A. L. SOHM.

ELECTRIC SIGNAL SYSTEM.

APPLICATION FILED SEPT. 24, 1907.

944,003.

Patented Dec. 21, 1909.

5 SHEETS—SHEET 1.

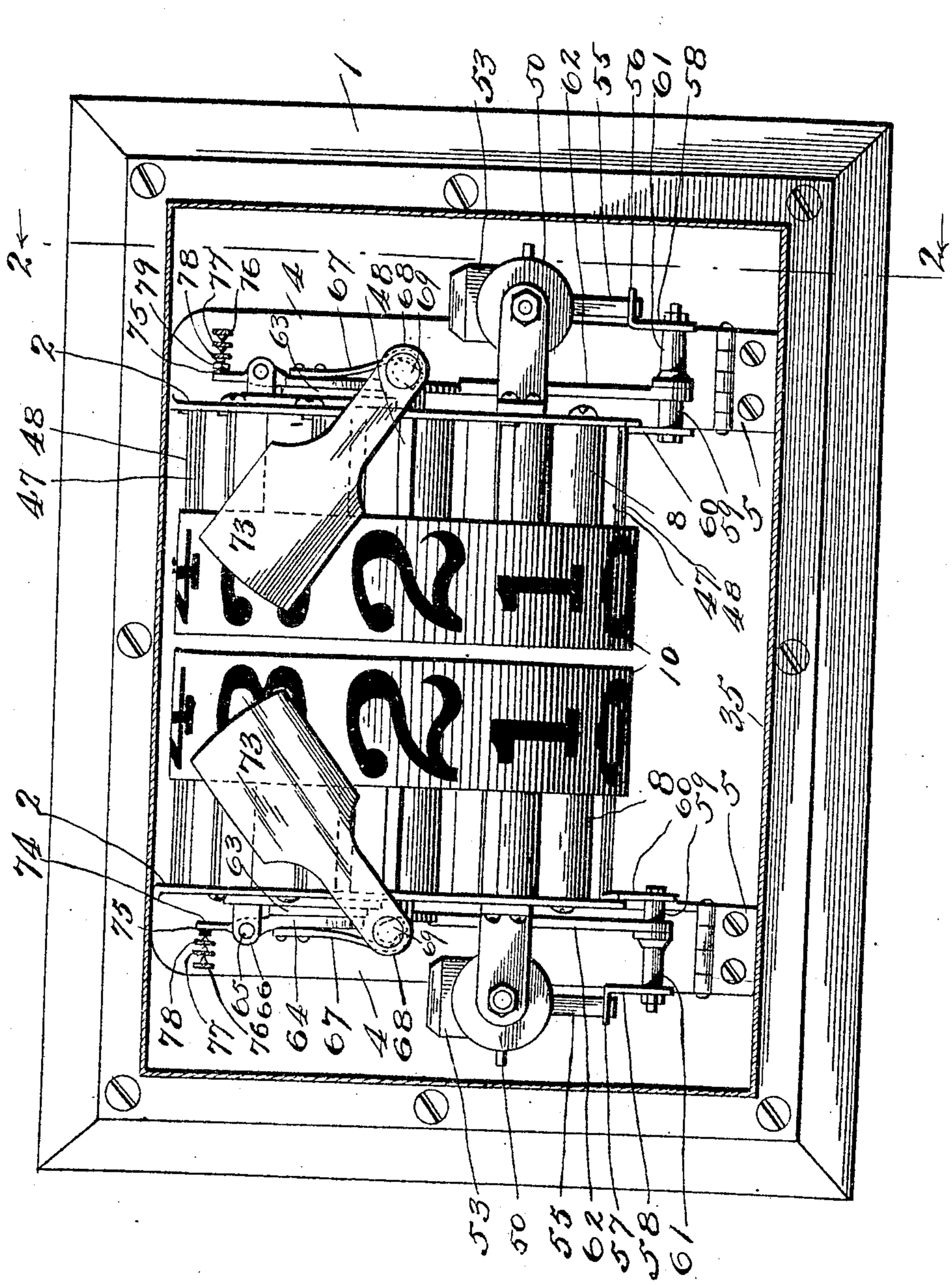

FIG. 1.

