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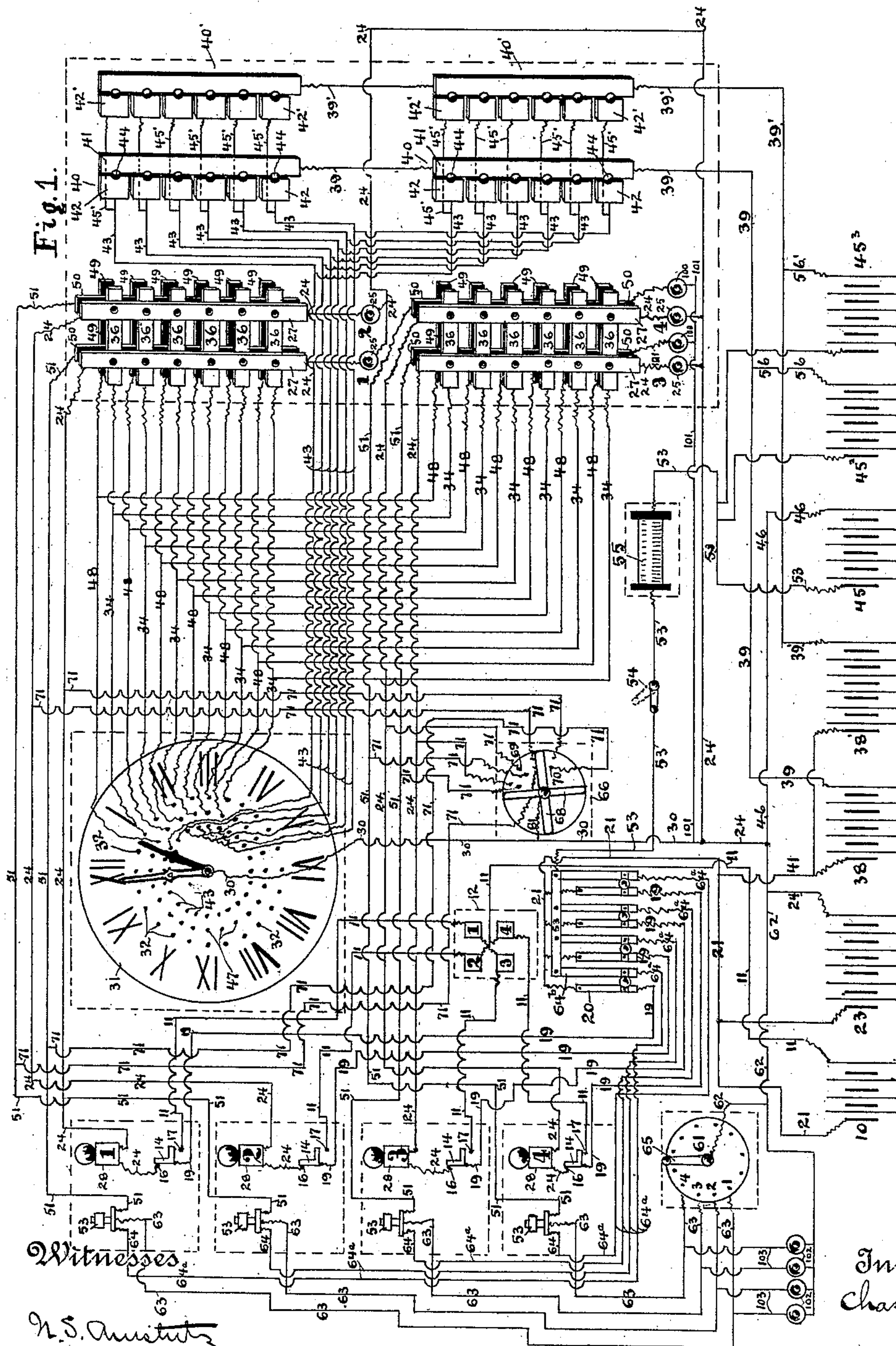
4 Sheets—Sheet 1.

C. A. HALE.

ELECTRICAL CALL, LIGHTING, AND ALARM SYSTEM.

No. 441,157.

Patented Nov. 25, 1890.



Witnesses

N.S. Amistutz

Richard Moser.

By his Attorney

H.J. Fisher.

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(No Model.)

