our Lord, one thousand eight hundred and thirty-seven, between Prof. Samuel F. B. Morse, ot the University of the City of New York, in the City and County and State of New York, of the first part, and Alfred Vail, of Speedwell (Morristown),

in the Township and County of Morris, and State of New Jersey, of the second part, as follows, to wit, viz:

Whereas, the said Samuel F. B. Morse, of the first part, has invented a new machine for the transmission of intelligence, called the "Electro-Magnetic Telegraph," and to secure to himself the benefits of his invention, he is preparing to take out letters-patent of the United States, and he hereby associates himself with the party of the second part in this undertaking, upon the following terms and conditions:

FIRST. The party of the second part covenants to construct and put into successful operation, *at his own proper cost and expense,* one of the telegraphs of the plan and invention of the party of the first part, and to exhibit its full power and value before a committee of the Congress of the United States, on or before the 1st of January, eighteen hundred and thirty-eight.

SECOND. All expenses, which in the judgment of both parties shall necessarily be incident to the final completion and perfection of the said plan of telegraphic communication, shall be defrayed by the said Vail, of the second part, *who also agrees to devote his time and personal services faithfully to this object without charge.* The expenses of obtaining letters-patent from the United States are intended to be included as a part of the incidental expenses, as well as all machinery and apparatus which may be found to be necessary for testing, by actual and speedy experiment, the efficiency of the mode of transmitting intelligence.

THIRD. And it is hereby further agreed between the said parties of the first and second parts, that in case either of them shall make any new discoveries which will be applicable to said telegraph or any new invention which will tend toward perfecting the same in any manner, he will, as soon as practicable, communicate the same to the other, and it shall be held as the property of each, in the same proportion as their respective rights in the whole, and the expenses of taking out letters-patent for such new discovery or invention, if such letters-patent be mutually thought to be necessary, shall be defrayed by each, in the same proportion as he holds of the whole, by these presents hereinafter mentioned

FOURTH. In consideration of the aforesaid payment of money (mentioned in Article 2 of this agreement), and such other aids as are promised, and shall be undertaken and fulfilled by the said Vail, of the second part, the said Samuel F. B. Morse, of the first part, doth hereby assign, transfer and convey to the said Alfred Vail, of the second part, and to his heirs and assigns forever, one equal undivided one-fourth part of all his interests and rights, which he now holds, or which may accrue by means of the said invention of the "Electro-Magnetic Telegraph" and by the proposed patent to be secured to him as aforesaid, so far as any benefits and advantages may arise therefrom.

FIFTH. It is also agreed by the said Morse, of the first part, that, provided that said Vail, of the second part, will procure to be taken out letters-patent for this invention, in any or all of the foreign countries of the globe, he shall be entitled to one equal and undivided one-half of all the benefits, profits and advantages arising therefrom, and it is further agreed by said party of the second part, that the said letters-patent for the exclusive right to use such invention of the "Electro-Magnetic Telegraph" in France, England, Scotland and Ireland shall be taken out in any or all of these countries with the least possible delay, and as soon as the models necessary for that purpose shall be sufficiently completed to

test their efficiency and that no unnecessary delay be incurred, these models shall be immediately commenced, as provided for in Article 2 of this agreement.

SIXTH. In event of the entire failure of the aforesaid invention, and its abandonment by the parties of this covenant, it is mutually agreed that all the machinery, apparatus, etc., made since the date of this agreement shall be the exclusive property of the said Vail.

SEVENTH. It is further agreed by the said party of the second part, that the letters-patent taken out for France, England, Scotland, and Ireland, in compliance with Article 5, *shall be taken out in the name* and for the exclusive benefit *of said Morse,* of the first part, and it is hereby agreed by the said party of the first part that as soon as he has obtained them, he shall immediately assign, transfer and convey to the said party of the second part, one equal undivided one-half of all his interest and rights by said letters-patent secured to him.

IN TESTIMONY WHEREOF we have hereunto set our names and seals.

(Signed), { SAMUEL F. B. MORSE,
{ ALFRED VAIL.

In the presence of
E. O. MARTIN,
ROBERT BOYLE.

Extract from an agreement between Morse, Smith, Vail and Gale, signed in March, 1838:

"9th. That the said Vail hath agreed and hereby agrees to devote his personal services and skill in constructing and bringing to perfection, as also in improving the Mechanical parts of said invention, until the same shall be made the property of the Government of the United States, or otherwise be disposed of by the said proprietors—and without charge for such personal services to the other proprietors, and for their common benefit, said service to be in accordance with the general direction and supervision of the said Morse.

"10th. Treats of Gale's duties.

"11th. All expenses and charges incident to the perfection of said Morse's application for Letters Patent from the Government of the United States, and of obtaining said Letters Patent, shall be borne and paid by the said Morse and Vail exclusively, as are all expenses incident to and growing out of the improvement and perfecting of the mechanism of said invention, until said Letters Patent shall have been obtained."

The following extracts show Morse's original idea:

FROM PRIME'S LIFE OF MORSE: (P. 19.)

Morse, when a student, heard Dr. Day of Yale say, at a lecture on electricity: "If the circuit be interrupted, the fluid will become visible and, where it passes, it will leave an impression upon any intermediate body."

MORSE SAYS IN 1832: (P. 252.)

"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."

Were not these remarks, on the Sully," based on Dr. Day's lecture heard years before. Many before Morse had laboured to develop the same idea.

PROF. SAMUEL F. B. MORSE

Inventor of the Magnetic Telagraph

Morse writes to Prof. Jackson, Sept. 18, 1837:

"The discovery, is the original suggestion of conveying intelligence by Electricity, the invention, is devising the mode of conveying it."

Morse writes the Secretary of the Treasury, Sept. 27, 1837:

"I planned (on the Sully) a system of signs and an apparatus to carry it into effect. I cast a species of type which I had devised for this purpose, the first week after my arrival home, and altho the rest of the machinery was planned . . . I . . . was not able to test the whole plan until within a few weeks." These type produced the V-shaped line, and could not produce letters. The points of each V being read as numbers, thro a "Dictionary" which Morse wrote Vail October 24, 1837, "is at last done." These points represented single or compound numbers as indicated by the larger or smaller spaces between them, these spaces producing at the top of the record, dashes, longer or shorter as made necessary to provide the larger or smaller spaces at the bottom. The top, therefore, showed *lines* or *points* with spaces between, being in fact the embryo of the letters which came when a machine and type capable of marking dots (or *points*), dashes (or lines) with *spaces* between, was evolved. The key made type unnecessary. Baxter, his assistant, says Vail constructed the new lever and thus for the *first* time produced a register capable of making dots, dashes and spaces.

Morse to Prof. Jackson: N. Y., Dec. 7, 1837.

"This machinery consisted, as you well know, of a system of signs, which were numerals to be read by intervals, type and apparatus to arrange the numbers for transmission, a lever to mark on the register, and a register moving by clock machinery to receive the marks at the proper times.

"The plan of numerals, type, lever &c., is the very plan I have now in successful operation."

March, 1838.

S. F. B. Morse signed a paper in which he claims to be "the sole and original inventor of a *system* of Electro-Magnetic Telegraphs for conveyance of intelligence by words or signs or by either."

He writes to the British Attorney General: July 12, 1838.

" . . the use of electricity on metallic conductors, for which no one could obtain an exclusive privilege since this much has been used for nearly one hundred years."

F. O. J. Smith to Vail: Washington, Jan. 13, 1839.

"You will find an interesting letter from Prof. Morse to me—in which he adverts to still other improvements and among them, the dispensing with all but one alphabet of type. I know not how this has been effected. . . . . Morse's first idea was decomposing salts by the Electric Current, and as he wrote Prof. Jackson in 1837 he tried the experiment."

Morse writes from. . . . . Paris, France, Sept. 8, 1839.

"I had on the Sully, invented the signs, planned the whole machinery for moving the paper, invented the type, and the levers for closing and breaking the circuits, before the end of the voyage."

Morse to Vail at Washington: London, Sept. 1, 1845.

" . . the advantage of recording is incalculable and in this I have the undisputed advantage."

The following letter was written about the time they began to read by sound.

MED. COLL. of OHIO, CINCINNATI. Feb. 16, 1846.

Mr. Vail . . . . some explanation is due to Prof. Morse and his friends in reference to my newspaper announcement of my discovery of the 'talking telegraph.' I was not aware of Prof. M's. special experiments on this subject and the announcement was made, not as a piece of public information, but as an exciting point of information to my subscribers, to whom I stated that the thing had no practical utility, differing little from the recognition of the letters by tapping or drumming out the contacts, a thing shown to me at the Telegraph Office, at Washington, and I considered it still as Morse's Telegraph . . . Signed John Locke.

Feb. 17, 1848.

"Prof. Walker stated that Prof. Henry told him that he, Henry, had many years ago used the relay magnet for making signals."*

February 18th.

"Prof. Morse, Dr. Gale and Prof. Walker had an interview with Prof. Henry to-day. Prof. H. now states, that many years since, and before Prof. M. invented his relay magnet, that he used a relay magnet on a line one-half mile long, and an Electro magnet for the purpose of ringing a bell and so exhibited it before his class."

These last two extracts refer to the relay controversy.

May 6th, Morse writes Vail from Poughkeepsie:

Sending "drawing and description of a machine to cut the type" as a "valuable improvement in sending letters."

The Sender Key was designed by Vail in 1844.

August 11th.

L. D. Gale Swore "I consider the essence or spirit of the invention patented by Samuel F. B. Morse to consist in a principle carried out in practice."

"Neither principle by itself, nor result by itself, is the proper subject of Letters Patent."

L. D. Gale was then one of the Examiners in the Patent Office.

The above is from the court records of Morse vs. O'Reilly as is also the following:

Aug. 12th, 1848.

L. D. Gale's testimony was: "to the best of my knowledge and belief, the alphabet of Morse consisted of horizontal dashes, dots and spaces. I am informed that originally the alphabet which was invented previous to 1836 consisted of dots and spaces."

In Morse vs. O'Reilly. August 12th, 1848.

Chas. G. Page testified: "Said Morse was not the first to suggest or employ the Electro-Magnetic power for communicating signals, but the first to suggest and employ that power for *recording* signals."

The following explains the charge that the caveat had been tampered with. The caveat, therefore, in its present form, is not as originally filed.

"This appears to have arisen from the practice of the office namely, of taking the caveat itself and converting the paper or papers, the drawings belonging to them into papers for the patent—In such case there would almost always be some *additional* drawings and explanations and *new* examples given. Thus in converting Morse's caveat into a patent, seven figures made for the caveat papers

were crossed out as not required in the Patent and reissues, and the numbers referring to said figures and examples were necessarily changed to suit the new papers—but since the present administration, a rule has been adopted, that under no circumstances can caveat papers be withdrawn from the office or undergo any alterations after they have been once filed."

This is not dated or signed, but seems to be part of L. D. Gale's testimony in Morse vs. O'Reilly, in 1848.

Morse memorialized Congress on January 30th, 1849, as follows:

"He cheerfully accords to Prof. Henry all that he claims for himself, and readily admits that, in the construction of this telegraph he uses many things invented by others. The chief merit he claims, is that of so combining together things and inventions already existing, as to produce a result never before attained, and this is the essence of his invention.

On September 7th, 1849,

Prof. Henry deposed "I have always considered his (Morse's) merit to consist in combining and applying the discoveries of others in the invention of a particular instrument and process for telegraphic purposes."

From Prime's Life of Morse. Paris, April 27th, 1858.

Count Walewski said—"The discovery of the principles upon which the process that has received the name of Mr. Morse rests, unquestionably does not belong to him, but he was the first to contrive to carry this discovery out of the speculative domain of reason into that of material application."

September 25th, 1868, U. S. Reports Paris Ex. 1867, p. 148.

"The idea of 1832 was the possibility of producing an automatic record at a distance by means of electricity—the idea of a true telegraph—and this original idea was immediately followed by devising the process and the means for carrying the idea into effect." (Signed) S. F. B. Morse.

