2 Sheets—Sheet 1.

J. FRANKLE & C. E. KELLEY.

Electric Call Bell.

No. 235,147. Patented Dec. 7, 1880.

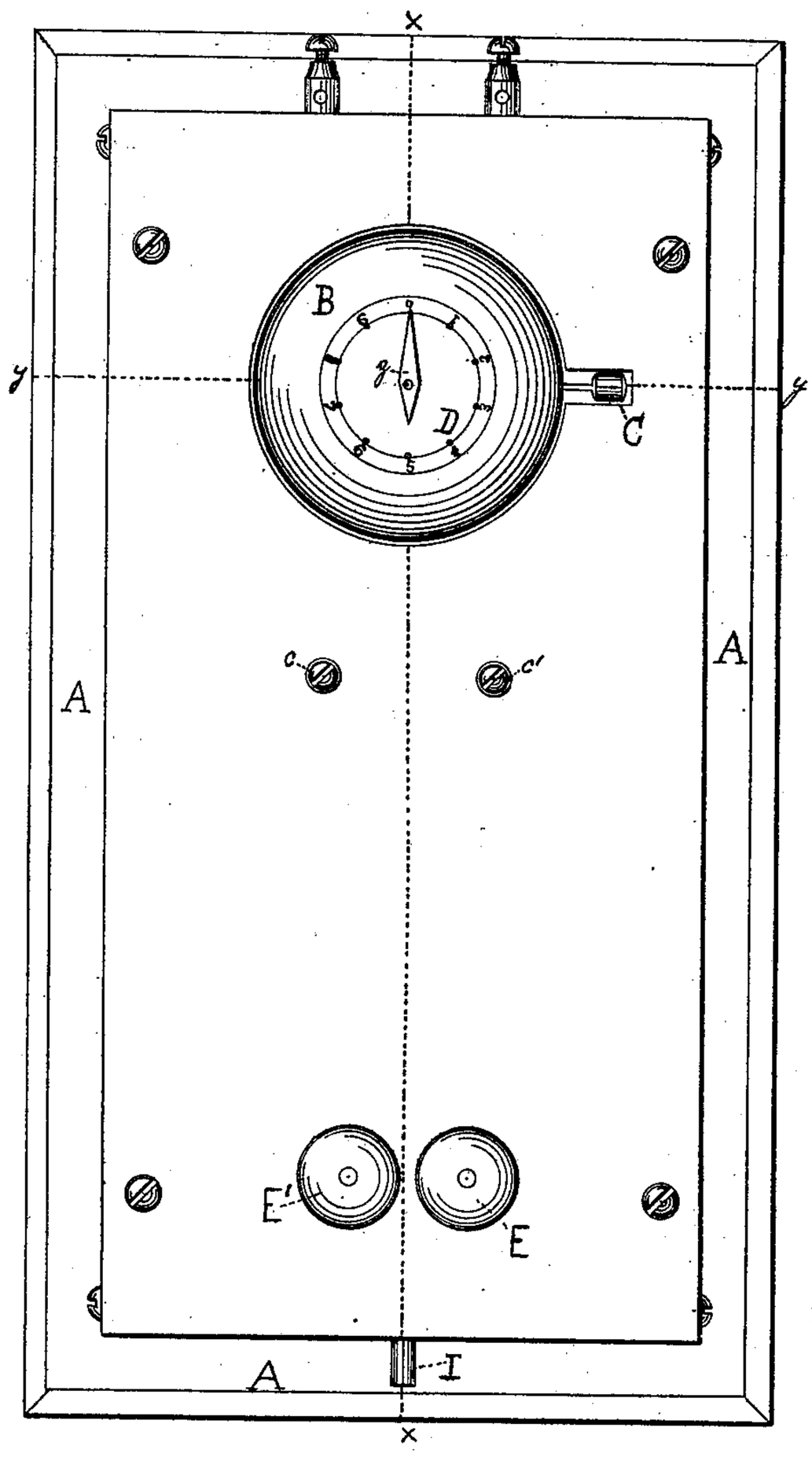

Fig. 1.

