5 Sheets—Sheet 1.

C. W. HUBBARD.
Electric-Annunciators.

No. 215,124. Patented May 6, 1879.

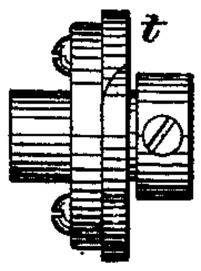

Fig. 9.

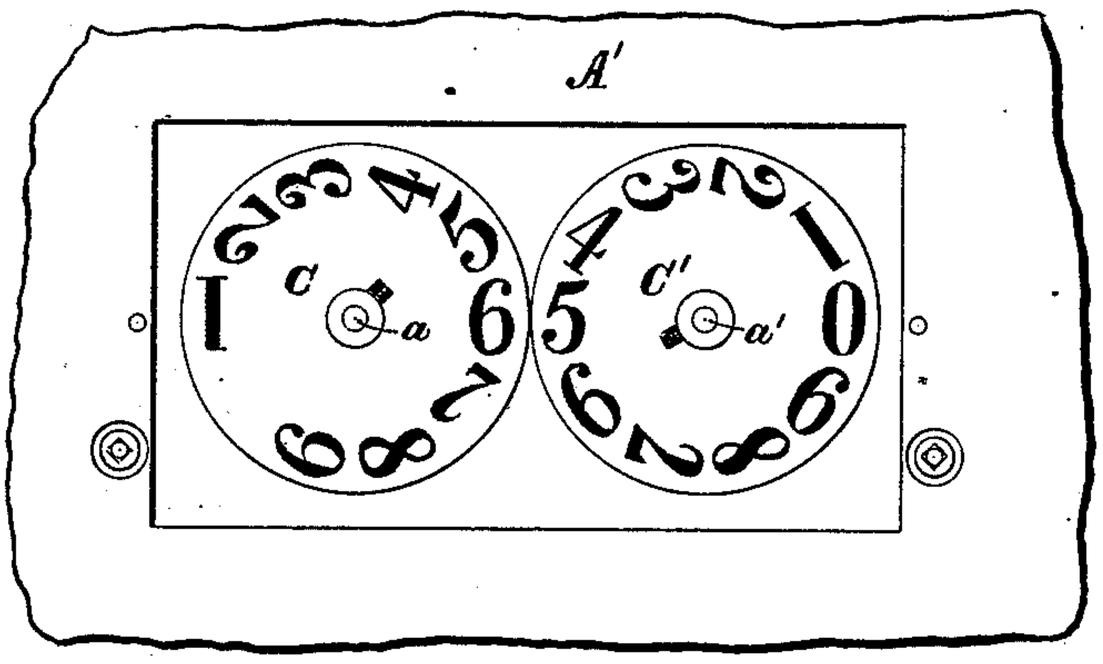

Fig. 2.

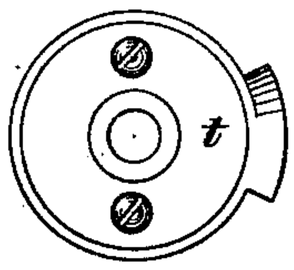

Fig. 8.

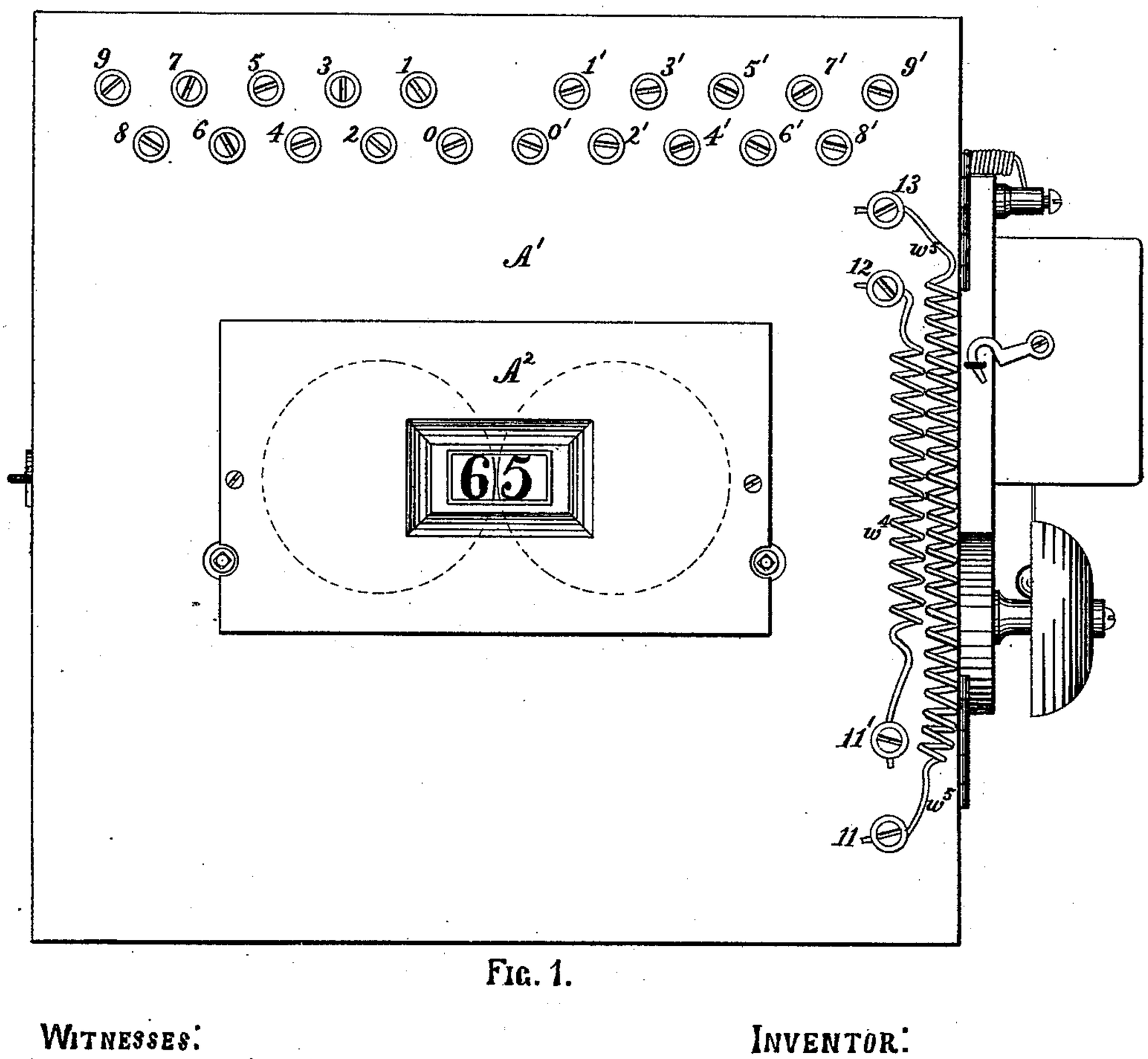

Fig. 1.