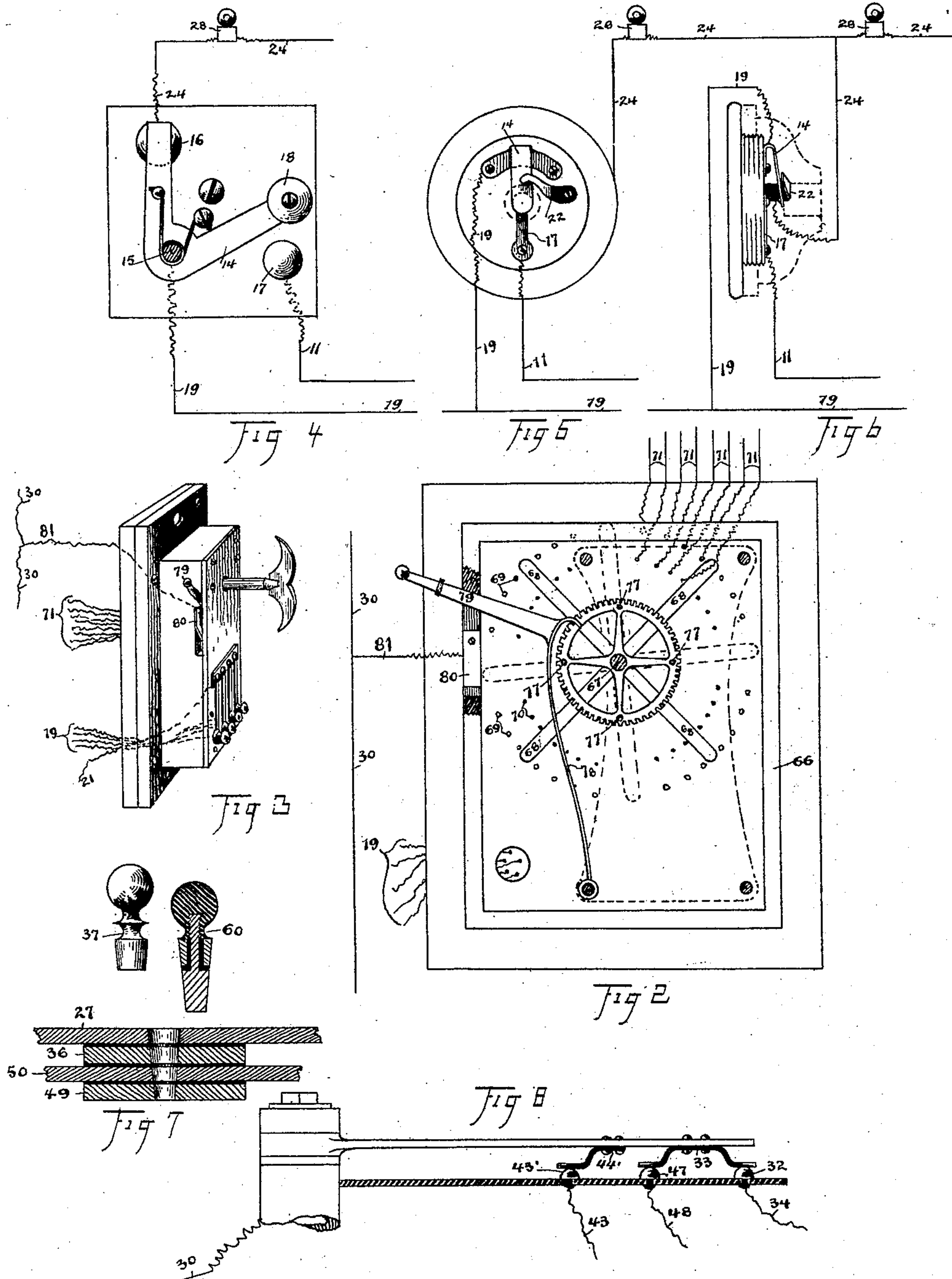
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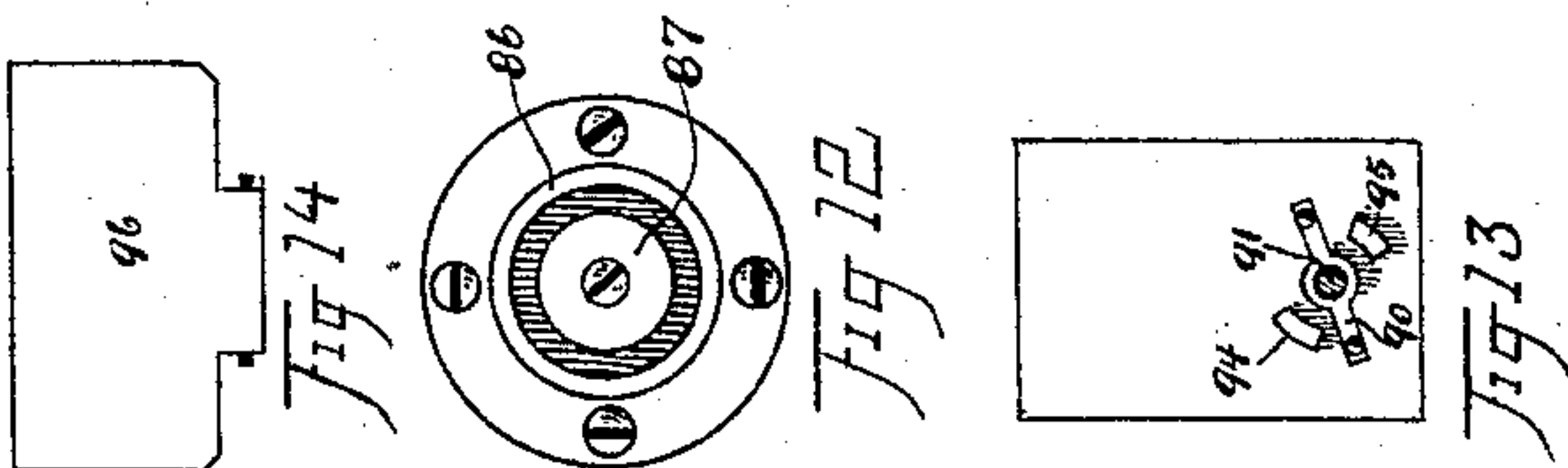
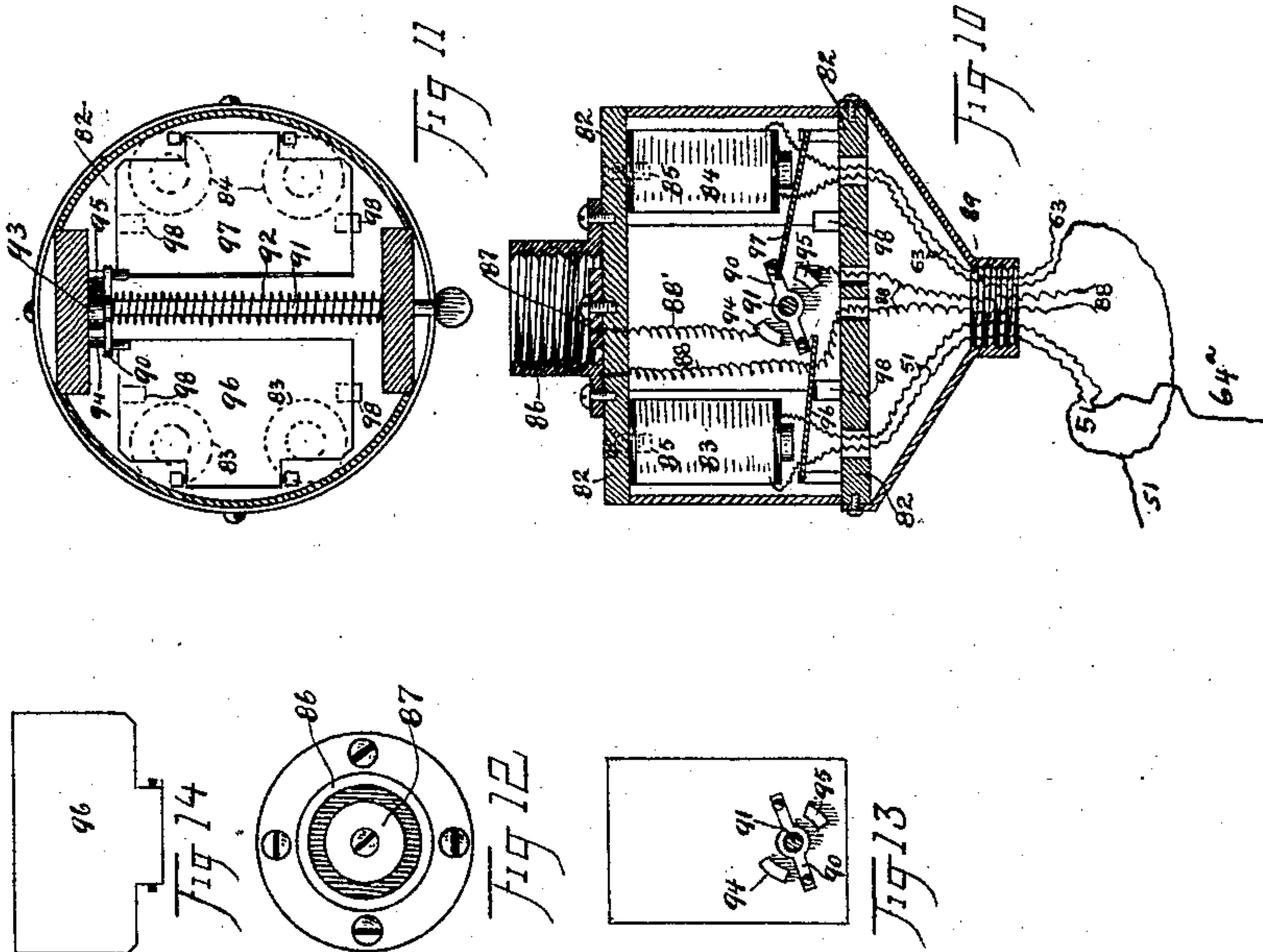
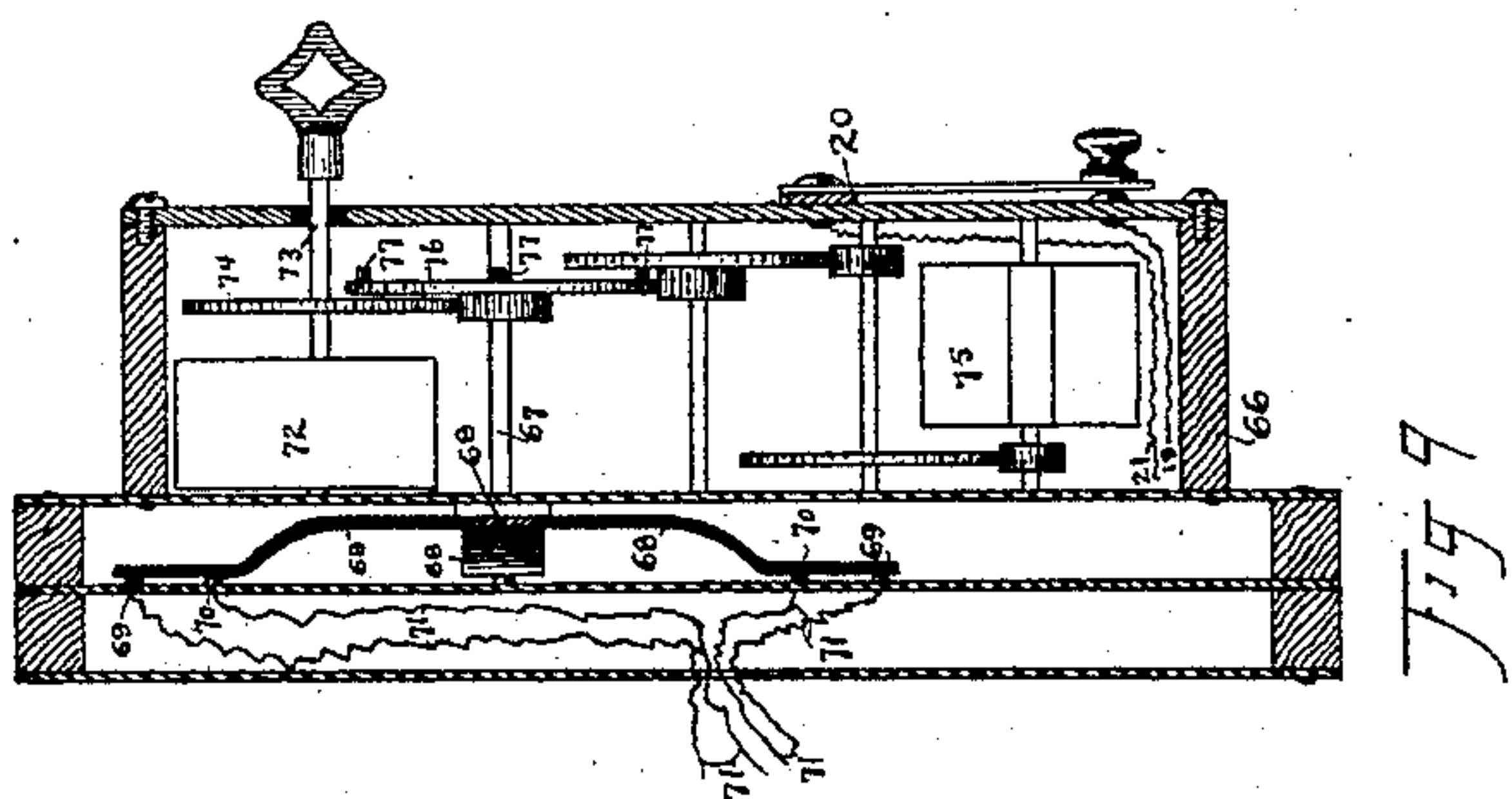
