(No Model.) 2 Sheets—Sheet 1.

F. ANDERSON.

AUTOMATIC TELEGRAPH.

No. 265,358. Patented Oct. 3, 1882.

Fig. 1.

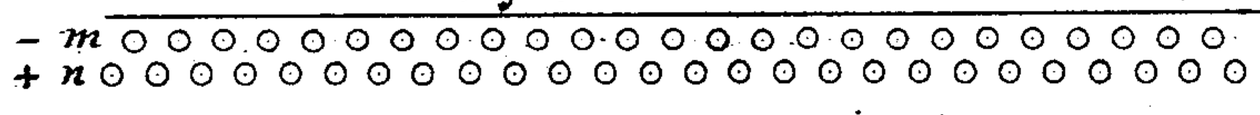


Fig. 2.

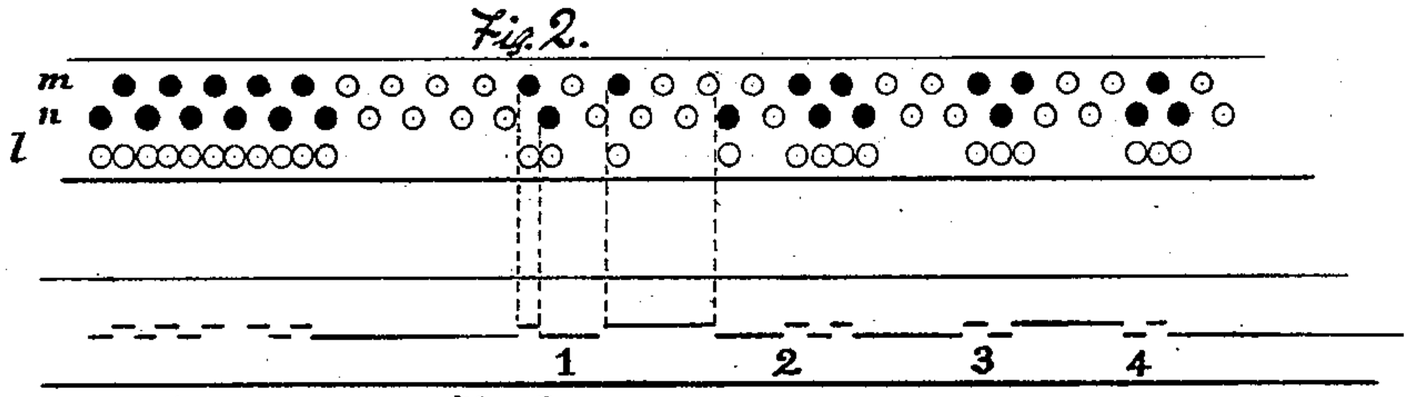


Fig. 3.

Fig. 4.