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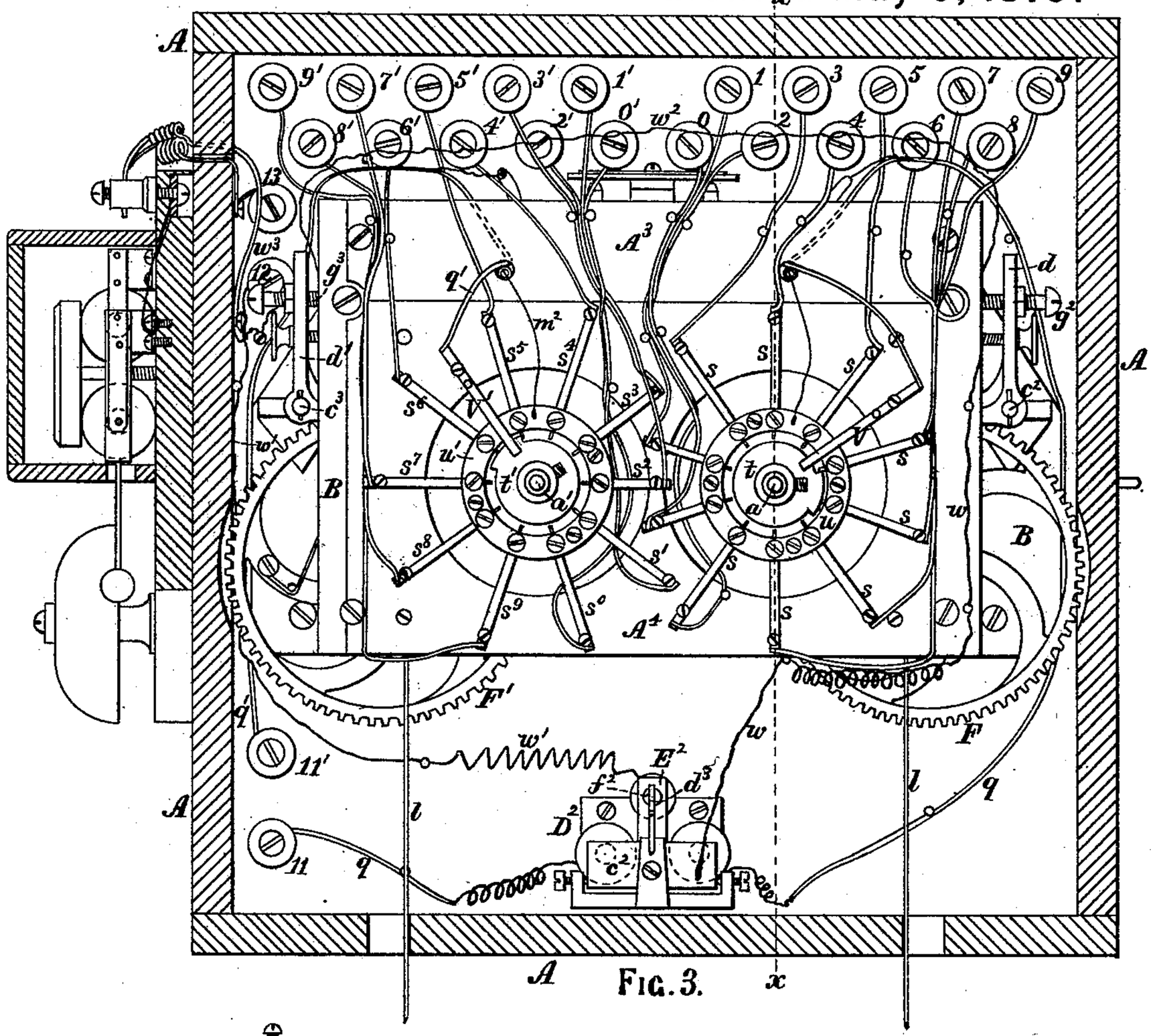

FIG. 3.

