(No Model.)

# F. ANDERSON.

## AUTOMATIC TELEGRAPH.

No. 406,982. Patented July 16, 1889.

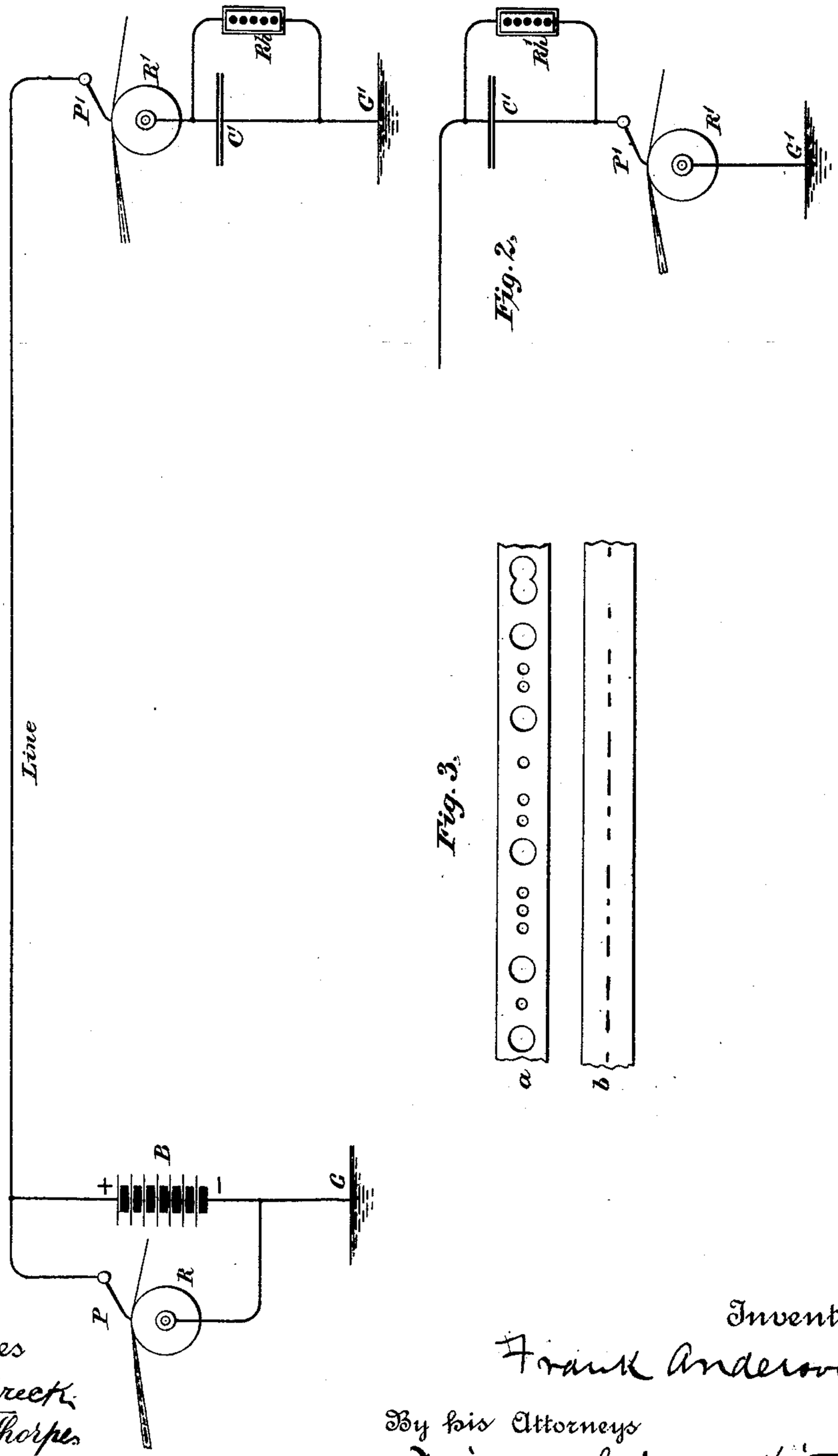


Fig. 1.

Fig. 2.

Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 406,982, dated July 16, 1889.

Application filed September 22, 1888. Serial No. 286,087. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK ANDERSON, a citizen of the United States, residing in Peekskill, county of Westchester, and State of New York, have made a new and useful Invention in Telegraphy, of which the following is a specification.

My invention relates particularly to improvements in that branch of the art of telegraphy known as "automatic" or "stylographic telegraphy;" and to this end it consists, first, in a novel arrangement of apparatus embracing a transmitter, a receiver, a battery, and a condenser connected up for operation, as shown; second, in a novel form of fillet or transmitting-strip for use with said system or with any system wherein the record is made dependent upon the breaks instead of the makes of the battery-circuit.

