

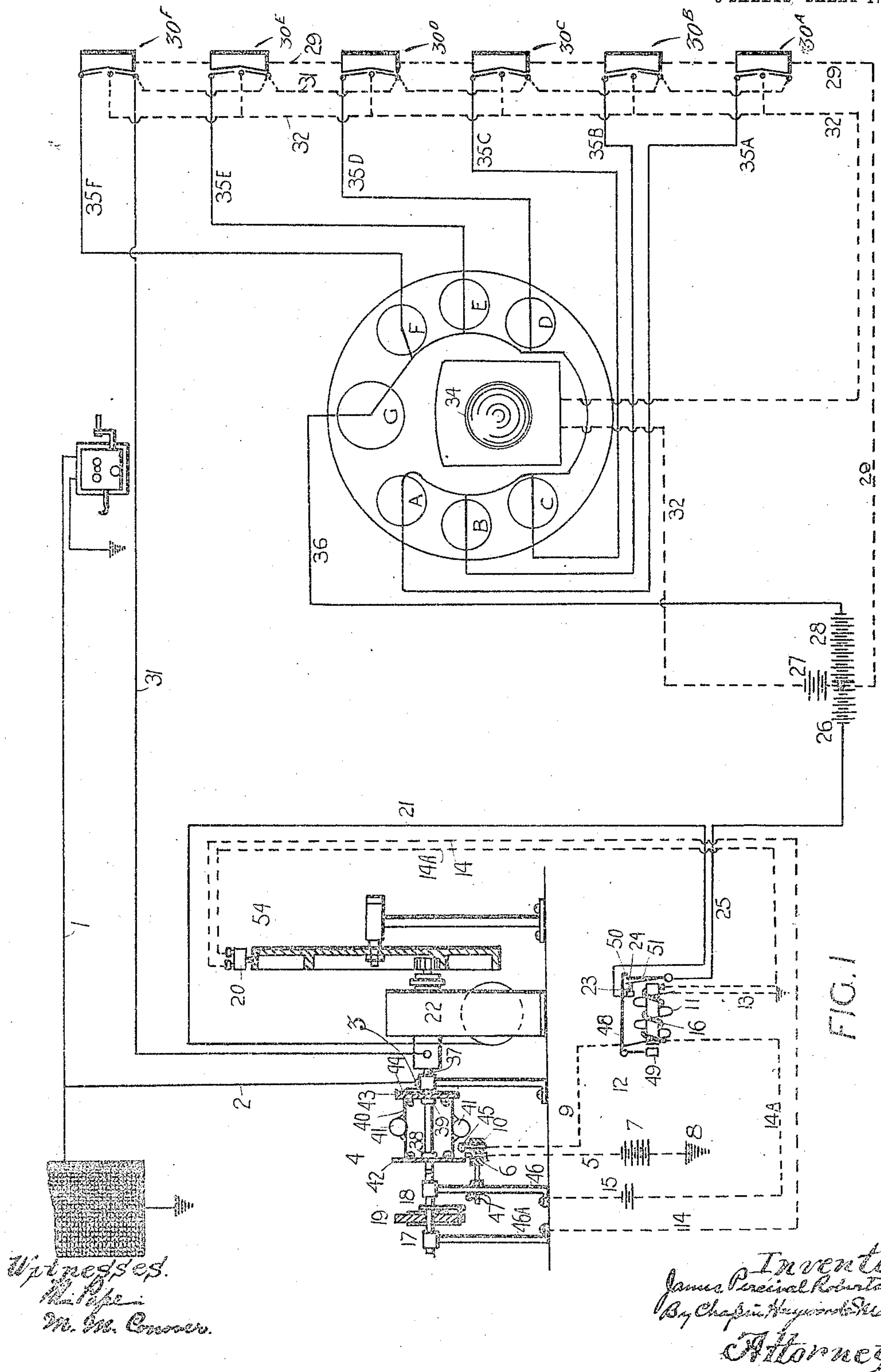
No. 787,344.

PATENTED APR. 11, 1905.

J. P. ROBERTSON.  
ELECTRICAL FIRE ALARM APPARATUS.

APPLICATION FILED AUG. 13, 1902.

5 SHEETS—SHEET 1.



Witnesses.  
M. Pipe  
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J. P. ROBERTSON.

ELECTRICAL FIRE ALARM APPARATUS.

APPLICATION FILED AUG. 13, 1902.