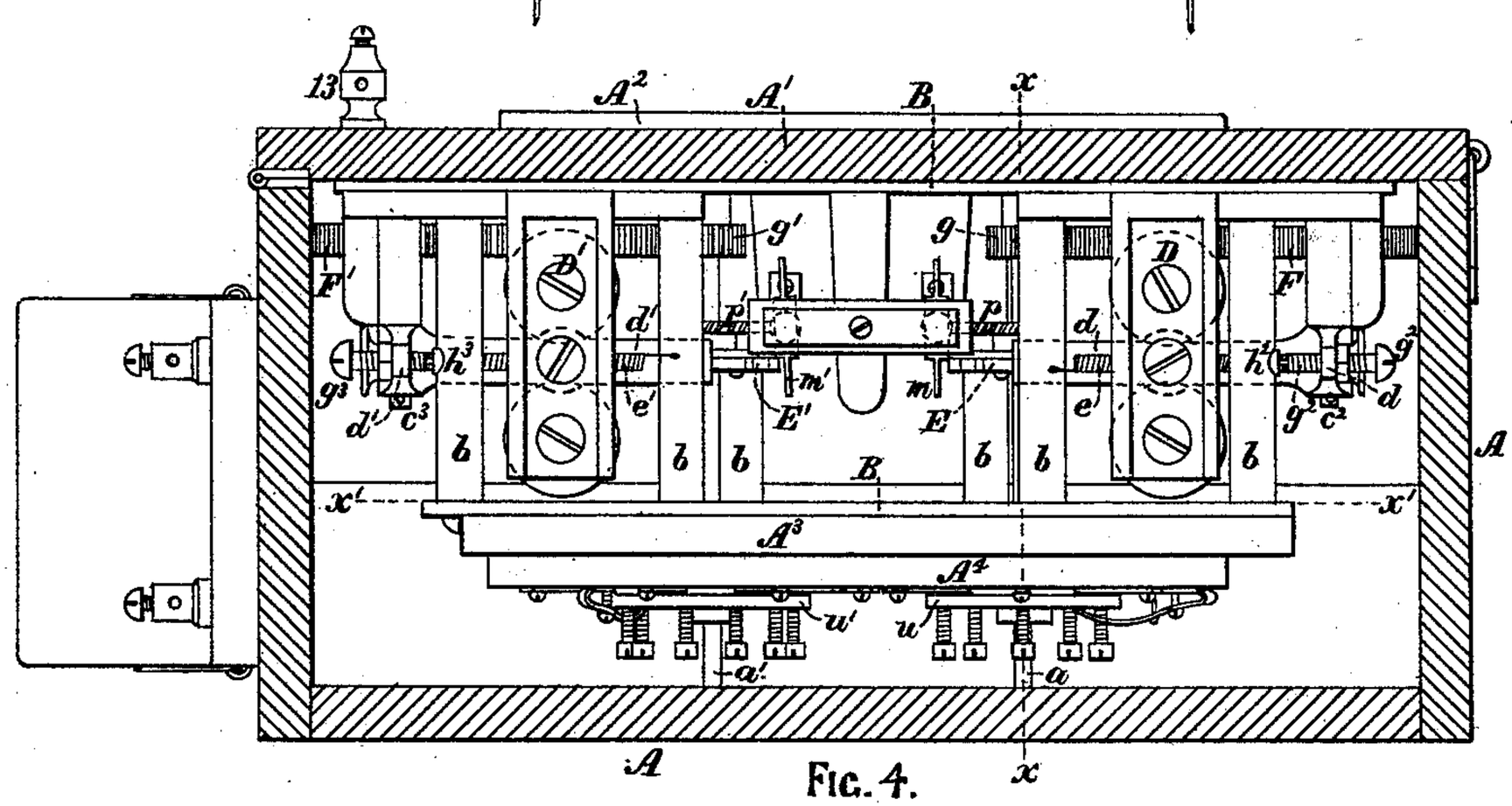

FIG. 4.

WITNESSES.

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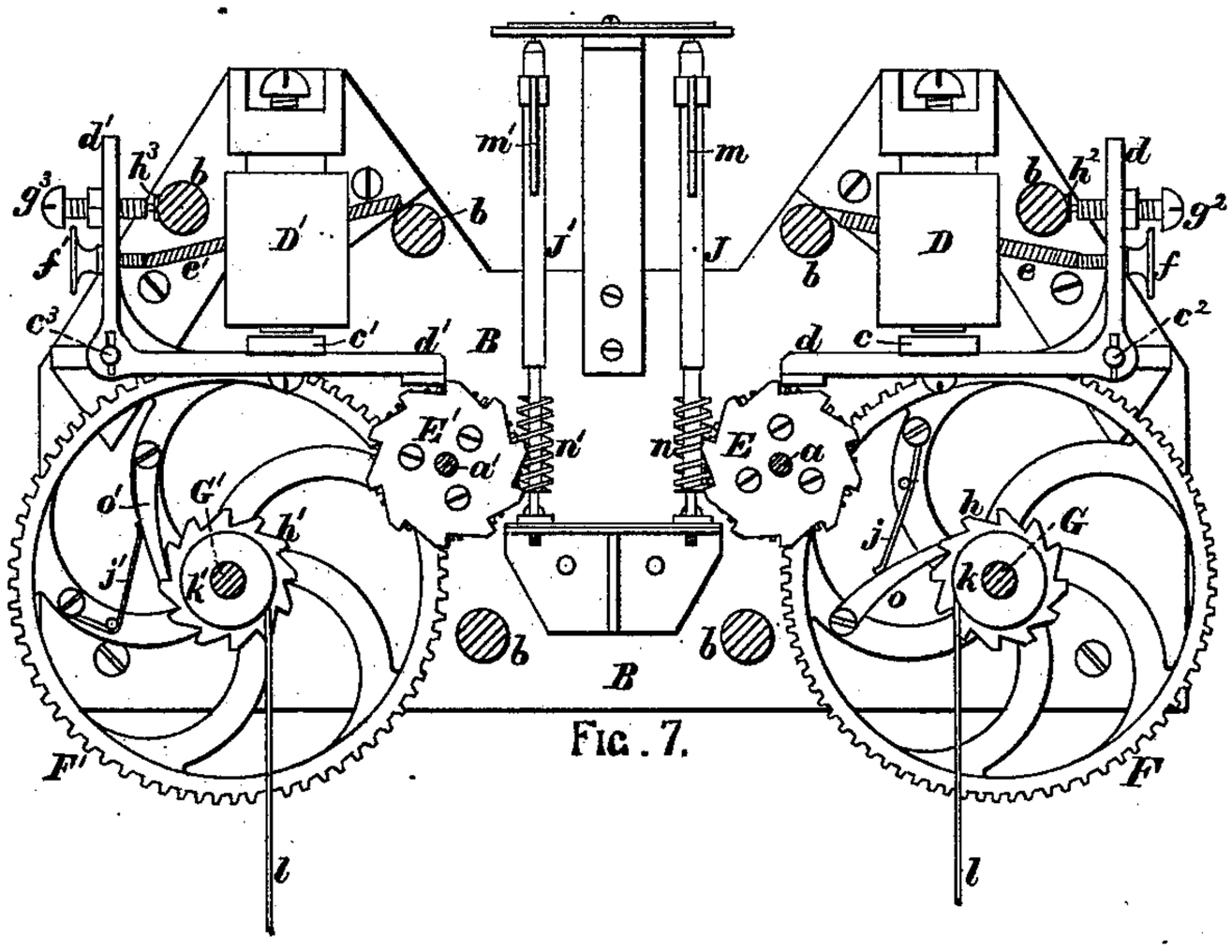

FIG. 7.