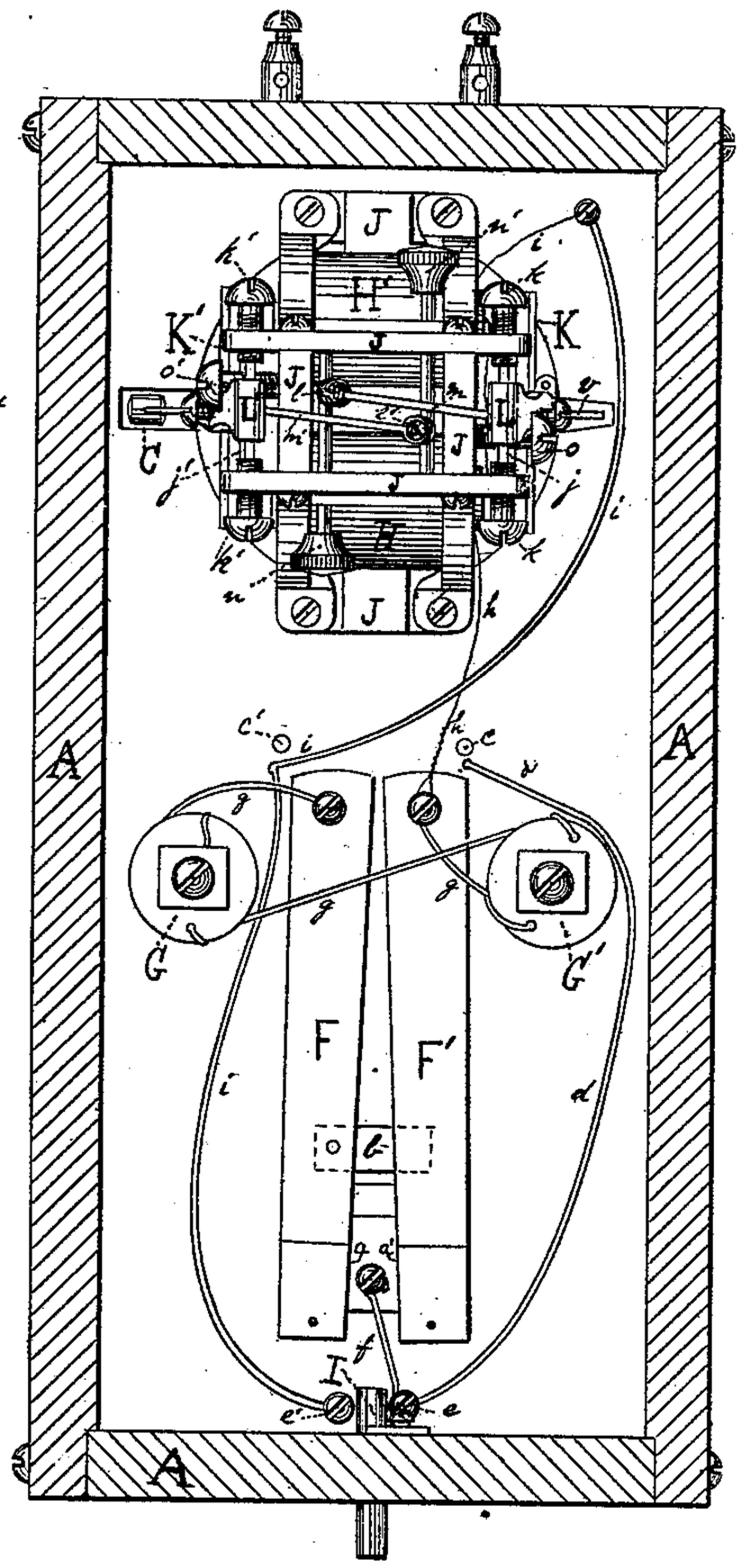

Fig. 2.

Witnesses.
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James Frankle
Clarence E. Kelley Inventors:
by their attorney
N. P. Preble Jr.

2 Sheets—Sheet 2.

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Electric Call Bell.

