

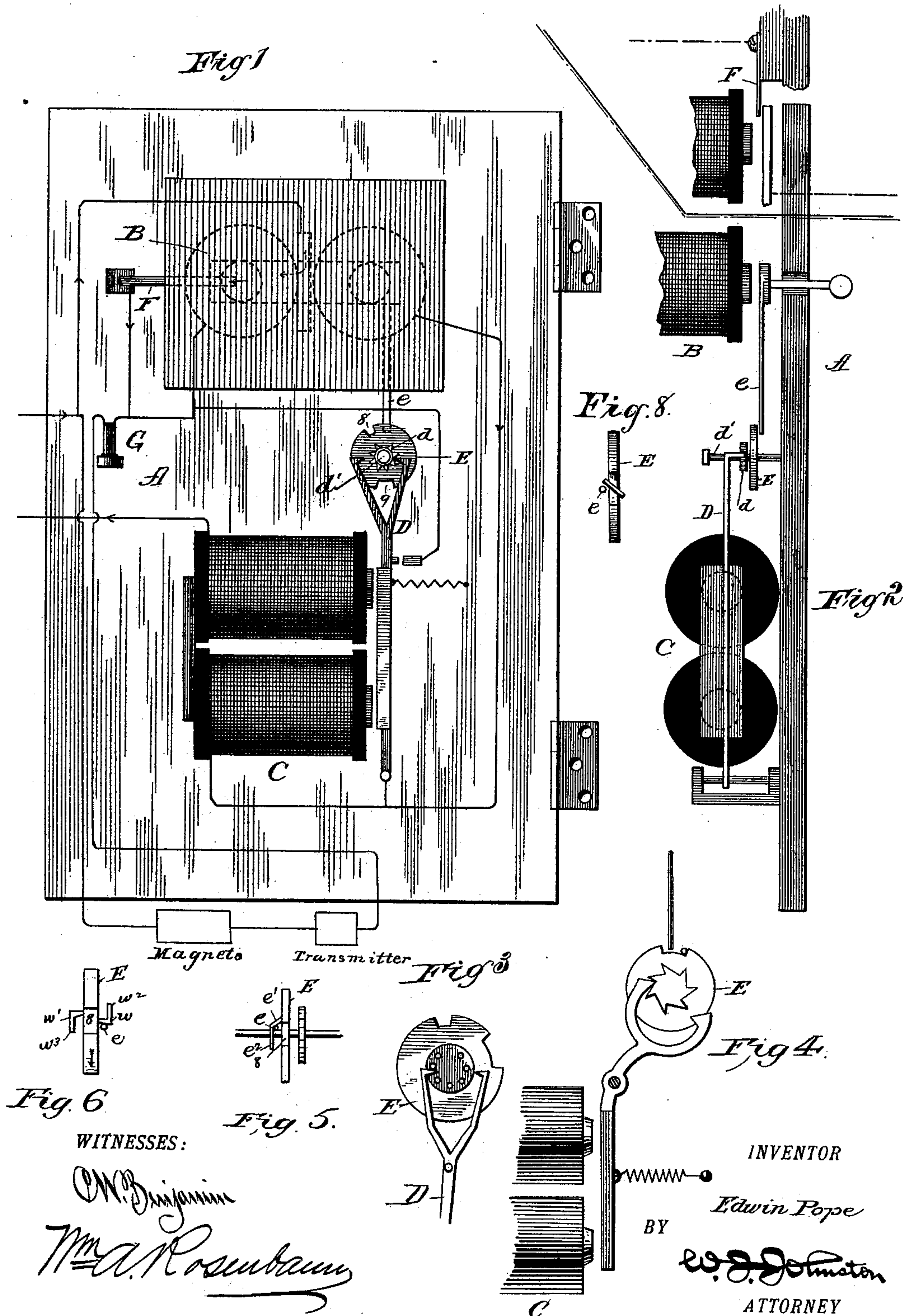
(No Model.)

2 Sheets—Sheet 1.

E. POPE.
INDIVIDUAL CALL AND SWITCH.

No. 403,776.

Patented May 21 1889.