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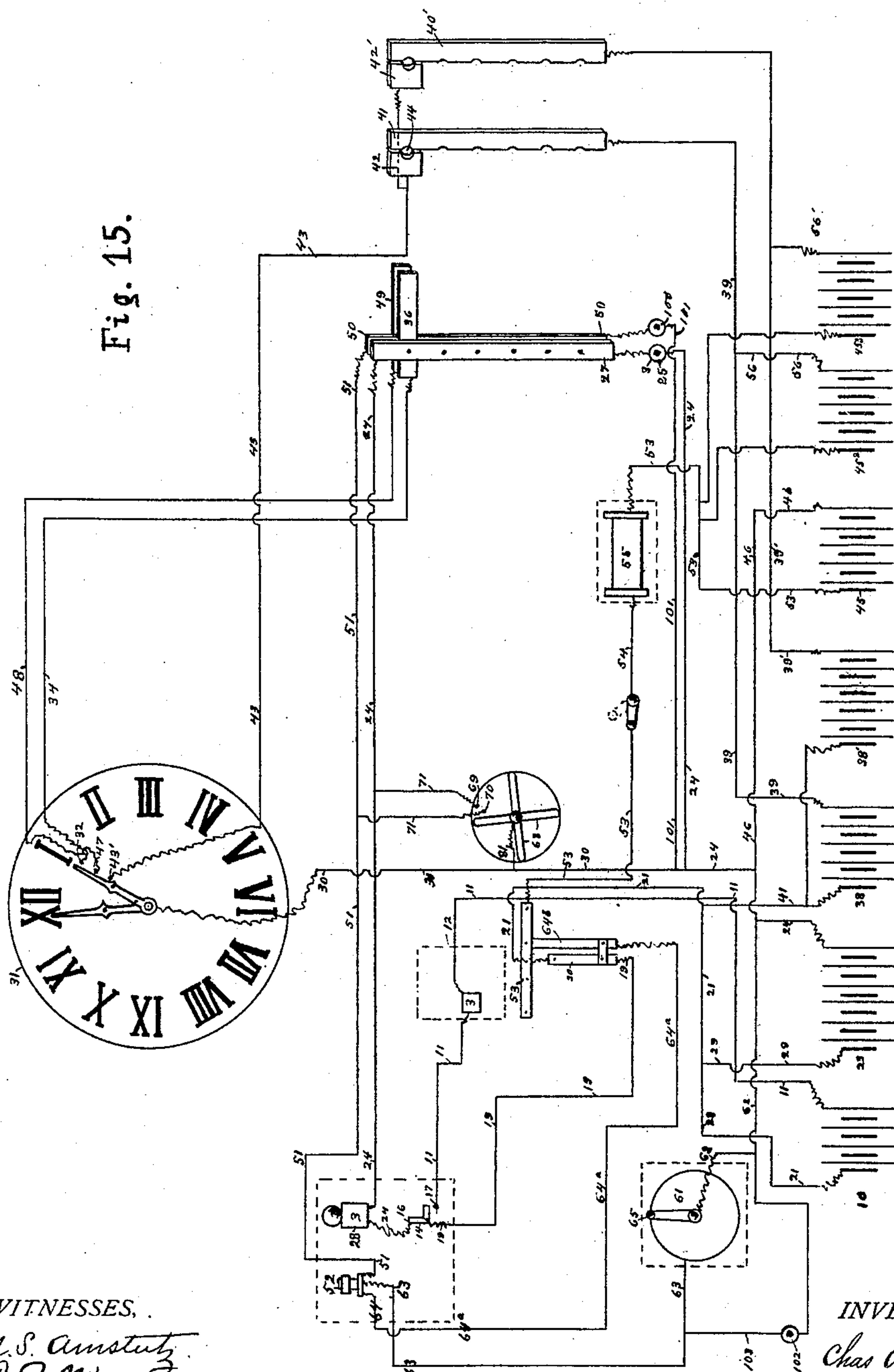
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WITNESSES.
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CHARLES A. HALE, OF CLEVELAND, OHIO.

