

(No Model.)

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ELECTRIC SIGNALING APPARATUS.

No. 292,542.

Patented Jan. 29, 1884.

Fig. 1.

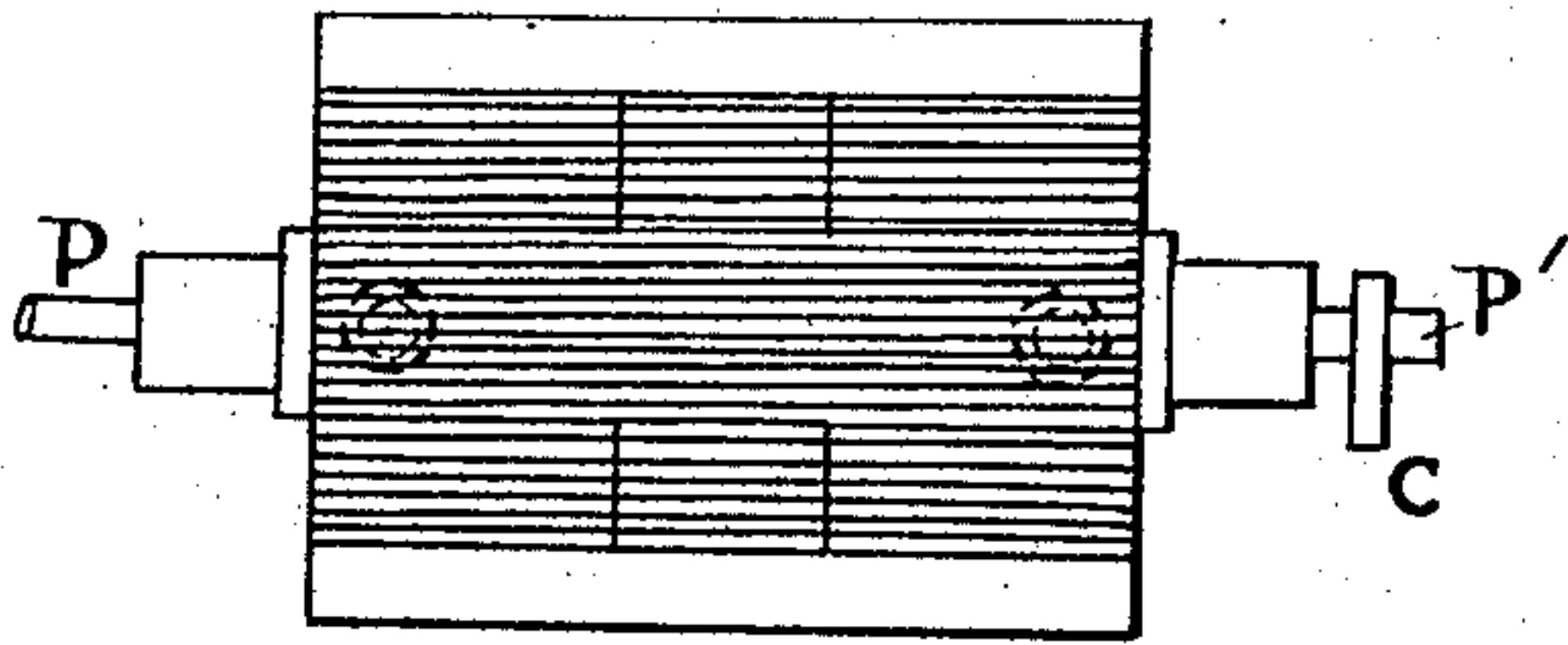


Fig. 2.