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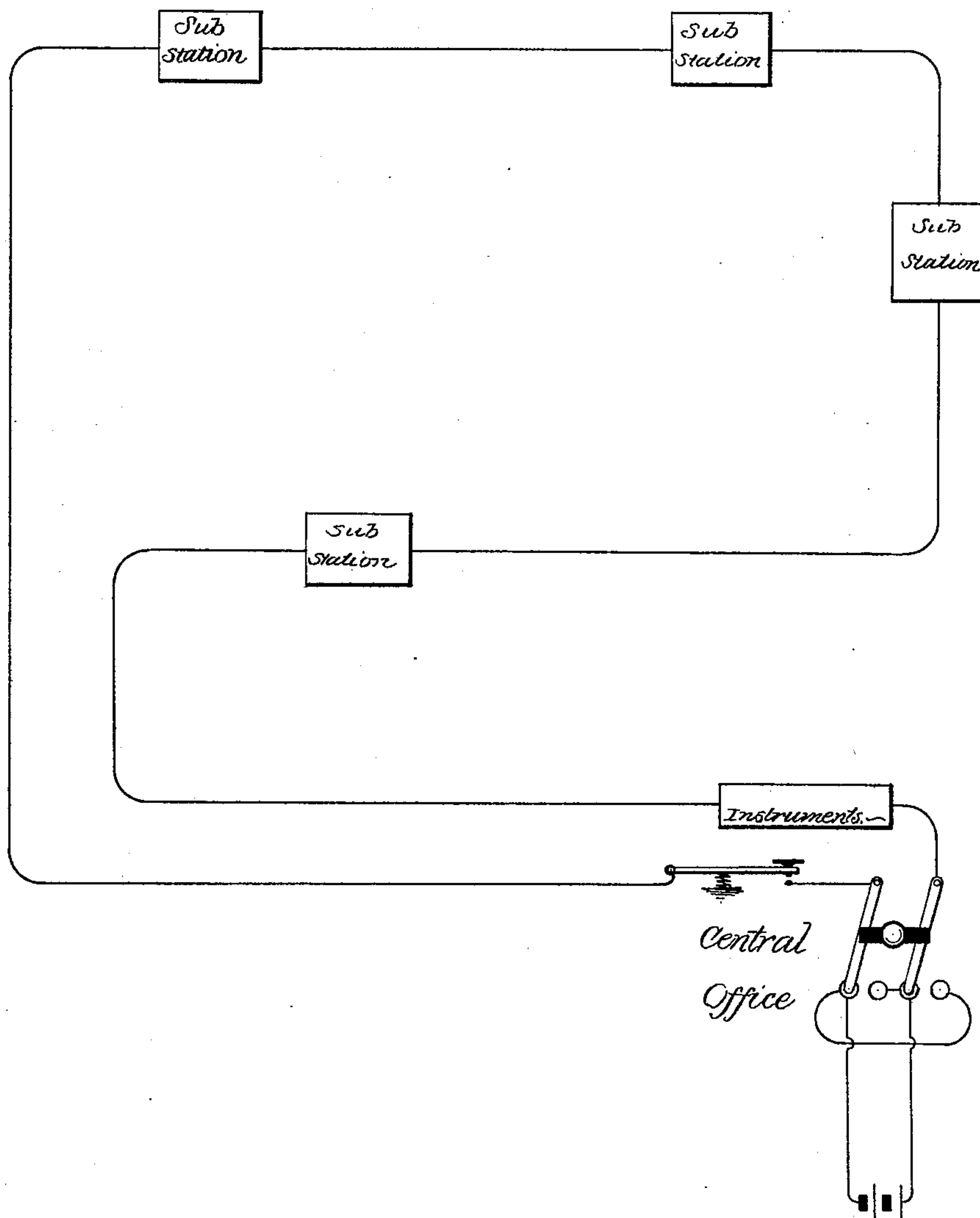
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Fig. 7.



WITNESSES:

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INDIVIDUAL CALL AND SWITCH.

SPECIFICATION forming part of Letters Patent No. 403,776, dated May 21, 1889.

Application filed June 15, 1888. Serial No. 277,199. (No model.)

To all whom it may concern:

Be it known that I, EDWIN POPE, a subject of the Queen of Great Britain, residing in Quebec, Province of Quebec, Canada, have
5 invented certain new and useful Improvements in Individual Calls and Switches; and I do hereby declare that the following is a full, clear, and exact description of my invention, such as will enable others skilled in the art to
10 which it appertains to make and use the same.

My invention relates to individual call apparatus for telephone service, and is designed to furnish an apparatus of this class which shall be entirely operative both as an indi-
15 vidual call and switch, and which shall not call into service any expensive apparatus.

A secondary object is to construct my apparatus in such a way that it may be applied as an attachment to telephone-instruments
20 now in common use.

The apparatus which I have designed is capable of being applied to the rear of the door of an ordinary telephone-case.

