(No Model.) 2 Sheets—Sheet 1.

P. B. DELANY.

RECEIVING APPARATUS FOR SYNCHRONOUS TELEGRAPHY.

No. 316,126. Patented Apr. 21, 1885.

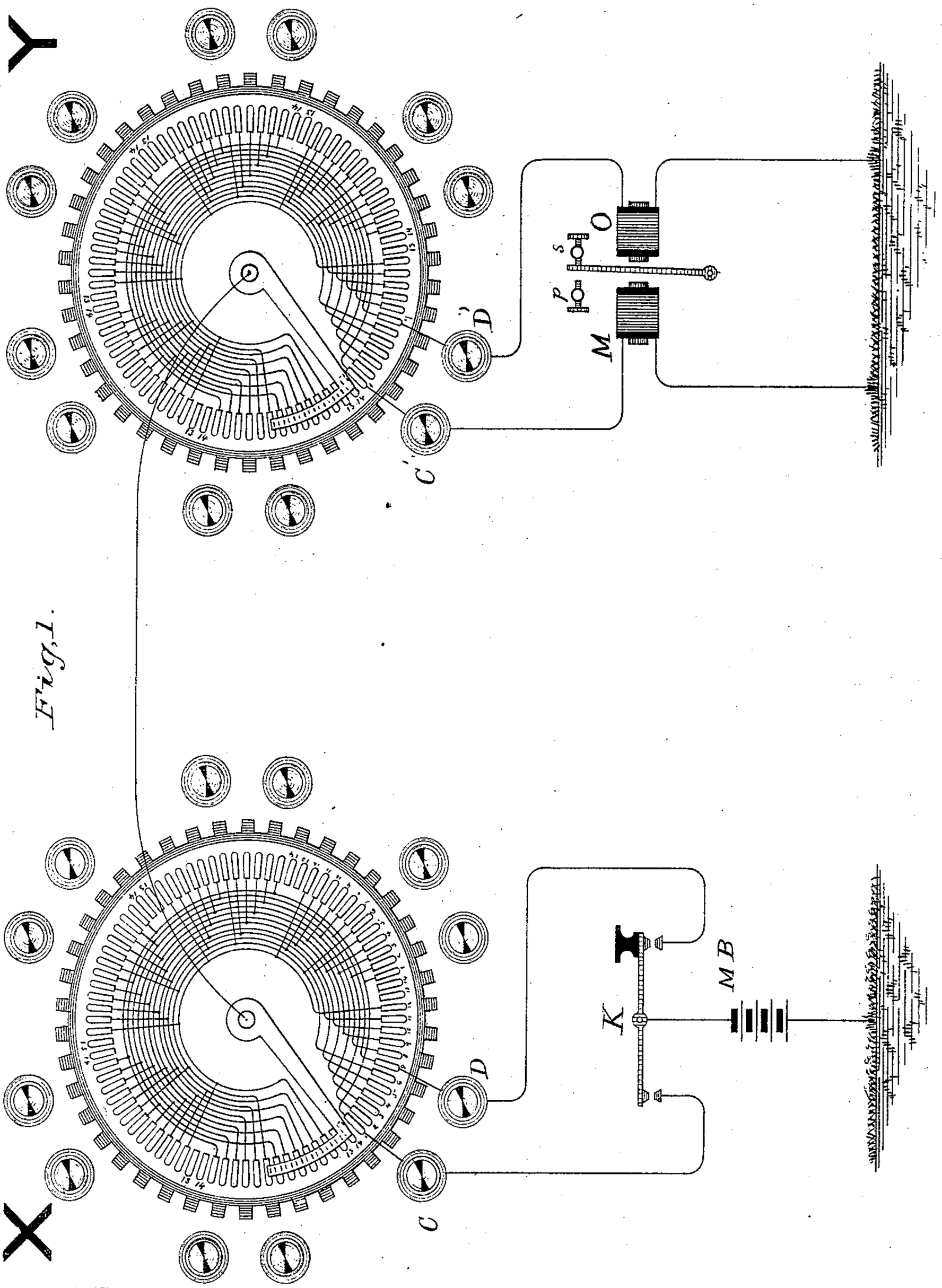

Fig. 1.