5 SHEETS—SHEET 2.

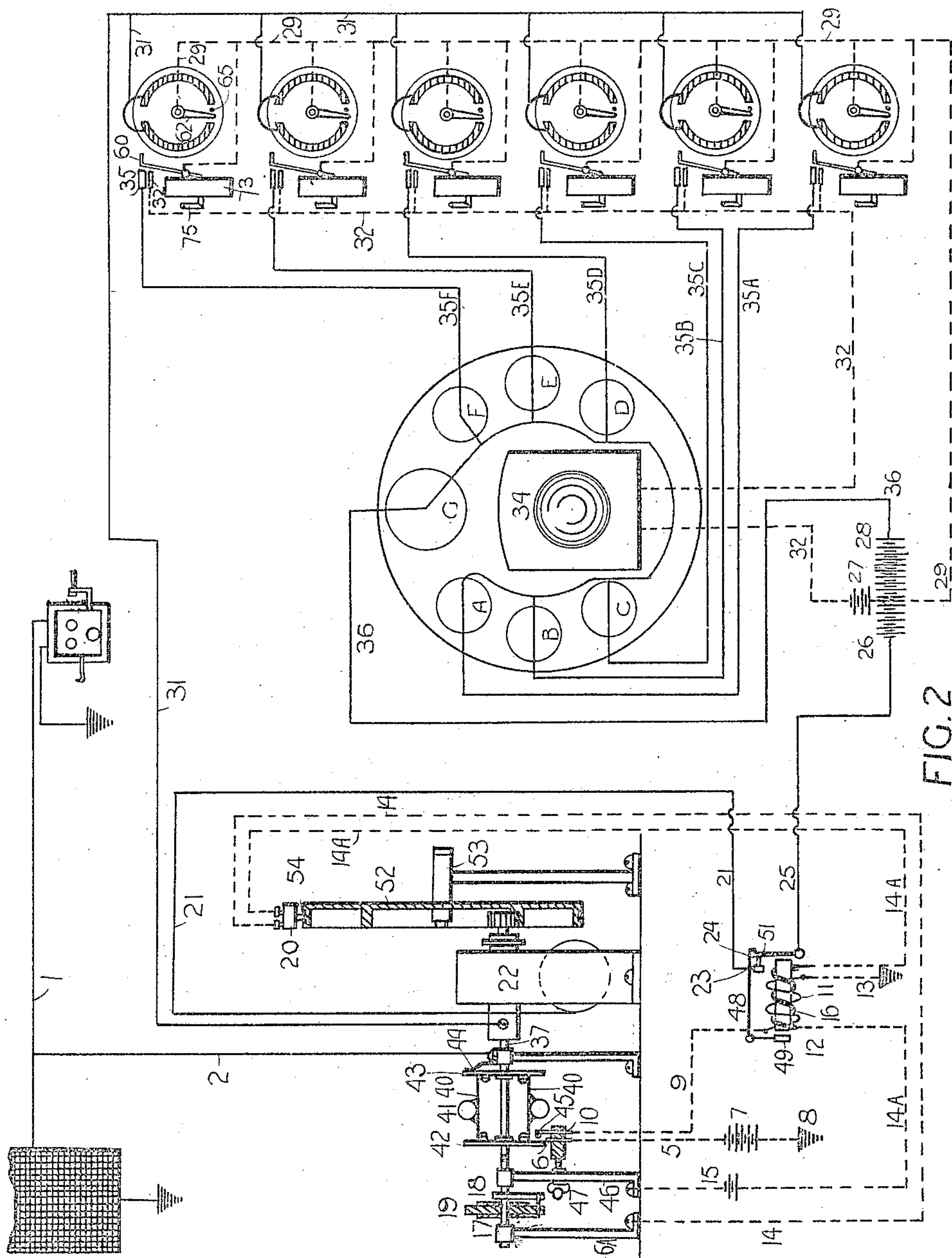


FIG. 2

Witnesses  
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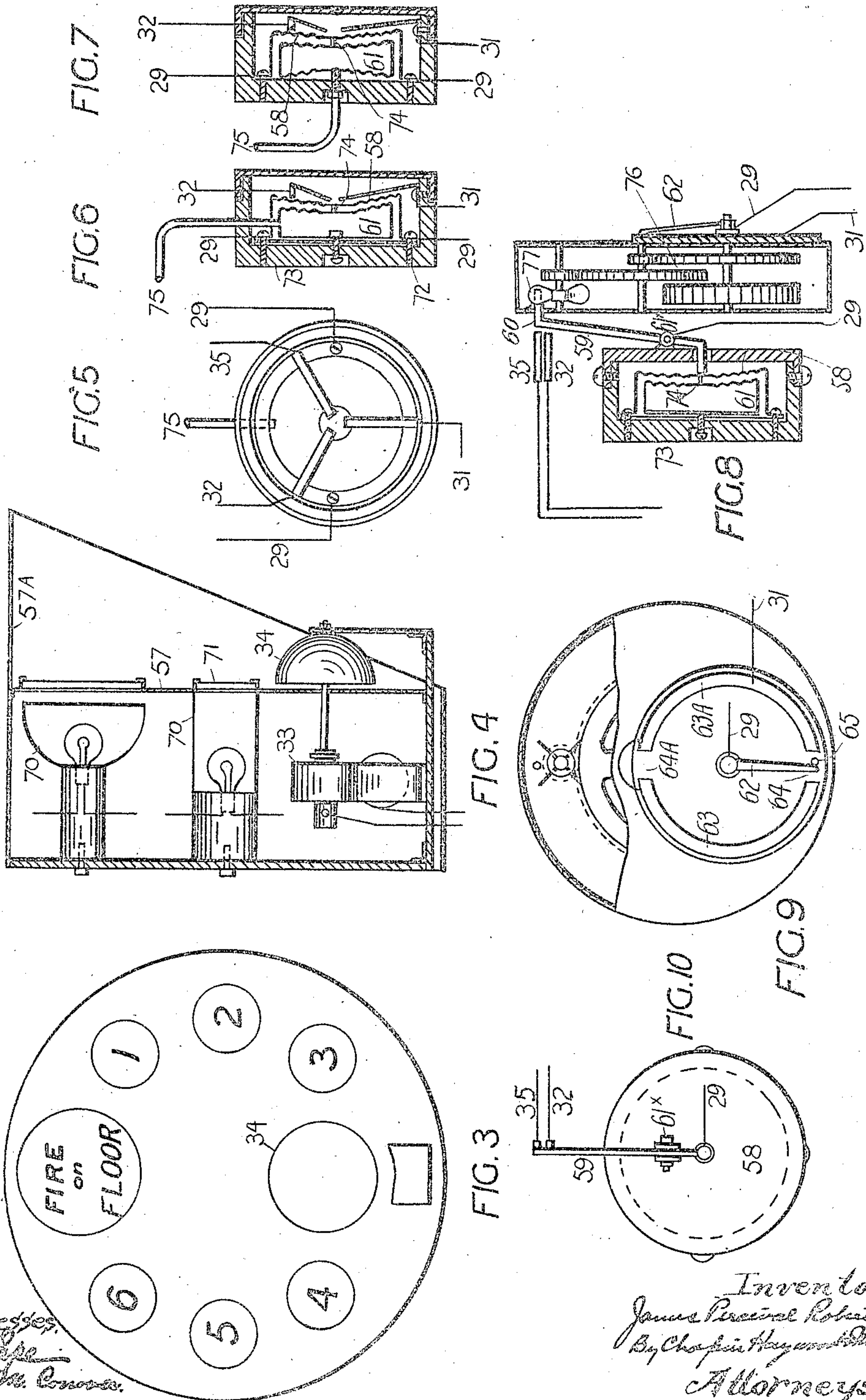
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5 SHEETS—SHEET 3.



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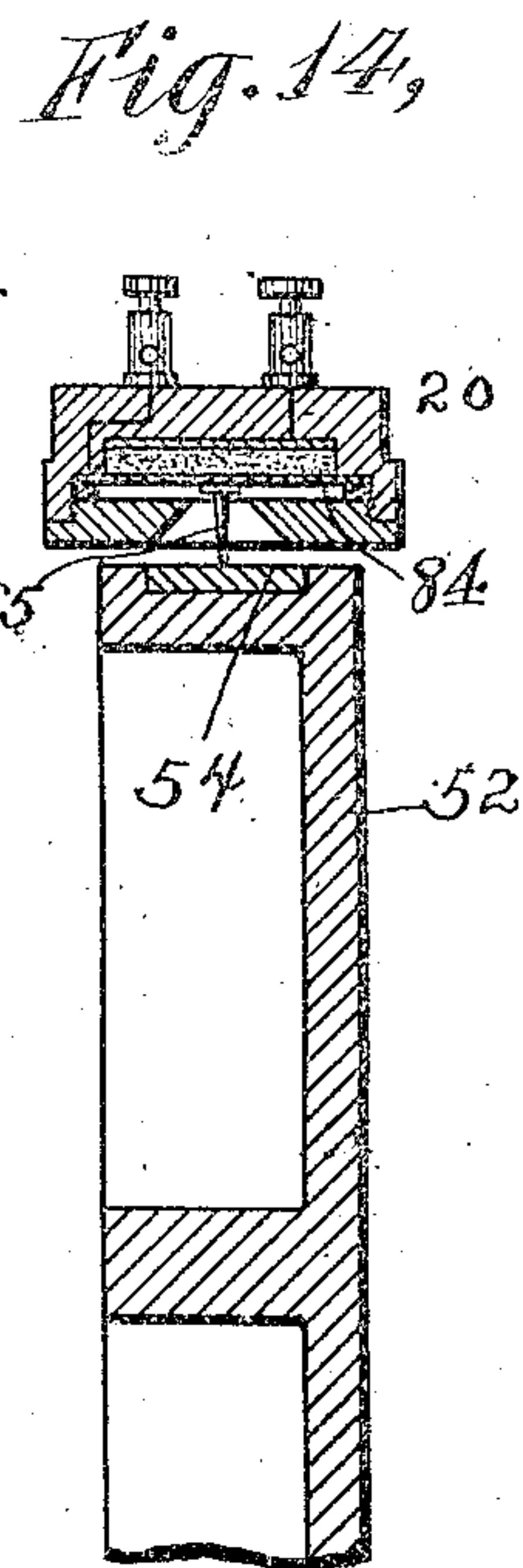
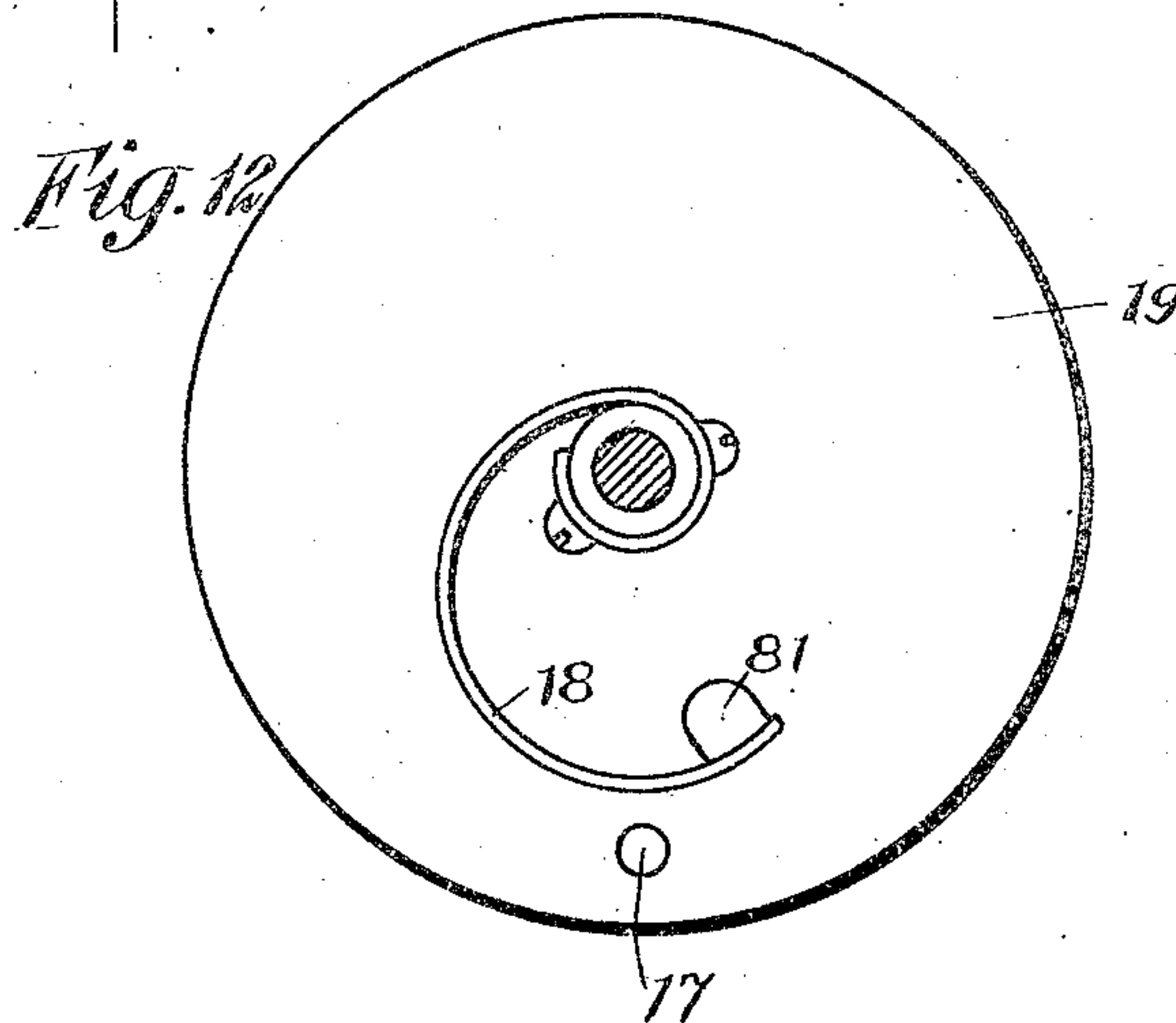
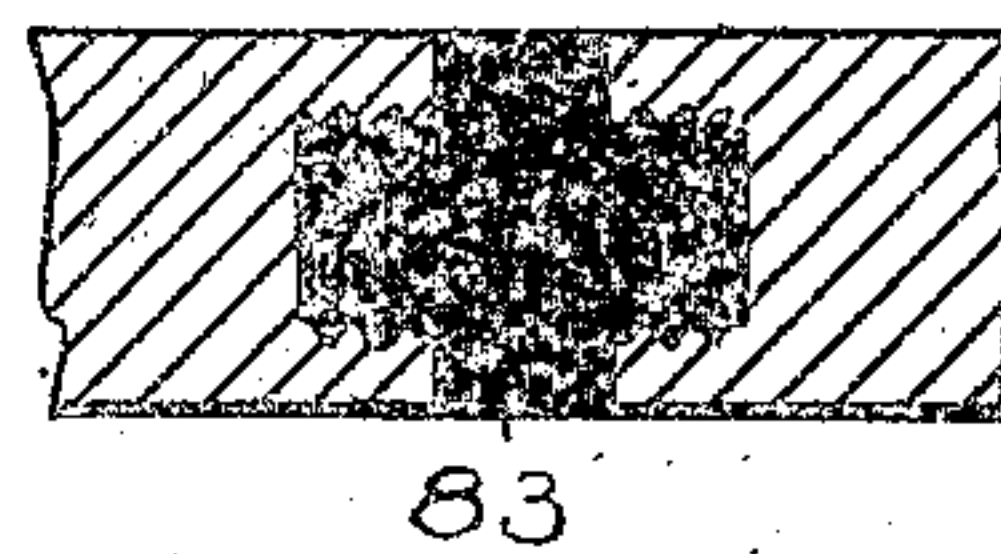
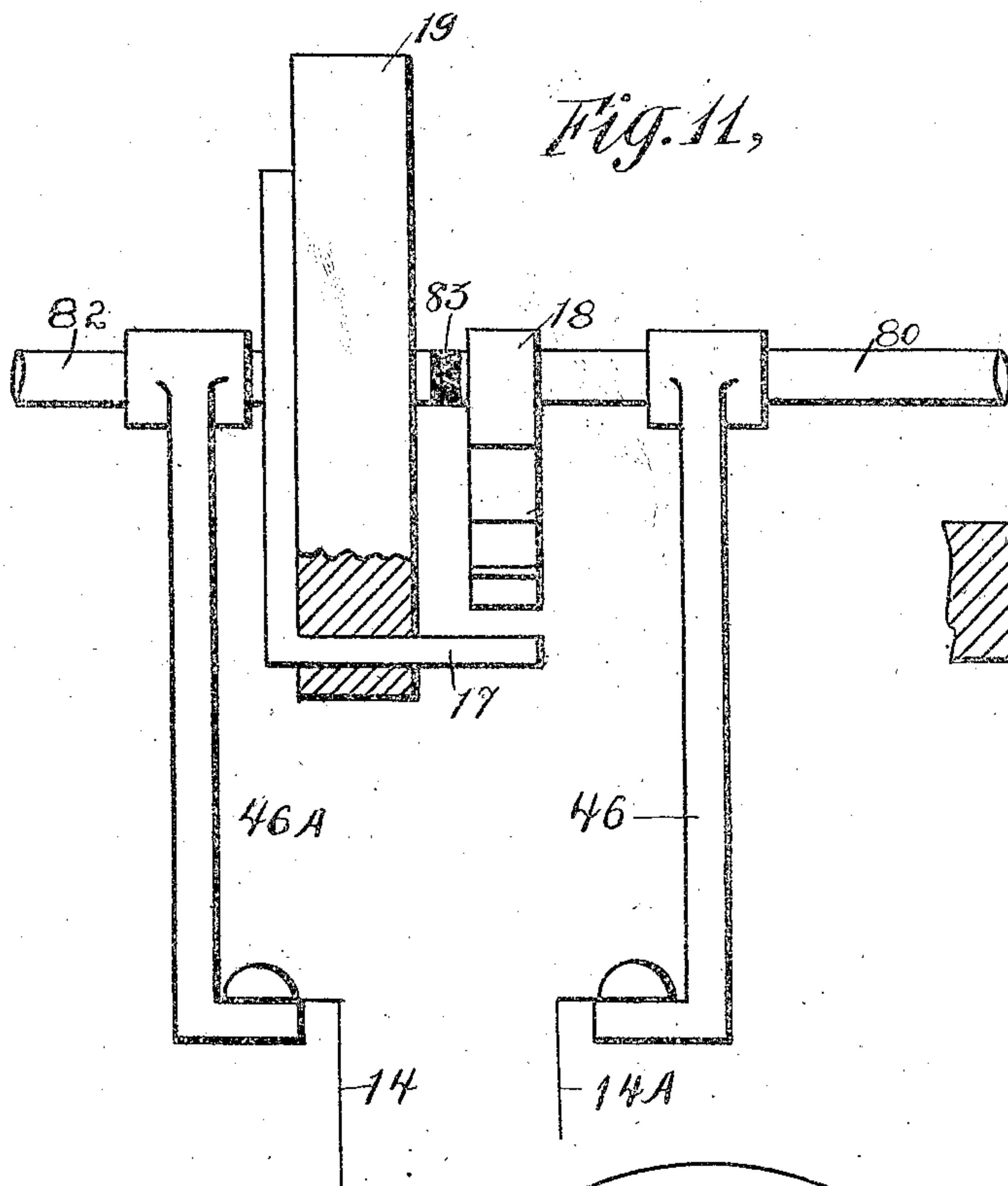
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5 SHEETS—SHEET 4.