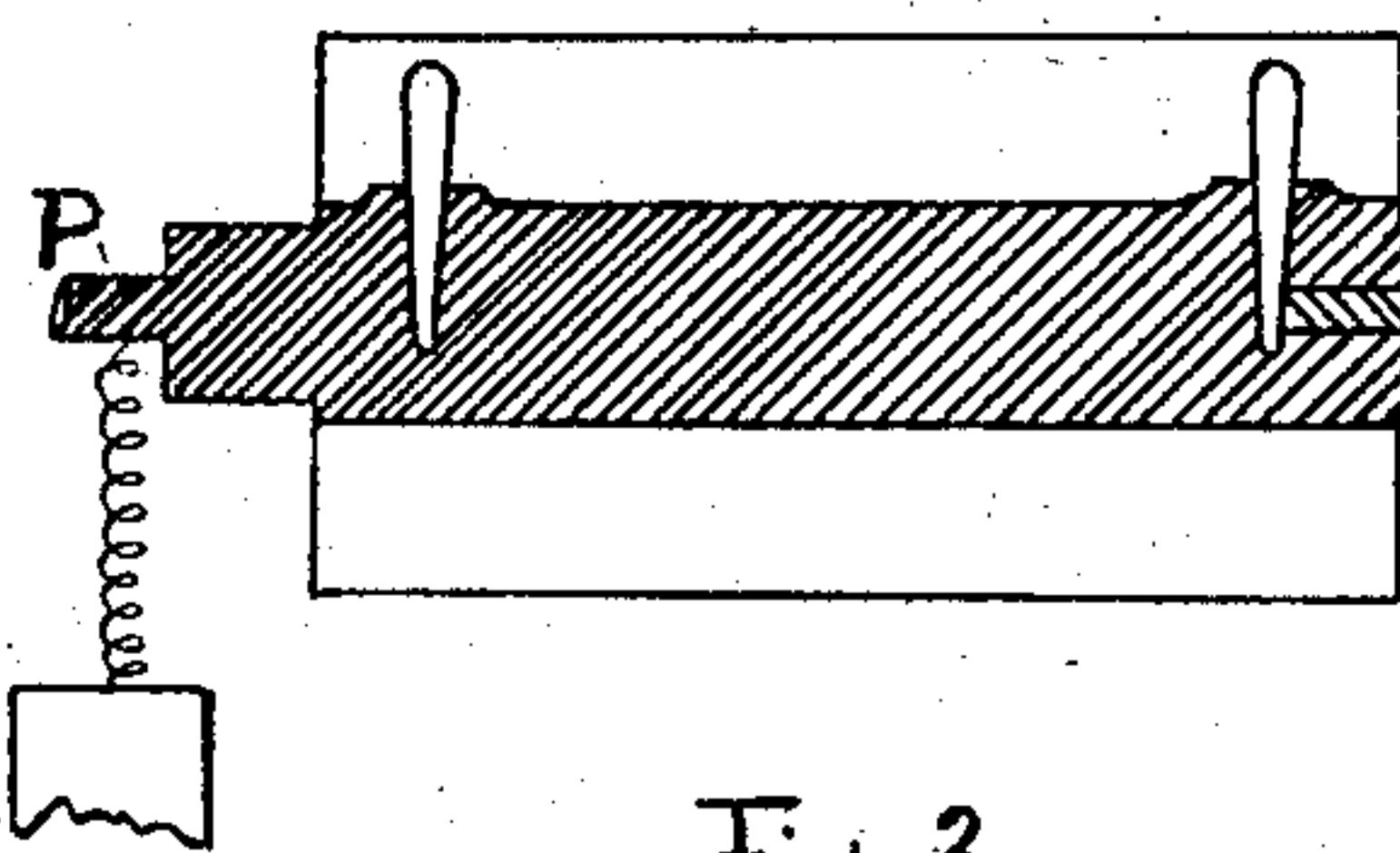
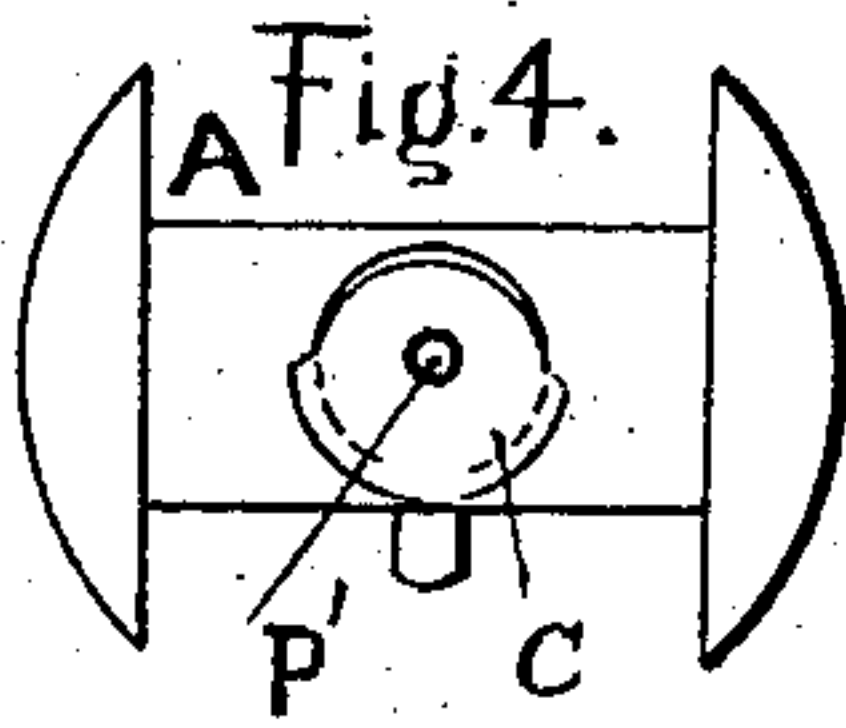