I have illustrated my invention in the accompanying drawings, in which—
25

Figure 1 shows an elevation of my apparatus as applied to the door of a telephone-box; and Figs. 2, 3, 4, 5, and 6 represent details, Fig. 2 being a partial side elevation taken
30 from the right of Fig. 1. Fig. 7 represents a diagram of the circuits, showing devices at central office for sending different characters of current. Fig. 3 is a detail showing means for pushing the ratchet-wheels over the space
35 made by an omitted tooth.

A is the door of a telephone-box, and B the usual bell-magnet. The armature of the bell-magnet is centrally pivoted, as usual. These parts are identical with those already in use
40 in telephone systems. I also support upon the box-door a magnet, C, which controls an armature and armature-lever, D, in the form of an escapement. The escapement acts upon a ratchet, *d*, on the shaft *d'*, the ratchet being
45 rigidly connected with a disk, E, and both are loosely mounted on the shaft.

If preferred, the shaft may be made to rotate and the other parts with it, or the disk and its connected parts may be operated by
50 a spring and the escapement may release the ratchet step by step. In the form shown, however, the escapement acts positively to

effect a step-by-step movement of the disk. The disk serves to hold the armature of the magnet B away from the pole at the right in
55 Fig. 1 through a rod or lever, *e*, connected to the right end of the said armature and normally held behind the disk, as shown in Fig. 1, or to the right of it, as shown in Fig. 2. When the parts are in the normal position
60 indicated, the left-hand end of the armature of magnet B presses against a conducting-spring, F, and closes a short circuit around the receiving-telephone G, and also the trans-
65 mitter and magneto, as shown. When the escapement or armature lever D is on its back-stop, the magnet B is cut out, as shown, thus reducing the resistance in the circuit.

The parts described are located at a subscriber's station, each subscriber of any particular line being provided with similar apparatus. Each disk or wheel E has a notch,
70 8, at the same point in its circumference, and another notch, 9, which is placed at a different point in the circumference of each wheel
75 in the circuit. Now, suppose any calling-station—say the central station—wishes to call up that station at which the apparatus illustrated is located. In that case the operator
80 at the calling-station sends over the line intermittent currents of one polarity, which gives the escapements at all the receiving-stations a to-and-fro motion and turns each of
85 the disks E. So far as the intermittent currents affect the condition of the magnet B it tends to keep the armature in its normal position and accordingly to hold the rod *e* in the position shown.

It will be understood that the sender at the calling-station has synchronous apparatus,
90 which shows him the position of the notches at the various stations, or he may know the number of intermittent currents to send in order to bring the notch of any given station opposite its bar *e*. When the notch of the
95 station wanted is brought opposite its bar, the sender transmits a series of negative and positive currents into line, which are so rapid that the magnet C is not sufficiently energized
100 thereby to move its armature. Consequently all the disks remain stationary and the rod which happens to be opposite its notch vibrates to and fro through it, thus ringing the bell. This operation calls the subscriber

wanted; but as no two of the notches 9 are located in the same way on the wheels or disks no other subscriber is called.

The calling-signal is arranged to end with a positive current on line. After a call is given, it is followed by "no current," thus releasing the escapement and moving the wheel forward far enough, so that the notch is out of alignment with the rod. Since the last current was a positive one, the rod will be left in front or to the left of the wheel. If required, another positive current is sent before negative current is resumed to clear the rod completely. All the other rods e remain to the right, as their wheels have prevented their passing to the left when positive currents were sent. The reversal of the position of the rod e also reverses the position of the armature of magnet B and cuts in the telephone and the speaking and calling apparatus at the station signaled. The wheels can remain at this point or they may be carried around by intermittent negative currents until all the notches have passed the point; or, if required, any other station on the line may be brought into circuit. The office answers through the telephone. To insure synchronism, a tooth is omitted in the wheel d , so that continued intermittent currents bring all the wheels to the same point, which is the normal position of the wheels. Here the notch 8 in each wheel is opposite the rod e . At this point all the rods are thrown to the left by positive currents and all the subscribers on the line can call and speak. Accordingly, if a subscriber finds that he cannot make a call he knows that the line is in use. When the central station wants to call again, however, it sends intermittent negative currents, as before, carrying the rods to the right, and in doing so causes each of them to act on an inclined tooth or pin on the wheel E, as shown in Fig. 8, pushing it over the gap made by the omitted tooth and bringing it again into position where it can be operated by the escapement D. Subscribers' magnetos send in only positive currents, so that their calls do not move the wheel when it is at its normal position. When a subscriber calls, the central office may answer with a positive current, which will make a faint rattle of the armature-lever D, but will not ring the bell. He gets the subscriber's number and order through the telephone, cuts out the other subscribers, and cuts in the calling subscriber in the manner set forth in describing the operation of calling from the central station.