ELECTRICAL CALL, LIGHTING, AND ALARM SYSTEM.

SPECIFICATION forming part of Letters Patent No. 441,157, dated November 25, 1890.

Application filed December 28, 1889. Serial No. 335,190. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. HALE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electrical Call, Lighting, and Alarm Systems; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in electrical call, lighting, and alarm systems more especially designed for hotels, but adapted to buildings or blocks used for other purposes.

The object of the invention is to provide a system whereby the following results, among others not here enumerated, may be obtained: First, as in the case of a hotel, a call by a guest in any given room to the office through an annunciator located therein; second, a call at will to any given room, or to all the rooms from the office, through a switch-board in the office, and having a return-wire in common with the annunciator; third, automatically sending a call to any room, or any given number of rooms, through a switch-board in the office, and connected with a suitably-constructed clock, whereby, when the clock reaches a certain hour or fraction of an hour at which the guest is to be called, the alarm will be sounded in the guest's room through proper contact made on the dial of the clock, as hereinafter described; fourth, sending a call to any given room or any number of rooms at will, and lighting the gas or the electric lamp simultaneously therewith; fifth, automatically calling one or more rooms and lighting the gas or electricity therein through a switch-board and a clock of suitable construction and connections, and, sixth, sounding an alarm on one or more floors at a time, and automatically turning on the light on such floors at the instant the alarm is sounded.

To these ends the invention consists in the construction, combination, and arrangement of parts, substantially as shown and hereinafter set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is

a diagrammatic view of a number of the parts constituting my invention so grouped and arranged as to best serve the purpose of illustrating the invention and facilitating the description, all of which parts are hereinafter more fully described. Fig. 2 is a front elevation of the alarm-box with the front plate removed and showing the stopping mechanism. Fig. 3 is a perspective view of the alarm-box, showing the various connections for the several rooms and the battery, but broken off. Fig. 4 is a front elevation of an automatic room-switch. Fig. 5 is a modification of the invention shown in Fig. 4, in which the ordinary push-button mechanism is employed with certain additional parts, as hereinafter described. Fig. 6 is a cross-section of the construction shown in Fig. 5. Fig. 7 illustrates a sectional view of a portion of the general switch-board employed in the office, said sections being drawn on a line midway of one of the openings in said board and adapted to receive a plug for connecting any given room, for the purpose hereinafter described. Fig. 8 is a detail view of the post on the clock carrying the hour and minute hands and showing the hour-hand as provided with a double bearing-spring making connection with points on the dial, through which electrical connection is established, as will appear farther on in the description. Fig. 9 is a side elevation of the mechanism in the alarm-box, front and perspective views of which box are shown in Figs. 2 and 3. Fig. 10 is a vertical sectional elevation of an automatic controlling device for an incandescent electric light, showing the switch by which the current is controlled as it lies when the circuit is open. Fig. 11 is a plan view of the device with the front and rear plates removed and showing the position of the magnets in dotted lines. Fig. 12 is a plan view of the socket for holding the lamp. Fig. 13 is an inside view of the switch-plate at the rear of the case. Fig. 14 is a plan view of one of the armature-plates, by which the switch is controlled through the magnets. Fig. 15 is a diagrammatic view of the system of wiring invented by me complete as to one room, and in which the parts are shown substantially the same relation and for the same purpose as in Fig. 1, where the princi-

ple applies to several rooms and floors and suitable apparatus connected therewith, the room selected in this case being No. 3, represented in Fig. 1.