No. 235,147. **Patented Dec. 7, 1880.**

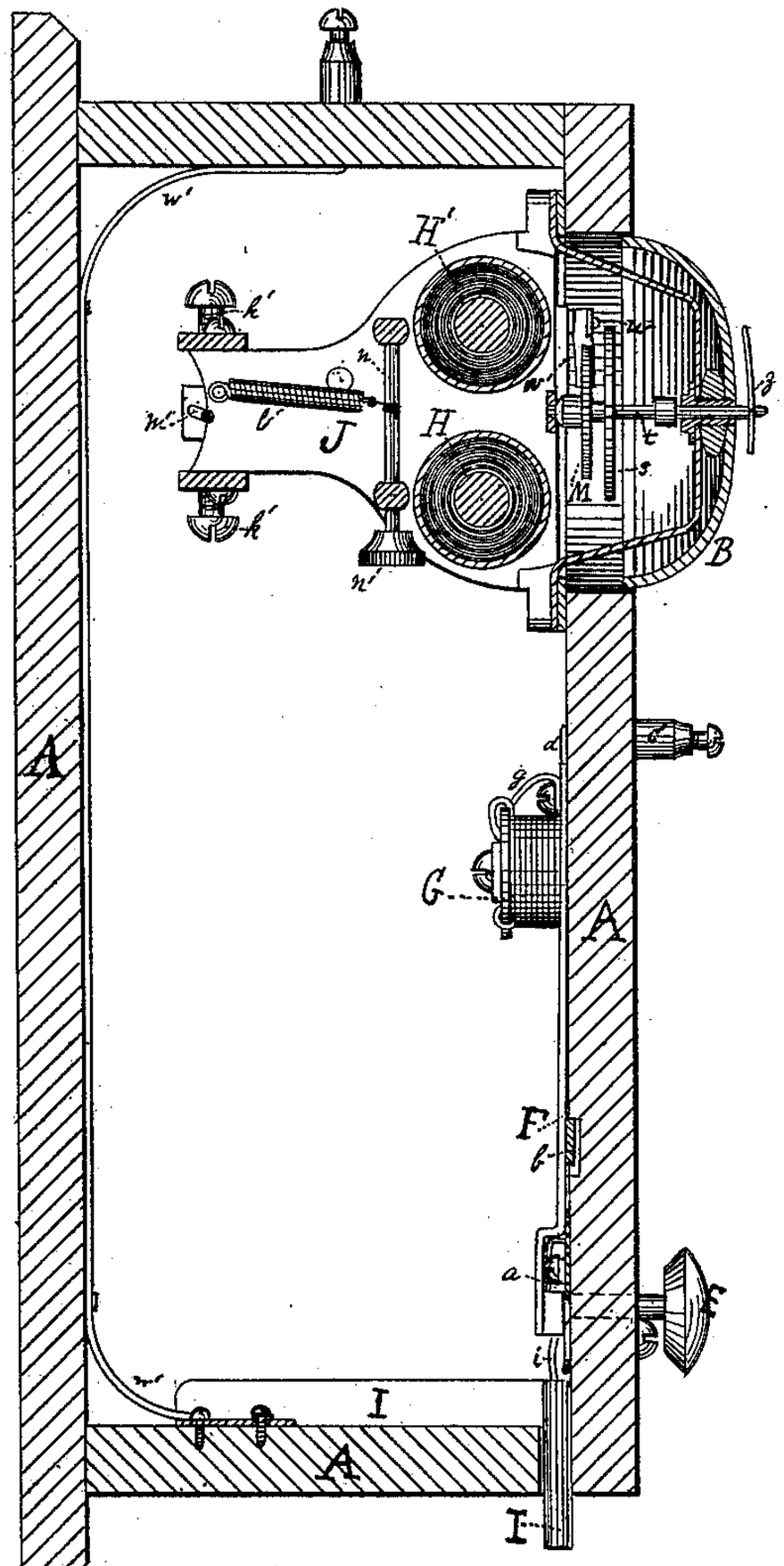

Fig. 3.