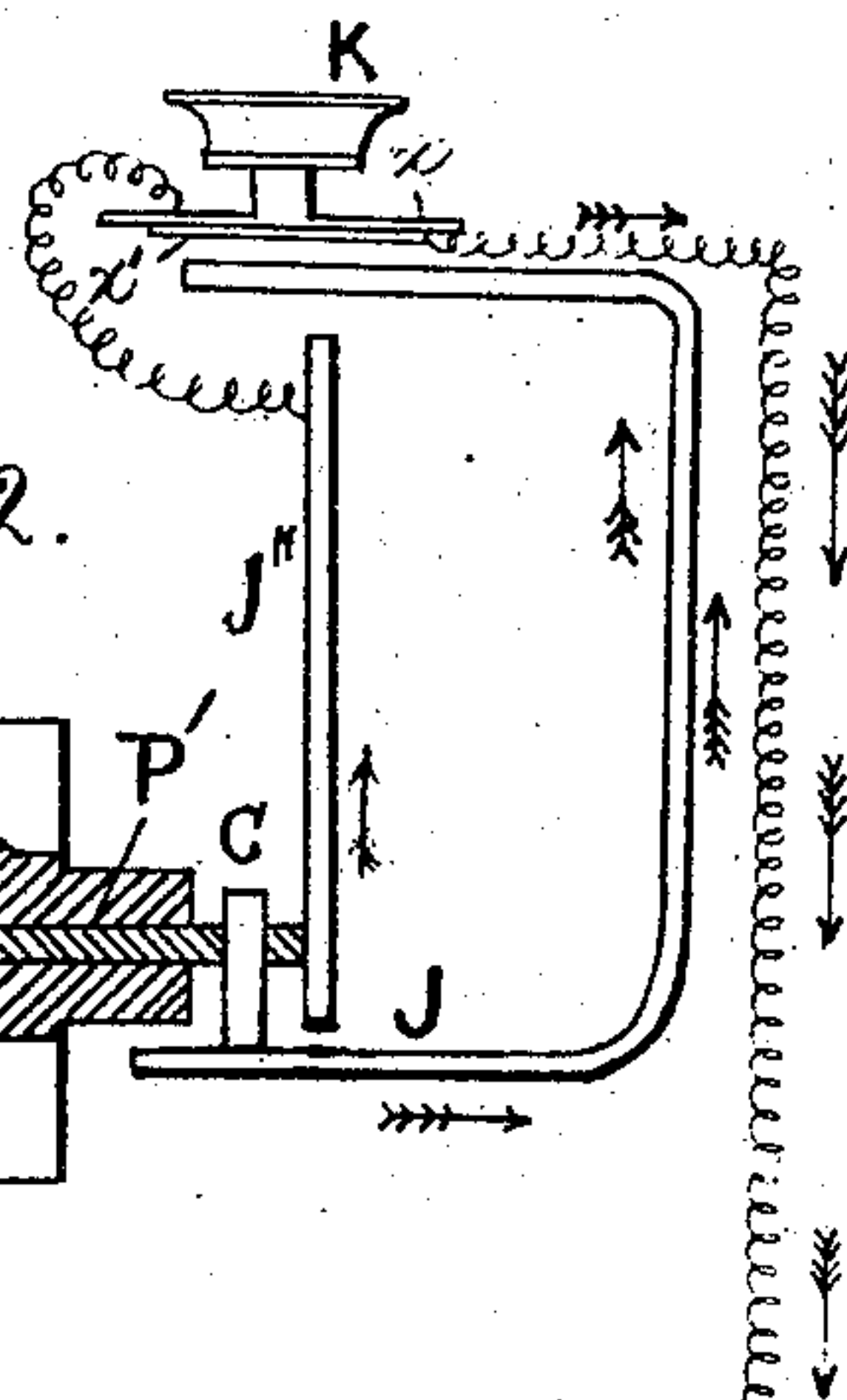