From Letter of F. O. J. Smith to Henry J. Rogers, December 11th, 1871.

"Prof. Morse cannot justly claim, nor will authentic history sustain such preeminence for himself. In other days he did not pretend to it. In his published letter to Dr. C. T. Jackson, dated December 7th, 1837, he says 'My invention on board the Sully is mechanical and mathematical.'" . . . . . .

"Barlow and Morse are inventors of exactly equal merit in the electromagnetic history, altho the former was in advance of the latter 12 years."

From Philadelphia *Press*, January 24th, 1872.

"Another quarter (of the Morse patent) having been earned by the late Mr. Vail of Morristown, N. J., for *devising* the telegraphic machinery first brought into practical use."

From Washington, D. C., *Sunday Chronicle*, March 3rd, 1872.
By L. D. GALE.

"The Morse invention is a machine, and nothing more nor has it been *claimed* by anybody else."

F. O. J. Smith, March 30th, 1872.

"Professor Morse, in fact, only acted the part of the errand boy, who called in the midwife's service to save the life of the unborn child; and even after its birth it was too feeble and slow of motion, too deformed of limbs and

speech, to be of value, without the nursing and ingenious new mechanical appliances of Mr. Vail."

As I was not permitted to see Morse's original caveat at the Patent office, I give extracts copied from U. S. Supreme Court record, and also extracts from his latest Patents.

CAVEAT, October 3rd, 1837.

"Your petitioner has invented a new *method* of transmitting and recording intelligence by means of electro-magnetism . . . My invention consists in laying . . . conductors of any length to any distance . . . to make use of the visible signs of the presence of electricity in any part of the said circuit, to communicate any intelligence from one place to another.

"To make the said visible signs of electricity available for the purpose aforesaid, I have invented the following apparatus, namely:

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

SECOND: A set of type adapted to regulate and communicate the signs. . . . . .

THIRD: A port rule, for regulating the times and intervals of the passage of electricity.

FOURTH: A register, which records the signs permanently.

FIFTH: A dictionary or vocabulary of words, numbered . . . . .

SIXTH: Modes of laying the conductors, to preserve them from injury."

"What I claim as my invention . . . . . is a *method of recording permanently* electrical signs . . . . ."

Morse's Caveat says: Signs for Numerals consist

"1st, of ten dots or punctuations made in measured distances of equal extent from each other, and in numbers corresponding with the numerals desired to be represented."

Morse wrote Prof. Jackson in 1837 that his first idea was decomposing salts by the electric current.

LETTERS PATENT, REISSUE NUMBER 117, June 13th, 1848.

First:——I do not claim the use of the galvanic current or current of electricity for the purpose of telegraphic communication generally, but what I specially claim as my invention and improvement is making use of the motive power of magnetism . . . as means of operating machinery or to produce sounds for the purpose of telegraphic communication. I, therefore, characterize my invention as the first Recording or Printing Telegraph by means of Electro-Magnetism.

There are various known modes of producing motions by Electro-Magnetism, but none of these had been applied, prior to my invention and improvement, to actuate or give motion to printing recording machinery, which is the chief point of my invention.

SECOND: I also claim as my invention and improvement the employment of the machinery called the Register or Recording instrument . . . . . .

THIRD: I also claim the combination consisting of the generator of electricity, the circuit of conductors, the contrivance for closing and breaking the circuit, the Electro-Magnet, the pen or contrivance for marking and the machinery for sustaining and moving the paper . . . . . .

FOURTH: I also claim as my invention the combination of two or more galvanic or electric circuits with independent batteries, for the purpose of . . enabling me to command sufficient power to put in motion registering or recording machinery at any distances.

FIFTH: I claim as my invention the system of signs consisting of dots and spaces, and of dots, spaces and horizontal lines for numerals, for telegraphic purposes.

SIXTH: I also claim as my invention the system of signs consisting of dots and spaces, and of dots, spaces and horizontal lines as signals for telegraphic purposes.

SEVENTH: I also claim as my invention the types and the Type Rule and Port Rule in combination with the signal lever for closing and breaking the circuit.

EIGHTH: I do not limit myself to the specific machinery or parts of machinery described in the foregoing specifications and claims, the essence of my invention being the use of the motive power of the electric or galvanic current, for marking and printing intelligible characters, being a new application of that power, of which I claim to be the first inventor or discoverer.

Witnesses. (Signed) SAMUEL F. B. MORSE.

GEO. WOOD,
J. READ BAILEY.

Chief Justice Taney on this Patent.

"Indeed if the eighth claim of the patentee can be maintained, there was no necessity for any specification further than to say that he had discovered that by using the motive power of electro-magnetism he could [redacted] print intelligible characters at a distance. We presume that it will be admitted on all hands that no patent could have been issued on such a specification."

LETTERS PATENT RE-ISSUE NO. 118. JUNE 13, 1848.

"The original and final object of all telegraphing is the communication of intelligence at a distance by signs or signals.

Various modes of telegraphing, or making signs or signals at a distance have for ages been in use. The signs employed heretofore are evanescent, leaving no trace of their having existed . . . I do not, therefore, claim to be the inventor of telegraphs generally.

The Electric Telegraph is a more recent kind of telegraph. Its distinguishing feature is the employment of electricity to effect the same general result of communicating intelligence at a distance by signs or signals.

I do not claim to have first applied electricity to telegraphing for the purpose of showing evanescent signs or signals.

The original and final object of my Telegraph is to *imprint* characters at any distance in a permanent manner."*

CLAIMS.

FIRST. What I claim as my invention is the employment of a Receiving Magnet, in combination with a short local independent circuit or circuits . . . as will enable me to obtain such motion or power for registering as could not be obtained otherwise . . .

* NOTE. (The telegraph signals are to-day read by sound alone and are therefore evanescent.)

SECOND. I also claim as my invention The Self Stopping Apparatus for setting the Register in action and stopping it . . .

THIRD. I also claim as my invention the pen and pen lever, with the grooved roller over which the paper for marking upon, may be made to pass for the purpose of receiving the impression of the characters by indentation . . .

Witness: (Signed) SAM'L F. B. MORSE.
GEO. WOOD,
J. THOMAS CLAKE.

Judge Woodbury, U. S. Circuit Court, Mass. 1850.

"In his last renewal of 1848, there is introduced for the first time some changes of language and tendencies in part of them (as well as in some of the arguments) to make the claim broader, and as in the letter just quoted, to cover all applications of electro-magnetism if not of electricity, to convey intelligence, or to telegraph to a distance . . . . . .

"Such broader view might subject his patent to be considered void both by claiming too much and for claiming also the invention of a mere principle.

"Others . . . as well as the history of the progress on this subject, show that several had before Morse not only made this discovery, but applied both electricity and electro-magnetism to telegraphing.

"He came into the world too late for truly claiming much as new. A large galaxy of discoverers on this subject had preceded him."

The following refers to the third claim of this patent.

Pasted on the Registering instrument used at Baltimore May 24, 1844, was the following: "This lever and Roller were invented by me in the 6th story of the New York *Observer* Office in 1844 before we put up the telegraph line between Washington and Baltimore, and the same has always been used in Morse's instrument. I am the sole and only inventor of this mode of telegraph embossed writing. Prof. Morse gave me no clew to it or did anyone else and I have not asserted publicly my right as first and sole inventor because I wished to preserve the peaceful unity of the invention, and because I could not, according to my contract with Prof. Morse, have got a patent for it."

(Signed) ALFRED VAIL.

Alfred Vail, to Gilbert Smith: Washington, D. C., Sept. 4, 1848.

1st. Please state what you recollect in regard to Prof. Morse's several experiments in regard to some plan of marking on the telegraphic paper for recording the signs?

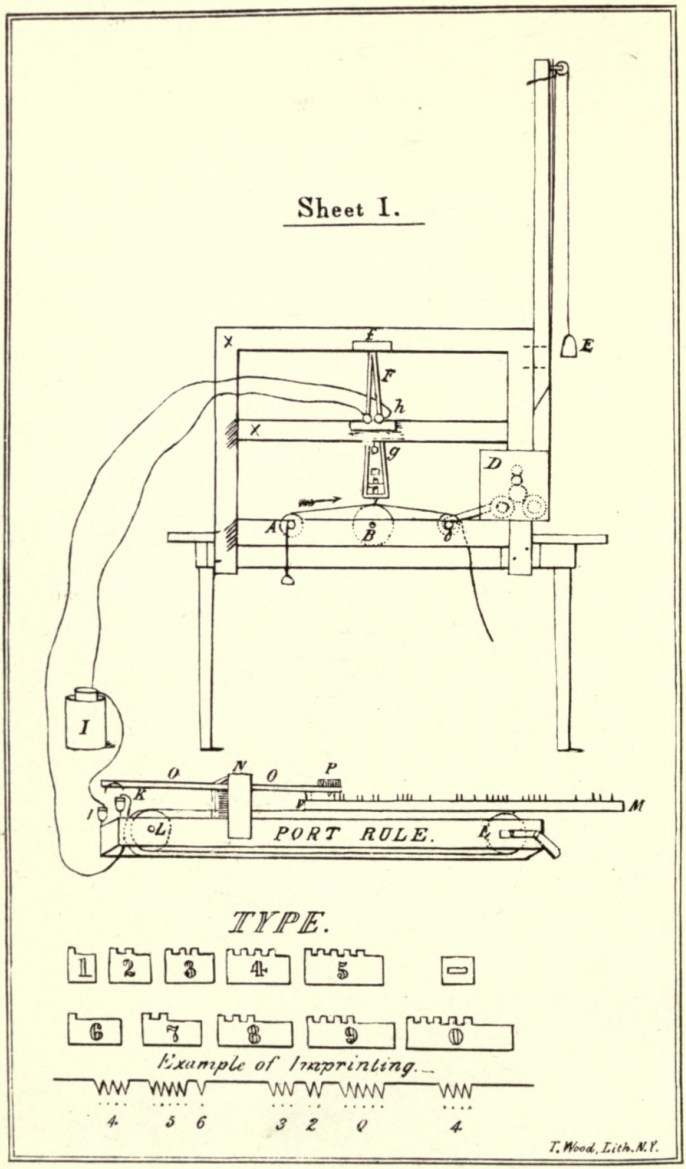
2nd. What were those different plans?

3rd. What do you recollect in regard to the present mode of writing with a steel point pressing upon the paper and making the identation now in universal use.

4th. Was the present plan of marking, one of the plans of Prof. Morse's experiments?

Gilbert Smith to A. Vail: New York, September 8th, 1848.

. . . . . In regard to your first question, I recollect that several plans for marking on the telegraphic paper, were tried during the time I was in the employ of Prof. Morse. In regard to the 2nd question, I recollect that one of the plans tried consisted of a wheel some 6 or 8 inches in diameter the edge of which was covered with some coloring substance and the paper is made to pass



MORSE'S TELEGRAPH OF SEPT. 3, 1837

over the surface, and then by pressing upon the paper with a point, the marks were obtained.

In regard to the 3rd question I recollect that yourself or Prof. Morse suggested the plan of making impressions upon the paper; instead of using ink or any coloring substance. I also recollect of making the apparatus to try the experiments, and it proved to be the best plan that had been tried.

4th. The present plan of marking is the same as the last mentioned above.

The foregoing extracts show that from 1832 to the date of his last patent, Morse's great claim was that he invented the plan of recording messages, the mechanism, successfully to accomplish which was all made after the Morse-Vail contract of September 23, 1837, and after his first machine was discarded, of which Smith writes, Oct. 31, 1872. "The first presentation of Morse's pendulum machine was by Doctor Gale, sworn to on the 19th of March, 1850. It was not, from prudential motives, made known in Vail's 1845 book."

Now let me present the evolution of the telegraph, as given in Vail's records.

Jan. 15, 1848, Vail writes in his Diary, "Have been writing the history of my connection with the Telegraph," and an undated manuscript was amongst his papers, in which he says "called on Morse early in 1837 and was told by Morse that he was about to bring out a *discovery* which would make some noise in the world."