WITNESSES

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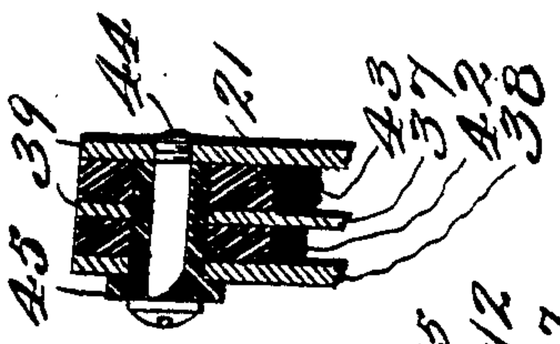

FIG. 4.

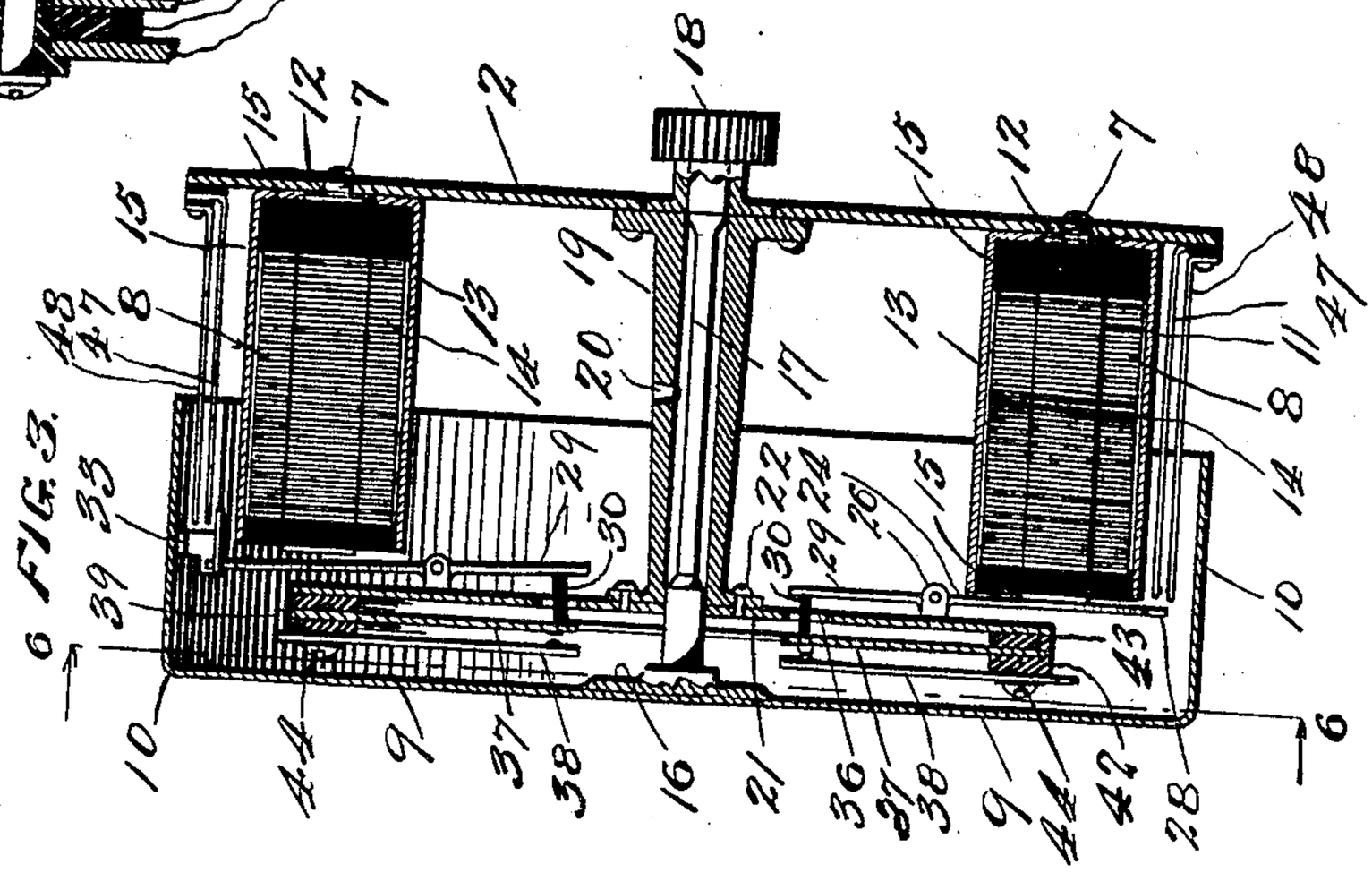

FIG. 3.

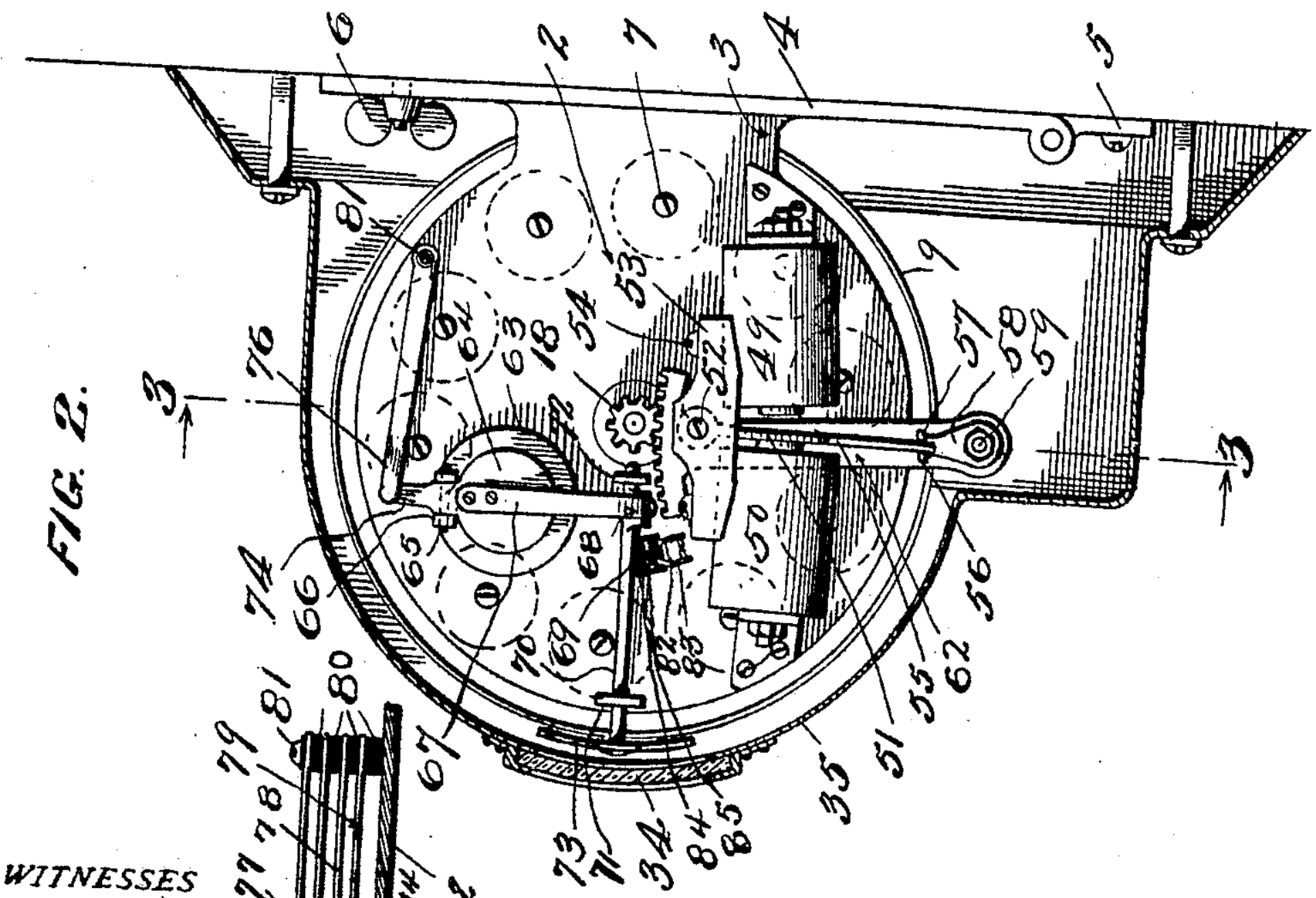

FIG. 2.