Fig. 3.

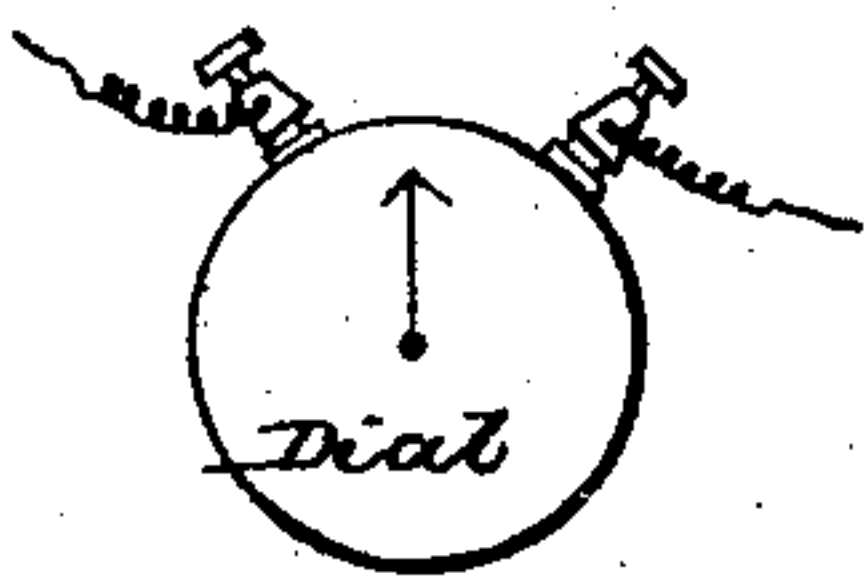
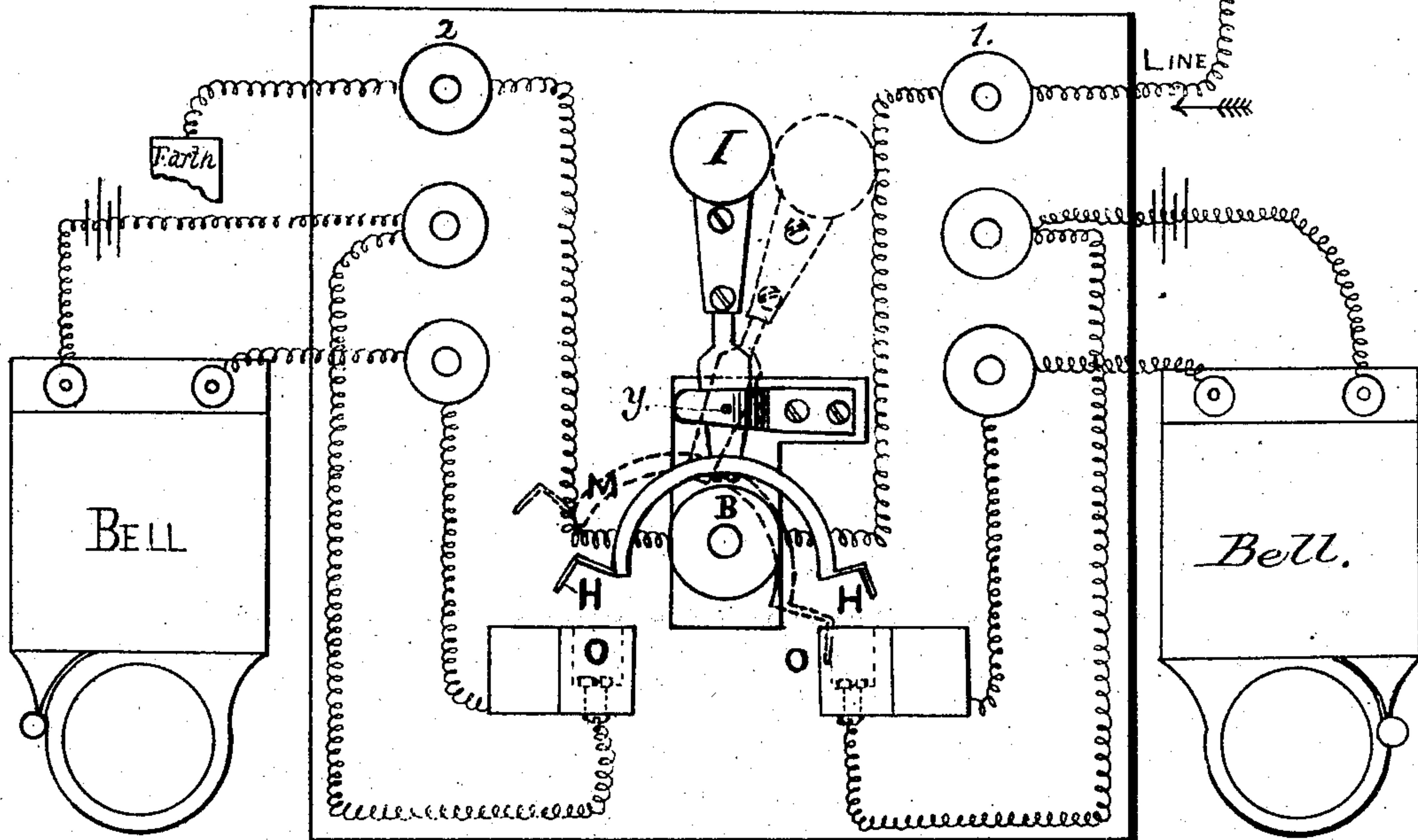