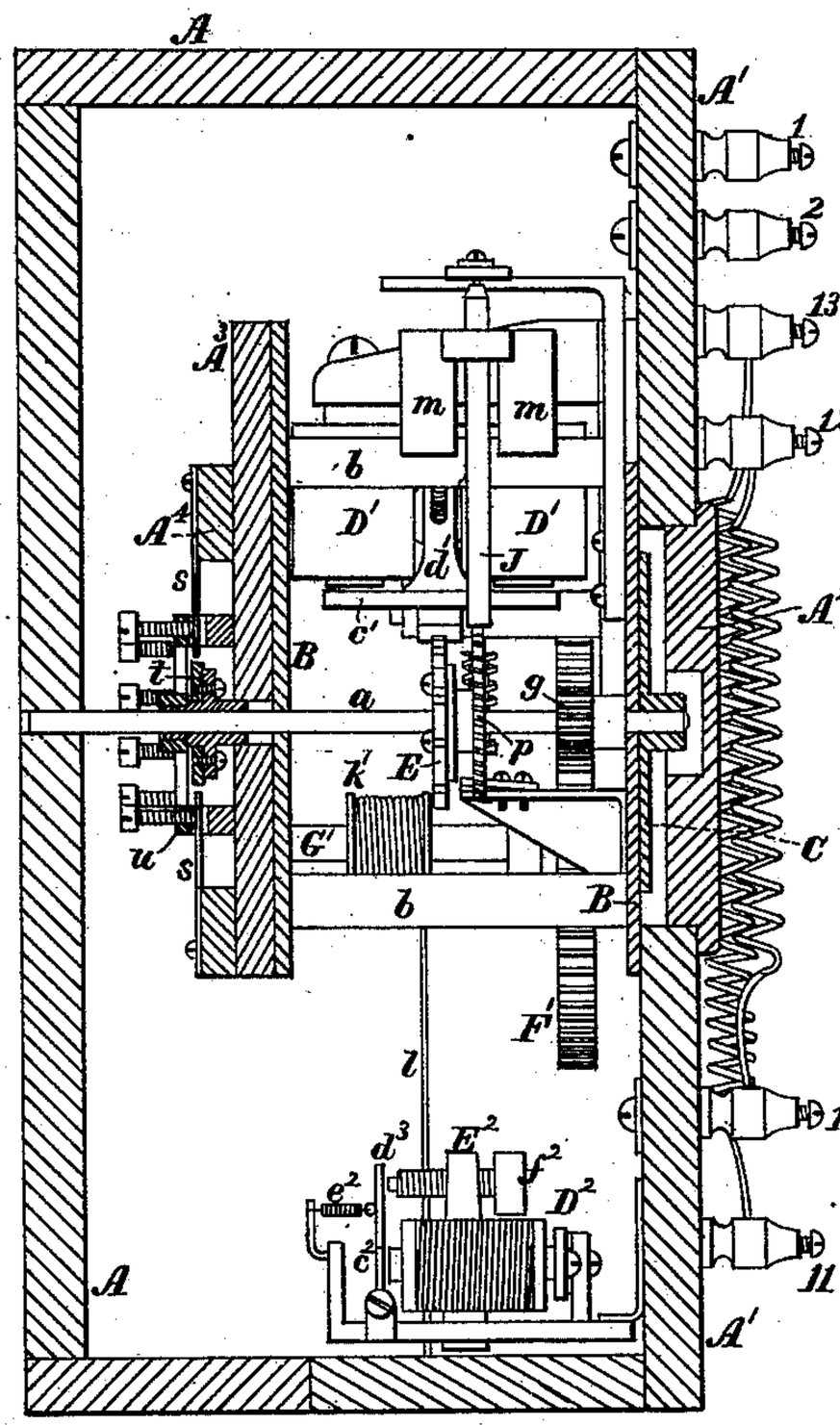

FIG. 6.

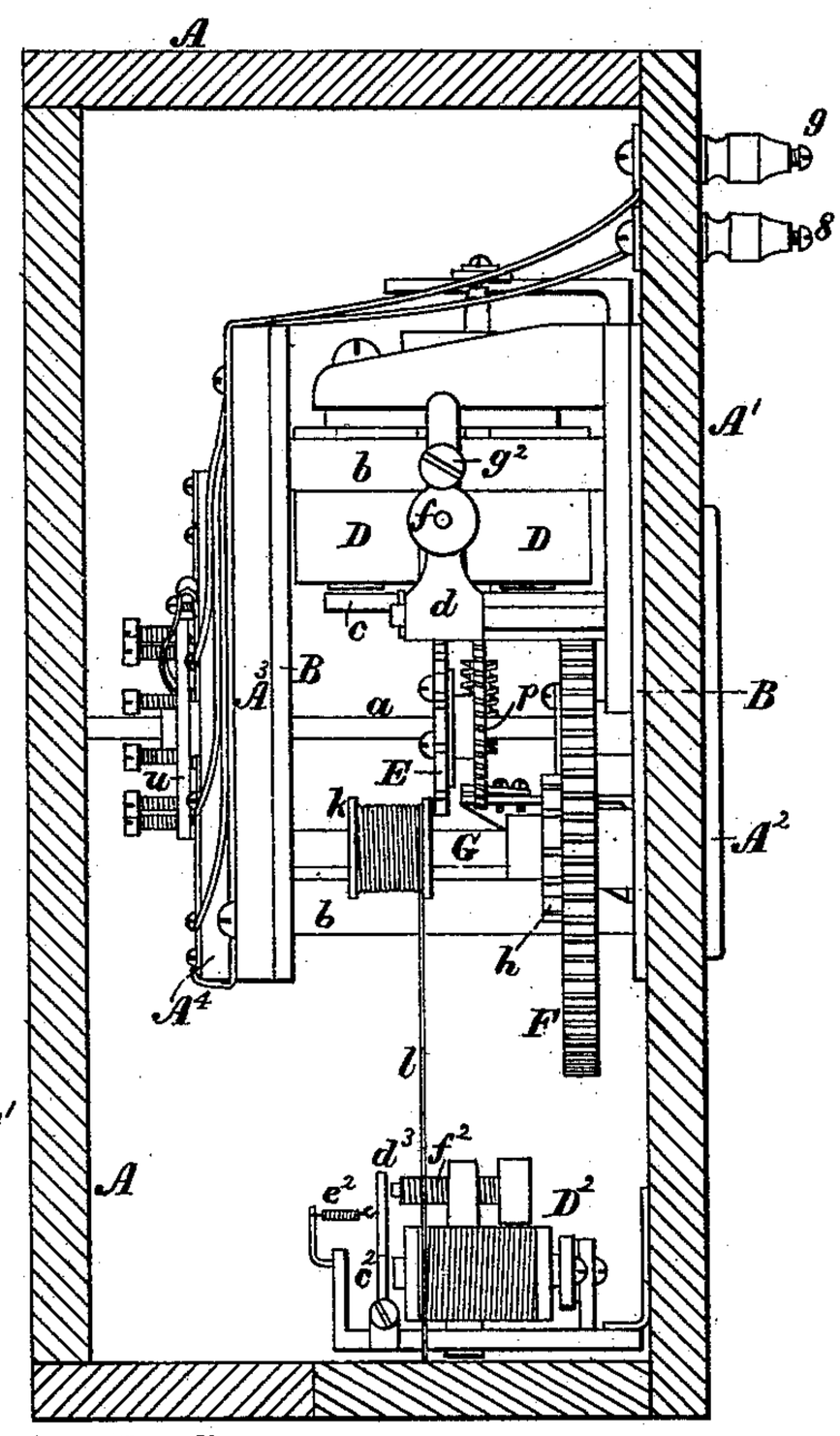

FIG. 5.