WITNESSES:

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INVENTOR

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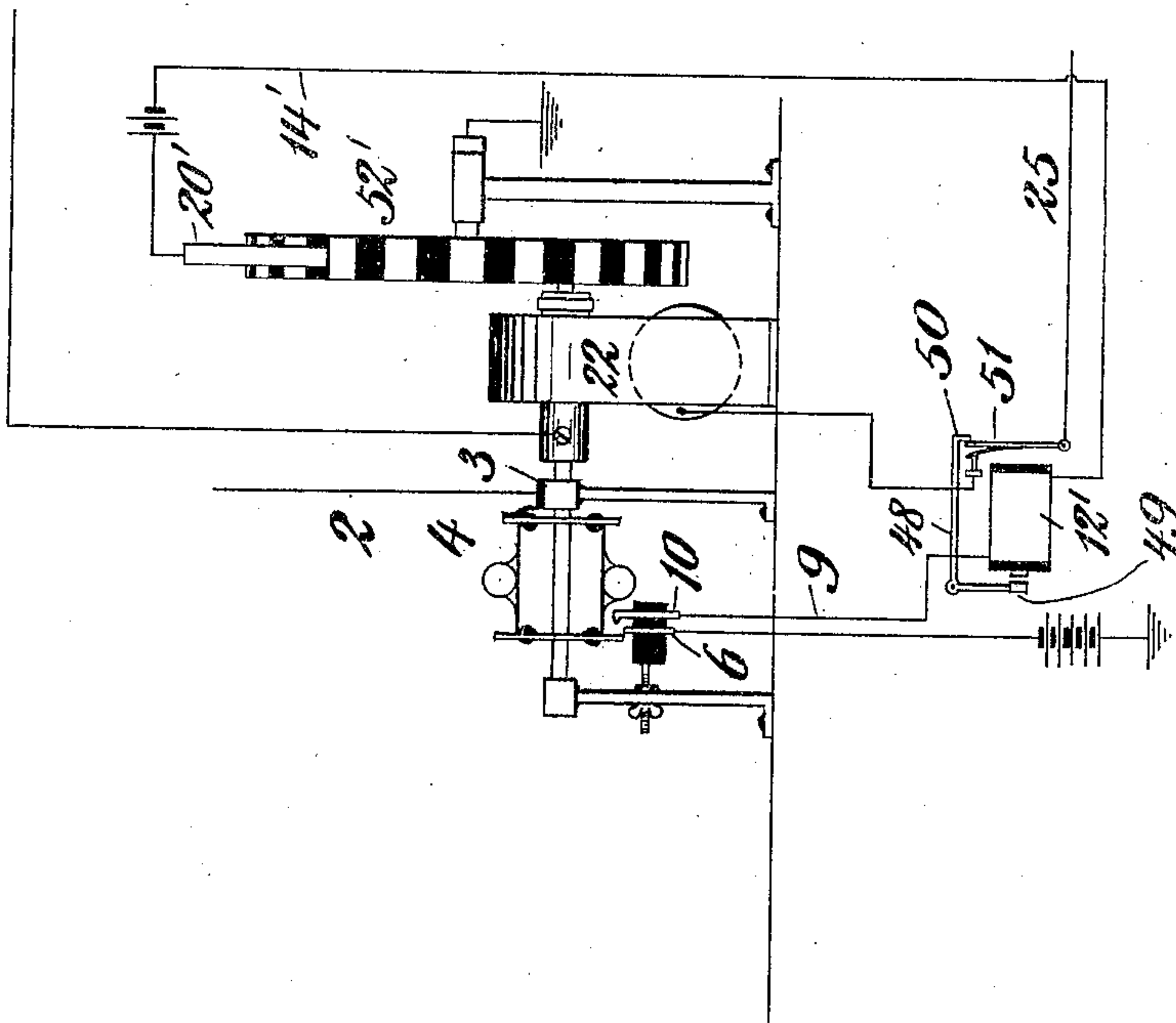
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APPLICATION FILED AUG. 13, 1902.

5 SHEETS—SHEET 5.

Fig. 15.



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# UNITED STATES PATENT OFFICE.

JAMES P. ROBERTSON, OF SYDNEY, NEW SOUTH WALES, AUSTRALIA.

## ELECTRICAL FIRE-ALARM APPARATUS.

SPECIFICATION forming part of Letters Patent No. 787,344, dated April 11, 1905.

Application filed August 13, 1902. Serial No. 119,571.