The fact that the line is engaged will be indicated by the position of the bell-hammer to the right, as well as by the line being in condition so that no current can be sent. It may be easily arranged so that the hammer in its normal position may be kept from striking the bell by having a suitable stop on the wheel E or on the rod e . Enough motion may still be allowed to permit the instruments to be cut in.

Fig. 3 shows a substitute for the wheel-escapement pins taking the place of the teeth, and one pin being omitted for the purpose already indicated. The tooth or pin omitted affects only that side of the escapement which works by the closing of the circuit, so that the wheel is only arrested once.

Figs. 4 and 5 show a different modification of the escapement and the device operated thereby. In this form no tooth is omitted, but the wheel E has a stop, e' , at the common notch 8, which comes against the rod e when the latter is at the left, thus checking the wheel, which is held at that point against any motion of the escapement so long as positive currents are used. A negative current being sent, the rod is thrown over to the right and the wheel moves on. The projection e' has an extension, e^2 , parallel to the wheel, which acts as a check to the rod e , preventing the hammer from striking the bell at that point.

Fig. 6 illustrates still another and the preferred modification. The wheel E has a stop, w , at the common notch, which comes against the bar e when the latter is at the right, thus checking the wheel, which is held at that point against the motion of the armature-escapement so long as intermittent negative currents are sent. The central office, after sending a sufficient number of such currents into the line to insure all the wheels being brought up to this point, sends a positive current, which throws all the bars to the left and releases the wheel, which is moved forward a step by the escapement and again checked by w' coming against the bar e . In this position, all the bars e being to the left, all the subscribers may call, using positive currents. To start the wheels again, the central office sends in intermittent negative currents. The first throws the bars to the right, and the wheels move on. The extensions w^2 and w^3 limit the movement of the bar e sufficiently to prevent the hammer reaching the bell at that point in the revolution of the wheel.

In Fig. 8 an inclined lug or small plate is shown located in a notch in the wheel E. This is for the purpose of pushing the ratchet-wheel over the space made by the omitted tooth. Rod e , in moving through the notch, strikes the inclined lug and by a cam motion forces the wheel around the distance of the space mentioned.

The calling may be done by keys suitably connected to batteries or magnetos to send the various currents into the line.

Having now described my invention, what I claim is—

1. As an attachment for telephone-boxes, the combination, with the polarized bell-magnet and its armature, of a rod or pin attached to said armature, a notched wheel for governing the position of said rod or pin, an escapement for controlling said notched wheel, and an ordinary electro-magnet for operating said escapement, as set forth.

2. The combination, with the bell-magnet

and armature in an ordinary telephone-box, and with the telephone, of a short circuit around the telephone controlled by the position of the armature, a rod or pin attached to the armature normally held by a notched wheel, so as to close the short circuit, and an electro-magnetic escapement in the main line operatively connected with the wheel, as and for the purpose set forth.

3. In a unison device for individual telephone-calls, the wheels having corresponding notches, the escapement for rotating the same step by step, two lugs attached to each of said wheels, located one upon each side of the corresponding notches and one behind the other, and a detent-rod, as *e*, adapted to impinge against said lugs to check the movement of the wheels, as set forth.

4. The combination, with the bell-armature and the notched wheel controlling its movements, of a stop, *e*², alongside the notches 8, as and for the purpose set forth.

5. In a unison device for individual telephone-calls, the wheels having corresponding notches, the escapement for rotating the same step by step, two lugs attached to each of said wheels, located one upon each side of the corresponding notches and one behind the other, a detent-rod, as *e*, adapted to impinge against said lugs to check the movement of the wheels,

and retaining pieces or lugs to limit the lateral movement of said rod *e*, as and for the purpose set forth.

6. In an individual call apparatus for telephones, the magnet C, located in the main circuit, in combination with the polarized bell-magnet, also located in the main circuit, the armature of said magnet C being arranged to close a short circuit around the bell-magnet, as described.

7. In an individual call apparatus for telephones, the magnet C, located in the main circuit, in combination with the polarized bell-magnet, also located in the main circuit, the notched wheel E, operated by magnet C, the detent-rod *e*, controlled by said wheel and connected with the armature of the bell-magnet, a contact-strip, F, also connected with the bell-magnet armature, and a short circuit around the calling and speaking instruments controlled by said contact-strip, as and for the purpose set forth.

In witness whereof I have hereunto affixed my seal and signed my name in the presence of two subscribing witnesses.

EDWIN POPE. [L. S.]

Witnesses:

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ADOLPHE CASAULT.