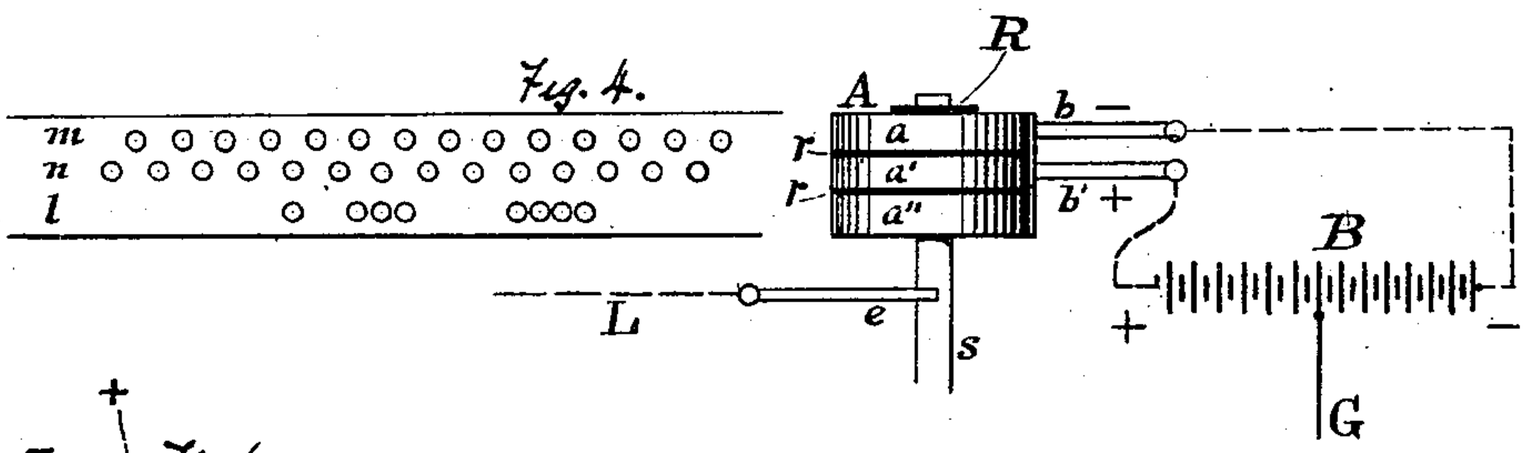


Fig. 6.

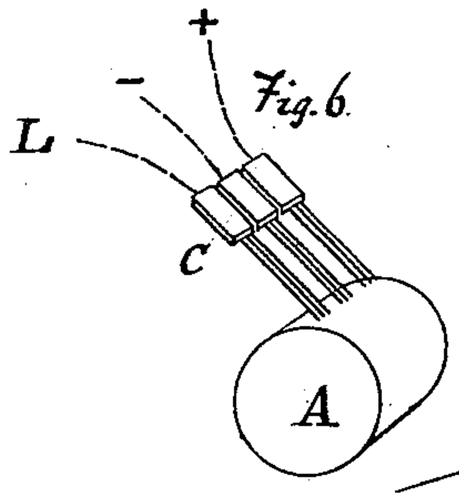
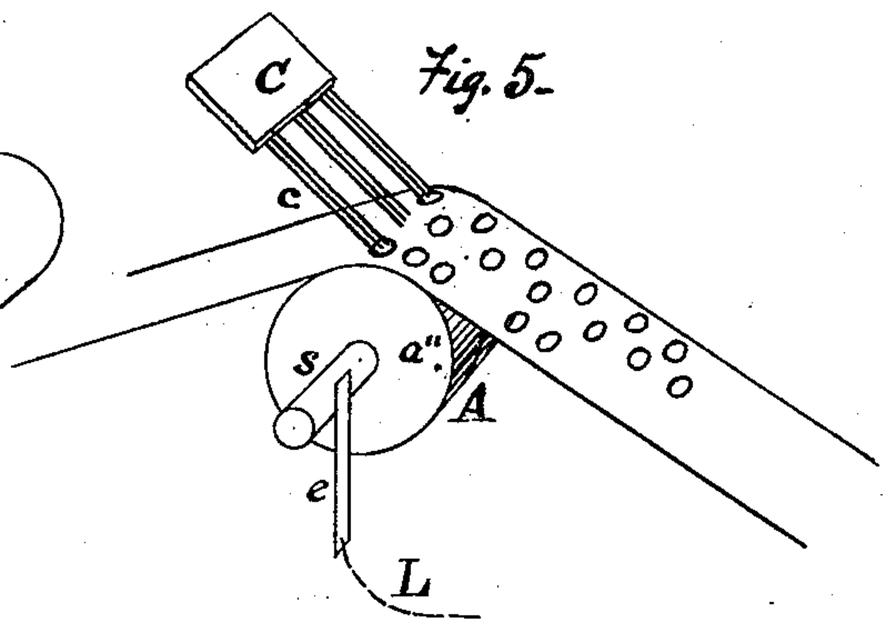


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

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AUTOMATIC TELEGRAPH.

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Fig. 7.