*To all whom it may concern:*

Be it known that I, JAMES PERCIVAL ROBERTSON, electrician, a subject of the King of Great Britain and Ireland, residing in the city of Sydney, in the State of New South Wales, Australia, have invented a new and useful Improvement in Electrical Fire-Alarm Apparatus, of which the following is a specification.

My invention relates generally to automatic alarm systems and apparatus, and more particularly to automatic fire-alarm systems and apparatus; and my invention has particular reference to alarm apparatus adapted to be worked in connection with a distant central-alarm system or a central-exchange telephone system.

In the following specification I particularly describe my invention as embodied in an automatic fire-alarm system employed in connection with a central-exchange telephone system, the apparatus of the system being set in operation primarily by suitable thermostats; but it will be understood that any other primary actuating device, such as are or may be commonly used in alarm systems, may be employed in place of the thermostat herein described.

My invention consists in the operation of telephonographic-signal-transmitting mechanism by an electric motor in a local circuit controlled by a primary actuating device, such as a thermostat; in automatic contact mechanism which normally holds the telephonographic or other signaling device isolated from the line-circuit, but is arranged to connect such signal-transmitting means at the proper time with the line-circuit and likewise to operate suitable signaling means at the central station to attract the attention of an operator; in means adapted to be operated from such central station for stopping the operation of the signal-transmitting mechanism; in a novel local alarm-indicator adapted to be placed on the outside of a building protected by my system or at any other convenient point for indicating the place from which the alarm originates, and in various other features hereinafter described, and particularly pointed out in the claims.

In the system herein described I locate at

suitable points signal-transmitting means connected to the wires of a central-alarm system or central-exchange telephone system. Such signal-transmitting means comprises means for sending through the wires of such system a telephone message or other characteristic signal which may serve to differentiate the alarm from the signals ordinarily sent over these circuits. The signal-transmitting means also comprises means for operating at the central station a suitable signaling device, such as a drop-shutter or signal-lamp, which will attract the attention of the operator located there. The alarm-transmitting mechanism preferably employed is a telephonographic device comprising a phonographic record on which may be recorded suitable words to indicate the character of the alarm and the place from which it is sent—such, for example, as “Fire at No. 100 King street”—and a combined phonographic reproducer and telephone-transmitter having a single diaphragm serving both for the reproduction of the recorded sounds and the telephonographic transmission thereof to the line-circuit. This telephonographic-signal-transmitting device is normally isolated from the telephone or other distant alarm-line and is connected therewith automatically when an alarm is to be sent in, provision being made for cutting it out of the line-circuit after the alarm has been transmitted, so as to reinstate the telephone or other line-circuit in its normal condition.

Primarily the signaling apparatus is thrown into action by a primary actuating device, such as a thermostat, and when in action is connected to the line-circuit “in parallel” with the subscriber’s telephone instruments; but the current used while transmitting the alarm cannot injure the telephone instruments. Currents ordinarily used in the operation of the telephone-calls and telephone instruments cannot affect the alarm apparatus, and, in fact, it is not possible to affect the local alarm apparatus by means of any current sent through the telephone-line except while the alarm is being sent in, at which time a current of suitable strength sent through the line for the purpose of disconnecting the alarm apparatus from the telephone-circuit



and stopping its operation will effect such result. My invention therefore enables a central-exchange telephone system to be requisitioned for fire-alarm purposes with perfect security that the operation of the telephone system can in no way be disturbed or injuriously affected and without expense, as no modification is required either at the exchange or at the subscriber's or branch instruments.

The explanatory drawings annexed are for the most part diagrammatic; but where necessary the apparatus used is shown in detail.

In the drawings, Figure 1 shows diagrammatically circuits and instruments located at a single substation connected to a telephone-line for transmitting alarms through such line to a central station. Fig. 2 is a similar view showing the use of primary actuating devices adapted to cause the signaling mechanism to be cut off automatically after a predetermined period. Fig. 3 shows a front view of a local alarm-indicator employed in connection with my system and comprising a plurality of indicator-lamps and an alarm-bell. Fig. 4 shows a vertical sectional elevation of this local alarm-indicator, showing the main lamp and one of the indicator-lamps and the bell and its motor and also showing the weather-hood over the front of the indicator. Fig. 5 shows a front view of the face of one form of thermostat which I may use and in particular shows the three contact-fingers of the thermostat and the return-circuit. Figs. 6 and 7 are similar vertical sections of two forms of such thermostat, the instrument of Fig. 6 having a flat back drum and that of Fig. 7 having a drum corrugated on both sides. Fig. 8 shows a section through a thermostat-head and the associated clockwork mechanism used for the automatic time-signal by which the message to fire-station is cut off after a predetermined interval has elapsed. Fig. 9 shows a front elevation of this instrument, a portion of the case being broken away. Fig. 10 shows a front elevation of the thermostat only of the instrument

Fig. 8, showing the arrangement of the lever-contact and clockwork-interrupter. Figs. 11, 12, and 13 are detail views of the centrifugal switch controlling the circuit of the microphone 20, Fig. 11 showing a side view and partial section of the switch on a scale larger than that of Fig. 1, Fig. 12 showing a face view, and Fig. 13 showing a section, of the shaft of the switch, illustrating the insulation of the two sections thereof from each other. Fig. 14 shows a detail section of the combined reproducer and telephone-transmitter. Fig. 15 is a diagram similar to the left-hand portion of Fig. 1, but showing an alternative form of signal transmitting device which may be employed.

Referring now to Fig. 1, in said figure 1 show a subscriber's telephone-line 1 provided

with ordinary telephone instruments, alarm-transmitting means comprising an electric motor 22, driving a telephonographic transmitting device 20 to 52, and suitable contact mechanism, hereinafter described, such alarm-transmitting mechanism connected to the telephone-circuit by a conductor 2, a plurality of thermostats 30<sup>A</sup>, 30<sup>B</sup> to 30<sup>F</sup>, inclusive, each of which when operated will cause the connection of the telephonographic signaling device to the telephone-line a local-alarm-indicating device comprising lamps A, B to G and a bell 34 and other circuits and instruments hereinafter mentioned.

Referring now to the telephonographic-signal-transmitting device, its motor, and the contact mechanism operated thereby, the branch 2 from the telephone-line is connected to the contact 3 of a centrifugal contact-maker 4.

5 is a line between the contact 6 and one pole of the battery 7, the other pole of which is earthed at 8.

9 is a line connecting the contact 10 to the secondary 11 of the induction-coil 12, the far end of such secondary being earthed by means of a line 13.

14 14<sup>A</sup> is a circuit with battery 15 connecting the two heads 17 and 18 of the centrifugal contact-maker 19 and the two binding-screws of the microphone-reproducer 20. This circuit 14 14<sup>A</sup> runs through the primary 16 of the induction-coil 12.

21 is a line connecting one terminal of the motor 22 with a contact-point 23 in the coil cut-out. The other terminal 24 of the coil cut-out is connected by a line 25 to the motor-battery 26. The motor-battery 26 is grouped with a local-alarm-bell battery 27 and a local-alarm-light battery 28, the returns of all of which are connected in a line 29, which connects the contact-plates of the several thermostats 30<sup>A</sup> to 30<sup>F</sup> together. These thermostats, as indicated in Figs. 6 and 7, comprise metal drums 61, to which are connected pipes 75, which may contain an expansible liquid or gas which will be expanded by rise of temperature, causing the flexible drum-heads to buckle outward. Each such drum is provided with a contact-plate to make contact with three contact fingers or points when it is moved by the thermostat. The contact-points may be in the form of light spring-plates. One of these contacts at each thermostat is connected to a line 31, which leads to the second terminal of the motor 22. When, therefore, a thermostat-contact is closed, the contact made at the point connected with the line 31 completes a circuit through the motor 22 and the return-line 29 through the battery 26, and so long as the contact is maintained at the thermostat the motor 22 will be rotated and operate certain other mechanism in the distant call apparatus, hereinafter described, until its circuit is broken by an automatic



cut-out or by ringing off, so that the connection between the lines 21 and 25 will be broken at the contact 23 24. Another contact from each thermostat leads by line 32<sup>A</sup> to 32<sup>F</sup> to the line 32, which passes through another (local alarm) motor 33, by which the local alarm-bell 34 is worked. Thence it passes to the battery 27 and obtains its return through the line 29. The closing of the thermostat-contacts therefore puts the bell-motor into operation, and this motor is kept operating until the contact at the thermostat is broken by restoring the buckling plate-head of same to its normal position. The third contact 35<sup>A</sup> to 35<sup>F</sup> from each thermostat is for the purpose of serving local alarm-lamps A to G, which are designed to indicate on the exterior of a building that a fire is alight within it and to indicate, further, when necessary the location of such fire in such building. These contacts must therefore each of them be connected to a separate circuit, as many such circuits being required as there are floors or localities in the building or block of buildings required to be separately indicated. In the indicator shown in Fig. 1 the floors are designated by letters A to F, indicating floors or localities known by the same lettering, or figures may be used in place of the letters, as in Fig. 3. These several circuits are marked 35<sup>A</sup>, 35<sup>B</sup>, and so on, according to the indicator and the corresponding thermostat to which they relate. These indicators A to F are each separately in series, with a master-indicator G, whence a line 36 is carried to the battery 28, and a return obtained thence by the line 29 to the thermostat.