WITNESSES.

William W Swain

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INVENTOR.

Charles W Hubbard

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C. W. HUBBARD.

Electric-Annunciators.

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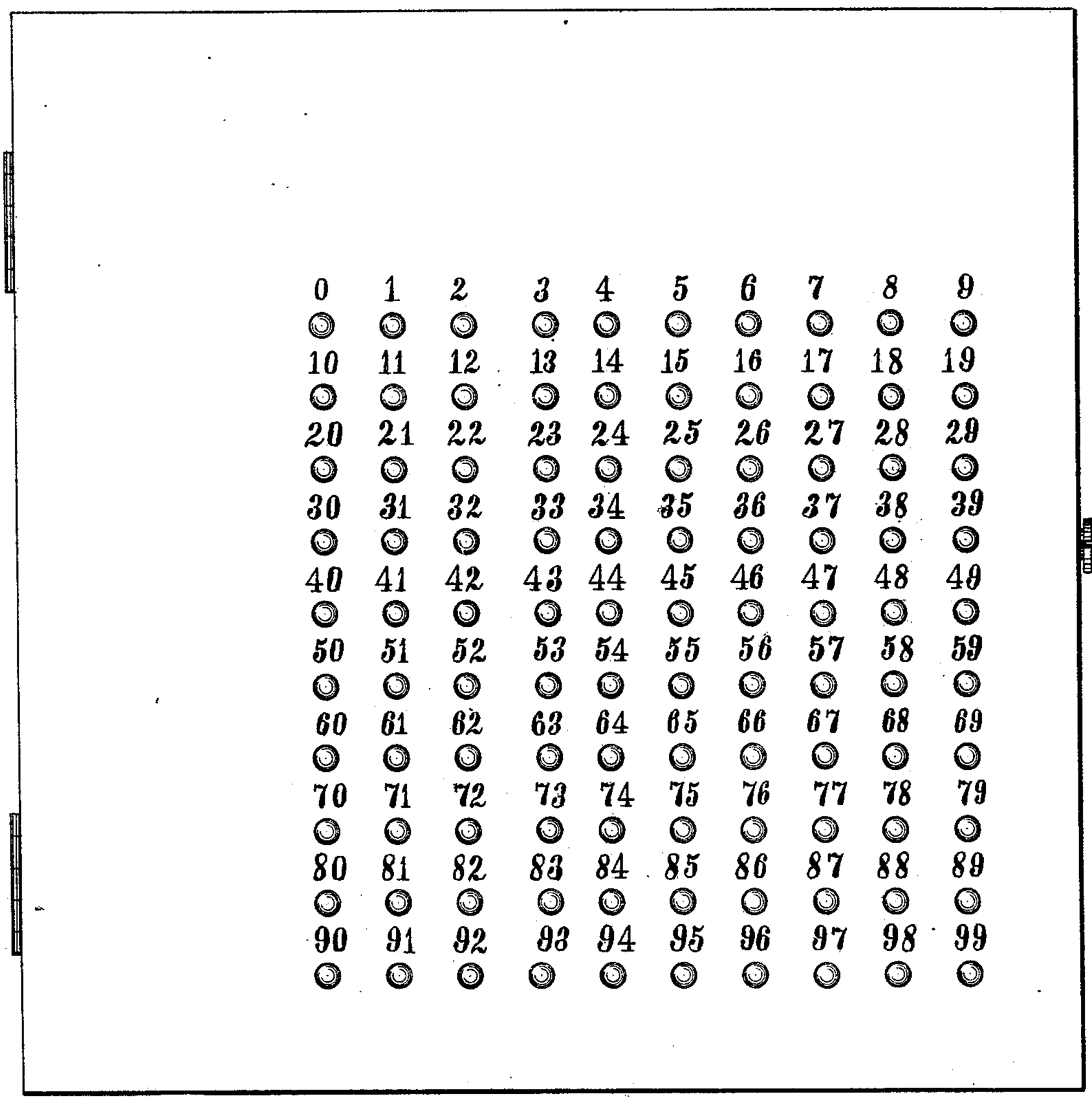

Fig. 10.

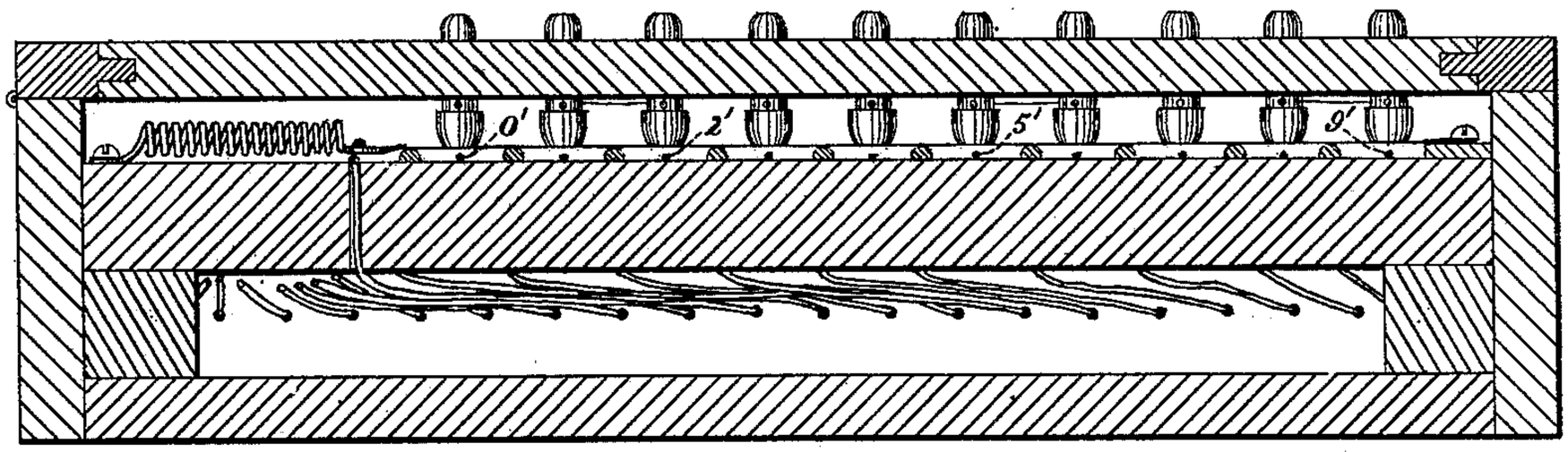

Fig. 11.