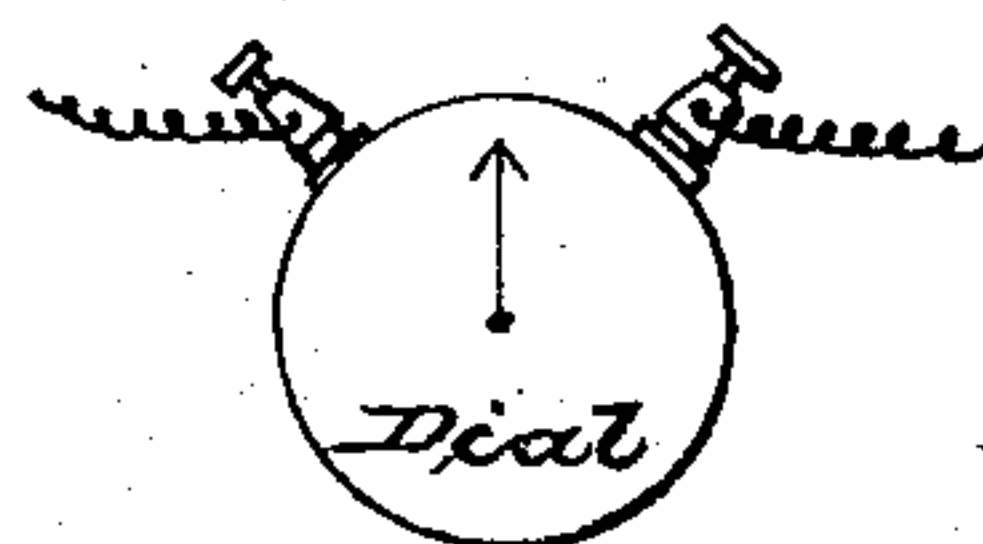
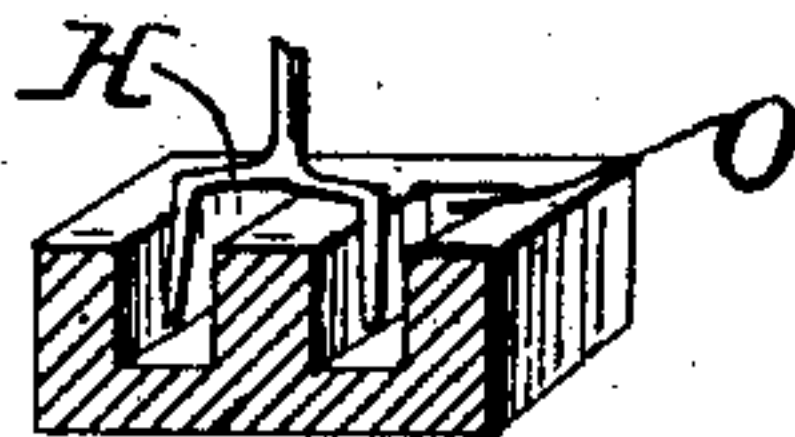