The shaft 37 of the distant call-motor 22 is extended and carried in suitable bearings. It carries two contact-makers 4 and 19, to the detail construction of which, as shown, I am not limited, as there may be substituted therefor other kinds of known contact-makers which are adapted to close contacts when certain movements are made automatically by the raising of the speed above a predetermined point. The contact-maker 4, which I find a convenient appliance, works on the Pickering governor principle. Its hub parts 38 and 39 are electrically insulated from the shaft 37, upon which 39 is immovable. The springs 40, which carry weights 41, join a pair of metal rings 42 and 43, which are mounted on these hubs 38 and 39. The ring 43 works against the contact-plate 44, which is electrically connected onto the line 2, but otherwise insulated. The plate or ring 42 is adapted to make contact with the contacts 6 and 10 successively, with the former while rotating at a low rate of speed and with the latter when rotating at a higher rate of speed, when by centrifugal force the plates 42 and 43 are brought more closely together.

45 is a metallic brake-shoe mounted on the contact 10. If the speed of the motor should

become abnormal, the effect would be to increase the centrifugal action in the balls 41, thereby drawing the plate 42 inward beyond the predetermined point necessary to make mere contact and would thereby bring it up against the brake-rubber 45, friction with which would diminish the motor speed to the normal. The contacts 6 and 10 are electrically isolated. They are supported from a standard, such as 46, by an adjusting-screw and back nut 47, whereby they may be set up so as to complete the contacts either at a lower or higher speed of the motor, as may be required. Exact adjustment to suit the motor speed, the stiffness of the springs 40, and the conditions of other parts may thus be obtained. The contact-maker 19 may be of the ordinary centrifugal type, such as is used in connection with certain descriptions of telephones, and comprises a spiral spring 18, secured to one section 80 of a shaft forming an extension of the motor-shaft 37 and provided near its extremity with a weight 81, and a disk 19, secured to another section, 82, of the motor-shaft extended, sections 80 and 82 being insulated from each other by an insulating-coupling 83, said disk carrying a contact-finger 17, with which at a predetermined speed of rotation spring 18 will make contact, whereby spring 18 being in electrical connection with bearing-bracket 46 and finger 17 in electrical connection with bearing-bracket 46<sup>A</sup> the speaking-circuit (lines 14 and 14<sup>A</sup>) will be closed through the primary 16 of the induction-coil 12. The plate 42 makes contact with 6 only for a small fraction of a minute while it is passing over lightly in contact with it. The piece 6 may be in the form of a light bent spring-plate. This contact occurs soon after the motor has been started and before it has reached its normal speed. Before the motor quite attains its normal speed the plate 42 is moved beyond 6 and breaks the circuit. While 42 and 6 are in electrical contact the calling-battery 7 is put in parallel with the telephone instruments, an earth or metallic return 8 being used for this calling-circuit in the usual way. Current from the battery 7 then passes through the telephone-line to the central station, causing an annunciator-shutter to drop or illuminating a signal-lamp or operating whatever other signaling device is provided for attracting the attention of the operator. When the motor 22 has attained its normal speed, contact is made between the plates 42 and 10 through the rubbing contact 45 or through a light brush or spring mounted on 10. The contact of these plates 42 and 10 closes the speaking-circuit from the lines 1 and 2 through the line 9 and the secondary 11 of the induction-coil 12 and the earth or metallic return 13 to the telephone instruments at the central station. The circuit of microphone-reproducer 20 being closed at this time through switch 19, and the phonograph-disk 52 being in rotation, telephonic



fluctuations produced by the microphone in the line 14 14<sup>A</sup> induce in passing through the primary coil 16 of induction-coil 12 similar fluctuations in the secondary circuit of said coil and in the speaking-circuit comprising lines 1, 2, 9, and 13. The operator listening through the receiver, as when an ordinary telephone call is sent in, will receive the alarm thus automatically transmitted through the telephone-line and thereupon will notify the fire-brigade or other suitable authorities. This latter may be done by ringing up the fire-brigade in the ordinary manner and then connecting the telephone-circuit through which the alarm is being transmitted to the telephone-circuit of the fire-brigade in the ordinary manner. The induction-coil 12 is set up so as to form the electromagnet of a cut-out device associated with mechanism like that used in an ordinary exchange-shutter. Said mechanism consists of a bell-crank lever 48, with armature 49 and catch-tooth 50 coacting with a drop-shutter 51, provided with a spring 24 or a counterweight. The speaking-current which runs through the coil is insufficient to excite it sufficiently to attract the armature 49, so that the shutter-contact remains closed while a ringing-up or speaking-current only is passing. If, however, while that current is passing a high-voltage current be sent through the secondary of the induction-coil, the coil will become sufficiently magnetically excited, and the armature 49 will be attracted, with the result that the bell-crank lever 48 will be canted, freeing the shutter 51 by releasing the catch-tooth 50, whereby the contact between 23 and 24 (51) will be broken and the whole distant-call motor-circuit thus interrupted, whereupon the motor and all the rest of the parts of it which it actuates will come to rest and be electrically isolated from the telephone-line. The motor 22 is also geared to a circular drum or plate 52, mounted on a bracket, such as 53, or if the motor be sufficiently slow running the circular disk or drum 52 can be attached directly to its shaft. On the edge of this plate or on its face near the edge is set a gramophone-record 54, impressed or printed in a strip of metal, ebonite, or other suitable substance, which is dropped and fastened into a circular slot in or near the periphery.

In order to make a phonograph or gramophone available for the purpose of sending a telephonic message in the way described, a certain modification in it is necessary. It is not practicable to obtain reasonably clear enunciation through a telephone-transmitter receiving its impressions from sound-waves emitted from a diaphragm of the ordinary phonograph or gramophone type, such diaphragms consisting of very thin flexible sheets of glass or other highly-elastic substance. On this account in order to make the invention practical I combine a microphone directly with the speaking-diaphragm and make cer-

tain modifications in the diaphragm itself, which if of the ordinary description above referred to would not satisfactorily coact with the carbon transmitter. I have found it most advantageous to use a diaphragm which would be almost entirely useless for ordinary phonographic purposes, for which the diaphragm is required to emit audible sound-vibrations. I have obtained satisfactory results by using a diaphragm of iron or steel plate of considerable thickness, preferably about one-fiftieth of an inch, using behind it a carbon transmitter of the Hunning's type, in which loose particles of carbon fill a cavity in a carbon block, so as to make microphonic contact between that plate and the diaphragm-plate. Such transmitter is illustrated in Fig. 14, in which numeral 84 designates the diaphragm, and 85 the tracing point or needle connected therewith. The very delicate vibrations set up in the diaphragm-plate by the tracing point or needle of the phonograph or gramophone are too feeble to produce audible sound-vibrations with any degree of clearness of articulation; but they are, however, of the proper character to act with a microphonic contact, so as to affect the current passing, as in a telephone, and reproduce the record telephonically with a highly satisfactory degree of clearness.

It is of course necessary to provide a specially-made record cylinder or plate for each premises in which the apparatus is fitted. The manner of and apparatus for making such records are well known to qualified persons.

20 is a microphone of the general character just indicated. It is served by the battery 15, and its currents pass through the primary 16 of the induction-coil 12, the circuit being closed by the circuit-closer 19, which is so set as to effect the closure immediately after the plate 42 has passed over the contact 6, as already described. A single message is imprinted on the strip 54, and the peripheral speed of the disk 52 is so regulated as that the record will speak clearly through the microphone. I have obtained very successful results when the diameter of the plate 52 is about ten inches and its speed about two hundred rotations per minute. It is not possible to send the current of the calling-battery 7 through the microphone. The only battery which can be connected with it is 15, which is a two-cell battery, as ordinarily fitted to work a microphone. Once started the gramophone will continue repeating its record through its lines 14 and 14<sup>A</sup>, through the primary of the induction-coil 12, thereby sending a secondary current through the lines 13 and 9, the contact 10, the plate 42, the springs 40, the plate 43, and the line 2 into the telephone-line 1.

It is necessary that the local indicator within the casing 57 should be distant from the other part of the apparatus, so as not to interfere with the clearness of enunciation of the gramophone.



Instead of providing the disk 52 with a gramophone-record it may be provided with a series of contacts and insulating-pieces around its periphery working against a spring plate or brush, the contact device thereby formed being placed in the signaling-circuit in lieu of the microphone 20. Such arrangement is illustrated in Fig. 15, in which numeral 52' designates the said disk having alternated conductive and insulating spaces on its periphery, and numeral 20' designates the said brush. Obviously the disk 52' and brush 20' might be connected to wires 14 and 14', Fig. 1, in place of the microphone 20, a battery being included in the circuit to supply current; but since there is no need to employ an induction-coil with this arrangement it is preferable to earth the disk 52' and to connect brush 20' by wire 14' to one end of the coil of a magnet 12', to the other end of which conductor 9 is connected, the said magnet taking the place of the induction-coil 12 in Fig. 1 and, like said induction-coil, operating the shutter 51. When the disk operates, the intermittent current produced by the passage of the disk under the brush will produce in the receiver of the central operator a sound which is readily distinguishable from any sound obtained through an ordinary telephone instrument, thus indicating an alarm. A certain simplification in the apparatus and circuits would thus be obtained, but at the expense of some delay in the reading of the signal at the fire-station, as it would be necessary for the exchange attendant to inform the fire-station per telephone of the telephone-number from which the call was received, so as to enable the fire-station attendant to refer to an index and discover the location of the fire by ascertaining the address corresponding with the telephone-number so received. Where the gramophone device is used, the exchange attendant merely connects the ringing-line to the exchange as for an ordinary subscriber's call and the apparatus does the rest, for it conveys a spoken message to the fire-station operator, telling him the exact address at which the calling apparatus is in operation.

The arrangement of the gramophone-record on the periphery of a disk, such as 52, may be modified in various ways without departing from the principle of the invention.