Witnesses:
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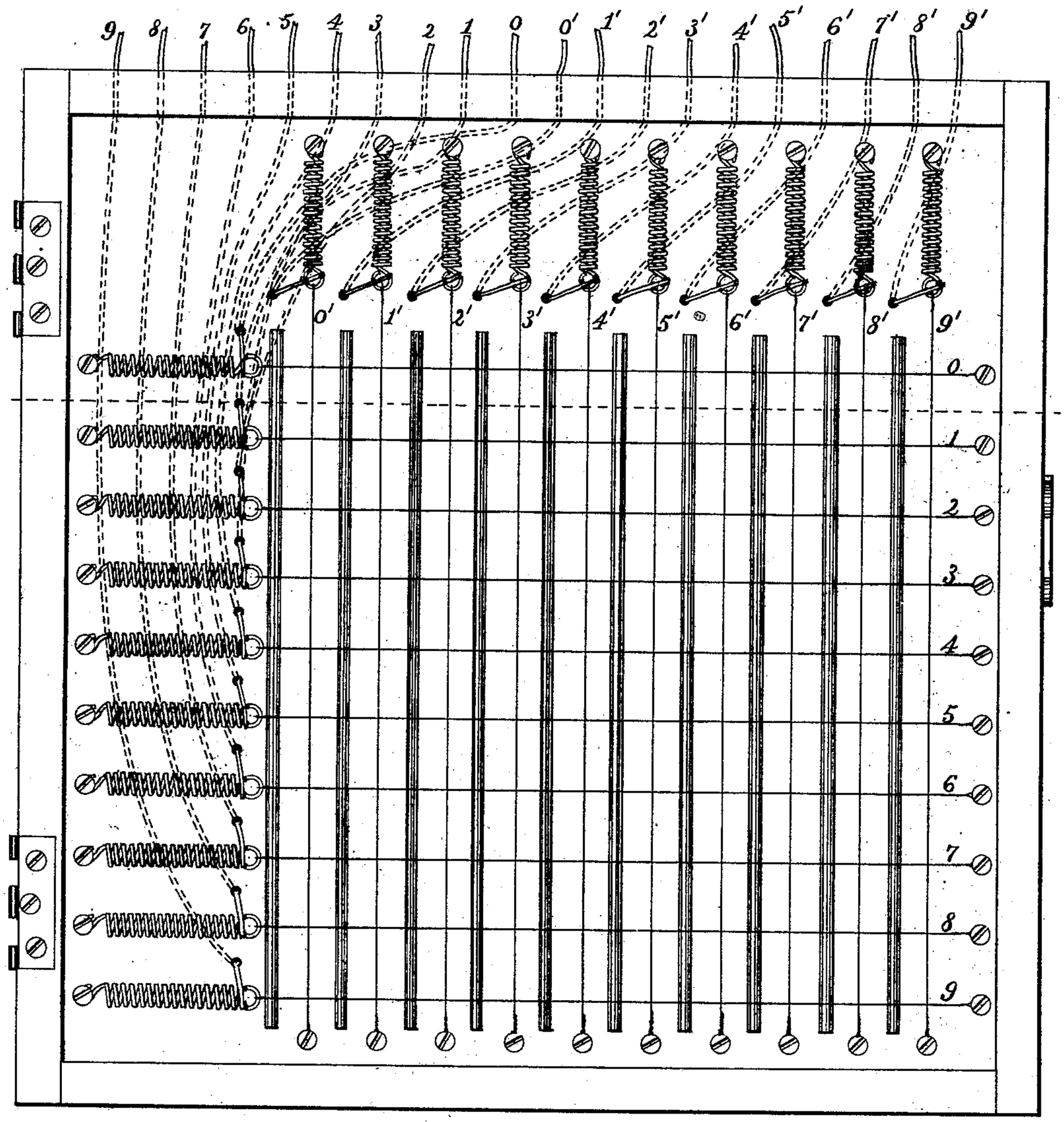

Fig. 12.

Witnesses:
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H. G. Olmsted

Inventor:
Charles W. Hubbard

UNITED STATES PATENT OFFICE.

CHARLES W. HUBBARD, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC ANNUNCIATORS.

Specification forming part of Letters Patent No. **215,124,** dated May 6, 1879; application filed February 10, 1879.

To all whom it may concern:

Be it known that I, CHARLES W. HUBBARD, of Boston, in the State of Massachusetts, have invented a new and useful Improvement in Electric Annunciators, of which the following is a specification.

My invention relates to that form of annunciator in which an indicating-disk or pointer is operated by a system of clock-work under the control of an electro-magnet; and consists in the use of a double disk and two systems of clock-work, in combination with two electro-magnets in a single circuit, so that the wire for each figure in rooms having a number consisting of two figures uses the wire of its fellow figure for a return-wire.

In all annunciators heretofore used where two electro-magnets have been employed to give two signals, whether to be read together or singly, there has been used at least one independent return-wire, making at least three wires in all.

The invention further consists in so combining a bell-circuit and mechanism with the disk apparatus in such manner that the bell will not ring until the proper number is set in the face of the instrument, but will continue to ring after the number is so set, while the two external wires of the main circuit are in electrical connection.

Figure 1 is a view of the face of the instrument, showing through a glass plate two numbers, one on each of two revolving disks. Fig. 2 is a portion of the same, with a plate in front of the disks removed in order to show the remaining numbers or figures. Fig. 3 is a rear elevation, the box or casing being shown in section. Fig. 4 is a plan taken below the lower row of screw-cups seen in Fig. 3. Fig. 5 is a side elevation, the casing being in section. Fig. 6 is a sectional elevation through the line *x x* of Figs. 3 and 4. Fig. 7 is a sectional elevation on the line *x' x'* of Fig. 4, with the casing removed. Figs. 8 and 9 are detailed views of the circuit-breaker. Figs. 10, 11, and 12 are views of a key-board to be hereinafter explained.