On Sept. 2, 1837, an accidental visit revealed to him this *discovery*, being the "pendulum" machine, constructed by Morse, and he at once offered assistance for a share in the invention, and the agreement of Sept. 23, 1837 was made.

This machine used a battery of many pairs and the Henry magnet, suggested to Morse in 1836 by Prof. Gale, and recorded a V-shaped line as reproduced in the N. Y. *Journal of Commerce* of Sept. 7, 1837, the points being read as numbers.

Alfred Vail was born Sept. 25, 1807, at Morristown, N. J. On his mother's side he was descended, thro a long line of preachers, from one of Queen Elizabeth's Chaplains and had several preacher ancestors on his father's side.

His Diaries, which began in 1825, show a deeply religious trend, and he studied for the ministry, at the N. Y. University before his partnership with Morse. In 1825, he went to work in his father's machine shop and at once began to record the products of his inventive brain, amongst others fountain-pens, stenographic printing machines and drawing machines for artists.

The mechanical work of his early youth fitted him well for taking hold of "the rude machine containing the germ of what was destined to produce great changes in the condition and relations of man."

The diary of Judge Stephen Vail for 1837 gives the following: "Sept. 9, Alfred home. Oct. 28, S. F. B. Morse came here last evening. Dec. 21, Prof. Gale is with us. Prof. Morse came this evening."

On Sept. 18, 1837, Vail sent Morse a check for $30.00 to pay for filing his Caveat.

Morse writes Vail from New York, Oct. 11, 1837.

"I am not idle, I assure you"—he was working on his Dictionary completed Oct. 24, 1837. On Oct. 19th he writes to Vail, still from New York, "I long to see the machine you have been making, and the one you have been maturing in the studio of your brain."

This shows that mechanical work was taken up by Vail on his own lines shortly after the partnership was arranged for, during which period the Vails

supplied the necessary funds for the development of the machinery, and provided the local in which the work was performed.

"Jan. 10, Mr. Morse and Alfred are showing and working the telegraph."

Judge Vail's diary for 1838 records under date of Jan. 6th "they have worked the telegraph in the factory this evening for the first time."

Prof. Gale came this morning by R. R.

So far as I know, after careful inquiry, there is nothing to show what machines were produced at the Speedwell Works between Sept. 9, 1837, and the machines used in Baltimore in 1844, except the following from Vail's notes.

"The frame, wheels and drums of the Register instrument were made, for then it was designed to put a sheet of paper upon a drum which slid upon a square bar of cast-steel for about 18 inches. This drum had a single spiral on one end made of steel plate which projected beyond the surface of the drum. Below each drum there was a long brass bar containing teeth of the same gradation as the spiral and into which the spiral worked so that at every revolution of the drum it would move on the steel bar the distance of one spiral on the end of the drum. The drums were placed horizontally and side by side and the machinery was so constructed that when the paper of one drum was entirely filled with the markings of the pen it could be stopped and the other cylinder commence its movement. The pen was placed midway between each end of the steel shaft, whose length was nearly twice that of the drum. This machine was never entirely completed as it was thought to be too cumbersome and also on account of a better mode having been devised so as to dispense with one of the drums. That improvement consisted of a single drum about 3 inches in diameter which opened thro its center and when it was designed to put paper on these two half drums, the paper was inserted into a clasp on the side of each half drum which shut down, holding the paper fast. The two half drums were then taken one in each hand and placed on the square cast-steel shaft and, when brought together, a catch secured both half drums together and drew the paper tight to the outer surface of the drum. When on the shaft the spiral on the end of the drum moves in a tooth rack below and thus carries the paper along making a sort of spiral written line on the paper. When one drum was about to be filled another was put on the shaft and by a peculiar catch fastened to the one before it until the first was entirely filled when it was taken off, the paper taken off and new put on. There were two machines of this kind."

"During the construction of the register and magnets there was also constructed a machine for holding the type in convenient rules about three feet long, called port rules, and also apparatus for carrying it along at an equal speed so as to close and break the circuit. There was also another instrument made for changing the poles of the electro-magnet, so that the current should pass thro the helices of the magnet, first in one direction and then in another, the object of which was to counteract the effects of permanent magnetism which it was apprehended would increase to such a degree from long use of the current in one direction as to destroy its electro-magnetism by producing permanent magnetism. It was, however, found after a short trial without it that it was useless and could be dispensed with."

"After a stay of a few days at Philadelphia the instruments, etc., were taken to Washington and set up in the room of the Committee of Commerce in the Capitol (the wire was placed on two reels of 5 miles each; used numbers entirely and a Dictionary) where they were exhibited for several weeks to members of Congress, the President of the U. S., Martin Van Buren and his Cabinet."

"Prof. Morse, F. O. J. Smith and myself set out for the North. The two former with the intention of preparing to sail at an early day for Europe and myself to Speedwell Iron Works to prepare suitable instruments for them to take with them in order to take out patents in European countries. On my arrival at Speedwell two instruments were commenced on a different plan from that so recently exhibited at Washington. The paper was to be ribbon paper, and the pens to hold ink instead of using pencil as in the former case. New devices were also made for the port rule, one of which was a groove in which the punctured type were to slide down an inclined plane until they came in contact with a trap wheel surrounded with small wire projections that match the holes in the type. This wheel was driven by clockwork and gave a uniform motion to the type. Another plan was that in which the type were to descend vertically in contact with the wheel as described Fig. 17 in the 'Description.' The pen was made by taking a piece of plate brass about 1/16 and a half thick, ¾ inch long and ½ inch broad, slitting the plate into two plates for about half its width with a saw 1/16 or less in thickness and then sawing with a fine saw at right angles the opposite edge in four equally distant places until the cut reached the parallel division. These spaces were filed to a point so as to form pen points and the wider saw cut was then stopped at its two ends, so as to form a reservoir for the ink. This soldered to the end of the magnet lever was used as a pen for making four dots or lines in paper instead of a pencil as in the former case. The paper was made to pass over a cylinder directly under the pen so as to make the proper marks. The paper was driven by a clock train as in the other cases."

"On his return to America, Morse applied himself occasionally to perfecting his invention and as I occasionally called upon him at his office I was made acquainted with his improvements. He was also engaged at this time with the new discovery of Daguerre. One of his improvements, so considered then, was the correspondent for the purpose of transmission by means of keys for each letter of the alphabet. He could on pressing down the key wind up a weight over a pulley, then releasing his finger from the key, the type for breaking and closing the circuit representing a letter, would slowly return to its former position producing the required marks of spaces for making the letter. He was also much engaged in producing some mode of marking better suited for the purpose of marking on paper than lead pencils or pens supplied with ink. In this his modes were numerous, such as marking upon metallic plates, upon different kinds of prepared paper, all these in turn were thrown aside for some better device."

Alfred Vail, writes of seeing the Pendulum machine on Sept. 2, 1837. "Before, leaving the room, in which I beheld for the first time this magnificent invention, I asked Prof. Morse if he designed to make an experiment on a more extended line of conductors. He replied that he did so intend, but desired assistance to carry out his plans. I then promised him assistance for a share in his invention, to which he assented."

Judge Vail's diary. Jan'y 11, 1838.

"Hundreds came to see the Electric Telegraph work."

"Brot out 300 oysters." Jan'y 12, 1838.

"We had an oyster supper with our Speedwell connections and Prof. Morse."

On January 11th, 1838, the first public exhibition was had at the Speedwell Iron Works, described in a manuscript, found amongst the Vail records. I believe written by Morse, which says in part:

"It is with some degree of pride that it falls to our lot *first* to announce the *complete success* of this wonderful piece of mechanism, and that hundreds of our citizens were the first to witness its surprising results, and no place could have been found, more suitable to pursue the course of experiments necessary to perfecting the details of machinery, than the great retirement of the Speedwell Iron Works. Replete as they are with every convenience which capital and mechanical skill can supply, Prof. Morse quietly pursued the great object, which for a considerable time has engaged his attention, and has finally succeeded in carrying it into successful practice, *aided by the ingenuity of Mr. Alfred Vail.* Others may have suggested the possibility of conveying intelligence by Electricity, but this is the *first* instance of its actual transmission and permanent record . . . " The words were put into *numbers* from the Dictionary; the numbers were set up in the Telegraphic type in about the same time ordinarily occupied in setting up the same in a printing office. They were then all passed complete by the Port Rule in about half a minute, each stroke of the lever of the port rule at one extremity marking on the register at the other, a distance of 2 miles, instantaneously. We watched the spark at one end, and the mark of the pencil at the other, and they were as simultaneous as if the lever itself had struck the mark. The *marks* or *numbers* were easily legible, and by means of the Dictionary were resolved again into words." . . . Part of this appeared in a Morristown newspaper a few days after the Exhibition.

The location is thus described by Vail:

"It was in the upper room of the old factory building on a wire, hung around the room, two miles in length. At one end of the wire was the battery—at the other was a small frame upon which was placed a sheet of writing paper. The battery was put in operation and communicated the contents of a note, written by one of the ladies present, thro the wire, in the spaces and lines at the other end; Prof. Morse translated it into English."

A picture of this old building is shown in Pope's 1888 *Century* articles.

Shortly after this exhibition the machines were taken to New York, as recorded in the following letters from Alfred to his brother George.

New York, January 22nd, 1838.

"We received the machine on Thursday morning and in an hour we made the first trial, which did not succeed, nor did it with perfect success until Saturday—all which time Prof. M. was *unwell;* he is altogether inclined to operate in his own name, so much so that he has printed 500 blank invitations in his own name, at your expense. Prof. Gale is not at all pleased with his conduct towards him, in not making the agreement."

New York, January 23th, 1838.

"Prof. M. feels better and will perhaps be willing to have us share with him in the honors, etc."

The invitation mentioned read as follows:

"Professor Morse requests the honor of ———————— company in the Geological Cabinet of the University, Washington Square, to witness the operation of the Electro-Magnetic Telegraph, at a private exhibition of it, to a few friends, previous to his leaving the city for Washington."

"The apparatus will be prepared precisely at 10 o'clock on Wednesday, the 24th inst. The time being limited, punctuality is especially requested."

"Please show this card at the door of the room."

The N. Y. *Journal of Commerce* of Jany. 29, 1838, thus describes this public exhibition.

"An entirely successful experiment was made with Morse's Electric Telegraph in New York on Wednesday, when intelligence was instantaneously transmitted thro a circuit of ten miles and legibly written on a cylinder at the extremity of the circuit . . . Prof. Morse has recently improved upon the mode of his marking by which he can dispense altogether with the Telegraphic Dictionary, using letters instead of numbers."

On Jany. 11th, 1838, the public saw the message recorded in signs representing numbers, and on Jany. 24th of the same year, in signs representing letters.

What is claimed to be the first message sent on Jany. 24th reads as follows: "Attention the Universe, by Kingdom's right wheel." The original is now in the Smithsonian Institute at Washington, D. C. Each character has under it its corresponding letter written in pencil by Alfred Vail.

At both these public trials, on Jany. 11th and 24th, the type and a port rule were used to send the message.

For further confirmation of the above, Morse rendered the following bill to Vail:

January 25th, 1838.

To Cash paid Mr. Greenland as doorkeeper during two days' exhibition of the Telegraph $2.00
Leads for types for letters for Telegraph 6.38
Glass tubes for pens, .37½

Total, 8.75½

What value these exhibitions had on the improvement of the machinery, or in obtaining a patent, I leave to the reader to decide.

They were then taken to Philadelphia for Exhibition at the Franklin Institute, and to Washington for the inspection of Congress as described in the following letter.

A. Vail to S. Vail & Son: Washington, Feb. 7, 1838.

"The machine did not exhibit its working so successfully as at New York for this reason—Prof. Morse had invented a new plan of an alphabet and has thrown aside the Dictionary—the new type which *he* made are very imperfect. Friday we, or rather I—for Prof. Morse is *indisposed* when there is anything to do—boxed up the machine."