Where it is required that the transmitted message, whether in the form of an intermittent current or a spoken message, shall be cut off automatically after a predetermined period, the additional mechanism shown in Figs. 2, 8, 9, and 10 is used. This mechanism consists of a buckling-plate head 58, controlled by the drum-head at the end of the thermostat-pipe. To the rear of the head is a lever 59, with a catch-point 60. This lever is mounted upon a pin 61, set near its lower end, which latter takes its bearing against the buckling-

plate 58, and by virtue of the greater proportionate length of its upper part the catch-point 60 has considerable amplitude of motion. In front of it is set a clockwork mechanism driven by a spring and designed to rotate a contact-finger 62 around a dial. The catch-point 60 normally engages an air-fan or other portion of the clockwork mechanism, so as to prevent the same from moving. When, however, the normal pressure within the drum 61 is raised by the warming of the air or liquid in the thermostat-pipe, the catch-point 60 is withdrawn and the clockwork mechanism rotates, carrying the contact-piece 62 around the dial. The dial consists of two or more segment-plates 63 63<sup>A</sup>, each connected to the line 31, and two or more interrupting-segments 64 64<sup>A</sup> of vulcanite or other non-conductor. In one of these segments is a stop-pin 65. When the contact-piece 62 is rotated, it passes over the several contact-segments 63 and insulator-plates 64, successively making contact and cutting off same, finally coming to rest on one of the insulator-pieces 64. The movement of the contact-hand 62 may be regulated for a predetermined pace, so that it will occupy, say, three or four or five minutes in making the circle. During the rotation the whole apparatus—that is, both the local alarm and the distant signaling portion of it—is worked repeatedly, as if so many separate calls were being received. The contact-hand 62 being connected to the return-line 29 completes the circuit with the line 31, alternately sending current to the motor 22 to operate it and then cutting that off as the hand 62 passes over an insulated segment, allowing the whole of the distant alarm mechanism to come to rest. In coming to rest and in speeding up again the exchange is twice rung up, the ringing being succeeded by the speaking of the message gramophonically. The only resetting required by this apparatus is to replace the hand 62 on the other side of the pin 65, against which it has come to rest, and to rewind the clockwork which has been in action. The ringing-off circuit through the secondary of the induction-coil 12 and the shutter-cut-out may therefore in this case be omitted. The lever 59, carrying the catch-point 60, must, however, be made to close the circuits through the lines 32 and 35. It is readily made to do this by being made to slide over two contact-points at the terminals of these lines at each thermostat, respectively.

In Fig. 3 the indicator-lamps, which refer to separate floors or apartments or sections of a building or block, are marked, respectively, 1, 2, 3, and so on. They are set in closed cases 70 to protect them from the weather, and the front of each case is closed with a glass plate 71. Each of the thermostat-lamp circuits passes through its corresponding lamp and thence through the large main indicator-lamp at the top, so that each of these circuits serves



two lamps placed in series with one another. The motor 33, operating the local alarm-bell 34, obtains its current from the battery through the circuits 29 and 32, which are closed by any one of the thermostats becoming affected by a rising temperature in its tube. As the lamp-circuit 35 36 29 and this motor-circuit 29 32 are positively closed by the buckling of the thermostat-plate, the lamps will continue lighted and the bell 34 will continue ringing until the affected thermostat-plate has been reinstated in its normal condition. This bell and lamp alarm box 57 is set on the outside of a building or in some place adjacent thereto within public view, and if properly cased need not be protected from the weather. Its purpose is to sound a local alarm by ringing the bell and exhibiting the lamp-signal as soon as a fire has broken out within the area served by it.

The lamps, or the portions of the cover-glass immediately adjacent to the several lamps, may be provided with suitable words or letters, visible when the lamps are lighted, indicating the existence of a fire and the location to which each lamp corresponds.

The thermostat illustrated in the drawings is especially adapted to operate with my system herein described and forms the subject-matter of a divisional application for Letters Patent filed October 7, 1903, Serial No. 176,052. As already stated, it comprises a drum 61, having a flexible corrugated head arranged by its movement to actuate a contact-plate and contact-fingers (see Figs. 6 and 7) or a tripping-lever 59 (see Fig. 8) and a tube 75, connected with said drum and containing an expansible liquid or gas.

The tube 75 is a tube of small diameter of the necessary length and of any material not acted on by the expansive fluid used. When the thermostat operates contact-fingers of circuits 31, 32, and 35, as shown in Figs. 6 and 7, the head of the drum 61 is not allowed to come directly into contact with these contact-making points of the lines 31, 32, and 35; but there is a false head 58 for that purpose, which false head is acted upon by the drum-head pressing behind it. This false head is buckled slightly, so as to remain either definitely in contact with the contact-points when buckled outward from the drum or definitely out of contact with them when buckled inward toward the drum. It consists of a circular corrugated plate 58, such as is used in an aneroid barometer, mounted on a body portion 73 through screws 72, by which the wires 29 are secured to it. The contact-points 31, 32, and 35 are fixed in the casing 73 by screws which connect to them, respectively, their wires. These contact-pieces 31, 32, and 35 are of flexible metal, and their neighboring ends are set in such a position that when the false head 58 is buckled outward it comes into contact with all of them and by virtue of its own elasticity keeps

in contact with them until pushed back by hand, and so reinstated in its normal position. The contact-pieces may be set by bending them or to obtain greater nicety of adjustment may be provided with setting-screws. The drum may have a flat back, as shown in Fig. 6, or a corrugated back, as shown in Fig. 7, and when in the latter form will be found to be more sensitive. 74 is a knob on the head of this drum 61 for making contact with the rear side of the false head 58. The drum 61 is airtight and operates after the manner of the drum in an aneroid barometer. The thermostat-pipe 75, being the end of the thermostat-pipe which is carried through the apartment to be protected, is carried into this drum 61.

In operation when the temperature is raised so as to affect the liquid or air in the pipe 75 such liquid or air presses upon the liquid or air in the drum 61, distending the heads and causing the pin 74 to press against the false head 58. When this head is pressed upon sufficiently, it buckles outward, making contact with the contact-points 31, 32, and 35 and completing the circuit through their wires and the line 29. It will be seen that the contact between 58 and 31, 32 and 35 is a rubbing contact, and the points of contact are kept together with elastic force. By keeping the head 58 pressed inward, so as to be almost at its buckling-point under normal conditions, a very slight elevation of temperature will cause sufficient expansion to push it over its center and make it buckle outward and quickly pass through a considerable distance and complete the alarm-contacts. A maximum of reliability is secured in a thermostat system of this class. It involves a minimum number of contacts, and, as will be shown later, the arrangement is such that the failure of any one contact cannot affect the others in the system. Moreover, a very large area can be served by a single contact, and a response to very slight variations in temperature may be secured. All the contacts are self-cleaning. A very ready and the best way of increasing the sensitiveness of the apparatus is also at hand, for the fluid or air contained in the thermostat-pipes and the thermostat-drum can be put under slightly-increased pressure at normal temperatures by pinching any portion of the thermostat-pipe, preferably its dead end, so as to reduce its volume. The original setting of the apparatus may be most neatly regulated or varied by pinching the closed end of the thermostat-tube with nippers until the exact required condition of balance of the contact-making head 58 is obtained.

Referring to Figs. 8, 9, and 10, 76 is a clockwork mechanism operated by a spring which requires to be wound to provide the motive power. At the end of the wheel-train is an air-vane 77, while on the slowest-moving spindle of the train is a contact-hand 62, which the movement of the train causes to rotate



tate over a dial. This dial consists of two or more (two only shown) contact-segments 63 and 63<sup>A</sup>, connected by a wire and two insulator-segments 64 and 64<sup>A</sup>, which separate the contact-segments. The circuit 29 31 is completed through the contact-hand 62, and these conducting-segments 63 and 63<sup>A</sup> being closed when the contact-hand is passing over these segments and broken when the contact-hand is passing over or at rest upon one of the insulator-segments. Normally—that is, in the position of rest—the contact-hand is as shown in Fig. 9. A peg 65 is inserted behind it. When the air-vane is released by the mechanism hereinafter to be described following upon the expansion of a thermostat-head, the clockwork mechanism comes into action and very slowly rotates the contact-hand 62 around the dial. When it passes from the lower insulating-segment onto the first conducting-segment 63, the circuit to the motor in the distant call apparatus is completed and that apparatus is thrown into activity. When the contact-hand passes thence on to the upper insulating-segment of the dial, the motor-circuit in the distant call apparatus is opened and the motor and connected apparatus come to rest. When, however, the hand passing beyond this insulating-segment passes on to the second conducting-segment 63<sup>A</sup>, the motor-circuit is closed again, once more throwing the whole of the distant call apparatus into activity and repeating the call to the exchange and fire station, *de novo*, as if a second alarm had been given. Finally, the contact-hand passes from the second conductor on to the lower insulating-space and comes to rest against the peg 65, which prevents any further rotation. The air-vane is controlled by a catch-finger 60 on the end of a long end lever 59, which is fulcrumed at 61<sup>x</sup> on a casing 73, inclosing the thermostat-head 61. The buckling of the false head of the thermostat presses out against the lower end of this lever, causing its long upper end, carrying the catch-finger, to be retired out of contact with the air-vane and over spring contact-plates 32 and 35, completing a circuit through the same and the line 29. The circuits connected to the distant call apparatus are governed by the contact-hand 62 and segment-plates 63 and 63<sup>A</sup> on the dial; but the circuits connected with the local alarm are those which are closed through the lever 59. To reset this apparatus, it is necessary to restore the false head of the thermostat to its normal position to draw out the lever 59 from the contact-plates 32 and 35 and so that its catch-finger 60 will prevent the rotation of the air-vane 77, and it is also necessary to rewind the spring-motor and to reset the peg 65 on the rear side of the contact-hand 62, as shown in Fig. 9.