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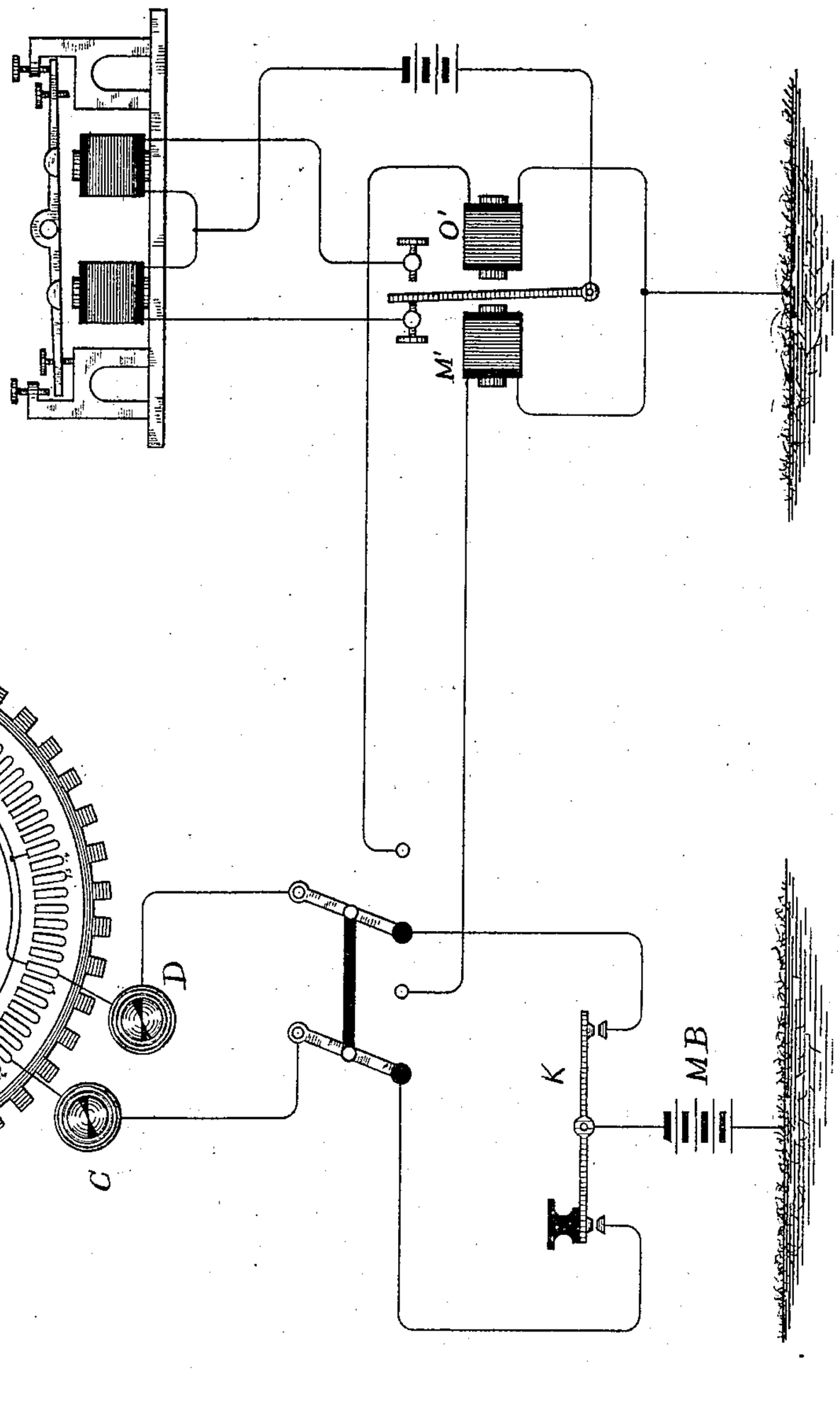
Fig. 2.



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RECEIVING APPARATUS FOR SYNCHRONOUS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 316,126, dated April 21, 1885.