Fig. 3*.



WITNESSES

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ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 292,542, dated January 29, 1884.

Application filed November 6, 1882. (No model.) Patented in England April 27, 1882, No. 1,323; in France September 16, 1882, No. 151,123; in Italy September 30, 1882, XVI, 14,664, XXIX, 192; in Belgium October 9, 1882, No. 59,221; in Victoria November 29, 1882, No. 3,356; in New South Wales January 19, 1883, No. 1,183; in Spain April 11, 1883, No. 3,743, and in Austria-Hungary April 13, 1883, No. 725 and No. 15,120.

To all whom it may concern:

Be it known that we, LOUIS JOHN CROSSLEY and WALTER EMMOTT, of Halifax, and JOHN FREDERIC HARRISON, of Bradford, all in the county of York, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Electric Signaling Apparatus, applicable also to other purposes, (for which we have obtained a patent in Great Britain, No. 1,328, bearing date March 18, 1882, and sealed April 27, 1882,) of which the following is a specification.

This invention relates to improvements in magneto-electric or electro-magnetic signaling apparatus for use in telephone-exchanges, railway-signal cabins, and for telegraphic and telephonic purposes generally, the improved signaling apparatus being also applicable to connecting and disconnecting wires used for telephonic, telegraphic, and other purposes.

For the purpose of illustration we will describe our invention as applied for use in telephone-exchanges.

We take an ordinary magneto-electric call-bell apparatus, and to or in connection with the axis or spindle of the revolving coil or coils we adapt one or more cams, pins, or the like, so that it or they will make contact with a suitably-placed spring or springs or its or their equivalent in such a manner that when the said coil or coils is or are rotated the electric currents are caused to flow out to the line in the direction or directions required by operating a key or by other suitable means. By this arrangement the subscribers to a telephone-exchange, in addition to the ordinary call-signal, are enabled to transmit a distinct and separate signal to advise the exchange-operator that the wires are free.

In order to enable our invention to be better understood, we will proceed to describe a suitable arrangement for carrying the same into effect when used for telephone-exchanges, by reference to the accompanying drawings, in which—

Figure 1 represents a view of a coil such as is generally used in the magneto-calls or call-bell apparatus now in use; but any other suitable form of coil may be employed in carrying out our improvements. Fig. 2 represents

a sectional view of the metal body of the bobbin of the coil fitted with a spindle-cam and springs according to our improvements. Fig. 3 represents a view showing a suitable arrangement for connecting an indicator with our improvements, and Fig. 4 represents an end view of the bobbin and cam shown in Fig. 2.

Similar letters in all the figures represent similar parts.

The construction of the armature is as follows: A casting is made (shown in Figs. 1 and 2) in the recess A, running the length of the casting, and shown in Fig. 2, a quantity of wire is wound, the two ends of which are connected to P and P', respectively. The armature thus formed is inclosed in an iron frame, which forms the poles of a compound magnet, and between which the armature is free to rotate. It is well known that on rotating a bobbin of wire of this nature between the poles of a magnet induced currents of electricity are produced in the wire, and these currents are alternately positive and negative, and as such are used for ringing magnet-bells for telephonic signaling and other purposes. Suppose it is desired to transmit signals to advise the operator in a telephone-exchange, so that the wires which he has put through may be disconnected. This can only be done by arranging a code of signals, using a certain number of rings for one expression and a certain number for another expression. This has, however, been found to be impracticable, as the subscribers are very liable to make mistakes, while the operators are very liable to miss the signal, in consequence of their attention being otherwise engaged at the moment the signal is transmitted. It is to remedy these defects that we brought out our improved apparatus, and after most careful trials, it proved to meet every demand.