5 The device described in the foregoing figures, 10 to 14, inclusive, is designed expressly for use in connection with incandescent electric lights when employed in my system in lieu of gas, and of course is only serviceable
10 with a system of this general nature.

Taking up the parts in the order above given, we have, first, the annunciatory mechanism, whereby a guest may ring a bell and announce a call in the office. This is done
15 through a battery 10, having a wire 11, leading to an annunciator 12, and thence to a switch or equivalent mechanism in the guest-room, forms of which mechanism are illustrated in Figs. 4 and 5. Thus in Fig. 4 we
20 have a triangular switch 14, provided with a spring at its pivot 15, which holds the switch normally, as shown in said figure, and with its upper arm making contact with the metallic contact-point 16 in the guest-call circuit. The annunciator-wire 11 leads to contact-point 17, and the switch 14 has a handle or knob 18 for operating it. A return-wire 19 connects with the pivot of switch 14, and this we may describe as a common return-wire for
25 all the rooms of that particular floor which runs to a floor-switch 20, supposed to be located in the office, and which is normally closed for all the floors. From the said switch a common or single return-wire 21 makes direct connection with the opposite pole of the annunciator-battery, and thus a complete circuit is provided for. Now, referring again to switch 14, if the guest wishes to call the office he has but to pull the switch down to touch
35 point 17, and then electrical connection will be made with the annunciator contact-point 17 and the current will flow through the switch and its pivot and the line 19 to the floor switch-battery, as above outlined. When the
40 said switch 14 is released, it will spring back and close the circuit at 16 on the guest-call circuit.

In Figs. 5 and 6 I show a modification of this mechanism, in which the common push-
50 button mechanism is used by adding thereto an additional element consisting in the strap or plate 22. Normally the spring-switch 14 is out in contact with strap 22, and the guest-call circuit flowing over said strap from the
55 wire connected therewith is rendered complete by said switch and the wire 19, so that, as in case of Fig. 4, the guest-call is always closed in the room. Then when the guest wishes to communicate with the office he
60 presses on switch 14, through the usual button, which bears the switch away from strap 22 and brings it in contact with contact-point 17, having the wire 11, which leads from the battery connected therewith. Thus the same
65 device is made to serve the double purpose of guest-call connection and annunciator-connection. As before stated, the floor-switch 20

is always closed unless opened in case of general alarm on one or more floors, as hereinafter explained, or for other purposes, and the
70 foregoing explanation as to one room serves for all.

The second purpose of the invention contemplates the calling of a guest in any room from the office. This includes a separate battery 23, having a wire 24 connected, say, with
75 the carbon element and running thence to a push-button 25, marked "I" for room I, and onto the outer strip or bar 27 of the switch-board, whence the wire 24 extends to bell 28 in
80 room I, and thence through switch 14 over wire 19 to the floor-switch 20, and on back to the battery 23, passing over the wire 21 to wire 29 *en route* home. It will be seen that wire 21 serves for both batteries 10 and 23 part way. 85
The circuit thus provided enables the hotel clerk to call the guest in room I by bearing on push-button 25, which closes the circuit, the same being closed at all other points continually unless opened for special and temporary reasons. Similar connections are made
90 for all the rooms, and the switch-board will have as many outer bars 27 as there are rooms in the system. I have here shown the switch-board only in part and divided into sections, 95
with provision for two rooms in each section, and this serves to illustrate the principle of its construction and operation; but all the rooms may be placed on a single continuous board, and any one of the several sets of bars 100
or strips of which the board is composed can be used for making one or another series of connections. In the upper section here shown accommodation is made for rooms 1 and 2, and in the lower section for rooms 3 and 4. 105
So, also, four rooms are selected, one on each of four floors, to illustrate the connection in a building-block, or the like, having several floors. The guest having been called, say, in room I, as above described, he can immediately respond through the annunciator, and thus communication is established between the guest and the office back and forth to the manifest advantage of both. A code of signals may help to interpret the ringings. 115

But it occurs that guests desire to be awakened at certain hours of the night to take trains, and in order to relieve the hotel clerk and his attendants of recollecting or making the call at the hour named, I provide mechanism and means whereby this call occurs at exactly the right time automatically. To this end the battery 23 is used and the wire 24 as far as convenient, when a wire 30 takes up the connection and leads directly to clock 31, 125
which is supposed to be in the office in convenient relation to the switch-board. This wire 30 is connected to throw the post of the clock, carrying the hands, into the circuit, and the dial is made of some non-conducting material, and has arranged on its face a series of contact-points 32, one for each half-hour, as here shown; but these points might be made for each quarter of an hour, if desired, or more 130

frequent, possibly, if the space permitted. The hour-hand has a brush 33, Fig. 8, adapted, in this instance, to make simultaneous contact with the series of points 32 and another series of points, as hereinafter described. Wires 34, one for each, connect the points 32 with cross-bars 36 on the office switch-board. These bars are as many in number as the points 32 on the clock-dial and are designed to extend across all the vertical room-bars 27, whatever the number may be. All the bars of the switch-board, four deep being here shown, are insulated from each other by suitable insulation placed between them where they cross. Then to make the circuit complete and to close it at will with any one of the hour cross-bars 36, I make tapering holes through said bars at the crossings and provide a suitable metal plug 37, Fig. 7, to occupy the hole, and thus bridge the crossing from bar 27 to bar 36. This throws said bar 27 into the circuit, whence the current flows over wire 34 at its upper end and to call-bell 28, and on round to the battery, as in the case when the clerk uses push-button 25, already described. In this instance, however, the call-bell 28 will continue to ring until the plug 37 is withdrawn, thus breaking the circuit, and the guest will announce to the office the fact that he is aroused by ringing the annunciator, when the plug will be removed.