These public exhibitions helped to prevent the issue of an English Patent.

Vail's value at this time is expressed as follows:

Morse to G. Vail: Washington, Feb. 21, 1838.

"I shall be able to spare Alfred in a few days I think, I could not well have done without him."

During the long wait from Feby., 1838, to March, 1843, when the Congress appropriated $30,000.00 for an experimental line from Washington to Baltimore, Vail was engaged on other affairs, in Morristown, and with Baldwin, Vail & Hufty in Philadelphia, now the Baldwin Locomotive Works; he was also from time to time experimenting on the machinery for the telegraph.

"Apr. 11, 1838. Prof. Morse came this evening to see about the telegraph."

April 13, 1841.

. . . Finished drawings of correspondent, and ordered one set of clock work for it of Stockell for $20.00 . . . A. V.

To Mr. Vail: New York City, March 21, 1843.

In reply to your inquiry relative to the cost of making lead and block tin pipes . . . 70000 lbs. of lead or 26000 lbs. of tin, can be made into pipes for $49.00 cost of Mfg., without rent, which would be $2.50 per week, fuel about the same, resulting in the cost of $1.47 per ton for lead pipe, and tin $2.96 per ton. (Signed) JAMES E. SERRELL.

A. Vail writes on May 1, 1843.

"I suggested the idea of 6 circuits with 4 wires."

While the line between Baltimore and Washington was under construction, Vail writes his wife:

Relay House, December 12, 1843.

"Dr. Gale nor Fisher are here yet—and I am superintending their work."

Baltimore, December 17th, 1843.

"Through the negligence of Dr. Fisher, and perhaps Dr. Gale, our lead pipe is defective, and wires also. Mr. Smith and Prof. Morse and myself stop together at the Relay House."

Washington, January 6th, 1844.

"Mr. Serrell's pipe is defective, the whole of it, and Mr. Tatum has injured the insulation in the mode of manufacturing the pipe, and thro Dr. Fisher's unfaithfulness. Dr. Gale has resigned—so I am left alone with Prof. Morse."

Washington, March 17th, 1844.

"This week we are putting up several miles of wire upon posts."

January 30, "Put one of the instruments in the Model Room."

April 1st, "Commenced putting the wires on poles." (Washington & Baltimore line.)

April 2nd, "Until Wednesday evening (10") tried the Telegraph at different distances on the road from 4 miles to 7 with success."

April 11th, Wash. "Moved to the Capitol and put up the instruments. The correspondent in one room and the Battery in another. This morning tried the wires for 10 miles out. I went out, by the 4 o'clock train a distance of 10 miles. Corresponded with Prof. M. at the Capitol and returned with the evening train."

April 20th, "Telegraphed 16 miles."

A. Vail to his wife: Apr. 22, 1844.

"To-morrow I go to the Junction 22 miles to prepare to announce the Whig candidates."

April 28th, "It is as much as I can do to keep Morse from being sick and don't seem to know sometimes how to operate his own instrument."

April 29th, Morse to Vail: "I shall want you to come and fix the instruments in their places in the new rooms, and to have them overhauled. The plan is marked out for the Telegraph thro the city, and it will soon be done. I shall want 4 Registers in all. Two at the Capitol and two at the Post Office."

New York April 13th 1838

Hon. F.O.J. Smith,

D. Sir,

I have just returned from Morristown and found that Mr. Vail had nearly completed the apparatus and in a very compact and convenient manner for travelling.

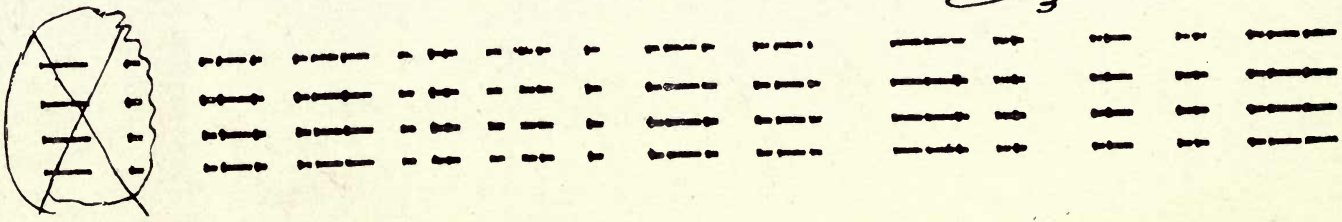
Mr Vail had completed a straight portrule on a plan of his own; which operates exceedingly well, so that for exhibition abroad, we shall not need another, and there is not time to construct a circular portrule before we sail. - The register acts well. The pen which is so divided as to make 4 copies of the intelligence at the same moment, is also newly invented; you have a specimen of the first trial of the machinery, below; you have the al-

phabet, so I shall let you decypher it, only remarking that the dots are a little elongated and have, (as well as the dashes) a blunt beginning which will not belong to the sign when properly adjusted. You will also take care in reading the signs to observe the difference, (4 kinds) of spaces or intervals. I thank you for the copy of the bill, and am looking with anxiety for the report and the action in Congress upon it. You have doubtless received my letter in answer to yours respecting sailing the 10th of May. — Please send anything interesting on the Subject, [redacted] of the Telegraph that occurs in the house and believe me as ever truly

Yr friend & Obt Servt

Sam. F. B. Morse.

3



April 30th, "Telegraphed all day. The 2 wires worked well 22 miles."

May 1st, "Telegraphed all day. In the afternoon announced the nomination of Mr. Frelinghuysen."

This seems to have been the first message, by telegraph, of a public nature.

May 2nd, Vail to his wife: "I yesterday announced the nomination of Henry Clay and Frelinghuysen to Washington."

"Morse changes oftener than the wind and seems to be exceedingly childish sometimes."

May 4th, Washington, 4 a. m. Morse to Vail at Junction: "Please pay Mr. Sumwalt for my breakfast yesterday. I forgot it in my hurry and I will settle with you."

All thro these records is evidence that all were constantly hard put to it for ready money.

May 6th, "Arranging the wires at the Capitol so that 1 battery will answer for 2 circuits and each act independently of each other. Prof M. is again low spirited—Prof. M.'s plan is to desist, let the Patent expire, and then if Government uses it and remunerates him, he will not see Prof. Gale and myself want. This he told me in the Capitol this a. m."

From May 8th to 11th inclusive: "Telegraphed from Junction to Washington."

May 14th, "Telegraphed from Relay House, all worked well."

May 22d, "Sent the instruments to Balt. upper depot."

May 24, 1844: "Telegraphed all morning. Miss Ellsworth sent as the first message 'What had God wrought.' In the afternoon took the instruments to the lower depot and put them up. Commenced telegraphing at 9 o'clock with Prof. M. at Washington."

May 25, to Vail by mail: "I was excessively fatigued last night and so probably were you. Good Bye." S. F. B. M.

May 27, to 31: "Commenced telegraphing for the convention and others, with Prof. M."

June 3, Morse to Vail: "The pamphlet of which you speak needs a great deal of care in the preparation, and ought to be a joint concern of yours and mine, since we alone have the materials and documents for its compilation.

I have laid up materials for such a work for many years embracing a description of the abortive attempts of the first plans abroad." No account of Morse's own original plans appeared in Vail's 1845 book to which the above refers.

June 8, Prof. Morse is not satisfied with the proprietors agreement. Mr. Ellsworth recommended its sale to Government at $50. per mile. I gave an unwilling assent, upon condition that the pamphlet which Prof. M. and myself intend to get out, ¾ of it shall be mine, ¼ his."

June 9: A. Vail to G. Vail: "None but Prof. Morse and myself can operate it."

June 15: "I have invented a combination of letters by combination of 2 letters, 3 letters, 4 letters, etc."

July 5: "Prof. Morse was at the Capitol but did not discover that the wires of the large magnet were disconnected."

July 6: "Prof. M. discovered that the Great Magnet was not connected, lightning it is supposed."

July 9: "By experiment find that 10 cups are sufficient for the whole distance."

July 10: "This morning took a double circuit from the main battery, one for the main line and the other for the local."

July 12: Washington: "Went to the Capitol, made a diagram or small model of the plan of the circuit, which worked well."

July 15: "Succeeded with experiment of 2 wires and grounds forming 2 independent circuits. It worked well."

July 20, Baltimore: "Have tried all my experiments upon the small plan upstairs, and find it succeeds well."

July 25: "Ascertained by experiments that the large battery could be dispensed with entirely, by using the galvanism of the earth."

"On the 25th of July, 1844, I used the galvanometer instead of our large receiving magnet, and with the needle of the galvanometer closed and broke the local circuit, thus operating the register magnet which was in the circuit, as is usually the case when using the receiving magnet.

(Signed) ALFRED VAIL.

July 27: Vail reports reducing the battery from 80 cups to 4 cups and succeeded well in sending from Baltimore to Washington.

July 27: "Commenced to refit my lever of the big magnet and 2 others, found that 4 cups would work the main line between Balt. and Washington very well."

July 30, 1844: "Telegraphing with 20 cups, the lowest number used since we have been in operation. All worked well."

July 31: "Both of us (Vail & Rogers) wrote independently of each other with only one battery of 20 cups between us."

Aug. 2, "Fitting up a more delicate lever."

Aug. 3, "Tried the more delicate lever and it worked very very well, I find I can, with the East wire, this lever and only 2 cups, work it. Since, 2 cups have worked it very well."

Aug. 3, Morse writes Vail from New York that he ought to take $18,000 cash for his shares.

Aug. 5, "Went to Havre de Grace, with Rogers, Avery & Cleveland."

Aug. 6 & 7, "Experimented across the Susquehannah River without wires, favourable results."

Aug. 8, Vail writes Morse refusing to sell for less than $50,000.

Aug. 9, . . . "I (Alfred Vail) have discovered a plan of making a telegraph without the Electro-Magnet . . . "

Aug. 8, Vail to Morse in N. Y.: "I was setting out for Havre de Grace to try the experiment of crossing there without stretching the wires, which resulted very favourable . . . but it needs still more experimenting . . . I have also got the telegraph to work for one circuit with only 2 cups . . ."

Aug. 13, Balt. "We reduced our battery to-day to 5 cups and telegraphed to Washington."

Aug. 13, . . . "I (Vail) urged upon him (Morse) the necessity of registering upon the Patent papers at the Patent office, the assignment which he made to me of my interest in the Telegraph. After much explanation on my part to convince him it had not been done and the necessity of doing it immediately, as in case of his death I should be left without any resource."

Aug. 14, Prof. Morse "will see" whether he will record the assignment on the Patent papers . . .

Aug. 17, If he (M) has any objection to do it he is not frank in assigning

a good and valid objection. It looks bad to find him putting off this matter of so much importance to me and my dependent family.

Aug. 17; G. Vail to A. Vail: " . . . I would recommend every possible concession to him except in new discoveries, which you should now keep secret. His plan was to sell out and then go to Europe with you, to sell there; he spoke of not being able to do without you."

Aug. 22; G. Vail to A. Vail: I regret extremely that Prof. M. will hesitate for a moment to grant what belongs to us—he longed for fame and has obtained it, his assistants are not without their need of fame either—and may have theirs nearly associated with his yet. Many claim for you all the honor except the original idea, but don't you claim it until your slice is in your hands securely—the important discoveries are to be kept aloof from the public.

Aug. 26, G. Vail to David Burbank: ". . . My brother and myself formerly owned ¼ of the rights of Prof. Morse's Electro Magnetic Telegraph. M. gave up one-half of our interests to Mr. Smith, a partner now in the concern in order to have the rights secured in England and France, this reduced our shares to ⅛."

Sept. 1, Balto. A. Vail to G. Vail: "I believe I have the confidence of Prof. Morse and he knows full well that it would be difficult to work the telegraph without me, and it is very well known by those who look on . . . Every day I have more and more of the responsibility of the Telegraph thrown upon me, and in all matters relating thereto he advises with me . . . The wires are now being put to the Post Office. Prof. M. will go with me on Monday to have the assignment made."