Application filed February 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, PATRICK B. DELANY, of the city, county, and State of New York, have invented certain new and useful Improvements in Synchronous Telegraphy, of which the following is a specification.

In the accompanying drawings, Figure 1 is a diagram view illustrating two stations connected by a main line and organized according to my invention, and Fig. 2 is a detail view showing the arrangement of operators' instruments in each of the branch circuits.

In sundry Letters Patent granted to me October 9, 1883, I have shown several systems in which the disks A and the trailing fingers *a* carried thereby are caused to rotate synchronously, so that the trailing fingers will synchronously travel over a table of insulated contacts, B. Any one of the systems shown in those patents may be adopted so far as my present invention is concerned, or any other suitable means may be employed, as my invention is not dependent upon particular means by which the synchronous rotation of the two apparatus is insured. In those patents I have shown a table of contacts on which sixty insulated contacts are arranged, the contacts being numbered from 1 to 10, in six distinct groups, the 9's and 10's in each group being devoted to maintaining the synchronism of the apparatus. The table of contacts shown in the present case contains, however, eighty-four contacts, which are numbered from 1 to 14, in six groups. In this case, as in the patents referred to, two contacts, 13 and 14, in each series, making twelve contacts in each circle, are to be devoted to maintaining the synchronism of the apparatus. They are not shown as connected in any way, nor is either of them shown as extended toward the other, as in said patents; but they are to be arranged and connected in any of the ways shown in the patents, and it is deemed unnecessary to enter into any description here. The contacts from 1 to 12, inclusive, in each of the six groups are devoted to telegraphic purposes, but are connected in a manner different from that shown in my Letters Patent No. 286,278, patented October 9, 1883. In that patent, which shows an arrangement for quadruplex transmission, the contacts at each station are shown as distributed and connected in four independent branch circuits containing telegraphic instruments. When the trailing fingers therefore synchronously rotate over the contacts, the circuit is rapidly made and broken between the corresponding instruments at the two stations, so that, although the four circuits are independent of each other for telegraphic transmission, the transmitting-current is composed of a series of impulses. In working with such a current there is apt to be a singing or chattering of the sounder, caused by the rapid makes and breaks of the circuit.

The object of this invention is to provide a new arrangement and system of operation by which absolutely sharp and distinct actuations of the sounder may be had. I will now describe the arrangement shown in the drawings for accomplishing this purpose.

At station X the 1's in each group of contacts are shown as connected together and to a binding-post, C. The 7's in each group are also connected together and to a binding-post, D. The binding-post D is connected with the front stop of a transmitting-key, K, and the binding-post C with the back stop of the key. One pole of a battery, MB, is connected with the key and the other with the ground. When the key K is put down on the front stop, the battery MB will be connected with the 7-contacts, and as the trailing finger rotates over these contacts impulses of electricity will be sent into the line through them. When the key is on its back stop, impulses of electricity will be transmitted into the line through the 1-contacts. Now, at station Y the 1's are similarly connected together and with the binding-post C′, from which a wire runs through the coil of an electro-magnet, M, thence to ground, and the 7-contacts are connected together and to a binding-post, D′, from which a wire runs through the coil of an electro-magnet, O, to ground. These magnets are arranged to face each other, as illustrated, and a freely-vibrating unbiased armature is arranged between them and provided with suitable stops, thus constituting an unpolarized relay of peculiar construction. In transmitting a message from X to Y over this circuit, when the key K is on its front stop the

7's at X will be thrown into circuit with the battery MB, and the circuit will be completed through the key, binding-post D, 7-contacts, and trailing finger at X, over the main line and through the trailing finger and 7-contacts at Y, through the coil of the electro-magnet O at that station. The relay-armature is therefore positively and firmly drawn against its contact-stop *s*, and as there is no bias to the armature and no coil-spring the vibratory nature of the current or the succeeding impulses of electricity which pass over the line as long as the key is held upon that stop do not tend to cause any change of contact between the armature and its stop *s*. There can therefore be no chattering of the sounder. When the key at X is thrown down upon the back stop, the circuit is completed through the 1-contacts at each station, so that the magnet M is energized, while the magnet O is demagnetized, and the armature is therefore positively drawn against the contact *p*.