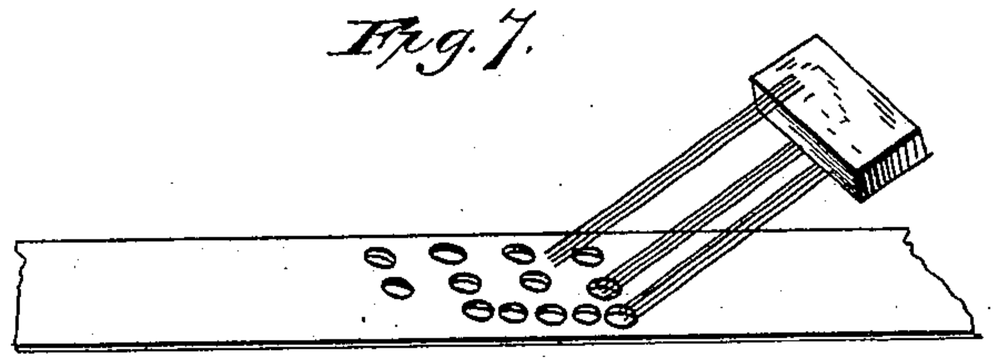


Fig. 8

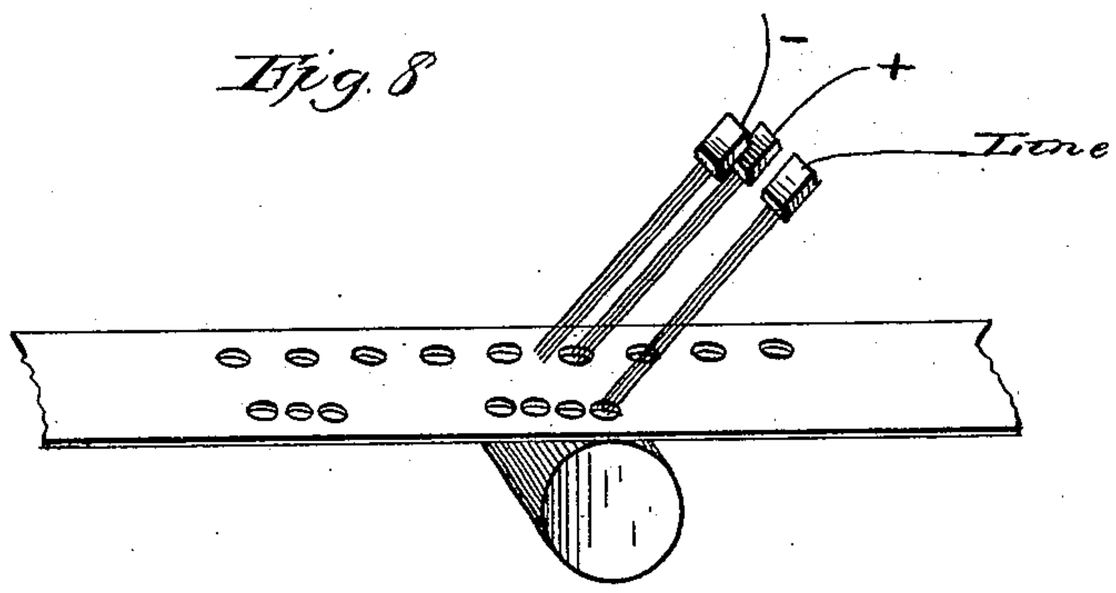
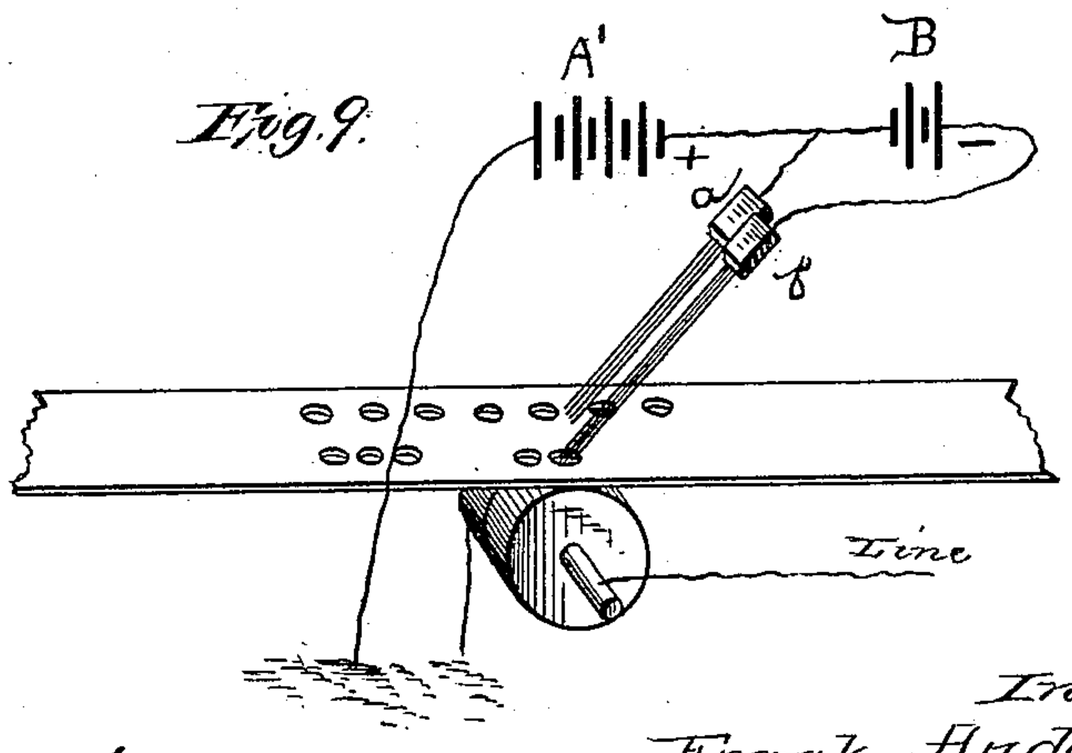