September 6th, 1844: The assignment has been signed and is to be recorded."

September 12th, A. Vail to G. Vail: "We have now the wires from the Capitol to Post Office, and will soon be ready to telegraph from P. O. to Baltimore and the Capitol."

September 13th: "Prof. M. left for Boston this afternoon."

September 26th: *"Telegraphed from the Post Office."*

September 27th: "Telegraphed this morning from the Post Office, and have been putting up the wires."

October 10th: "Prof. M. returned to Washington."

October 14th, Washington. A. Vail to G. Vail: "Prof. M. returned on Friday—I am busily engaged here in telegraphing Election News."

October 21st, Washington. A. Vail to G. Vail: "Our office is in the second story of the City Post Office."

October 23rd: "Took down the instruments at the Capitol."

December 7th, Washington. A. Vail to G. Vail: "I have the entire management of the Telegraph at this end, Prof. M. being otherwise engaged in helping our bill thro the House."

December 25th, Washington. A. Vail to his Father: "We are every day engaged in reporting the proceedings of both Houses for the Baltimore *Patriot*—so much depends upon me that I cannot leave for the present. I have the complete oversight of working the Telegraph."

December 25th, Prof. Chas. G. Page has been engaged for some time in improving his Magneto Electrical Machine. The first experiment tried this morning in presence of Prof. Morse and Mr. Vail his assistant fully tested the invention. The telegraph was operated to Baltimore and back to Washington, 80 miles of wire by this new improvement.

In 1844 Vail drew plans for a hard point to work horizontal in a grooved roller.

February 3rd, 1845. Here is a telegram from Vail at Washington to H. J. Rogers at Baltimore: "Prof. Morse made an agreement with me to have ¼ interest in the pamphlet, he wants to be a silent partner. V.

April 2nd, Washington. A. Vail to G. Vail: "I am now connected with Post Office Department at Washington, U. S. of America. Have been sworn in and entered upon my duties."

May 8th, Washington. A. Vail to G. Vail: "Prof. M. goes to New York this evening."

Morse to Vail: N. Y., May 17, 1845.

"I hope you will be able to take at least $5.00 per day at each terminus."

Morse to Vail: New York, July 17th, 1845.

"I send you a drawing of Soemmering's telegraph which accompanies the German translation made by E. Goodrich Smith. Mr. Smith owes me $50 and wishes to pay me by this translation and others made for you—amounting to $40. Just put this to my credit on the Score of the book."

Vail to Morse: Washington, D. C., July 23rd, 1845.

"In regard to the book I am writing, I had the impression that you had either given up your *partnership* with me, or was not deeply *interested*—— The work will cost me over $600, when completed. I am now responsible for over $500. Will you have the goodness to remit me $150.—your portion of the expenses. If you do not wish to retain an interest in the work please let me know."

Morse writes on July 25, 1845, that the publication of the work will destroy any chance of the Telegraph in Europe, but declining to send the $150., and adds "Be very careful that no descriptions of my machinery nor the plates get out——"

"I can produce on my principle of alphabetic writing or printing a rapidity of communications far beyond anything the Printing telegraph men have dreamed of and it is by methods known only to you and I. But keep dark upon the subject."

A. Vail to Morse: Washington, D. C., July 30, 1845.

"What is there in the book that has not already been published in more than 100,000 copies of the Commissioners' report? If you will relinquish your portion (one-quarter) I can get assistance elsewhere, or if you will remit me the $150. it will help me along."

Morse to Vail: New York, August 4, 1845.

"——I have not the $150. to spare—but if you will release to me your entire interest abroad in the Telegraph, I will release all interest in the work you are publishing and the $40. or $50. due me on Mr. E. G. Smith's account for translations for you, and then you may publish your book whenever you please."

May 17, 1846. Office in Baltimore in upper Depot.

G. Vail to A. Vail: August 7, 1845.

"——The book I had some conversation with Prof. Morse about the day before he sailed. He wishes me to request you not to publish it to the world until

he was ready as you might interfere with his business on the other side of the water. He also said that his interest in it was ¼, having seen your letter to father in which you expressed some doubts whether he claimed any rights."

A. Vail to Morse: Washington, D. C., August 26, 1845.

"Hon. Amos Kendall and Dr. Page have stated to me that they cannot see what possible harm there is in its immediate publication. Mr. Kendall thought it might be an advantage to publish it. I cannot accede to your proposition, which a moment's reflection will convince you as impossible."

Louis F. Zantsinger in acct. with U. S. Telegraph,

Washington, D. C., February 2, 1846.

For receipts from December 22, 1845, to January 31, 1846, $84.17¾.

A. Vail to Morse: Feb'y 18, 1846.

"Cornell has thrown out your receiving magnets, and has put his own at the three stations on this end."

Vail writes his wife from New York on February 28, 1846, that his getting home would "depend upon being able to get Prof. Morse to take charge of the making of the instruments."

May 11, 1846.

Pres. Polk's message was telegraphed. It took a little over 2½ hours, contained 3,017 words and 14,810 letters, and cost to telegraph $15.08½.

A. Vail to his father: Washington, September 8, 1846.

"According to an Act of Congress passed last session the Postmaster General may sell or lease the U. S. line, and as there is some talk of it already, it may be done by the 1st of October."

A. Vail to his father: Washington, November 15, 1846.

"I expect that the appropriation made for this line by Congress will run out the last of this month, and on that account I have proposed to the Post Master General to operate the line, until the 4th of March, for the proceeds, which I have no doubt he will assent to."

Hon. Cave Johnson, November 15, 1846.
Postmaster General,

Dear Sir:—

I would respectfully, in conjunction with Mr. Rogers of Baltimore, propose to you that, inasmuch as it is desirable that the government should retain possession of the Washington & Baltimore telegraph until the 4th of March, that we will faithfully and truly conduct its business after the present appropriation has been exhausted, without expense to the government, and for no other remuneration than that which the line may produce.

Yours respectfully,
Alfred Vail, Asst. Supt.

Memo. November 16, 1846, to Mr. Rogers:

Mr. R. We take the line jointly—and of course its revenue will be divided equally—I think the cost of battery maintenance has been too much. I estimated the cost of maintaining a battery of 50 cups at Phila., which I had the care of while there and from actual experience at not over $1.25 per week. The repairs

to the line are chargeable to the New York, Philadelphia and Washington Co. in consideration of the use of the one wire.

(Signed) Vail.

"Ordered, that Alfred Vail and Henry J. Rogers are permitted to have the use of the telegraphic wires from the 1st of December, 1846, to the 4th of March, 1847, they agreeing to keep up the line at their own expense, and without any charge for their personal services other than the proceeds of the telegraph, and to hold the same subject to any future order of the Department.

Journalized 16th November, 1846. C. J.

Post Office Department
November 25, 1846.

Gentlemen:—

Above you have a copy of an order made by me on the 16th inst., setting forth the terms on which you can have the use of the United States Electro-Magnetic Telegraph wires on the line between this city and Baltimore, Md., from the 1st December, 1846, to the 4th March, 1847. You will please, if the terms suit you, furnish me with acceptance in writing before the 1st proximo.

I am, very respectfully,
Your obedient servant,

To Alfred Vail and Henry J. Rogers, C. JOHNSON,
Asst. Supts. U. S. Electro Telegraph. P. Genl.

Post Office Department,
18, February, 1847.

Gentlemen:—

I am instructed by the Postmaster General to inform you in reply to your letter of the 15th inst., that your application for the lease of the Washington-Baltimore Telegraph Line, after the 4th of March, 1847, will be considered, provided Congress does not otherwise act on the subject.

I am, respectfully, your obedient servant,

To Messrs. Vail & Rogers. Wm. H. Dundas, Chief Clerk.

Post Office Department, 13 April, 1847.

Gentlemen:—

I am instructed by the Postmaster General to communicate to you the order made by him yesterday in relation to the Magnetic Telegraph Co. upon the same terms and conditions upon which it has been used by Messrs. Vail and Rogers, they, the Telegraph Co., consenting thereto—to be kept up in future by the Company at their own expense and subject to any future orders Congress may make in relation thereto. (Signed) C. J. April 12, 1847.

I am, respectfully, your obedient servant,

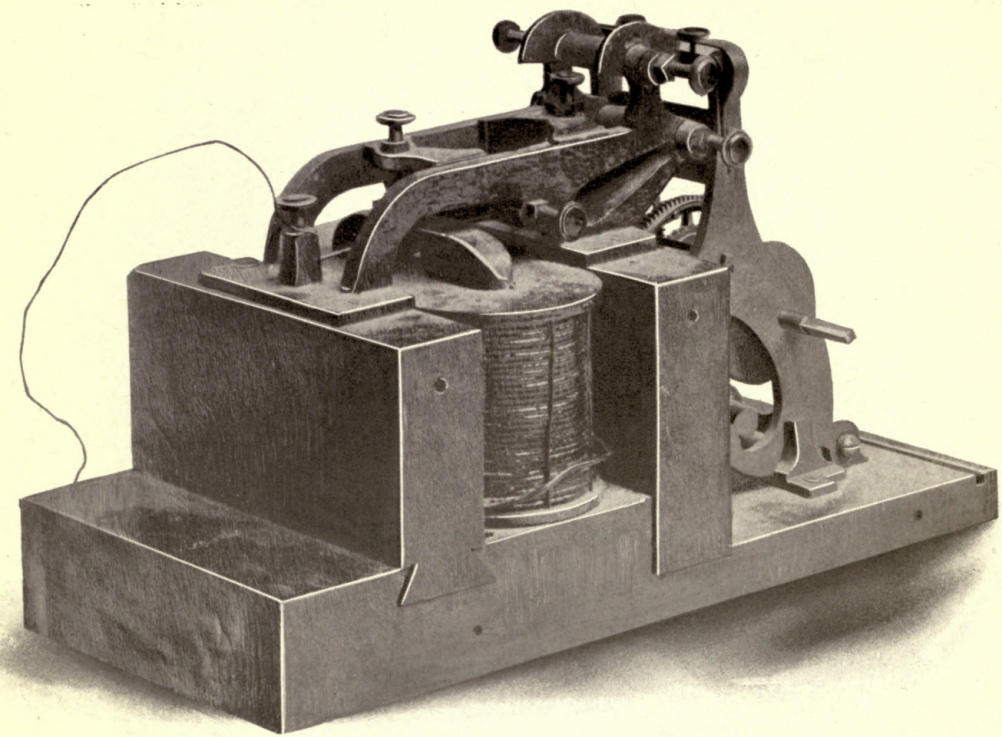
To Messrs. Vail & Rogers, Wm. H. Dundas, Chief Clerk.
Washington, D. C.

Endorsement on back of above letter. "This order goes into effect on the 16th of this month." A. Vail.

The Magnetic Telegraph Co. was organized May 15, 1845.

In 1846 Vail planned a new hard point and grooved roller. Two sender Keys and a paper reel.

Morse to Vail at Washington: New York, April 9, 1847.



ORIGINAL MACHINE WHICH AT BALTIMORE RECEIVED THE MESSAGE
"WHAT HATH GOD WROUGHT?" SENT FROM
WASHINGTON, MAY 24, 1844

"Mr. Kendall left this evening for Washington—he speaks highly of your instruments."

A. Vail to his wife: Richmond, July 25, 1847.

"I have just taken upon myself the whole responsibility of the Washington-Petersburg line."

Not dated or signed. "Had a talk with Prof. Cyrus Cook, some time back relating to Mr. Morse's claims. Mr. C. has spent much time in your city, and he told me it was the generally accepted conclusion there that Mr. Vail had done much more towards completing the 'Morse System of Telegraph' than did Morse."

December 2, 1847.

Dr. A. Vail in account with S. F. B. Morse, Cr.

1845 to Cash paid for ¼ expenses of publication of his work on Telegraph $250.00.