A is the cabinet or casing, of wood, within which are contained the clock-work and most of the electrical apparatus, they being attached to the inner side of the hinged lid A^1 of the casing, but being intermediately supported by a metallic frame-work, B, rigidly secured to the lid A^1. The frame-work B consists of two metallic plates connected by several studs, *b*, but includes several metallic brackets secured to one of the plates. C C′ are two disks, having numbers or figures on their faces, as shown.

It is to be observed that the figures on the disk C′ are used as units, while those on the disk C are used as tens, and also that the disk C has a blank space corresponding to the zero on disk C′. These disks are rigidly secured to the ends of two shafts, *a a'*, which have bearings in the frame. A slot is cut in the lid A^1 to make room for the disks, and this slot is mostly covered by a plate, A^2, which serves as a frame for the glass plate in the face of the instrument.

D D^1 are two electro-magnets secured to the frame, as shown. Their armatures *c* c^1 are parts of elbow-levers *d* d^1, pivoted, respectively, to the frame at c^2 c^3, and, as shown, serving as detents to ratchet-wheels E E^1, which are rigidly secured to the shafts *a a'*. The ratchet E^1 has ten teeth, corresponding to the ten figures or numbers on the "unit-disk" C′, and in like manner the ratchet E has ten teeth, corresponding to figures or spaces on the other disk, C. Springs *e* e^1, respectively secured to the short arms of the elbow-levers *d* d^1 and studs *b* of the frame, cause the armatures, when not attracted by their magnets, to serve as detents or stops to the ratchets E E^1. The power of these springs is regulated by thumb-screws *f* f^1.

For the purpose of revolving the shaft *a* when its detent is raised, there is connected with it a clock mechanism, consisting of a gear, *g*, rigidly secured to said shaft, a large gear, F, running loosely on a winding-up shaft, G, a ratchet, *h*, rigidly secured to said last-named shaft, a pawl, *o*, pivoted to the gear F and working in the ratchet *h*, a spring, *j*, working against the pawl *o*, and a drum, *k*, carrying a weighted cord, *l*.

J is a fan-shaft, supported in the frame, as shown. It carries a fan, *m*, and is operated by a worm, *n*, into which works a gear, *p*, upon shaft *a*.

The shaft *a'* in like manner has a clock mechanism, consisting of small gear g^1, large gear F′, winding-up shaft G′, ratchet h^1, pawl *o'*,

spring j', drum k', and weighted cord l'; but it is obvious that other forms of clock mechanism or springs would operate equally well to revolve the shafts a a' when the latter are free from their detents. The shaft a' has also a fan mechanism consisting of the shaft J', fan m^1, worm n', and gear p'.

A^3 and A^4 are two insulating-plates, secured to the back of the metallic frame B, as shown, the plate A^4 having a recess to receive two circuit-breakers, t t', on the ends of shafts a a', and two brass rings, u u'. Both the circuit-breakers t t' and the rings u u' are properly insulated.

For the present, confining this part of the description to the electric apparatus used more immediately in connection with the unit-shaft a', attention is first called to ten screw-cups, (marked 0′ 1′ 2′ 3′ 4′ 5′ 6′ 7′ 8′ 9′.) Each of these cups has a wire leading to a metallic spring, s^0 s^1 s^2 s^3 s^4 s^5 s^6 s^7 s^3 s^9, one end of each of which is screwed to the insulating-plate A^4, while the other passes under the brass ring u', and presses up against an adjusting or contact screw in said ring, thus establishing metallic connection between each of said screw-cups and the ring u'.

V′ is a metallic spring, one end of which is screwed to the insulating-plate A^4, while the other bears constantly upon the brass circuit-breaker t'. A wire, q', connects the spring V′ with the screw-cup 11′, leading to the battery.

The brass ring u' has attached to it a wire, m^2, which passes through the electro-magnet D^1, and then connects with the wire q' before the latter is attached to the screw-cup 11′.

The projection upon the circuit-breaker t' is cam-shaped, and in the revolution of the circuit-breaker the cam successively strikes the inner points of the springs s^0, &c., and breaks their contact with the ring u'.

The instrument shown in the drawings is designed to indicate calls or signals from one hundred different rooms, and I have accordingly shown a key-board for the purpose of more fully illustrating the manner in which the circuit is completed in each of the said rooms; but the apparatus already described as used in connection with the unit-shaft a' forms by itself a valuable feature of my invention, it being assumed that each of the screw-cups 0′ 1′ 2′ 3′ 4′ 5′ 6′ 7′ 8′ 9′ has a wire leading to a room where it may be put in connection with a wire leading to the other pole of the battery—that is, referring to the drawings, it is to be assumed that the wire q from the battery screw-cup 11 may be connected directly with the room-wires or external wires leading from the screw-cups 0′ 1′ 2′ 3′ 4′ 5′ 6′ 7′ 8′ 9′; and if this connection is made between the wire q and the room-wire from one of the screw-cups—for instance, 5′—the circuit is complete. Beginning, say, at the place of contact in the room, the current passes through the room-wire to screw-cup 5′ thence to spring s^5 and the ring u', thence by the wire m^2 through the magnet D^1, making the latter an electro-magnet, and by the wire q' to the battery, and from the battery back to the place of contact in the room by the wire q. The magnet D^1, being made an electro-magnet, attracts its armature, and this releases the clock-work, thereby putting in motion the circuit-breaker t', which, in course of its revolution, must strike the spring s^5. When it does this the magnet is immediately thrown out of the circuit, the current now passing from the place of contact in the room to the screw-cup 5′, thence through the spring s^5 to the circuit-breaker t', and thence directly to the battery by wire q', and back to the room by wire q. The armature is thus released, and the spring e' causes the detent to catch the cog on the ratchet E^1 which corresponds to the number of the screw-cup 5′ or room, and accordingly shows through the glass plate in the face of the instrument the same number on the disk.

One electro-magnet is thus made to answer for as many separate rooms as can conveniently be represented upon the disk C′, and by cogs on the ratchet E^1, and springs upon the ring u'.

Where, however, the armature is to serve for a large number of rooms, it is more convenient to make use of two disks, one representing units and the other tens, and forming thereby the combinations which may be made by two figures.