Any number of calls can be made for the same hour, even to the extent of all the rooms; but this is not likely to occur. The more likely experience is that calls will extend through the night according as trains go out or persons desire to be called for other reasons, and hence a battery of ordinary size—say half a dozen cells—will be found sufficient. However, should it occur that the calls at any time are too heavy for the usual battery, I have provided a reserve battery 38, which connects at one pole by wire 39 with reserve switch 40, and at the other pole by wire 41 with the return-wire 21. The reserve board 40 shows a continuous bar 41, one for each section of the general switch-board, and connected so as to be equivalent to one bar, as they might be, and a series of blocks or plates 42 corresponding to the hour-bars 36 of the general switch-board. Suitable holes, slots, or the like 44 are formed in or between the bars 41 and the blocks 42, into which a plug is inserted to establish electrical connection between said parts. The plates or blocks 42 are connected by wires 43 with the inner series of contact-points 43' on the clock-dial, the hour-hand having a brush 44' to touch said points as the brush 33 makes contact with the outer and intermediate contact-points, all of which is hereinafter more fully explained. Then when a suitable plug is inserted in any one of the holes 44 in the reserve switch-board the circuit is closed through said board over wires 43, so that when the hour-hand comes round to make contact by its spring-brush 33 and the brush

44' with points 32, 43', and 47 on the dial the said brush will unite the current coming over said points, and one will re-enforce the other. Plugging the holes 44 will only be required when an extra number of calls is to be made at any given hour, and the extra plug will be inserted to correspond with the hour-bar 36, thus overloaded.

Again, if it should occur that the reserve battery 38 thus switched in be not sufficient, I provide a second supplemental battery 38', which has a wire 39', leading to a second reserve board 40', having plates 42' corresponding to the plates 42, and connected with the wires 43 by wires 45', so that when more battery is wanted for heavier work the second reserve can be called in to aid the other two. In this way, by dividing up the battery, only as much battery is used at any one time as may be needed.

Another feature of the invention consists in the lighting and extinguishment of the gas or other lights in the rooms of the guests, one or more, as may be needed. The lighting is done automatically at any given hour in a manner somewhat similar to making the calls. First, we have a wire 46 leading the circuit from the battery 45 to the wires 24 and 30 extending to the clock, where the current flows, as before described, over the hour-hand and the brushes thereon to the intermediate series of gas circuit-points 47 on the dial of the clock as well as to the call-points 32 and re-enforcing point 43'. Wires 48 connect points 47 with the inner cross-bars 49, which said cross-bars correspond to bars 36 on the general switch-board. In front of said cross-bars 49 are vertical bars 50, corresponding to vertical bars 27, and the bars 50 have wires 51, which pass onto the lamp or light 52 (gas or electricity) in the guest-room, which light has a suitable device for automatically lighting and extinguishing the same, one form of which is hereinafter more fully described. From the lamp the current returns to the battery over its room-wire through the floor-wire and switch, and thence over a common return-wire 53 to the battery. In this circuit I show a cut-out 54, which normally is closed, but may be opened by day when an alarm is sounded and the lights are not wanted, and a spark-coil 55, through which the current reaches the battery.

In the event the battery 45 is not sufficient for the service by reason of an extra number of lamps to be lighted, I employ one or more reserve batteries 45² and 45³, similar in purpose and use to reserve batteries on the call system. Thus a wire 56 leads from first reserve battery to wire 39, and thence on over the circuit, as in the case of the current from the reserve call-bell batteries, and if the battery 45³ be used the current flows over wire 56' to 39', and thence to the second reserve board 40', plugs on said boards being used as before.

Having the main lamp-battery connected,

as above described, with the general switch-board, all that is necessary to close the circuit on the switch-board is a plug, as 60, Fig. 7, having sufficient length to reach through and
5 connect the bars 49 and 50.

The lights are extinguished by means of a switch-board 61, to which a wire 62 leads from lamp-battery 45, and on which board are contact-points corresponding to the respective
10 rooms—one for each—and for convenience numbered 1, 2, 3, &c., corresponding to the rooms. A wire 63 leads from each of these points to a lamp or light in the corresponding room. These lamps being provided with
15 automatic lighting and extinguishing devices, already referred to, and which devices are known to have magnets to close the gas-valve or to switch off an electric current, the current flowing over wires 63 will energize said
20 magnet and turn out the light.

The return from the lamps is by wires 64, connecting each lamp with the common floor-wire 64^a—one for each floor—and these wires lead to a floor switch-board 64^b, with which
25 the wires 64^a are connected. From the board 64^b the common return-wire 53 for all the floors proceeds, as before described. Normally, the board 64^b will be closed for all the floors, as is the floor-switch for the call-bells, and by
30 it the current can be cut out as to one or more floors and the lights lighted on only such floor or floors as may need lighting at that time. These switch-boards, like the others, having a general use, are supposed to be located in the
35 office at some convenient place. As here shown in Fig. 1, the floor switch-board for the calls and the switch-board for the lamps are united in one structure, and the corresponding switches of the floors are united by insulating material, so that by a single operation
40 the lights may be extinguished and the bells silenced on each floor. The respective currents flow over their own connections and do not meet, one set of bars or switches being
45 built out of electrical contact with the other; but in other respects the two constitute a common board.