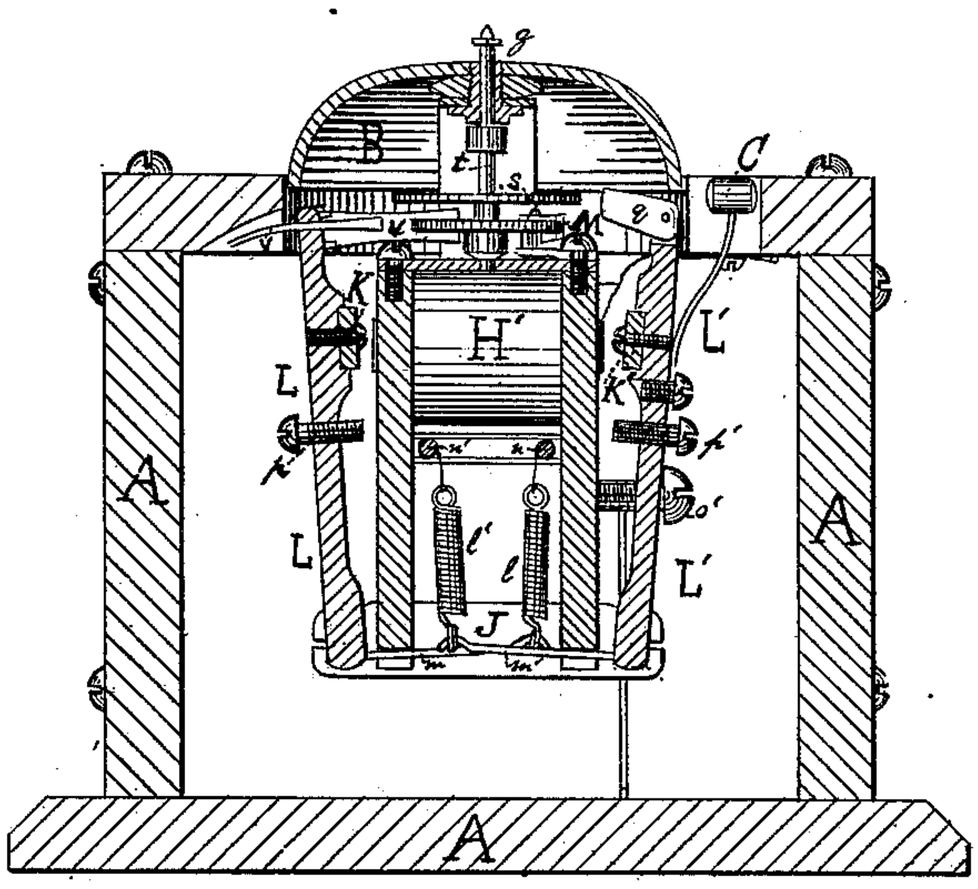

Fig. 4.