The objects of my invention are, first, to provide a cheap, simple, and efficient system which shall possess increased capacity for transmitting and receiving ordinary Morse characters and at the same time avoid tailings on the receiving strip or fillet, thereby making a clear and well-defined record; second, to cheapen and simplify the transmitting strip or fillet, so that speed in its preparation and use in transmitting may be effected. I accomplish these objects by the arrangement of apparatus and construction of parts hereinafter described, but particularly pointed out in the claims which follow this specification.

Prior to my invention it was old in the art to transmit Morse or analogous codes of signals in systems of the automatic type by interrupting a main-line-battery circuit normally connected to line through the agency of shunting mechanism, consisting of a perforated strip and a transmitting-cylinder and pen or stylus located in a shunt at the transmitting-station. It was also old to use condensers at the receiving-station to cut off the tailings; but so far as I am aware it is not old to combine these two features, as I have done.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 represents diagrammatically a system of automatic telegraphy arranged in accordance with my improvement. Fig. 2 is a similar view showing a modified disposition of the receiving apparatus. Fig. 3 is a plan view illustrating my improved transmitting-fillet or message-strip and also the record made by a chemical or ink receiver.

Referring to Fig. 1, B is a main-line battery normally in circuit through the line from earth G at the transmitting-station to and through the receiver and earth G′ at the distant or receiving station.

R is a metallic transmitting-cylinder, of usual form, connected through a contact-pen P and shunt-wire around the battery B when there is no transmitting fillet or strip in position or when a perforation of the strip in position lies beneath the pen or stylus. R′ is a similar cylinder, and P′ the receiving stylus or pen.

C′ is a condenser located between the receiving-cylinder and the earth G′.

R*h* is an adjustable rheostat, which may be done away with, if desired, it only being used to regulate the discharge of the condenser C′ in a manner at once obvious.

I have shown the battery with its plus or copper pole to line in Fig. 1. It will be understood that should the poles be reversed, so that the zinc or minus pole goes to line, the connections at the receiver should be so changed that the line would go direct to the cylinder instead of the pen, as now shown, the pen being connected through the condenser to ground.

The arrangement of the receiver shown in Fig. 2 is designed to operate with the battery connected to line the same as in Fig. 1.

If the poles of the secondary battery are reversed from Fig. 1, the line-connections should go to the cylinder first, instead of the pen; otherwise the connections are the same.

I will now describe my improved fillet or transmitting-strip shown at *a*, Fig. 3, *b* being the record made at the chemical-receiver from the particular fillet perforated, as shown.

I represent the spaces between the individual letters by large holes or perforations, and those between the elements of the letters by small holes or perforations all arranged in one line. The spaces between words are made by duplicating the word-space holes, the feed of the perforating-machine being such that

it advances the fillet less than one large space at each action, as shown at the right-hand end of *a*, Fig. 3. In most transmitting-fillets as heretofore devised the perforations are designed to permit the transmitting-pen to contact electrically with the transmitting-cylinder, and the characters are made up of dots and dashes through short and long intervals, dependent upon the length of the perforations. With such fillets great difficulty has been experienced in practice in producing the perforations of varying length, especially when made by a machine where the entire letter is made at a single operation. This difficulty arises from the fact that it is impossible to arrange any one set of dot and dash punches which will accommodate the various relative positions of the characters in different letters. Attempts have been made with more or less success to overcome this difficulty by arranging side spacing-holes in a parallel row wherever needed; but this complicates matters and makes the fillet more or less objectionable. I overcome this trouble by providing a strip or fillet in which the signal impulses are sent by the breaks due to its passage under the transmitting-pen rather than the makes; and by arranging the perforations of two orders in a single row, as before noted, I so construct the fillet that all of the spaces between letters shall be of the same length and all those between words any desired length, dependent upon the number of times the spacing-key is depressed. The long breaks due to a single large hole always occur after each letter, and hence it follows that a single row of perforations in any one die-plate having one large spacing-hole is sufficient to produce all code-characters, provided the spaced letters—as c, r, o, &c.—of the Morse code are not used. For these letters I provide special substitutes of my own, which can soon be easily learned by an operator.

It will be seen by examining the drawing Fig. 3 that I require fewer perforations than with any fillet heretofore used, so far as I am aware, as the dash is obtained by leaving out a perforation instead of requiring two or three, and if it occurs at the end of a letter, or the letter consists of a dash only, as T, I simply feed the paper a little farther, so as to leave a larger blank before the next succeeding letter.

In an ordinary perforating-machine one of the keys is for spacing. I utilize this key for the large perforations and make the space between words by successive perforations from the space-key, as before disclosed. To make the letter "e," therefore, after a letter or word space, I simply perforate a large space-hole one space distant. Similarly one large perforation would give the letter "T," by increasing the space. The same economy of perforations holds through all the characters except those consisting exclusively of dots—as I, S, H, and P—and they require no more than the usual number of perforations. These breaks are necessarily so uniform in length (being determined by the diameter of the holes) that much less difference in length of spaces between parts of a letter and letters themselves is necessary to insure their proper discrimination.