A further object of the invention is to provide means for an alarm throughout the system, or to a portion thereof, as occasion may require. This alarm is sounded on the call-bells in the rooms, and is designed to be accompanied with the lighting of the lamps, as in the case of special calls. For this purpose
55 I provide the office with an alarm-box 66. (Shown clearly in Figs. 2, 3, and 9.) This alarm is wound up like a clock, and runs automatically for a sufficient time when started. To this end I provide a shaft 67, which has a
60 brush 68 at its inner end arranged to make contact with buttons or posts 69 and 70, for the call and lighting purposes, respectively, and each post is provided with wires 71 leading to the call-bells and lamps. The brush
65 68 has two or more arms, and each bell is rung every time the contact-post with which it is connected is touched by either arm of the

brush. The lamps are supposed to be lighted the first time the brushes go round; but if they are not all lighted then they will be in
70 subsequent contacts. The brush turns rapidly enough to keep up a rapid succession of calls, so that one call or ringing is quickly followed by another on all the bells. To propel the brush-shaft 67, I employ a spring 72
75 on a shaft 73, adapted to be wound up like a clock, and having a wheel 74 meshing with a pinion on the brush-shaft 67. From this shaft I gear down to a fan 75, which serves to govern the speed of the clock mechanism. The
80 gear-wheel 76 on shaft 67 has pins 77 on its outer side, (two or more,) which are engaged by a spring-catch 78, Fig. 2, having a handle 79, by which it is controlled. The pins 77 are so arranged on the wheel that when en-
85 gaged by the catch 78 the arms of the brush will be intermediate of contact-points and hence keep the circuit open. Then when the alarm is to be sounded it is only necessary to pull down the handle 79 to make locking en-
90 gagement with spring 80 on the edge of the alarm-box and the current will flow over the wire 81 and said spring, the catch 78 and the metallic frame-work intervening, to brush 68,
95 whence it goes to the respective rooms as contact is made by said brush. The contact posts or points on the back of the alarm-box of course are arranged on insulating material, so that no current reaches them except over the
100 brush 68. The current flows from the batteries over wires 24 and 30 to the alarm-box, and from said box over the wires 71 to the call-bell wires and the lamp-lighting wires, respectively. In this case the current does not
105 pass through the clock or the general switch-board; but connection is made with the respective call and lighting wires beyond the switch-board, as seen in Fig. 1.

The alarm can be rung on any one of the several floors alone by cutting out the other
110 floors on the floor-switch 20, or two or more of the floors may be cut out. Otherwise the alarm will be general, as the floor-switch is normally closed for all the floors. A single sweep of the switch 65 over the switch-board
115 will extinguish all the lamps that have been lighted.

In Fig. 3 the floor-switch is shown as placed for convenience on the front of the alarm-box; but it may be placed as well at
120 some other convenient point, and any convenient disposition of the several switches may be made.

The general switch-board in the office may be built of a size to provide connections for
125 all the rooms, and may include the reserve-switch mechanism here shown as connected by wires. This is a mere question of taste, office-room, or the like, and does not affect the merits of the invention. The vertical
130 bars 27 will all be numbered to designate the room with which they are connected, and the transverse bars will have figures to designate the hours or subdivision of hours they rep-

resent on the clock-dial. I do not, of course, limit myself exactly to the arrangement or style of switch-board here shown, nor indeed to the other parts of the invention shown and described, but understand that I may adopt equivalent mechanism and also vary the same within the range of mere mechanical skill.

Inasmuch as the brush on the alarm-board is constructed to cover only four points at a time the ordinary battery is sufficient to make the calls and light the lamps without the aid of the reserves. A half-sweep of the brush on the alarm-board suffices to light and ring in all the rooms, and the brush travels fast enough to keep up a practically constant ringing on each and all of the bells.

I have described the invention as connected with a hotel; but this was chiefly for convenience of description. It may be used in any other building or in several connected buildings, blocks, or the like, as shall be found desirable.

In order that any given room may be lighted from the office on call through the annunciator from said room, or when a guest starts to his room, or at any other time, as may be desired, I provide push-buttons 100, which in Fig. 1 will be seen as connected with the rear bars 50 on the lower section of the general switch-board. Similar push-buttons of course would be used with each and all of the said bars over the entire switch-board. These buttons are connected by a wire 101, connecting on the main wire 30 leading to the clock, so that at any time when connection is made through the push-button the circuit will be closed on the corresponding lamp in the room, and the lamp will be lighted. Then in order that any given lamp may be extinguished separately from the others in the system I provide push-buttons 102, (seen at the left in Fig. 1,) near the room cut-out 61. Here are shown wires 103, leading through from the push-buttons to the respective room-wires 63, and from the push-buttons a single wire goes to the return-wire 62. Thus, by pushing any one of said buttons 102, if a lamp be lighted, the lamp will be extinguished. Of course the circuit is open on the push-buttons hereinbefore described, so that the circuits thus provided will not interfere with the general operations of the system, and are supplemental thereto.

In Figs. 10 to 14 I show a device for automatically lighting an incandescent electric lamp. This device consists of a case provided with top and bottom plates 82 of some suitable insulating material, to the upper one of which I secure magnets 83 and 84 by insulating pins or plugs 85. On the top of the case is a screw-socket 86, into which the lamp is adapted to be screwed to give it support, and a plate 87 is at the bottom of this socket, for a purpose hereinafter described. The current for the lamp is conveyed over the wires 88, which pass through a thimble 89, forming a support for the case and adapted

to be attached to any suitable stand or base or to a gas-jet. Then in order that the lamps may be automatically lighted and extinguished when the current is turned on, for that purpose I use a switch 90, supported on a handled spindle 91, having a spring 92 bearing the switch against its washer 93, and against the switch-plates or contacts 94 and 95 on the inside of the back plate of the case. One of the wires 88 leads to the contact-plate 95, and a short continuing wire 88', to make this line complete, leads from point 94 to the lamp. Hence when the switch 90 is turned to touch the points 94 and 95 the circuit is closed on the lamp and it is lighted. Now to control the switch 90 by the lighting-current through the general switch-board, or directly from the alarm-box, I provide the four electro-magnets 83 84 and the armatures 96 97. The wire 51 leads to the magnet 83 and, energizing it, raises the armature-plates 96 and carries up the switch 90 so as to contact with the points 94 95, which turns the current on the lamp. Then when the lamp is to be extinguished and the current turned off the other magnet 84 is energized through the wire 63, connected with the lamp-extinguishing switch-board. The brush 90 will remain in any position given it by the armatures. Posts 98 keep the armatures from dropping below the influence of the magnets. The short continuing wire 88' leads to the plate 87, which makes contact with one of the lamp-connections, and the other wire 88 leads directly to the lamp-socket, where the other metallic contact is made with the lamp, so as to complete the circuit. The armatures 96 97 are supported by pivots in posts, so as to be free to rise and fall under the influence of the magnets, and the switch has projecting points which are engaged by the armatures, and through which the switch is thrown into or out of contact with the contact-points 94 95.