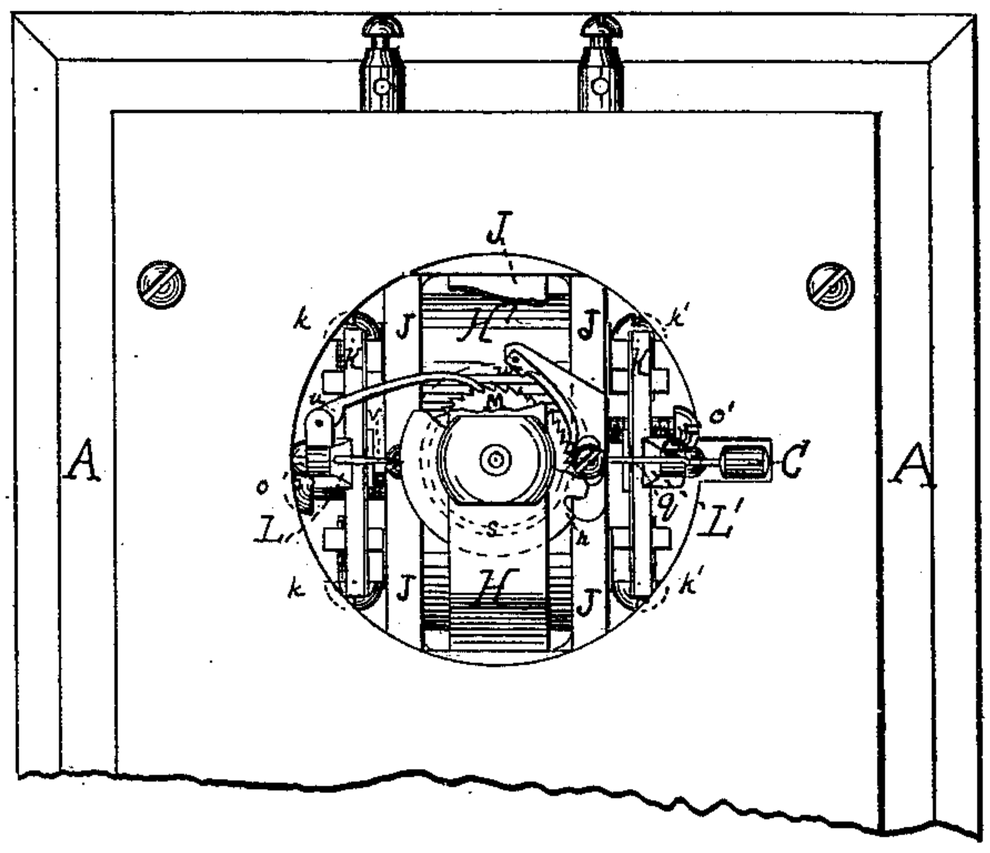

Fig. 5.

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Inventors:
James Frankle
Clarence E. Kelley
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UNITED STATES PATENT OFFICE.

JONES FRANKLE AND CLARENCE E. KELLEY, OF HAVERHILL, MASS.

ELECTRIC CALL-BELL.

SPECIFICATION forming part of Letters Patent No. 235,147, dated December 7, 1880.

Application filed December 27, 1879.

To all whom it may concern:

Be it known that we, JONES FRANKLE and CLARENCE E. KELLEY, both of Haverhill, in the county of Essex and State of Massachusetts, have invented a new and useful Improvement in Electric Call-Bells, of which the following is a specification.

The object of our invention is to enable a person at any one of a number of stations in the same electric circuit to call any desired station in that circuit without sounding the bell at any other station than the one wanted.

We are aware that inventions have already been made by which the operator at one station can call any other station upon the particular circuit at will, without sounding the bell at any other station than the one called, but never before, we believe, by which all the stations on the circuit can do this.

The apparatus by which we accomplish this result consists in a finger turning round its dial-plate, a slotted disk, and a ratchet-wheel at each station, moved in unison with each other by suitable mechanism, so that the finger points to the same number on the dial-plates at all the stations at the same time. The slotted disk has but one slot, which is placed in a different position at each station with reference to the finger or pointer, so that the slot allows the bell-hammer to strike the bell only when the finger points to the number corresponding to its own station. The mechanism by which this is done will be more fully described hereinafter.

The mechanism is shown in the drawings which accompany this specification.

Figure 1 represents a front elevation of the box containing the apparatus, showing the dial-plate, press-buttons, and switch. Fig. 2 is a rear plan view of the apparatus with the back of the box removed. Fig. 3 is a vertical section at the line *x x* of Fig. 1. Fig. 4 is a transverse section at the line *y y* of Fig. 1. Fig. 5 is a plan view of the apparatus as it would appear when the bell and part of the frame-work are removed and the slotted disk partly cut away to show the ratchet-wheel beneath.

The same letters refer to similar parts in the different figures.

A is the box which incloses the apparatus. B is the call-bell; C, the bell-hammer; D, the dial-plate, marked with the numbers of the stations on the circuit, and E E′ the press-buttons.

The dial-plate may be marked on the bell itself, as in the drawings, or be a separate disk rigidly fastened to it.

These buttons E and E′ press upon springs of metal or keys F F′, Fig. 2, and thus operate to open and close the circuit by lifting them from their stops. The right-hand button, E, lifts both keys F and F′ from their stops *a a′*, and thus interrupts the current wholly by means of the arm *b*, which is rigidly connected to the key F and extends under the key F′, but is not fastened to it. The left-hand button, E′, lifts only the key F′ from its stop *a′*, and thus allows the current to enter the apparatus through the stop *a* and key F.