Morse deducted this amount from monies collected by him for Vail, altho I found no evidence that he, Morse, contributed any cash to the expenses.

Morse in a signed pamphlet published in 1853, wrote of his connection with Alfred Vail's book: "I made notes of several telegraph projects (in 1838 in Europe) and brought them home and gave them to Mr. Vail to arrange, to add to, or reject as he thought proper." (P. 65). Also "just before I left for Europe in the Autumn of 1845, I read over, at Mr. Vail's request, for correction and comparison with the plates, the manuscripts of a small portion of his work, consisting only of the plans and descriptions of my own telegraph."

The motive for writing the pamphlet of 1853, is given in the following letter.

S. F. B. Morse to A. Vail: Po'Keepsie, December 7, 1853.

"I am preparing the last touches of my 'Defense.' I mean to make it a *porcupine* at every point; let them touch it if they dare. I regret the necessity of demolishing the jackdaw dreams of Henry, and of plucking the peacock's feathers that have been stuck upon him, but if he allows them to do it and struts as if they were his own plumage, why I have no choice, they must come out."

Joseph Henry to W. P. Vail, June 12, 1868.

"I see by the papers that Mr. Morse is about to prepare a history of the Telegraph, and should he be so unwise in this as to make another attack upon me, the correspondence you mention may be of importance.

"I have never set up any claim in regard to the invention of the telegraph. He published a pamphlet——to prove me guilty of perjury.

"The history of magnetism which it contains was taken directly from the 2nd edition of Daniel's Chemical Philosophy, the extract, however, stopped about a paragraph short of an account of my later experiments on the subject."

Morse writes, p. 64, of his pamphlet:

"I have shown that his (Henry's) published researches disclose no new discoveries of any avail in the Telegraph."

Jan. 11, 1848. Prof. Morse and myself devised a mode of telegraphic punctuation.

A. Vail to his father: Washington, Jan. 31, 1848.

"I am constantly engaged in something relating to the telegraph, and in perfecting every part of the system."

Feb. 7. Have been drawing a new register instrument all day.

Feb. 8. I have been the whole day engaged in completing the drawings for a New Register.

Feb. 9. Have been working at my drawings for a new instrument. Made an entirely new key by which means there is no need of a button for connecting and closing the circuit independent of the key. The whole is performed by the key alone. In the Register instrument I use a weight instead of a spring to hold down the roller wheel to draw the paper over the pen roller. I showed Prof. Morse this day the working of my new receiving magnet as compared with one attached to my new register instrument. The latest one worked much better than the old, and is constructed so as to make out of two common magnets, four magnets. It was made more than a year since.

Feb. 10. I made this day an insulator of Gutta Percha, the first I ever saw, and believe to be the first ever made.

Feb. 19. Designed a new and beautiful reel for the paper, so as readily to receive without trouble any size coil of paper.

Feb. 27. I have been engaged all day in drawing a new register instrument with my improvement of pen key for telegraphing to any number of stations and branch lines.

Feb. 28, 1848. "Think I shall take out a patent for my pen key, disconnecting key, my compound receiving magnet with circular armiture and circular back piece, combinations for connecting and disconnecting circuits in various ways, new mode of hanging the grooved roller upon pivots, my new accommodating paper reel, improvements in the form of zincs, lightning protector, horizontal register magnet."

Mar. 23, 1848. Have described my re-transmitter and sent Mr. Kendall a copy.

Mar. 24. I have to-day commenced a specification and drawings for patenting my use of the galvanometer instead of the receiving magnet.

Mar. 31. Devised a method of carrying out what I conceived in 1844 of using a magnet moving thro the helices, both single and double. This I think is the idea of Page's Electric Engine. Engaged all day upon register in drafting plans of working the register magnet with a lever, also with horizontal movement, the arms of the magnet and coils stationary, also the arms moving and coils stationary.

Apr. 10. I consider that one key will close six or more circuits at the same time.

Apr. 21. Have succeeded in making a mixture of Gutta percha and shellac.

June 2. Prepared a copy of my work for deposit in the Washington Monument.

July 21. They are working across the North River by a gutta percha covered wire.

Sept. 4, 1848. "Mr. Colt called to see me and says F. J. Smith was the first to suggest inverted glass insulators.

September 5th: "Major French tells me that Mr. Smith suggested the glass insulators before the Baltimore and Washington line was built."

Sept. 8. My new register instrument works beautifully. To the instrument is attached the pen lever key and the proper attachment, it works beautifully on both the Washington and Petersburg and Baltimore and Washington lines.

Sept. 20. Washington, A. V., to A. H. C., N. Y.——Will you please say to Mr. Stokell I shall in a few weeks send him six more registers to be fitted with clockwork precisely as the one recently made.—

Sept. 23. Have been drawing new register all day. Making important alterations.

Dec. 8, 1848: "Invented a Telegraphic key with 5 keys for writing faster, each finger and the thumb have a key."

In the 1848 diary he mentions the following as improvements made by him:

Plans for two paper reels, two sender keys, two horizontal hard points.

A vertical acting hard point, working upwards.

Memo. no date: "Prof. Morse and Alfred Vail have both suggested the practicability of so constructing a delicate magnet and register as to answer all the purposes of a portable register without a local battery, or a special receiving magnet, so as to telegraph along the telegraphic line, or at the permanent station. To go by a spring barrell.

(Signed) Saml. F. B. Morse.

A. Vail to Mr. Gifford: Morristown, N. J., Feb. 26, 1851.

"Please allow me briefly to state that I myself designed the metallic key—the original one."

Morse to G. Vail: Po'Keepsie, March 18, 1852.

"If Fulton had a Livingston to aid him in his early extremities, I had Vail's to aid me in mine."

Morse writes in 1853: "but especially to the attention and skill and faith in the final success of the enterprise maintained by Mr. Alfred Vail, is due the success of my endeavors to bring the telegraph at that time creditably before the public."

Morse to G. Vail: Po'Keepsie, July 14, 1854.

"I shall ever cherish the recollection of the kindness and promptness with which your brother Alfred came to my pecuniary relief at a time when I had no means to carry forward the *exhibition* of my invention."

A. Vail to Amos Kendall: October 7, 1852.

"——I took hold of the Telegraph in its infancy, and when the world was laughing at it and the Inventor—by mismanagement or misfortune I have the smallest mite in the concern and am prohibited from holding any lucrative office in it, because I in its early developments hazarded it my assistance.

Even some little portions of the telegraph which I invented have never been publicly awarded to me, viz: the mode of recording by the indentation of paper. ——"

G. Vail to his father: Washington, July 3, 1854.

"Alfred must not claim now, what he did not when the patent was taken out. He will not be believed; again the renewal legally gives him or me no rights. Mr. Kendall has informed me, however, that Prof. M. will secure to us our share as before but will not assign to Smith any part of it—all of which nothing should be told."

A. Vail to G. Vail: Speedwell, July 8, 1854.

"Besides have I not made important improvements in the Telegraph which he (Morse) is aware of, and have I not a right to the benefits of the extension? All this Morse is aware of. I shall stand upon my rights, even without regard to his promises. If ever I shall write the history of the Telegraph, I shall do it honestly and it will then appear what service I have done to the whole concern."

Morse to Vail: Po'keepsie, July 15, 1854.

My dear Sir:

The legal title to my Patent for the American Electro-Magnetic Telegraph of June 20th, 1840, is by the late extension of said patent for seven years from said date, now vested in me alone, but I have intended that the pecuniary interest, which was guaranteed to you, in my invention as it existed in 1838 and in my Patent of 1840 by my articles of agreement of March, 1838, should still inure to your benefit (yet in a different shape) under the second patent and the late extension of the first.

For the simplification of my business transactions I prefer to let the articles of Agreement which expires on the 20th of June, 1854, remain canceled, and not to renew them, retaining in my sole possession the *legal title,* but I hereby guarantee to you two-sixteenths of such sums as may be paid over to me in the sale of Patent Rights, after the proportionate deductions of such necessary expenses as may be required in the business of the agency for conducting the Sales of said Patent rights, subject also to the terms of your agreement with Mr. Kendall.

Truly as ever your friend,
(Signed) Saml. F. B. Morse.

Alfred Vail, Esq.

Mr. Kendall informs me that no assignments of an interest in my Second Patent (the Patent of 1846) was ever made to you. This was new to me. I presumed it was done, and that the assignment was duly recorded at the Patent Office. The examination of the Records in the process of obtaining my extension had doubtless led to the discovery of the omission. It can be supplied at any moment. Write to Mr. Kendall and have the proper form made out and I will sign it.

Yours——S. F. B. Morse.

A. Vail to G. Vail: Morristown, July 24, 1854.

"In regard to the mode in which we are to receive the benefits of the patent extension, it is totally different from what I have been led to expect from Prof. M. by his repeated promises, and savors of his fear to trust me with my portion of the patent heretofore assigned me."

Alfred Vail to Wm. M. Swain: Morristown, Dec. 11, 1856.

I have reason to believe that the American Telegraph Company in their endeavor to procure an exclusive privilege of the Corporation of the City of New York to bury telegraph wires thro the streets of that city, have for their object a monopoly which will sooner or later require us to take down our poles and submit to an exaction not very profitable or pleasant in the form of an exorbitant price for the use of their underground wires. I think the matter requires attention and I would suggest the propriety of at once petitioning the Corporations of your city, Baltimore and Washington for permission to bury wires thro the streets for telegraphic purposes.

Philadelphia *Ledger* of Feb. 17, 1859, reports B. B. French as saying at a special Telegraph Co. meeting on Feb. 16th: "When Prof. Morse first came to Washington to exhibit his invention in Congress—Mr. Vail was with him as his principal assistant—and his hands were among the first, if not the very first to

work it on the line between Washington and Baltimore. Mr. Vail did much by his superior mechanical skill, to perfect the discovery—and to him the Telegraph interests of America owe much."

Morse to Vail: Po'Keepsie, May 5th, 1858.

I am in the hope of communicating something of interest to you from Europe in a few weeks at furtherest. The demonstration towards me by the *Governments*, is approaching a result, but I learn that the amount will be small.

G. Vail to Mrs. A. Vail: Feb. 1, 1860.

"Morse's conduct is singular. Alfred told me that we were to receive a share of the amount received from the Continental powers and sure we ought, for at Prof. M.'s wish we gave away ½ of our interest to secure to us the proceeds of ¼ of the sales to the Continent and from that day to this neither of us have received a penny and even now I am afraid that we are destined to go without."

Messrs. S. Beach said, in N. Y. *Sun* of September 25, 1858.

"Alfred Vail entered into these experiments with his whole soul, and to him is Prof. Morse indebted for his ultimate triumph. He it was who invented the far famed alphabet; and he too was the inventor of the instrument which bears Morse's name."

"The alphabetical, as distinguished from the numerical telegraphic code was originated and applied to the telegraph in the latter part of January, 1838, by Alfred Vail."

Mr. Beach afterwards wrote "My impression is that the (above) article was at the time approved for its exact statement—never controverted."

Feb. 16, 1859. "If justice be done the name of Alfred Vail will forever stand associated with that of Samuel F. B. Morse in the history of the invention and introduction . . . of the Telegraph.

Amos Kendall.

F. O. J. Smith writes: "It is by taking all the correspondence together, that justice can yet be done to all concerned.

"I have no doubt, and never had, from an early day, that Mr. Vail is the author of all those indispensable transformations which alone gave practical and commercial value to the telegraph."

W. P. Vail to Mrs. Vail: April 25, 1868.

"Your husband told me, if my recollection does not mislead me, that *he*—Mr. Vail—was the inventor of the alphabet, that he invented much of the *clockwork*, as it is called that he suggested the *steel pen* point. I have a letter of Mr. Morse's dated November 25, 1862. In that letter, among other things, he wrote thus: 'Your nephew, Alfred Vail was shown my experiments in 1837 . . and took from that time a strong interest in the invention, and became an associate with me in the labors and expenses and profits of the invention.' "

W. P. Vail to Mrs. Vail: Nov. 12, 1872.

"What George (Vail) did say was about this 'Mr. Morse is entitled to the credit of suggesting the application to an instrument, of the motive power of the Electro Magnet, for the purpose of recording messages at a distance; but Alfred *wrought out that application* and made it *available for practical purposes.*

From W. P. Vail: Nov. 27, 1879.