The plug 60 (seen in connection with Fig. 7) preferably consists of two sections insulated transversely from one another, so that the current which divides at the clock passes over wires 34 and 48 and will be communicated to both the cross-bars 36 and 49 of the general switch-board, whence it will flow to its destination on the call and lighting system, as hereinafter described. The said plug is thus made to serve the double purpose of connecting the call strips or plates of the switch-board and the lighting plates or strips, while the two sets of strips are kept insulated from each other by reason of the insulation in the plug itself.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electrically-operated system for buildings, an alarm switch-board located in a central station or office, room-bells electrically connected with said switch-board, a floor-switch constructed to switch out one or more floors connected with said bells, and a battery

in circuit with said parts, substantially as described.

2. In an electrically-operated system for buildings, a general switch-board consisting of insulated strips or bars, as 27, 36, 49, and 50, and plugs to connect bars 27 and 36, a reserve switch-board electrically connected with the strip or bar 49, a clock provided with corresponding sets of contact-points, and wires connecting said points with the bars 36 and 49, a hand on the clock, constructed to make contact simultaneously on both series of said contact-points, a call-bell in circuit with the bar 27, and two separate batteries, one connected directly with the clock and the other with the reserve switch-board, and a common return from the said call-bell for the said batteries, substantially as described.

3. In an electrically-operated system for buildings, a general switch-board provided with four several sets of bars or plates insulated from one another, a clock having two sets of contact-points, and electrical connection between said points and said switch-board, call-bells and lamps connected in circuit with different bars of said switch-board, and a battery in circuit with said several parts, whereby a guest in a hotel may be called and his lamp lighted at any given hour, substantially as described.

4. In an electrically-operated system for buildings, a main switch in the main office, and a reserve or supplemental switch-board connected electrically with the main board, and plugs for said board, a clock provided with sets or series of contact-points and a hand to close the circuit over said points, lamps connected in circuit with the main switch-board, and batteries in circuit with said switch-board, clock, and lamps, substantially as described.

5. In an electrically-operated system for buildings, an alarm-board having a brush and a series of contact-points touched by the brush thereon, lamp-switches controlled by magnets in circuit with said contact-points through suitable connections, a switch to extinguish the lights, wires connecting said lamps with said extinguishing-switch, magnets controlled by the extinguishing-switch operating to open the lamp-switches, and a battery in circuit with said parts, substantially as described.

6. In an electrically-operated system for buildings, an alarm-board having two series of contact-points and a brush to touch the points in both series simultaneously, call-bells and lamps, and wires running thereto from said alarm-board, floor-switches for the lamps and the call-bells and battery service in circuit with said parts, substantially as described.

7. In an electrically-operated system for buildings, a main switch-board provided with four sets of bars, one behind the other and insulated, two reserve switch-boards connected with said main board, and plugs to close the

circuit on said boards, a clock provided with three series of contact-points electrically connected with different bars on the main switch-board, and call-bells, lamps, and batteries in circuit with the main and reserve switch-boards, substantially as described.

8. In an electrically-operated system for buildings, an alarm-board having a revolving brush and a series of contact-points, a series of lamps to be lighted, a board to extinguish the lamps with which each of said lamps is connected, and a floor-switch having a separate switch for each floor and normally closed, substantially as described.

9. In an electrical system for buildings, a central switch-board composed of four several insulated bars or strips crossing one another and provided with holes for a conducting-plug, in combination with a plug formed in two sections insulated midway, whereby the two rear bars or strips are kept out of electrical connection with the two front strips where the board is plugged, substantially as described.

10. In an electrical system for buildings, an alarm-box provided with mechanism to rotate the brush, a series of contact-points touched by the brush, and projections engaged by the locking device, in combination with a locking device having a conducting-spring and lever engaging said projections, said spring serving to make electrical connection in the said box, substantially as described.

11. In an electrical system for buildings, an alarm-box provided with a rotating brush, clock-work to turn the brush, and a double row of contact-points on its face, in combination with call-bells and lamps connected in circuit with said rows of contact-points, respectively, and a single lever to turn the current on the said box and to lock the switch out of contact with the said points, whereby an alarm may be sounded and lamps lighted simultaneously, substantially as described.

12. In an electrical system for buildings, a switch-board having room and hour bars for making calls and room and hour bars for lighting lamps, said bars built one over the other and insulated to separate the bars electrically, holes in said bars, and centrally-insulated plugs for said board, in combination with a clock having a double row of contact-points on its face, a hand having a brush to connect two of said points in opposite rows, call-bells and lamps and battery service, and wires connecting said parts, substantially as described.

13. In an electrically-operated system for buildings, a clock-dial provided with two circular rows of projections on its face and a switch-board having a double arrangement of plates or pieces insulated from one another and coupled, respectively, with said projections, in combination with a hand having a brush to span and electrically connect said projections, substantially as described.

14. In an electrically-operated system, a clock having two series of contact-points insulated from each other, and a general switch-board having insulated pieces connected by
5 separate wires or strips with said contact-points, in combination with call-bells in circuit with one set of said pieces on the general switch-board and lamp-controllers in circuit with the other set, said clock having a hand
10 provided with a brush to close the circuit on aligned points, substantially as described.

15. In an electric system for buildings, a main switch-board, a series of call-bells, and a clock through which said parts are connected, in combination with a battery to supply the current and a reserve battery connected through the clock with said circuit,
15 substantially as described.

16. An electric system comprising a general switch-board, call-bells, a battery, and a clock in circuit, in combination with one or
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more reserve batteries to re-enforce the current and a separate switch for each reserve battery, substantially as described.

17. In an electrical system for buildings, 25 lamps provided with suitable controllers and call-bells distributed with the lamps, a general switch-board in circuit with the lamp-controllers and bells, and a clock with suitable contact-points for the hand in circuit 30 with the switch-board and an electrical generator, in combination with one or more reserve batteries electrically connected with said parts through a separate switch for each reserve battery to increase the current on demand, substantially as described. 35

Witness my hand to the foregoing specification this 14th day of December, 1889.

CHARLES A. HALE.

Witnesses:

H. T. FISHER,
NELLIE L. McLANE.