With the contacts connected as shown, the circuit through each stop of the key has six contacts for each revolution of the trailing fingers, and as these fingers are rotated about three times a second the circuit through each stop has eighteen electrical impulses (more or less) per second. As the relay-armature at station Y, however, is unbiased and acts positively, there is no possibility whatever of its vibrating on either of its contact-stops, so that this number of impulses per second is amply sufficient for the most rapid Morse transmission.

I have shown five other groups of binding-posts, with which the other contacts in each group are to be connected, as follows: The 2's and the 8's with one pair of binding-posts, the 3's and 9's with another, the 4's and 10's with another, the 5's and 11's with another, and the 6's and 12's with another, so that with all the branch circuits fully equipped with telegraphic instruments six distinct circuits may be operated with as perfect freedom as if each pair of operators had a separate line devoted entirely to their own use.

While the contacts have been shown and described as connected in a particular way, they may of course be grouped differently, and each pair of binding-posts may be connected with a greater number of contacts. In that event the number of operators and the capacity of the line would be reduced. By this arrangement of circuits, contacts, and relay I avoid in a very perfect manner the objections due to the vibration of the relay-armature on its contacts.

While I have shown the main battery at station X arranged for transmission from one pole only, of course a split battery arranged for reverse transmission could be employed, for the relay-magnets M O at Y are entirely distinct and separate from each other, and their armature is a freely-vibrating one without bias and without spring. The arrangement is clearly applicable to systems of synchronous printing. Of course each branch circuit is to be provided with instruments, so that messages may be transmitted in either direction over that circuit.

A simple and convenient way of arranging the instruments is illustrated in Fig. 2. In this figure I have shown a sounder constructed on the same principle as the relay—namely, having two independent magnets, M′ O′, and a freely-vibrating armature. Of course an ordinary sounder connected in the usual way may be used, if desired. The circuit-connections will be obvious from the drawings.

I claim as my invention—

1. The combination of a main line, a series of independent contacts at each end of the main line, synchronously-actuated apparatus for successively placing said contacts in connection with the main line, a branch circuit at one end of the line in which one or more of said contacts is independently connected, another branch line in which one or more of said contacts is independently connected, a transmitting key or instrument common to both lines, and arranged to transmit electrical impulses into the line through one branch when the key is in one position and through the other branch when the key is in another position, corresponding branch lines similarly connected to corresponding contacts at the other end of the main line, an independent electro-magnet included in each of said branch lines, and a freely-vibrating armature actuated by said electro-magnets.

2. The combination of a main line, a series of independent contacts at each end of the main line, synchronously-actuated mechanism for successively placing the line in communication with said contacts, two branch circuits at one end of the line, in each of which one or more of said contacts is independently connected, a transmitting key or instrument common to both of said branch lines, whereby the battery is thrown upon the main line through one branch and its contacts when the key is in one position and through the other branch and its contacts when the key is in the other position, and receiving mechanism at the distant station by means of which the transmitted signals are received.

3. The combination of a main line, a receiving-relay consisting of two independent electro-magnets and a freely-vibrating armature, electric circuits by which each of said magnets may be independently energized to act upon the armature, transmitting mechanism, circuits, and connections at the distant station, and means by which one of said receiving relay-magnets is energized when the transmitting-instrument is in one position and the other of said magnets is energized when the transmitting instrument is in the other position.

4. The combination of a main-line relay, consisting of two independent electro-magnets included in independent or branch cir-

cuits, a freely-vibrating armature actuated by said magnets, a sounder consisting of two independent electro-magnets, and a freely-vibrating sounder-armature, and the local circuit of said sounder and its connections, whereby one of said sounder-magnets is energized when the relay-armature is on one contact and the other of said magnets is energized when the relay-armature is on its other contact.

In testimony whereof I have hereunto subscribed my name.

P. B. DELANY.

Witnesses:

EDWD A. CALAHAN,

FRANK W. JONES.