In order to enable the subscribers to transmit a special signal when they have finished with their connection, and to save the annoyance caused by lines being left through too long, we arrange the bell in such a manner that the same bell serves to transmit the separate and distinct signal, which can be made to record itself either visually or audibly. This is accomplished by attaching to the spin-

dle of the bobbin a cam, pin, or other projection, C. Once in every revolution of the armature the cam C comes in contact with the spring J during just sufficient of its movement to transmit one of the two currents generated—that is to say, either always a positive or always a negative current. For example, if the key K has been depressed by the finger and the coil rotated, it will be seen that the currents of one polarity taken off the generator will flow in the direction shown by the arrows, through the spring to the center of the key K, through the line to the exchange or elsewhere, where the indicator I is placed, and entering the indicator at terminal 1, the current passes through the coil and out either to earth in the case of a terminal station or to the next subscriber's line. The indicator I, as shown in Fig. 3, is pivoted at y, and to it is attached, as shown, the magnet M, which is provided with the forks H H. If the key were not depressed, it will be seen, by following out the connections, that the currents are taken off direct from the contact-pin P, through the spring J", to the repose-contact, and thence, through the key, out to the line, as shown by the arrows. From this it will be seen that all the currents generated in the revolving armature will be taken off through this circuit, in contradistinction to the case when the key is pressed and only the currents taken off from the cam C, making contact with the spring J once in each revolution, thus taking off a current in one direction only. When the key is not pressed, all the currents generated in the armature pass out through the insulated pin through the spring to the key and out to line. While, when the key is pressed, the cam comes into circuit at each revolution, and sends only the currents generated as it makes contact with the spring, the spring being only connected to line when the key is pressed. When the key is pressed, the circuit through the spring J" is broken by the separation of the plates x x.

(See Fig. 2.)

Suspended over the coil in the indicator is a light curved magnet, M, and when no current passes this magnet remains by the force of gravity in the position shown over a coil or coils of wire, B; but immediately a current of electricity of one polarity flows through the indicator the needle H is deflected, as shown in dotted lines, to the right or to the left in accordance with the direction of the current—viz., either positive or negative. Immediately the magnet is deflected to either of these positions, the fork H, at the end of the curved magnet, comes into contact with the mercury in the mercury-cup O, and this closes a local circuit, which may contain a bell, relay, drop-indicator, or any other appliance to attract attention; but a bell is shown in the drawings.

From this description it will be gathered that the rapidly-alternating currents transmitted when the key K is not pressed do not deflect the curved magnet-indicator sufficiently

to either side to make contact with the mercury-cups; and it will also be seen from this that one subscriber to an exchange can call up his fellow subscriber, to whom he has been put through as often as he may desire without the operator in central exchange knowing anything about it; but the moment either subscriber presses his ring-off key the indicator falls over, short-circuits the two mercury cups, and rings the bell or otherwise advises the operator, who should at once put the lines straight again, ready for the next call.

If the curved magnet M be weighted slightly on one side, it may be used without a local circuit and additional apparatus, as the indicator I will fall over when deflected and remain until put back.

Fig. 3 is a detail view, showing the mercury-cups in section and the fork.

There are numerous other useful applications of this system. For instance, an intermediate station can be arranged with two terminal stations, so that the terminals can speak with each other or with the intermediate station, the switching being done by the station wishing to speak, as will be well understood without further description. The system is also applicable to the working of electric signals on railways instead of using batteries, as at present. For example, the "ring-off" key or other suitable arrangement will enable the operator to transmit the currents, so as to indicate "line clear" and "line blocked," or otherwise, as required.

It will be seen by referring to the indicator with the curved magnet that the local circuit, instead of including the two bells shown, may have an ordinary single needle-block dial, which will indicate "line clear" or "line blocked," according to the side to which the curved magnet is deflected, such direction being governed by the direction of the current.

Having thus described our invention and a suitable manner of carrying the same into effect, we wish it to be understood that what we claim is—

The combination, in a telephonic-exchange system, with the axis or spindle of the revolving coil or coils of a magneto-electric call-bell apparatus, of one or more cams, pins, or the like, key K, and its springs J and J", whereby, in addition to the ordinary call-signal, a distinct and separate signal may be transmitted to advise the exchange-operator that the wires are free, substantially as hereinbefore described.

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Witnesses to the signatures of Louis John Crossley and Walter Emmott:

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