Fig. 9.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 265,358, dated October 3, 1882.

Application filed May 20, 1881. Renewed September 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, FRANK ANDERSON, of Peekskill, in the county of Westchester and State of New York, have invented a new and useful Improvement in Automatic Telegraphs; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to telegraphic methods and apparatus of that class in which electrical impulses of more or less alternating polarity are sent into the line for the purpose of increasing the legibility and speed. Though more broadly applicable, it is more particularly designed for operation in connection with the special method set forth in Letters Patent of the United States No. 172,409, of January 18, 1876. In that patent the perforated fillet of paper by which the proper connections and breaks in the circuit are made is provided with two rows of holes alternating in position, and the alternate perforations are all used to form the characters which represent the letter or letters of the message transmitted. Thus the perforation or perforations in one line compose with alternating perforation or perforations in the other line an integral group of perforations, which transmit the character representing the letter. It is essential in this method that these component perforations, or the perforation or perforations in one line which produce a mark or a sign shall alternate with the other component perforations in the other line. These component perforations which make up the integral group representing the character are easily made so as to alternate, and when the integral perforations or groups are composed of an even number of component perforations, and are followed by like groups of integral perforations, the same alternation of polarity would ensue between the groups forming different characters which represent letters; but when uneven groups or integral perforations formed of an uneven number of component perforations are followed by like uneven groups no alternation of polarity would ensue between these groups, and it became necessary to reverse the position of an uneven group following an even or of an even group following an uneven. This reversal of the characters or groups of perforations representing the characters was accomplished in the machine shown in Letters Patent of the United States No. 228,585, dated June 8, 1880.

The object of this invention is to secure the necessary alternation of polarity, to avoid the complexity of the method and apparatus referred to, and to simplify the operation required in the final preparation or composition of a fillet for use in this system of telegraphy.

The nature of my invention is fully explained in the following specification in connection with matters well known in the art and in part herein referred to, and is specifically indicated in the claims.

In the drawings, Figure 1 represents the band or fillet as prepared for use in the composing-machine, and Fig. 2 the fillet after leaving composing-machine and ready for the transmitting-instrument. Fig. 3 represents the writing or record produced by the fillet. Fig. 4 represents the transmitting mechanism with battery and connections. Fig. 5 is a perspective view of transmitting and pole-changing device. Fig. 6 shows modification of Figs. 4 and 5. Figs. 7, 8, and 9 also represent modifications.

It will be observed that the strip of paper represented in Fig. 1 is perforated with two rows of holes, separated by equal spaces, and the holes in one row located opposite the spaces in the other, whereby, when the fillet passes under the brushes used in the apparatus to which this invention relates, alternating impulses of opposite polarity are sent. If this strip of paper, perforated as shown, be put into a transmitter in which only a short impulse of opposite polarity is transmitted after each recording-current, or in which a current of opposite polarity to the recording-current flows on the line, whenever the recording-current is broken a single row of sharp dots is produced. The same strip in the apparatus shown in Patent No. 172,409, above referred to, will produce a double row of sharp dots, and out of the single or double row by my selecting method the necessary characters may be taken to represent letters of the alphabet. I propose, however, to use a transmitter substantially such as that shown in Figs. 4 and 5. In these figures, A represents a drum or cylinder equal in length to the width of the paper fillet. It is composed of three disks of metal, *a a' a''*, insulated from each other by proper