"The implication was that Mr. Vail invented the 'so-called' Morse Alphabet. It was so understood by all who were admitted in his intimacy. In a conversation with him shortly before his death in 1859, he so assured me. I am not aware that Mr. Morse ever set up an adverse claim."

1879 W. B. Taylor of the Smithsonian writes: "I feel I have done him (Vail) but scanty justice for which no thanks are due. It is rather the public acknowledgment of a debt of humanity which has been too long ignored."

In 1884 the Franklin Institute issued the following account of the original instruments used on the Washington-Baltimore line in 1844: "A considerable part of the mechanical work being done by his own hands. Vail invented the combination of mechanism for registering—an apparatus so simple and effective that it has never been superseded. There appears to be little doubt that to Vail is due the devising of the alphabet of dots and lines which has become the universal telegraph language of the world."

Frank L. Pope, Chairman.

To J. C. Vail: Dec. 5, 1913.

The Rev. Josiah Canfield—said "Alfred Vail told me that the dot and dash alphabet was his invention."

"He said that it came to him like a flash one day when he was in the New York *Observer* office and he sat down and wrote it out, then upon his return to Morristown he went to the office of the *Democratic Banner* and ascertained which letters were most used, to which he applied the simplest characters." —This occurrence is as clear to me as if it happened yesterday, and the Rev. Josiah Canfield was not a man to made random statements.

Very truly yours,
C. V. Smith.

Franklin L. Pope writes, June 10, 1884: "I find much from other sources confirming the view I have long entertained, that the universal telegraphic system of to-day, is in fact based upon the work of Mr. Vail rather than that of Mr. Morse."

Alfred Vail's book, published in 1845 on pps. 74-5-6 gives the following: "from the New York *Journal of Commerce.*"

"We have received the following note and diagram, with the explanation of the latter, from Mr. Morse:

To the Editors of the *Journal of Commerce:*

Gentlemen: You had the kindness to assert, a few days ago, my claim to the invention of the Electro-Magnetic Telegraph, for which I thank you. As to the *priorty* of my invention, entirely planned and for the most part executed as it was, nearly five years ago, I can adduce the amplest proof.

You announced that I was preparing a short circuit, to show to my friends the operation of the telegraph. This circuit I have completed, of the length of 1700 feet, or about one-third of a mile; and on Saturday, the 2nd instant, in presence of Professors Gale and Torrey of this city, and Professor Daubeny of the Oxford (English) University and several other gentlemen, I tried a preliminary experiment with the register. It recorded the intelligence sufficiently perfect to establish the practicability of the *plan,* and the superior simplicity of my mode of communication, over any of those proposed by the professors of Europe.

It will be observed that no account has reached us that any of the Foreign proposed Electric Telegraphs have as yet succeeded in transmitting intelligible communications; but it is merely asserted of the most advanced experiments (the one in London), that "by means of five wires," etc., intelligence may be conveyed. I have the gratification of sending you a specimen of the writing of my telegraph, the actual transmission of a communication made this morning, in a more complete manner than on Saturday, and through the distance of one-third of a mile.

Thinking it may be gratifying to your readers to see the kind of writing which it performs, I have had it engraved for you, accompanied with an explanation.

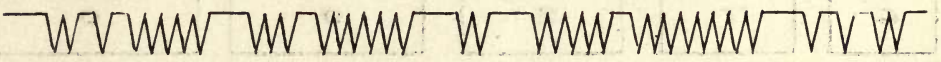
Your obedient servant,

N. Y. City University, September 4, 1837. SAM'L F. B. MORSE.

Specimen of Telegraphic Writing made by means of electricity at a distance of one-third of a mile.

Successful Experiments with Telegraph September

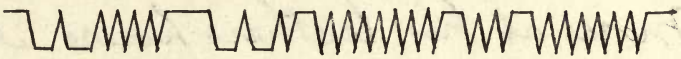
215 36 2 58 112



2 1 5 3 6 2 5 8 1 1 2

Fourth Eighteen thirty seven

4 1837



0 4 0 1 8 3 7

The *words* in the diagram were the intelligence transmitted.

The *numbers* (in this instance arbitrary) are the numbers of the words in a telegraphic dictionary.

The *points* are the markings of the register, each point being marked every time the Electric fluid passes.

The register marks but one kind of mark to wit, (V) this can be varied two ways. By intervals, thus, (V VV VVV), signifying one, two, three, etc., and by reversing, thus, (Λ). Examples of both these varieties are seen in the diagram.

The single numbers are separated by *short,* and the whole numbers by *long intervals.*

To illustrate by the diagram: the word "successful" is first found in the dictionary, and its telegraphic number, 215, is set up in a series of type prepared for the purpose, and so of the other words. The type then operates upon the machinery, and serve to regulate the times and intervals of the passage, of Electricity. Each passage of the fluid causes a pencil at the extremity of the wire to mark the points as in the diagram.

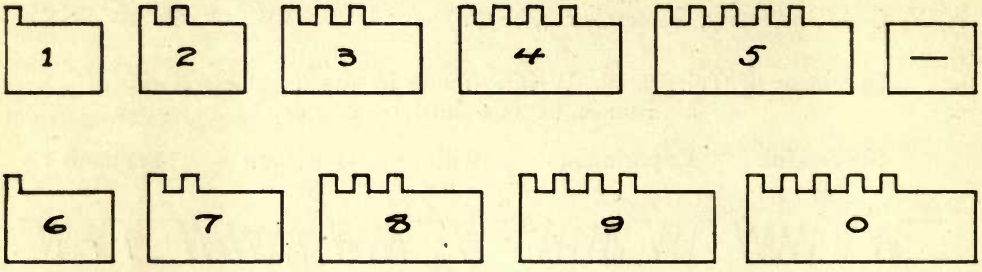
To read the marks, count the points at the *bottom* of each line. It will be perceived that two points come first, separated by a *short* interval from the next point. Set 2 beneath it, then comes one point, likewise separated by a *short* interval. Set 1 beneath it. Then comes five points. Set 5 beneath them. But

the interval in this case is a *long* interval; consequently, the three numbers comprise the whole number, 215.

So proceed with the rest, until the numbers are all set down. Then, by referring to the telegraphic dictionary, the words corresponding to the numbers are found, and the communications read.

Thus it will be seen that, by means of the changes upon *ten* characters, all the words can be transmitted. But there are *two points* reversed on the lower line. These are the *eleventh* character, placed before a number, to signify that it is to be read as a *number*, and not as the representative of a word."

There you have Morse's own description of the first known message recorded by electricity.



The original telegraph type cast by Prof. Morse at his brothers house. A Vail

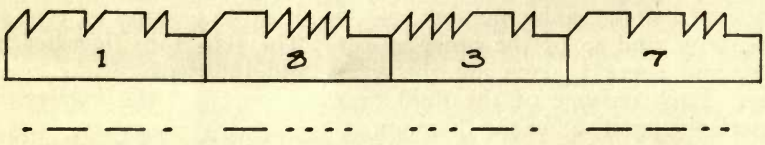
It is reasonable to assume that these type were the ones referred to by Morse in his letter published on p. 70 of Vail's book as follows:

"I cast a species of type, which I had devised for this purpose the first week after my arrival home" (in the fall of 1832 from Europe).

Morse does not give in above letter a description of either the machine or the type he used on Sept. 4, 1837. The machine is in the Smithsonian, and also some of the type pictured above.

On p. 32 of Vail's book the real saw teeth type are pictured, and picking out those required to write the number 1837 (in Morse's original message of Sept. 4, 1837, we get this as to type and record.

This diagram shows the difference between the original and the later saw teeth type both in arrangement of the teeth and the record made.



It is plainly evident that these later type could have been used in the 1837 machine, just as successfully as the original ones, and avoided the labor of constructing a dictionary and also the time required to manipulate, which could only

Amos Kendall 1836

be done by using the dictionary at both ends of the electric circuit. If this is true, why did Morse, if he knew it, cling to the dictionary, until January 24, 1838, four months and a half, after Vail became his "co-partner,' when the alphabet was first publicly used? On Jan'y 24, 1838, Morse renders a bill to Vail, one item of which reads "Leads for types for letters for Telegraph $6.38." This shows the change from numbers to letters occurred very shortly before that date. As Vail's book was published under the joint ownership of Morse and Vail, the extracts given above undoubtedly had the approval of Morse.

Extracts from a record kept by Alfred Vail and called by him "Journal of the Telegraph" beginning from the opening of the Washington-Baltimore line.

M. for Morse at Washington, V. for Vail at Baltimore, R. for Rogers at Baltimore, W. for Wood and Z. for Zantzinger, both at Washington.

May 27, 1844. Separate your words more. Oil your clockwork. Don't be so impatient. V. Yes. M.

May 28. Mind your Bs and Ms. M. Yes. V.

June 7. When did you come this morning. M. 10 minutes after 9 o'clock. V. That explains. M. Keep circuit closed. V. Accident. M.

June 11. You closed your circuit, don't do it. V. Wait a minute. M. Yes. V. I had it so. M. It is strange. V. Study it out. M. Yes. Change to E. & W. V. Yes. M. It is all right. V. Yes. M. The two wires require more cups. V. No go. M. Yes, Yes, I have caught him now. V. Glad. M. You have not soldered the wires right. V.

June 12. Dr. Smith says you must not go without dinner. V. No danger. M. Dr. Lardner spoke in high terms of your telegraph—if it was yours. V. Who does he think it belongs to? M.

June 14. Write faster. V. Yes. M. How do you like standing. V. Not much. M. A great bug has confused me. M. Drive him out and sit down. V. I can't. M. I hope you have no impediment. V. Only the bug and I killed him. M. Three cheers. V.

July 15. Now for the great experiment. Is it all right. V. Yes. good—three cheers. M. Don't keep your circuit closed. It bothers me—Hurrah boys. V. This is grand. M. Three cheers. V. Hurrah, hurrah, hurrah. M. Well done. V. Don't keep the circuit closed. V. Habit is strong. M.

Aug. 30. I have finished a new register, it works well. V. Glad. M.

Aug. 31. I shall go to Washington on Monday morning with the new register; do you want it at the Capitol? V. I want 2 at the Capitol and 2 at the Post Office. M. I have but one ready. V. No matter at present. M.

Sept. 7. I have made a diagram of the wires as they now are and by it the thing is no mystery. V. Yes. M.

Sept. 9. Let us take things leisurely. V. I wish I had your diagram. M. Made you one. V. I will look for it. Is all right. M. Yes—strike firmer. V. Yes. M. Repeat your last. V. Three cheers. M.

Vail at Washington, Rogers at Baltimore.

Oct. 21. When will you send your instrument? V. Forthwith. R. Did you tell Prof. Morse? R. Yes. V. What did he say. R. Not much, *I* take the *responsibility*, so hurry it off. V.

Oct. 28. Your key is connected by sharper points than before alteration. R. No. V. More pointed the better. R. Yes. V.

This after the Presidential election.

Nov. 13. This is all the thanks we get by the defeated party, even after sitting up after night. R. Have you seen Burbank. V. Yes. R. What had he to say. V. That Smith was getting on with his book (a Dictionary). R. Ha, ha. V. Seems down in the mouth. R.

Nov. 14. Just received a letter from Prof. Morse. He says he is highly gratified at our doings. R. Yes, V.

Nov. 15. Get a checker board and let us play a game to-morrow morning. V. The Editors wont believe what I send. R.

Nov. 16. (The game of checkers was played between Mr. Vail and a Mr. John Wills this day, taking about two hours.) Mr. Wills won.