The mode of operation of the apparatus is as follows: The action is precisely the same in the apparatus, irrespectively of which of

the thermostats 30 is affected. Assuming that the pressure in the tube connected with thermostat 30<sup>A</sup> is increased beyond the critical point, so as that the pressure of the front of the drum 61 causes the false head 58 of the thermostat to buckle outward, a circuit is closed through the lines 29, 32<sup>A</sup>, 31, and 35<sup>A</sup>. The circuit through 32<sup>A</sup> passes through the line 32 and the motor 33, causing the motor to be rotated and to ring the bell 34, thence by the line 32 to the battery 27, returning to complete the circuit by the line 29, which is a common return for all the circuits. The circuit through 35<sup>A</sup> passes through the lamp A and the lamp G, lighting up both the same, through the common line 36 to the battery 28, thence returning by the common return 29. The circuit through 31 runs through the motor 22, thence through line 21, the contact 23, and the spring-shutter 24 51 to the line 25, thence to the battery 26 and returning to complete through the common return 29. The circuits through the lines 35 and 32 once completed cannot be interrupted except by reinstating the false head 58 of the thermostat 30<sup>A</sup>, so as to break the circuits at the contacts operating in connection with that false head. The circuit through 21 and 25 can, however, be interrupted independently of the local alarm-bell 34 and local light-circuits by the dropping of the shutter 51, whereby contact between the point 23 and the spring-back 24 of the shutter 51 is broken. The spindle of the motor 22 rotates the centrifugal mechanisms 4 and 19. The rotation of 4 causes the balls 41 on the light spring-plates 40 to fly outward as in an ordinary engine-governor, whereby the end plate 42 is drawn in gradually as the speed of the motor runs up. The plate 42 is so adjusted with reference to the contact 6 that there shall be a definite gap while the motor is at rest, cutting out the circuit 5 from the battery 7 from the circuits connected through the centrifugal contact-maker 4. As the centrifugal governor is a sensitive piece of mechanism, however, the comparatively slow rotation of its motor-spindle 37 suffices to draw the plate 42 into contact with 6. In passing over 6, which occupies but a few seconds, a circuit is completed from earth through the battery 7 and the line 5, the contacts 6 and 42, the spring-plates 40, the end plate 43, and the rubbing-spring 44 to the line 2, and thence into the telephone-line, returning by the exchange and distant telephone instrument through earth. This circuit from the battery 7 is for calling the operator at the exchange, the battery 7 being of a character adapted for that purpose, and a single current-pulse from battery 7 suffices to drop the switchboard-shutter or to operate the relay controlling the switchboard signal-lamp corresponding to the line through which the call is sent. When the speed of the motor has become sufficiently high to draw the plate 42 past the



contact 6, the calling-current from the battery 7 is cut off. Shortly afterward—that is, when the motor is approximating to its normal speed—the plate 42 is brought into contact with the knob 45 on the stem 10. The friction between the plate 42 and the knob 45 makes a good electrical contact, while it suffices to act as a brake upon the motor. Upon contact between 42 and 45 taking place a circuit is completed from the telephone-line 1 through the line 2, the contact-spring 44, plate 43, springs 40, and plate 42 and contact 45 10 to the line 9, thence through the secondary winding 11 of the induction-coil 12, and thence to earth by the line 13, returning through earth and the distant telephone instrument and exchange to the telephone-line 1. The other centrifugal contact-maker 19 is adapted to close the electrical contact between its two ends 17 and 18 when the speed of the motor approximates its normal. When this takes place, the circuit is completed from the speaking-battery 15 by the supporting-standards 46 and 46<sup>A</sup> to the line 14, thence through the microphone 20, and 25 thence by the line 14<sup>A</sup> through the primary 16 of the induction-coil 12 to the battery 15.

The currents from the batteries 7 and 15 are of too low a tension to affect the energizing of the induction-coil 12 sufficiently to attract the armature 49. If, however, while the motor 22 is running at its normal speed and the circuit is completed through 17 and 18 and 42 and 45 a ring-off current is received from an ordinary telephone instrument through the line 2, that current passing through the secondary 11 of the coil 12 will suffice to energize that coil sufficiently to attract the armature 49. Upon that armature being attracted the bell-crank lever 48, on which it hangs, is 40 canted so that its catch-point 50 will be lifted up from the tip of the shutter 51, whereupon the spring 24, reacting against the contact 23 will throw open the shutter, thereby interrupting the circuit between the lines 21 and 45 25. The interruption of this circuit cuts out the motor-battery 26, and the motor and the whole of the apparatus then comes to rest.

The motor 22 rotates the plate 52, on the edge of which is set up the gramophone-record 54. The vibration of the diaphragm-plate of the microphone 20, due to its needle running through the record on 54, varies the resistance in the well-known manner in the microphone, and so governs the current from the battery 15. This undulating battery-current passing through the primary 16 of the induction-coil 12 sets up in the secondary 11 of the same coil a line-current which passes to the telephone-line and is of the character required for telephone-speaking purposes. The rotation of the motor 22 therefore first sends into the line a calling-current from the battery 7. This current passes only for a sufficient time to operate the annunciator-shutter, signal-light, or other signaling device employed at

the central station for attracting the attention of the attendant. Almost immediately after the cutting out of the battery 7 the induction-coil and the microphone are cut into the telephone-circuit 42 45, so that the gramophone will continue to speak its message into the telephone-circuit so long as the rotation of the motor 22 continues and until the motor-circuit 21 25 is broken by the opening of the shutter 51, due to the passing through the induction-coil 12 of a ringing-off current per the telephone-line. The current for driving the motor 22 is supplied by the battery 26, whose return is through the common line 29.

In the alternative arrangement, in which a spring-motor mechanism is associated with the thermostats, the motor-circuit 21 25 is broken automatically. When the rotating contact 62 passes from the lower insulated space 64 onto the contact-segment 63, the circuit is completed between the lines 29 and 31 and the whole of the electrical and mechanical mechanism connected with the motor 22 and associated parts is put into action. When the rotating contact-hand 62 passes onto the upper insulating-space 64<sup>A</sup>, the motor-circuit is interrupted and the whole of the electrical and mechanical apparatus referred to in connection with the distant-call apparatus comes to rest. When the rotating contact 62 again passes onto the second contact-segment 63<sup>A</sup>, the whole of the said distant-call apparatus is restored to working condition, the exchange being rung up and the speaking-circuits cut in afresh just as if a new call were being sent. Finally when the rotating contact 62 comes to rest on the lower insulating-space 64 against the stop-peg 65 the motor-circuit is again interrupted and the whole of the said distant-call electrical and mechanical apparatus finally comes to rest and cannot be restarted until the peg 65 is removed and reinstated on the other side of the rotating contact. The clockwork mechanism 76 is permitted to rotate when the catch-finger 60 on the lever 59 is withdrawn by the buckling of the false head 58 of the thermostat 30. The backward movement of the upper end of the lever 59 throws its top end into contact with the terminals of the lines 32 35, completing circuits therefrom to the line 29, which is connected to the pin 61 of said lever 59.

In any case where the motor-circuit 21 25 is broken automatically by means of the clockwork device or broken by ringing off from the exchange or distant station the local alarm-bell 34 and local signal-lights are maintained until the thermostat contact is reinstated in its normal position.

When the motor 22 is slowing up and coming to rest by reason of the breaking of its battery-circuit 21 25, the centrifugal contact-makers 4 and 19 gradually reassume their normal positions, successively cutting out the speaking-circuit and cutting in the battery-



circuit 7 just before coming to rest, said battery 7 sending a ring-off current through the line 2 to the telephone-line. So that it will be seen that the distant-call apparatus is entirely automatic, first ringing up the exchange, then connecting up the speaking apparatus, and, having delivered its message, ringing off the exchange again, denoting that it has come to rest. When the automatic clockwork cut-out is used, the shutter cut-out mechanism for breaking the circuit between 21 and 25 is not needed, and it is not necessary to reinstate any part of the distant-call apparatus in order to put it into condition for work again. The only reinstatement of parts that is needed in that case is in connection with the thermostat and its clockwork mechanism. When, however, the drop-shutter cut-out is used, the whole of the distant-call apparatus is reset by simply replacing the shutter 51 behind the catch-tooth 50 of the bell-crank 48.

By the term "telephonograph," hereinafter used in the claims, I mean any instrument comprising a speech-reproducing instrument of the class variously termed "phonograph," "graphophone," and "gramophone" combined with a telephone-transmitter in such manner that when the instrument is operated articulates speech or other suitable signals may be transmitted over a line conductor. I preferably employ, however, an instrument in which the reproducer of the phonograph part of the instrument and the microphone or transmitter of the telephone part of the instrument are combined in one, as above described.

I do not limit myself to the use of an electric motor for operating the signal or alarm transmitting mechanism. Any suitable motor may be used, although an electric motor is ordinarily the most convenient.

I do not limit myself to the use of telephonographic signal-transmitting mechanism, as any device which when operating on the line-circuit will produce a characteristic sound or signal at the receiving-station may be used. It is not necessary that the signal transmitted shall indicate by a telephonic or telegraphic message the source from which the alarm originates, as this is shown by the number of the switchboard or signal-lamp which is operated by the incoming signal.