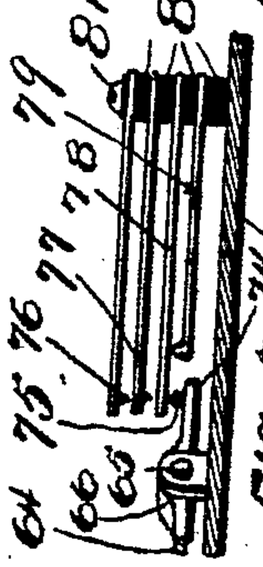

FIG. 5.

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5 SHEETS—SHEET 3.

FIG. 7.

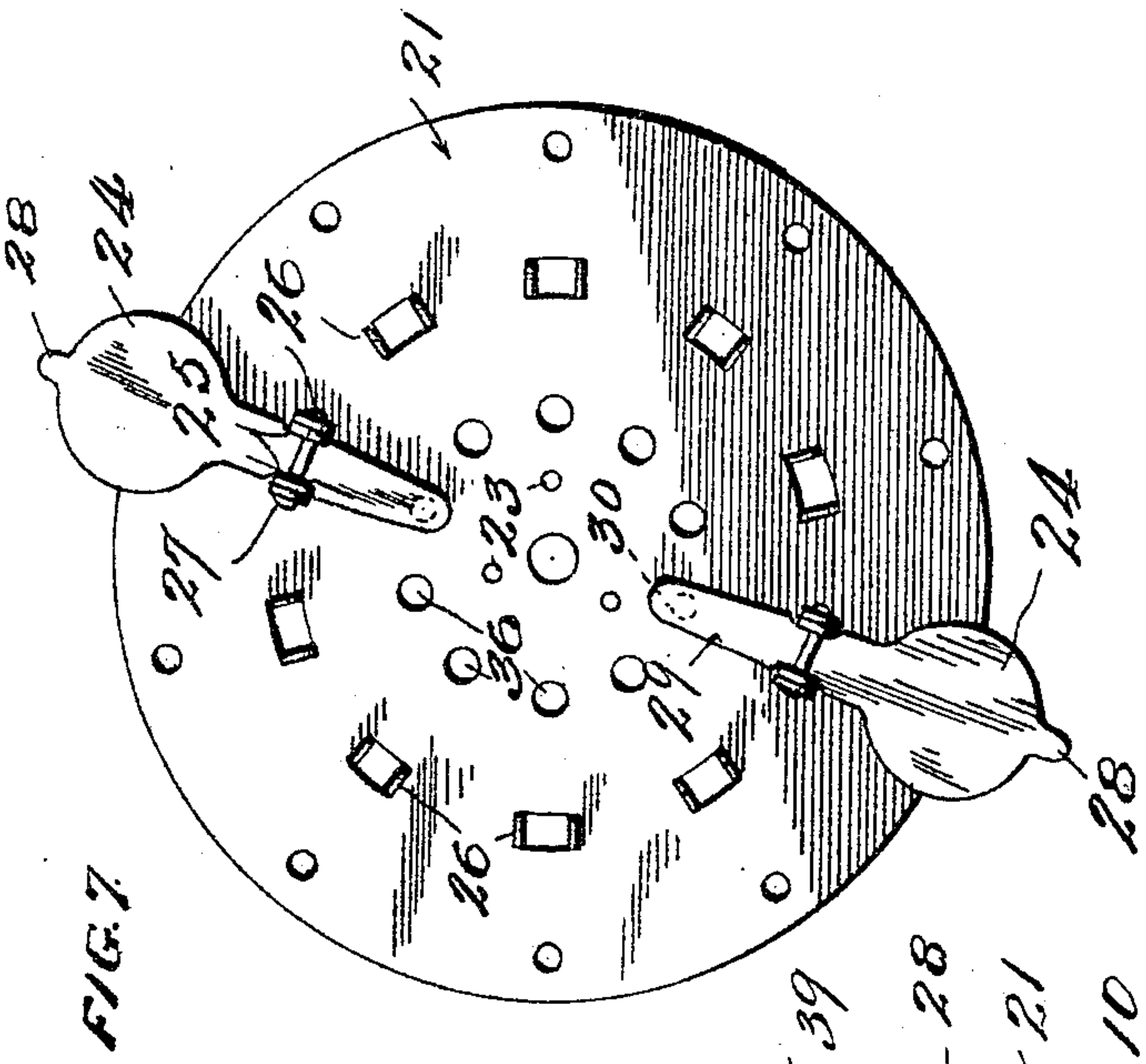


FIG. 8.

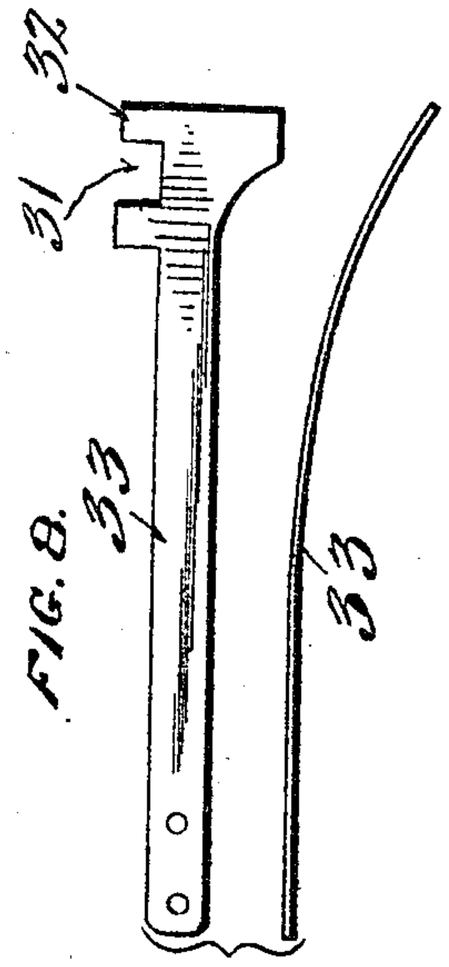
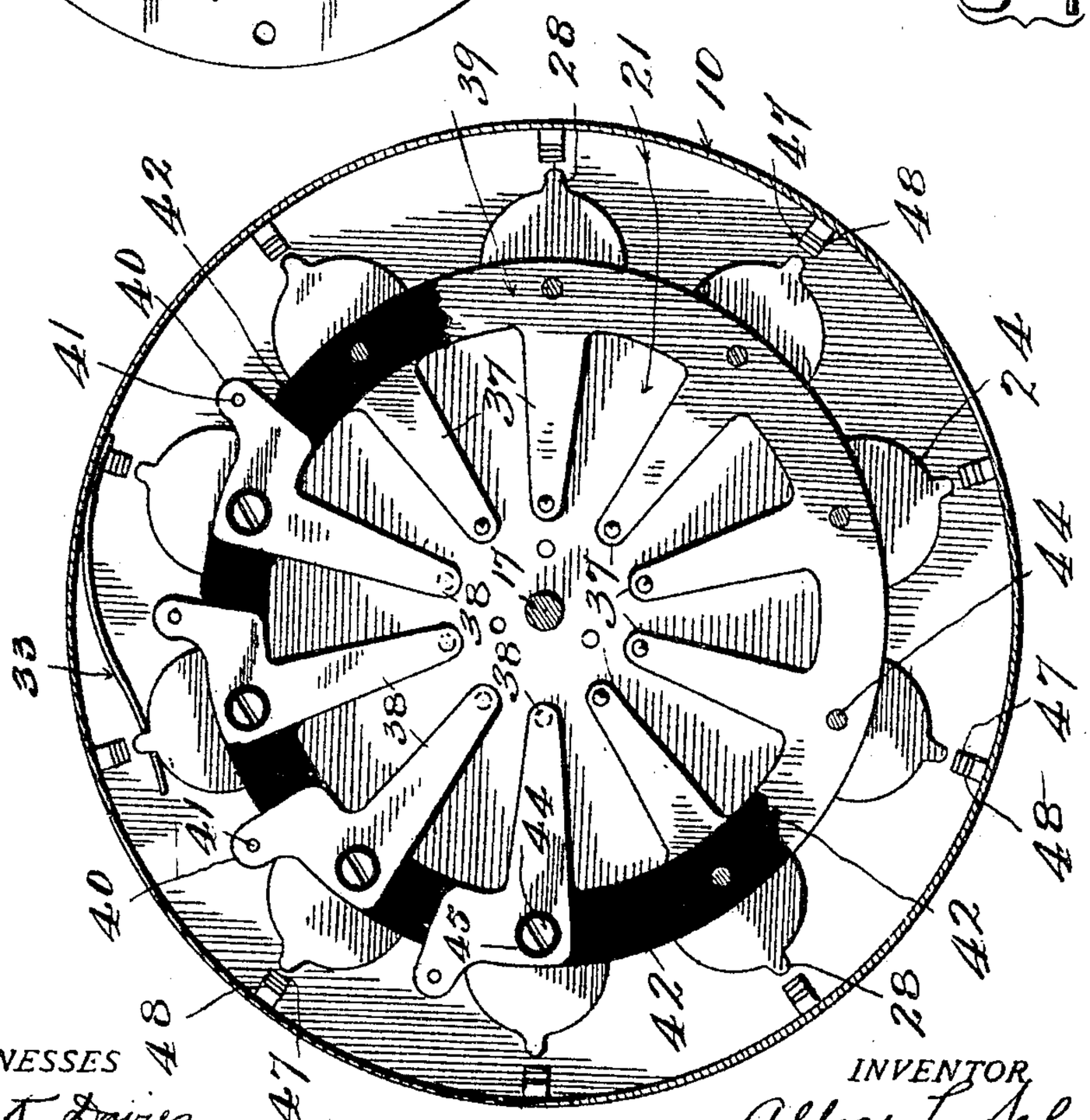