material, *r r*, the disk *a''* being in electrical connection with the shaft S, and through spring *e* with line L, the other two disks, *a a'*, being connected one to the positive and one to the negative pole of battery B by springs *b b'*. The battery B is equally divided, so that one-half only is in action at one time, it being virtually two batteries. The rows of holes *m n*, Fig. 1, in the fillet are so placed that one row, *m*, will cover only the part *a* of the drum A, and the other row the part *a'*. Resting on the drum A, except when separated by the paper fillet, is the brush C, whose wires, falling through the holes in succession as the paper is moved, close the circuit between the brush and the battery, first of one side or half and then of the other of the battery; but never with both sides of the battery at once, owing to the alternation in position of the two rows of holes *m n*. With paper perforated as in Fig. 1 in this transmitter no current could pass to the line L, because the part *c* of the brush rests on imperforate paper, and the circuit is not completed to the line; but if another series of holes be made in the fillet, as shown in Fig. 2, contact of the brush C with *a''* will be permitted, and whichever current is passing into C through holes *m* or *n* will be transmitted to the line and thence to the receiving-station. The holes of the third row are placed opposite (transversely) the holes in rows *m* or *n*, and never so as to cover two or part of two holes. With a brush having one part, *c*, set in advance or in the rear of the other part the relative position of the holes might be different. If the holes of the third row are made close together, so that a hole in the third row comes opposite every hole in *m* and *n*, as at the left in Fig. 2, the resulting record by the double-pen system will be as shown in the lower corresponding part of Fig. 3—namely, a series of dots (short dashes) alternating between the upper and lower line, just as in the rows *m* and *n* of the perforated strip, and all resulting from the single row of holes in the lower part of the strip. So it will be seen that as the upper rows of holes are all uniform and may be prepared beforehand it is only necessary in composing a set of characters to perforate in a single row and at proper points as many holes as may be required. The uniform rows of holes *m n* act simply as a pole-changer by presenting alternately positive and negative currents, while the third row acts solely to select those impulses that are needed to produce the desired characters. By noticing the perforations in Fig. 2 it will be seen that when the lower line, *l*, of the perforations ends no more of the alternating currents presented can pass to the line L till other holes occur in that row. The result is that, as there is no opposing current to neutralize the last impulse, it continues for some time to mark the paper, as in Fig. 3, gradually, however, failing. Now, if another selecting-hole should occur and the hole selected in *m* or *n* should be on the same line as the last, the two records would run together and destroy distinctness; but if we place our next selecting-hole opposite a pole-changing hole whose number counting from the last is an odd number the recorded mark will be distinct, because it is on the opposite line from the preceding mark, as at 1, Fig. 3, and puts to the line an impulse of opposite polarity.

In forming the letter A of the "Morse" alphabet, as shown at 1, Fig. 3, in the perforations two holes of line *l*, Fig. 2, close together, select successive impulses of opposite polarity, and the second hole, not being immediately followed by another, "tails" out and forms the dash of the A. Now, to keep said dash from tailing out to an uncertain length, and thus losing its identity, a third hole is selected at an odd number, distant and therefore of an opposite polarity, to cut off the A dash. As there is no ready way of preventing this impulse from being recorded also, (in the double-pen system,) the space is made long enough to make a dash always recognizable as a space-dash. Thus we record or get a dot or line to represent not only the letters or characters, but a longer dash that represents the space also, said space-dash being twice as long to represent space between words. The next letter or Morse character shown in Fig. 3 is the letter B, at 2, a dash and three dots—a letter which requires five selecting holes, including one for space. The next letter, 3, Fig. 3, shown is one of two dots, I, which requires three selecting-holes. This letter is shown repeated in the perforation—that is, at the proper distance. Three more selecting-holes are made, sending three more impulses, two for dots and one for space-dash, which latter in this instance tails out indefinitely. By observing the two letters I I the effect of spacing the letters a distance that includes an odd number of the pole-changing holes may be seen. It causes an alternation or reversal in the position of the record—that is, the I in one case begins on the upper line and in the other case on the lower line. If the second I (4) had begun on the same line as the first I, (3,) the first dot of the second I would form a continuation of the first I-space, and only one dot (the upper) would have appeared. The selected holes in Fig. 2 are blackened in the drawings, that this alternating feature may be readily seen. As has been seen, this selection is accomplished by simply allowing the proper distance between each letter, which is the office of the feeding mechanism of the composing-machine or perforator.