In the old methods heretofore practiced the time required for the transmitting-pen or stylus to drop into the perforation and its premature exit therefrom, due to the edge of the paper upon which it rides, necessarily shortens the length of the signal, already too short when operating at high speed; but by the shunt arrangement of the transmitting-battery, combined with the contracted arrangement of perforations as devised by me, increased speed and more perfect signals may be had.

The mode of operation of the fillet is obvious without further description on inspection of Fig. 3, which is perforated for the word "Morse," and at *b* is shown the record from the receiver, as before indicated.

I will now describe the operation of the system. Suppose the fillet in place under the transmitting-pen P, as shown, said pen resting on the paper. In this condition the battery B sends a current to line, makes a record on the sensitive fillet under the pen P′, and charges the condenser C′. As the two cylinders R and R′ are rotated at substantially the same speed, each space of the transmitting strip or fillet will hold the shunt-circuit through the pen P and cylinder R open and permit the battery to charge the line and condenser C′. Now it is a well-known fact that any charged line yields when broken a statical discharge at any given point which bears a direct fixed relation to the potential at that point, so that with a battery connected as shown the greatest statical discharge occurring on interrupting the circuit is near the battery. It is also well known that a condenser takes a charge of plus polarity on that face connected to the plus pole of the battery, and that the discharge from the condenser will, when the line is ruptured, be of the same nature as that at or near the plus pole of the battery, and being in the opposite direction it is apparent that the receiving-pen will make a well-defined record free from tailings, because the condenser-discharge will cut them off abruptly. By regulating the capacity of the condenser to bear a fixed relation to that of the line I am enabled to make a record absolutely free from tailings, and by combining this condenser, as shown, with the novel form of fillet and shunting-transmitter I increase materially the speed of transmission.

I am aware that it is old in the art to use a condenser in an artificial line between the receiver and the ground and to give to said condenser an electrostatic capacity substantially equal to that of the line, so as to make the static discharge flow in opposite directions at the receiving-cylinder; but such a

construction differs materially from mine in that its action is in the nature of a statical balance which tends to leave no tailings, while mine acts, as described, to counteract tailings which would otherwise exist. Such an apparatus requires additional resistance in the artificial line to bring about the statical balance, while mine acts directly in the line.

I am also aware that electro-magnets have been arranged in a shunt about the receiver to avoid tailings; but this arrangement is essentially different from mine in that the discharge is, and must be, wholly in a local circuit to produce the desired results, thereby dividing the recording-current and hence diminishing its effect on the receiving device.

I am also aware that fillets have been devised in which large and small perforations were arranged in a single row, but not in such manner that the large perforations always occurred at the ends of the individual letters and never at intermediate points, as described and claimed herein. I do not limit myself, however, to the use of the specific form of fillet with particular system above disclosed, as I may use any fillet which transmits by the breaks rather than the makes; but the fillet I have disclosed is preferred by me.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an automatic telegraph, the following combination of elements: a single transmitting-battery at a transmitting-station connected to earth and directly to a main line, which it normally charges, a shunt around said battery including in its circuit an automatic transmitter adapted to open and close said shunt, a recording-receiver at the distant receiving-station located in the main line, and a condenser also located directly in the main line between the receiver and the earth, substantially as described.

2. An automatic telegraph system consisting of the following elements: a main line earthed at each end and containing a single main-line or transmitting battery normally in circuit, a transmitter consisting of a perforated fillet, a contact brush or pen, and a transmitting-cylinder located in a normally-open shunt around the entire battery, a receiver located at a receiving-station, and a condenser located between the receiver and the earth, substantially as described.

3. A transmitting-fillet for use in automatic telegraphy, consisting of a perforated strip or band, the perforations being in a single row and of two sizes, the large perforations representing the spaces between individual letters only and the small perforations the spaces between the elements of the letters only, the greatest distance between any two elements of an individual letter not exceeding one of the small perforations, substantially as described.

4. A transmitting-fillet for use in automatic telegraphy, consisting of a perforated strip or band, the perforations being located in a single row and of two sizes, the large perforations representing the spaces only between individual letters and being in every instance of uniform size, while the small perforations represent the spaces only between the elements of the letters, the greatest space between any two letters of a word not exceeding the diameter of one of the larger perforations and that between any two of the elements of a letter not exceeding the diameter of one of the smaller perforations, substantially as described.

5. A fillet for use in automatic telegraphy, consisting of a perforated strip, the perforations being in a single row and of two sizes, both circular, the larger-sized perforations representing the spaces between individual letters of a word and the small perforations representing the spaces between the individual elements of a letter, the space between any two letters of a word not exceeding the diameter of one of the larger perforations and that between any two elements of a letter never exceeding the diameter of one of the smaller perforations, substantially as described.

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