Nov. 23. Chas. Howard, W. Habersham and James McHenry will play any 3 members of the Washington Chess Club and commence to-morrow at 11 o'clock a. m. R. Yes. V.

(A checker game began Nov. 23, 1844, finished Monday, Nov. 25, 1844, between Dr. Jones of Washington and Mr. Green of Baltimore. Green won.)

Nov. 26. The chess party here (Washington) will be ready at 4 p. m. V. 4 p. m. The chess party are here. R. Ours are here. V.

Nov. 26, 1844. Will two queens be allowed on the Board at the same time? R. Yes. V. Ten minutes for each move. Go ahead. R. Yes. V. Give us the names of the persons playing. R. Col. Gardiner, Mr. Dexter and Dr. Condict. (first moves 12 to 28: V)—53 to 37. R.

Nov. 30. I am at the Capitol. V. In what room? M. It is nameless. In front and in the south wing. V.

Dec. 3. I have an abstract of the President's message which I will send after the Express had started. V. Yes. R.

Dec. 7. Stop I want to try your new key. R. Yes. V. I have tested your new key. It operates well. R.

Dec. 9. Skinner has made arrangements and wants all the news you can send, he is to give you $5.00 per week. R. Yes. V.

Dec. 17. You will get a share as constructor and carrying out the experiments. R. Well. V. So you feel in good spirits. R. I have not had time to think about it before. V.

Jan. 10, 1845. I have a copy of *Smith's dictionary*. V. What do you think of it? R. It will do for secret communication. V. It will take as long to hunt the words as to write them by telegraph. R. Longer. V.

Jan. 18. Say to Col. Munroe that our funds are almost run out. W.

Jan. 28. The telegraph will have to stop in a few days if Congress does not make an appropriation. V. Yes. R.

Jan. 29. It may be announced in the Baltimore papers that the operations of the Telegraph are suspended after the 1st of February for want of funds, Prof. Morse. W. Yes, shall I announce it in Prof. Morse's name or mine? R. In yours. W.

Jan. 30. Tell Avery and Cleveland to hold on, I hope an appropriation will be made soon. V. Yes. R.

Jan. 30. Suppose you open your end for exhibition at 25c. each to defray expenses. V. Is Prof. Morse willing? R. I have not asked him. V.

Feb. 1. Prof. Morse says keep employees at same wages till every cent of appropriation is expended. Wood. Yes. R.

Feb. 14. Do the reporters know that we stop on Saturday? V. No. R. I suppose Col. Reed's invention was the same plan we (Morse & Vail) had discussed some 7 years ago. I now see it is the same. It is impracticable. V.

We are all without pay after to-morrow the 15th. W. Yes. R.

Feb. 15. Tell Prof. Morse my time is voluntarily devoted to his service until the adjournment of Congress. H. J. R. Prof. Morse thanks you for your offer. Do you want report of proceedings to-day? W. No. It will throw the Eastern Editors into confusion. R. Vail says we must go on. W. "This ends the Journal."

It appears an additional appropriation carried them until December 1st, 1846, when Vail & Rogers took the telegraph over from the Government and worked it until April 16th, 1847, as shown by the Postmaster General's orders already printed herein.

Tel. correspondence between Rogers at Baltimore and Zantzinger at Washington in 1845. The original tape on which this was recorded is in existence.

Baltimore: They would do the fair thing, otherwise a new plan without magnets will be used.

Washington: I do not believe it can be effectually used without the Electro Magnet.

Baltimore: I thought so two months ago.

Washington: You may use the old fister stations, but I don't believe you or they can converse as we at this moment.

Baltimore: No, nor Morse could not 3 years ago, he then talked and wrote about a Dictionary as being necessary.

Extracts from Alfred Vail's "HISTORY OF THE TELEGRAPH" published 1845.

INTRODUCTION.

Pps. VII & VIII. "The principal part is a description of various plans of telegraphic communication by electricity and galvanism, in the order of their invention up to the present; nothing fulfils so completely the conditions of what is signified by the term telegraph, as the *plan* invented by Professor Morse."

Page 24. "This arrangement by which one battery is made efficient for both circuits at the same time, where two were formerly used, was devised by Mr. Vail, Assistant Superintendent, in the spring of 1844, and has done much to diminish the care and expense in maintaining that part of the apparatus of the telegraph."

Page 30. "This conventional alphabet was *originated* on board the packet Sully by Prof. Morse, the very first elements of the invention, and arose from the necessity of the case."

Pps. 41-42-43. "The circuit of the Electro Magnet closed and broken by the movement of the lever itself, acted upon by the electro magnet."

Pps. 43-44-45. "Conducting power of the earth. Experiments in the Spring of 1844 under the direction of Mr. Vail. Using a copper plate (buried

"This arrangement of the Electrome, was devised by Mr. Vail in the summer of 1843 (see Silliman's Journal, Vol. 39, 1839, Pps. 258-267)."

in the ground) at Washington, and the zinc plate at Baltimore, with the single wire connecting those distant points, and the battery thrown out."

"Success following the experiment, the fact appears conclusive, that the ground can, thro the agency of metallic plates, constantly generate the galvanic fluid."

Footnote Page. 45. Mr. Vail in 1844, succeeded in operating the Electro magnet, with an armature attached to a lever, without any battery."

Page 69. Morse writes to Secy. of the Treasury, Sept. 27, 1837.

"Having *invented an* entirely new *mode* of telegraphic communication."

Page 70, same letter, con'd. "The whole apparatus will occupy but little space (scarcely six cubic feet, probably not more than four)." Footnote on page 70 says "it now occupies a space 10 inches long, 8 inches high and 5 wide (this in 1845).

"No other time is consumed than is necessary to write the intelligence to be conveyed, and to convert the words into the telegraphic numbers. The numbers are then transmitted nearly instantaneously to any distance, where the numbers are re-converted into the words of the intelligence."

Page 159. "Electro Magnetic Printing Telegraph, invented by Alfred Vail, September, 1837."

"Soon after my connection with Prof. Morse as *co-partner,* and at the time *I* was constructing an instrument for exhibiting the advantages of his telegraph to a committee of Congress, it occurred to *me,* that a plan might be devised, by means of which the *letters* of the alphabet could be employed in recording telegraphic messages. I immediately gave it my attention and produced the following plan." (plans and descriptions follow)

Page 168. The Printing Telegraph. "If we suppose that hammers, carrying type, can strike the same point, and each resume their original position without collision, etc."

"Footnote. Mr. Vail invented an instrument with this arrangement 16 years ago." (1829). His journal speaks of a stenographic type-writer he was making about that time. (He was then 22 years old.)

Page 169. "All Electro-Magnetic Telegraphs require as their basis . . . the Electro Magnet where recording of intelligence is an object and *it would seem,* must be applied in the mode *adopted* by Prof. Morse."

Page 171. "The instrument *employed* by Prof. Morse has but a single movement."

Page 182. "Steinheil (1837) had an arrangement of dots to represent his telegraphic alphabet."

Page 202. Bains Printing Telegraph (1840) Footnote. "This contrivance for moving the paper is exactly similar to that of Prof. Morse's first model of his telegraph, made in 1837, for the Patent Office."

In this book no other mention is made of the experiments of Prof. Morse from 1832 to Sept. 2, 1837, and by both Morse and Vail after 1837, except of the mechanism covered by the first patent.

Mr. Vail does not, in any case, say that any of the parts were *invented* by Prof. Morse. He used the words *"orignated," "adopted," "employed."*

It may seem strange to the reader, that, in view of the many things done by Alfred Vail to improve the working of the Telegraph, he did not assert his claims;

but he considered himself bound by his contract of 1837 with Morse, to remain in the background, and the following extracts from private letters show that when he found he was being ignored, his mouth was absolutely closed during the life of the Patents.

He died before the last re-issue expired.

To Alfred Vail: New York, Oct. 16, 1852.

Dear Sir:— . . . I take it for granted therefore, that in what you say about justice not having been done to yourself, you do not mean that there is anything *unexplained* which could legally affect the validity of Morse's patents. Yet if you were to publish or make known to our adversaries what you say to me, they would seize hold of it . . . to give it weight before the courts in the hope of destroying not only your property in the patents, but that the multitudes to whom your rights have been sold. I concede to you the right to injure your own remaining property in the patents by any statements you think proper to make, but I must respectfully insist that you are not at liberty to say or do anything which can lessen the value of the patent rights which have been sold to others by yourself, or me, as your agent. It would fix upon you a character which does not belong to you, and which you would resent with a just indignation. . .

Amos Kendall.

A. Vail to A. Kendall: December 7, 1852.

. . . I am told that the Telegraph Cos. will never again give to the Patentees an office—and yet the very same man that tells me this (Norton) votes for you as its officer and with the same breath calls one of the Patentees. . . I took hold of the Telegraph in its infancy and when the world was laughing it and its Inventor to scorn. By mismanagement or misfortune, I have the smallest mite in the concern. I am prohibited from holding any lucrative office in it because I, in its early development, hazarded it my assistance. Even some portions of the Telegraph which I invented, have never been publicly awarded to me. I consider myself as not treated fairly in many instances which I do not and have not named in this letter.

Morristown, Morris Co., N. J., March 11, 1853.

Hon. Amos Kendall,

Dear Sir:—

Too long have I already delayed the reply I promised you in relation to the Floyd affair and other matters noticed in yours of Oct. 16/52. . . . Now I have simply to speak out frankly and fearlessly and state to you, that I did invent what I stated in a former letter and that I never refrained from stating it, anywhere, and everywhere, whenever and wheresoever I thought of it, or had occasion to do so, not for the sake of boasting, but simple truth, which may be spoken and in this case ought to be spoken. I have never announced it to the public proper. I, however, informed you of the fact of its being my invention as soon as I became acquainted with you. . . .

Now admitting I invented it, you could, I think, have never read my agreement with Prof. Morse by which I became a joint owner with him in the patent right. If you had to the purpose, you would not have written me as you have, and you would there have found that whatever Mr. Smith or Dr. Gale, or myself, should invent or discover, going to simplify or improve Morse's Telegraph would belong to all jointly and become a part of the original invention. I could not

therefore have taken out a patent for this invention for myself. Yet this agreement with Morse and others, does not refuse me the honor of being the inventor of anything I did invent. Else, why was it not so specified in the agreement? It supposed I might invent or make improvements in the Telegraph, but does not refuse me the honor, but denies me the exclusive right to ownership in such improvement; yet the agreement is such that it makes the invention a unity and the property of the patentees under Prof. Morse, so it was intended and such is its power.

That agreement is open to all who choose to read it, for if I mistake not it is on the public records. Now what is it that I was contending for? Simply that I might have what had never been given me, a public acknowledgment of what is in universal use, and has been from the first when Prof. Morse's invention is used. Under the circumstances would this invalidate the patent and brand me a "fraudulent" man?

I do not seek renown for myself, I care little for the world's applause, which at best is very hard to maintain even when justly yours, and given often, where they cannot and will not discriminate and justly award. But what I do desire, is truth, in relation to the history of the improvements of the Magnetic Telegraph, and such equal chances among those with whom I am co-partner, as may be equivalent to the risk I have run, the interest I have shown, and the improvements I have made in the enterprise.

ALFRED VAIL.

In this last clause, I find my excuse for publishing these few extracts from my father's records now in the Smithsonian at Washington, D. C.

By reference to page 3 of these records, it is seen that Dr. Day of Yale, gave Morse, when a student there, the idea of a telegraph, on which he worked from the fall of 1832 to that of 1837 in producing an experimentally successful machine.

That this machine was radically changed by Vail to this commercially successful one of 1844.

Many additional records, not quoted here, confirm this statement and also show his work included many other things required to perfect the *system* of Telegraphs which bear the name of Morse.

I find nothing in Vail's writings to show that either he or Morse claimed the Alphabet, which was not claimed in the original caveat.

I have left nothing out that was favorable to either, having tried to be unbiased.

Morse's "sketch book" said to have been used on the "Sully" in 1832, now contains nothing of any value to the history or the Telegraph.