The current enters the apparatus by the screw-cup *c* and passes through the wire *d*, screw *e*, wire *f*, and stops *a* and *a′* to the keys. After passing through the apparatus the current leaves the instrument by the screw-cup *c′*.

G G′, Fig. 2, are two resistance-coils of fine wire connected with the keys F and F′ by the wire *g*. These coils are introduced for the purpose of increasing the resistance which the current has to overcome when it enters the apparatus through the key F. When the current enters through the key F′ it passes directly into the apparatus without meeting this resistance. This increase of resistance produces a decrease in the strength of current, and this difference in strength is taken advantage of in the operation of the mechanism, as hereinafter described.

It is obvious that any other convenient method of weakening the current at will which would accomplish the same result could be employed.

From the key F′ the current passes through the wire *h h* to the electro-magnets H H′, and then by the wire *i i i* to the screw-cup *c′*, and thence out of the apparatus, as before stated. The wire *i* is continued to the screw *e′* to complete the telephonic circuit by the switch I, when the call-bell apparatus is cut out from the circuit.

I is a switch for the telephonic circuit, and serves to connect the wire *w′* at the back of

the box A with either screw *e* or *e'*. The screw selected depends upon whether the calling-station is at the right or left of the station called.

J is a metallic frame-work, which supports the call-bell and its operating mechanism. For convenience of adjustment, all these parts are made removable with the frame-work from the box-cover.

K K' are two soft-iron armatures, which vibrate in front of the poles of the electro-magnets H H'.

L L' are the armature levers or rods carrying the armatures K K'. These levers are hung on the shafts *j j'*, held by the set-screws *k k k' k'* in the frame-work J. The armatures K K' are held away from the poles of the electro-magnets H H' by the springs *l l'*, one end of which is fastened to the arms *m m'* of the armature-levers. The other end of these springs *l l'* is fastened to the adjusting-rods *n n'*, working in the frame-work J, and by them the tension of the springs is regulated. The spring *l*, which controls the armature K, is a weak spring. The spring *l'*, which controls the armature K', is stronger. Hence it requires less current to move the armature K than it does the armature K'.

o o' are two set-screws, which act as stops to prevent the armature-levers L L' from being pulled too far away from the poles of the electro-magnets by the springs *l l'*.

p p' are two set-screws, which act as stops to regulate the inward motion of the armatures toward the poles of the electro-magnets. In the case of the armature K there may or may not be actual contact with the poles of the magnet.

The armature-lever L' carries the bell-hammer C, and is provided with an arm, *q*, which at the proper time (predetermined by the arrangement of the slotted disk on its pinion with reference to the pointer, as before explained) enters the slot *r* in the slotted disk *s* and allows the bell-hammer C to strike the bell B.

M is a ratchet-wheel on the shaft *t*, which carries the slotted disk *s*. This ratchet-wheel M is moved one notch at a time by the pawl *u*, carried on the armature-lever L. The stop *v*, also carried on the armature-lever L, moves in unison with the pawl *u*, and prevents the ratchet-wheel M from being turned more than one notch at a time by too violent an impulse given it by the pawl *u*.

The pawl *w*, fastened to the frame-work J, engages another tooth of the ratchet-wheel M, and prevents its turning backward when the armature is released and the pawl *u* is carried back.

z is the finger or pointer which turns around the dial-plate D to indicate the station called, as hereinafter described. This pointer *z* is fastened to the shaft *t*, which carries the slotted disk *s* and the ratchet-wheel M, as before described.