When the system herein described is used as a central fire-alarm system not connected with a telephone system, there will be at the central station a switchboard substantially like a telephone-switchboard, without speaking-circuits or telephone apparatus, the shutters or signal-lamps of the switchboard showing the source from which the alarm comes.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an alarm system, the combination with local signal-transmitting mechanism comprising telephonographic signal-transmitting devices and an electric motor for operating the

same, and a line-circuit for connecting said signal-transmitting mechanism with a distant station, of a local circuit supplying current to drive said motor, and a primary actuating device controlling said local circuit.

2. In a fire-alarm system, the combination with local signal-transmitting mechanism comprising telephonographic signal-transmitting devices and an electric motor for operating the same, and a line-circuit for connecting said signal-transmitting mechanism with a distant station, of a local circuit supplying current to drive said motor, and a thermostat controlling said local circuit.

3. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a main signal-transmitting device driven thereby, and means for transmitting a calling-signal comprising centrifugal contact mechanism operated by said motor, of a local circuit controlling said motor, and a primary actuating device controlling said local circuit.

4. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a main signal-transmitting device driven thereby, and means for transmitting a calling-signal comprising centrifugal contact mechanism operated by said motor, of a local circuit controlling said motor, and a thermostat controlling said local circuit.

5. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, main signal-transmitting circuit-varying means driven thereby, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and another contact in circuit with said main signal-transmitting circuit-varying means, of a primary actuating device and means operated thereby controlling said motor.

6. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, main signal-transmitting circuit-varying means driven thereby, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and another contact in circuit with said main signal-transmitting circuit-varying means, of a thermostat and means operated thereby controlling said motor.

7. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-trans-



mitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, main signal-transmitting circuit-varying means driven thereby, a local circuit controlled by said signal-transmitting device, an induction-coil arranged to connect said local circuit inductively with the line-circuit, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and a main-line contact, arranged respectively to transmit a calling-signal through the line and to complete the line-circuit through the induction-coil, and a local-circuit contact arranged to complete the said local circuit, of a primary actuating device and means operated thereby controlling said motor.

8. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, main signal-transmitting circuit-varying means driven thereby, a local circuit controlled by said signal-transmitting device, an induction-coil arranged to connect said local circuit inductively with the line-circuit, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and a main-line contact, arranged respectively to transmit a calling-signal through the line and to complete the line-circuit through the induction-coil, and a local-circuit contact arranged to complete the said local circuit, of a thermostat and means operated thereby controlling said motor.

9. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a telephonographic signaling device driven thereby, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and another contact controlling the transmission of signals from said main signal-transmitting circuit-varying means through the line, of a primary actuating device and means operated thereby controlling said motor.

10. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a telephonographic signaling device driven thereby, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and another contact controlling the transmission of signals from said main signal-transmitting circuit-varying means through the line, of a thermostat and means operated thereby controlling said motor.

11. In an alarm system, the combination

with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a telephonographic signaling device driven thereby, a local circuit connected to said telephonographic signaling device, an induction-coil arranged to connect said local circuit inductively with the line-circuit, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and a main-line contact, arranged respectively to transmit a calling-signal through the line and to complete the line-circuit through the induction-coil, and a local-circuit contact arranged to complete the said local circuit, of a primary actuating device and means operated thereby controlling said motor.

12. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a telephonographic signaling device, an induction-coil arranged to connect said local circuit inductively with the line-circuit, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a ringing-contact and a main-line contact, arranged respectively to transmit a calling-signal through the line and to complete the line-circuit through the induction-coil, and a local-circuit contact arranged to complete the said local circuit, of a thermostat and means operated thereby controlling said motor.

13. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor having an electric controlling-circuit, main signal-transmitting circuit-varying means driven thereby, and centrifugal circuit-closing mechanism likewise driven by said motor, comprising a contact arranged to operatively connect said main signal-transmitting circuit-varying device with the line-circuit, of an automatic cut-out relay in the line-circuit, having contacts in the controlling-circuit of said motor, said relay arranged to respond only to incoming signals, and a primary actuating device controlling said motor.

14. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor having an electric controlling-circuit, a telephonographic signaling device driven thereby, a local circuit connected to said telephonographic signaling device, an induction-coil arranged to connect said local circuit inductively with the line-circuit, and centrifugal circuit-closing mechanism likewise driven by



said motor, comprising a main-line contact adapted to complete the line-circuit through said induction-coil, said induction-coil having an armature and contacts in the said motor-controlling circuit, and constituting a cut-out relay arranged to respond only to incoming signals, of a primary actuating device controlling said motor-controlling circuit.

15. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, main signal-transmitting means driven thereby, and circuit-closing mechanism likewise driven by the motor comprising means for completing a ringing-contact while the motor is at low speed and for breaking the ringing-contact and completing a contact controlling transmission of signals from said main signal-transmitting means through the line, when the motor reaches higher speed, of a primary actuating device and means operated thereby controlling said motor.

25 16. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, main signal-transmitting means driven thereby, and circuit-closing mechanism likewise driven by the motor comprising means for completing a ringing-contact while the motor is at low speed and for breaking the ringing-contact and completing a contact controlling transmission of signals from said main signal-transmitting means through the line, when the motor reaches higher speed, of a thermostat and means operated thereby controlling said motor.

40 17. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a telephonographic signaling device driven thereby comprising a movable actuating member and a combined reproducer and telephone-transmitter having a single diaphragm performing the functions both of a reproducer-diaphragm and of a transmitter-diaphragm, and contacts controlling the transmission of signals through the line, of a primary actuating device and means operated thereby controlling said motor.

55 18. In a fire-alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a telephonographic signaling device driven thereby comprising a movable actuating member and a combined reproducer and telephone-transmitter having a single diaphragm performing the functions both of a

reproducer-diaphragm and of a transmitter-diaphragm, and contacts controlling the transmission of signals through the line, of a thermostat and means operated thereby controlling said motor.

70 19. In an alarm system, the combination with local signal-transmitting mechanism comprising a telephonographic signaling device and a motor for operating the same, and a line-circuit for connecting said signal-transmitting mechanism with a distant station, of a local circuit for supplying current to drive said motor, a plurality of primary actuating devices each controlling said local circuit, and a plurality of local signaling devices, one for each of said primary actuating devices and controlled thereby.

75 20. In a fire-alarm system, the combination with local signal-transmitting mechanism comprising a telephonographic signaling device and a motor for operating the same, and a line-circuit for connecting said signal-transmitting mechanism with a distant station, of a local circuit for supplying current to drive said motor, a plurality of thermostats each controlling said local circuit, and a plurality of local signaling devices, one for each of said thermostats and controlled thereby.

80 21. In an alarm system, the combination with local signal-transmitting mechanism comprising a motor for operating the same, and a line-circuit for connecting said signal-transmitting mechanism with a distant station, of a local circuit controlling said motor, a plurality of primary actuating devices each controlling said local circuit, local signaling means comprising local signaling devices connected one in circuit with each of said primary actuating devices, and another signaling device connected in multiple circuit with all of said primary actuating devices, said primary actuating devices arranged to set in operation both the local signaling devices and the local signal-transmitting mechanism.

85 22. In a fire-alarm system, the combination with local signal-transmitting mechanism comprising a motor for operating the same, and a line-circuit for connecting said signal-transmitting mechanism with a distant station, of a local circuit controlling said motor, a plurality of thermostats each controlling said local circuit, local signaling means comprising local signaling devices connected one in circuit with each of said thermostats, and another signaling device connected in multiple circuit with all of said thermostats, said thermostats arranged to set in operation both the local signaling devices and the local signal-transmitting mechanism.

90 23. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor and means for transmitting calling and



main signals driven thereby, of a primary actuating device and means operated thereby controlling said motor, and automatic repeating mechanism, likewise controlling said motor, arranged to cause repetition both of the calling and of the main signals.

24. In an alarm system, the combination with local signal-transmitting mechanism and a line-circuit for connecting said signal-transmitting mechanism with a distant station, said signal-transmitting mechanism comprising a motor, a main signal-transmitting device driven thereby, and means for transmitting a calling-signal comprising centrifugal contact mechanism operated by said motor, of a primary actuating device, means operated thereby controlling said motor, and automatic repeating mechanism likewise controlling said motor and arranged to cause repetition both of the calling and of the main signals.

25. In an alarm system, the combination with local signal-transmitting mechanism and a line conductor for connecting said signal-transmitting mechanism with a distant station, of automatic stopping means therefor connected with the same line conductor and arranged to respond only to incoming signals.

26. In an alarm system, the combination with local signal-transmitting mechanism, a line conductor for connecting said signal-transmitting mechanism with a distant station, and a local circuit controlling the operation of said signal-transmitting mechanism, of a stopping device controlling said local circuit and connected to the same line conductor

and arranged to respond only to incoming signals in the circuit including said line conductor.

27. In an alarm system, the combination with local signal-transmitting mechanism comprising an electric motor, a local circuit for supplying current to drive said motor, and a line conductor for connecting said signal-transmitting mechanism with a distant station, of an automatic switch connected to the same line conductor, arranged when operated to break said local circuit, and arranged to respond only to incoming signals in the circuit including said line conductor.

28. In an alarm system, the combination with an induction-coil, local signal-transmitting mechanism, and a local circuit operated thereby and passing through the primary of said induction-coil, of a line conductor for connecting said signal-transmitting mechanism with a distant station, connected to the secondary of said coil, a local circuit controlling the operation of said signal-transmitting mechanism, and contact mechanism operated by said induction-coil as a magnet connected to said local circuit, said contact mechanism arranged to be operated only by incoming signals in the circuit of said secondary coil.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES P. ROBERTSON.

Witnesses:

W. J. SPRUSA,  
W. J. DAVIS.