An apparatus thus embracing two disks has already been fully described, with the exception of the electrical apparatus working more immediately in connection with the "ten-disk;" but this is substantially a duplicate of the apparatus described in connection with the "unit-disk." Thus there are ten screw-cups, 0 1 2 3 4 5 6 7 8 9, leading by wires to ten springs, s, in connection with ring u. There is circuit-breaker t, a spring, V, a battery-wire, q, and screw-cup 11.

In describing the operation of the unit apparatus by itself it was assumed that the wire q led directly from the battery to the room-button. In the instrument as shown, however, the circuit of the unit apparatus is completed through the mechanism or apparatus of the "ten" side of the instrument; and in like manner the circuit for operating the disk carrying the tens is completed through the mechanism or apparatus of the "unit" side. In other words, there is but one circuit; but each side works independently of the other. For instance, to show the number 65 at the glass plate in the face of the instrument, an external wire leading from screw-cup 6 and an external wire leading from screw-cup 5′ are brought into contact. Both magnets immediately become electro-magnets and remain so—the magnet D^1 until the circuit-breaker t' throws it out of the circuit by striking the spring s^5, as before explained, and the magnet D until thrown out of the circuit by the circuit-breaker t striking the spring s connected with screw-cup 6.

D^2 is a relay-magnet, through which the wire

q passes, as shown. It is connected with the bell-circuit; but it is so connected that the bell will not be rung except under three conditions: First, the relay must be in the main circuit, and this, as we have seen, happens whenever the two room-wires are in contact; second, the number on the unit-disk must be set, and this we have seen does not happen until the magnet on the unit side of the instrument is thrown out of circuit; third, the number on the ten-disk must be set, or the magnet on that side of the instrument thrown out of the circuit.

The relay-magnet is supported upon an independent bracket secured to the lid of the covering, as shown. Its swinging armature is marked c^2, and is hinged to the bracket, as shown. A spiral spring, e^2, attached to an arm, d^3, extending upward from the armature and to projection from the bracket, tends to keep the armature away from the magnet.

E^2 is an insulated metallic post between the two coils of the magnet D^2, through which there is a contact-screw, f^2, as shown. A wire, w^1, leads from the post E^2 to a screw-cup, 12, to connect with the bell-battery. A wire, w, leads from the swinging armature c^2 to an insulated point on screw g^2 in the elbow-lever d. Opposite this last-named point on the stud b, as shown, is an insulated plate, h^2, connected by wire w^2 with a similar insulated plate, h^3, on the stud b on the opposite side of the instrument; and in like manner opposite the plate h^3 in the elbow-lever d^1 is a screw, g^3, from the insulated point of which a wire, w^3, leads to the bell mechanism.

Thus there are three breaks to be closed in the bell-circuit before the bell will ring: first, a break in the relay between the arm d^3 and the contact-screw f^2; second, a break between the wire w and the plate h^2; and, third, a break between the plate h^3 and the wire w^2.

Now, we have already seen that if the two room-wires are brought into contact, the magnet on the unit side of the instrument will remain in circuit until the corresponding unit number is set in the face of the instrument, and in like manner that the magnet on the ten side will remain in the circuit until the proper ten is set in the face of the instrument; and we have seen that when the proper numbers are set the magnets are taken out of the circuit and their armatures released, and the elbow-levers d d^1 placed under the control of the springs e e^1. This, as is evident by inspection, completes the bell-circuit at the breaks at the two plates h^2 h^3. The break in the relay is closed while the two room-wires are in contact.

It follows that the person desirous of giving the signal must press the button by which the two room-wires are united long enough to set the required number before the bell will ring at all, and that after the number is set the bell will ring as long as he continues to press the button.

The bell mechanism shown is of ordinary character, and needs no further description. As shown in the drawings, it is to be worked by the main battery, the screw-cups 11 and 11′ being connected with screw-cups 12 and 13 by wires w^4 and w^5 for that purpose; but it is advisable to employ a separate battery for the bell.

In order to connect the rooms with an instrument employing a single disk, a separate wire and a separate screw-cup are used for each room, the return-wire answering for all the rooms; but when the instrument has two disks I have devised a method of connecting the rooms therewith which greatly reduces the number of wires ordinarily required for such purposes—that is, I use but a single wire for each unit, no matter in how many rooms that unit may be found, and a single wire for each ten, wherever that ten may be found. For instance, taking again the number 65, the wire leading from screw-cup 5′ is made to pass through all the rooms of the hundred having the unit place of these numbers filled by a 5—*i. e.*, 5, 15, 25, 35, 45, 55, 65, 75, 85, 95; and the wire leading from the screw-cup 6 is made to pass through all the rooms the ten place of whose numbers is filled by a 6—*i. e.*, 60, 61, 62, 63, &c. The two wires in each room are brought into contact by a button, in the usual way. This method of connecting the rooms with the instrument is illustrated by a key-board, (shown in Figs. 10, 11, and 12,) which I have devised for exhibiting my invention. The room-buttons are shown in Fig. 10. If one of them is pressed by the finger, it will bring into contact two wires, which cross each other beneath it. For instance, if the button 65 is pressed it will be found by an examination of Fig. 12 that wires 6 and 5′ have been brought into contact.

In Fig. 12 the fine black lines are room-wires, having numbers corresponding to their screw-cups. The other lines are merely a frame-work to keep the wires in position in the key-board.

I claim—

1. The two disks C C′, shafts a a', ratchets E E^1, bent levers d d^1, armatures c c^1, and electro-magnets D D^1, in a single circuit, in combination with clock-work or similar mechanism for operating said shafts, and contrivances for using said clock-work to create a branch in the main circuit, thereby throwing the magnet out of the circuit, substantially as described, for the purpose specified.

2. The two disks C C′, shafts a a', ratchets E E^1, bent levers d d^1, armatures c c^1, and electro-magnets D D′, in combination with clock-work or similar mechanism for operating said shafts, and contrivances for using said clock-work to create a branch in the main circuit, thereby throwing the magnet out of the circuit, in further combination with a bell mechanism and an independent bell-circuit, which is completed by closing breaks in the main circuit when the proper figures are set in the face of the instrument and the external wires of the

main circuit are united, all substantially as described, and for the purpose specified.

3. The herein-described arrangement of external wire for rooms having numbers of two figures, whereby a single wire passes through the rooms having the same figure in the unit place, and a single wire through the rooms having the same figure in the ten place, in combination with two electro-magnets, each controlling a system of clock-work and a disk, all substantially as described, for the purpose specified.

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Witnesses:

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H. G. OLMSTED.