The practical operation of our apparatus is as follows: When the apparatus is not in use the press-buttons allow both keys to touch their stops, and a constant current passes through the instrument. Both armatures are held near the poles of the electro-magnets. By pressing both the press-buttons E E' the operator at any station cuts off the current completely. The armatures are released and are drawn away from the magnets. By then releasing the right-hand button, E, keeping the left-hand button pressed, the operator lets a current of electricity into the instrument. This current enters by the stop *a*, key F, wire *g*, coils G G', and key F', instead of directly by the stop *a'* and key F'; or, in other words, the current admitted while E' is pressed and E released is the weaker current, or the one with added resistance. The amount of resistance required to make the necessary difference in strength of the two currents varies with the length of the circuit and number of stations upon it, and is made more or less by adding or taking away coils similar to G G', or in any other suitable way. This weaker current attracts the armature K (that which carries the pawl *u*) toward the poles of the electro-magnets. It does not attract the armature K', (that which carries the bell-hammer,) because the spring *l'*, which holds it, has too strong a tension to be overcome by the weaker current. The spring *l* is just strong enough to pull back the armature K when released, but not to prevent its being attracted by the weaker current. Pressing this press-button E releases the armature K, which is thereupon pulled back by the spring *l*. As explained before, when this armature K and its armature-lever L approach the magnets H H' the pawl *u* engages one of the teeth of the ratchet-wheel M and turns the ratchet-wheel M, the slotted disk *s*, and the pointer *z* one notch. At the same instant the stop *r* engages another tooth of the ratchet-wheel M and prevents it from being driven more than one notch, and the pawl *w*, falling by its own weight between two other teeth of the ratchet-wheel M, prevents its turning backward when the armature is released, and the pawl *u* and stop *v* are drawn back into position for the next notch upon the ratchet-wheel. Instead of the pawl *w* and the stop *v*, a single stop or check may be used, consisting of a coiled spring hung from the frame-work and provided with a delicate spur or pin. This spring is struck by a screw on the armature-lever at the forward end of its stroke. The spur is thus driven by the spring between two teeth of the ratchet-wheel and prevents further motion till withdrawn by the contraction of the spring, which does not take place till all danger of forward or backward motion is over. This device we have found to work very successfully. Four of these notches in the drawings correspond to one number on the dial-plate D, as the ratchet-wheel M has forty teeth and the dial-plate but ten numbers. Any convenient number of teeth, however, may be selected for

the ratchet-wheel and for the number of stations on the dial-plate. Of course, it is desirable, though not necessary, to have the number of teeth some multiple of the number of stations.

By alternately pressing and releasing the press-button E, the operator, without the trouble of counting, works the pointer round to the number which represents the station desired. This being done, he alternately presses and releases the other press-button, E′, a number of times. The current now enters the magnets by the stop *a′* and key F′ without meeting the added resistance of the coils. It is then the full or stronger current and attracts the armature K′, which is held by the stronger spring *l′*. Pressing the press-button E′ releases the armature K′, and every time the button E′ is thus alternately released and pressed the armature K′ and its armature-lever L′ make one vibration. The armature K does not vibrate, because, the press-button E being left released, the current is not interrupted by pressing and releasing the button E′, but only changed from stronger to weaker, and vice versa. The weaker current is then constantly flowing through the magnets, and the armature K is constantly held near the magnets.

The slot *r* in the slotted disk *s* is so adjusted at each station, as hereinbefore described, that it comes opposite the arm *q* on the armature-lever L′ at the moment the pointer indicates the number of that particular station. Thus when the pointer indicates figure 3 the slot at the third station is opposite the arm *q*. When the pointer indicates figure 4 the slot at the fourth station is opposite the arm *q*, while the slot at station 3 has passed by. In this way, although the bell-hammer C advances at each release of the press-button E′ toward the bell B at all the stations, it is allowed to reach the bell only at the proper station.

Having sounded the bell at the station desired long enough to attract attention, the operator sounds his own number by pressing the button E′ a corresponding number of times. This is to inform the operator at the station called whether the calling-station is at his right or left, without which he would not know whether to turn the switch I to the right or left, as before explained. The switch being turned and both press-buttons being kept pressed, communication is established.

We claim—

1. A call-bell provided with a device for arresting the movement of the bell-hammer or permitting it to strike the bell, as may be desired, and with an index which shows upon that bell and upon each of a number of bells in the same circuit when the arresting device is at the position which will permit the bell to be struck.

2. In an electric call-bell, the combination of a dial-plate, D, pointer *z*, slotted disk *s*, and ratchet-wheel M, working in unison, as hereinbefore described, and for the purposes specified.

3. In a series of call-bells upon an electric circuit, the mechanism above described for sounding the bell at any desired station in the circuit from any other station in the circuit, consisting of the dial-plate D, pointer *z*, and slotted disk *s*, with their operating mechanism, substantially as described.

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