Fig. 6 shows a variation of the transmitter. Instead of dividing the drum A, the brush C may be divided into three parts, as shown, and the drum left solid. In this form two of the brushes present opposite poles to the drum, and the latter connect to brush *c*, thence to the line whenever selecting-holes occur.

I do not confine myself to the precise form herein shown, for the arrangement can be varied in a number of ways without departing from the general principle of my invention.

It is evident that the pole-changing holes may be placed opposite, instead of in alternate positions, and the brushes placed obliquely, as shown in Fig. 7, in which the spaces between the pole-changing holes are equal to the diameter of the holes, the selecting-holes and contact-wheel being the same; or one brush may be placed behind the other and the holes in a single line, at a distance apart equal to to their diameter, as shown in Fig. 8, with the same result. In this case the drum is solid and brush divided, as shown; or a single brush and single row of holes might be made to accomplish the same result through a peculiar arrangement, whereby one battery would act only when the other (a stronger one) was cut out, as shown in Fig. 9. In this figure the battery A′ is double the power of battery B. The batteries have opposite poles to the ground, and the contact-wheel is divided, one part being to earth and the other to line. When the fillet is in position shown in the figure battery A′ overpowers B by an amount equal to B, and a positive current goes to line. When brush *a* falls on the contact-wheel through a hole battery A′ is short-circuited and B throws a negative impulse to the line. The selecting-holes are the same.

It is also evident that other means may be used in connection with a drum, besides the double row of holes, to cause the alternatives of polarity, and the alternatives otherwise produced may be selected in the same way by the brush and selecting-perforations.

The main object of my invention is included in any of these methods, that object being the simplification of the work done by the composer of a message, so that comparatively simple mechanism will perform the work.

The previous perforation of the two uniform rows of holes is a very simple operation, and is designed to be done on separate machines. When the paper, perforated as shown in Fig. 1, is put into the perforator for perforation of the third row, the holes previously made serve as an aid to the controlling of the paper, so that a certain relation may always be preserved between them and the selecting-holes, made during the composing operation. This is accomplished by having the feed-wheel of the perforator studded with pins that enter part of the holes and insure proper position of paper fillet.

I am aware that transmitting-instruments that present alternate currents for selection have been used, as in the Wheatstone system and others; but the said alternations or pole-changers were produced by separate mechanism and entirely independent of the perforated fillet.

I am also aware that paper fillets have been used for causing alternations of currents, as in the Foote and Randall patent above referred to and others; but in these methods the alternations are made only as they are selected, and require complicated combinations of perforations and perforating mechanism that are difficult to produce and operate.

Having thus described my invention, what I claim is—

1. In combination with a drum and electrical connections, as described, a fillet perforated with two rows of equidistant alternating holes, adapted to operate in connection with contact-points, and also provided with a third set of selecting-holes adapted to operate in connection with a third brush or contact-point, whereby the selected impulses are put to line, substantially as described.

2. The combination of the drum, composed of three insulated sections and provided with electrical connections, as described, a brush, C, adapted to cover the three sections, and of a fillet provided with two rows of equidistant holes made to operate in connection with the brushes as pole-changers, and provided also with a third row of selecting-holes, arranged in the described relation to the first, all substantially as set forth.

3. A fillet of paper or like material perforated with two continuous series of equidistant holes that act as pole-changers, and having a series of selecting-holes arranged in the described relation to the pole-changing holes—namely, having the selecting-holes so spaced that the distance from one impulse to another shall always include an odd number of the pole-changing holes—substantially as set forth.

4. A fillet of paper perforated with two series of equidistant holes adapted to act as pole-changers, an additional row of holes adapted to select of the impulses presented those only that are an odd number distant, substantially as described.

5. In a transmitting-instrument in which a pole-changing fillet of paper is used of the special form shown, the drum or cylinder A, divided into three insulated sections, *a a′ a″*, and the springs or brush C, made wide enough to cover the three sections, substantially as described.

6. A perforated non-conducting fillet having one or more rows of equidistant holes, in combination with a divided contact-wheel, suitable brushes, and line and battery connections, substantially as described, whereby the fillet acts as a continuous pole-changer, substantially as described.

7. A perforated non-conducting fillet having two rows of equidistant holes, in combination with a divided contact-wheel and line and battery connections, substantially as described, whereby the fillet acts as a pole-changer, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK ANDERSON.

Witnesses:

RUFUS ANDERSON,

COLERIDGE A. HART.