FIG. 6.



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5 SHEETS—SHEET 4.

FIG. 10a.

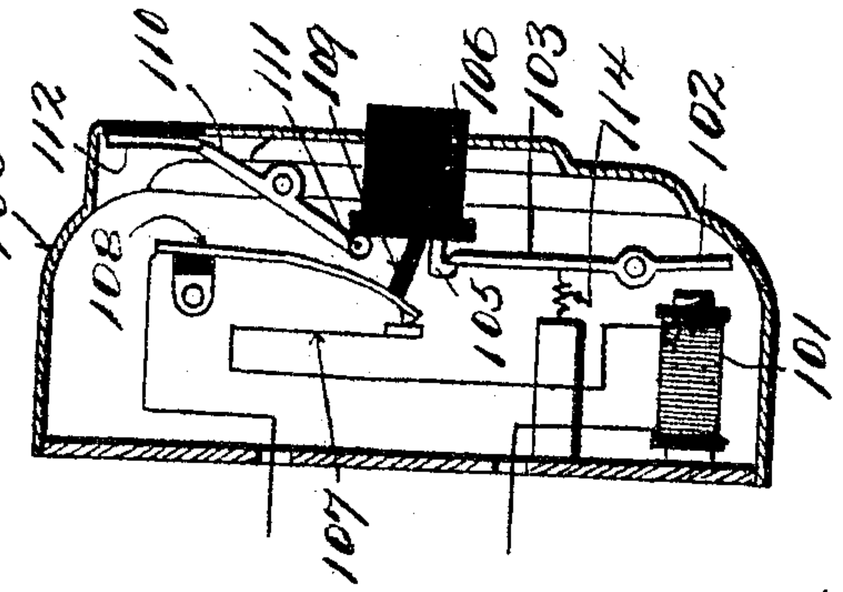


FIG. 10.

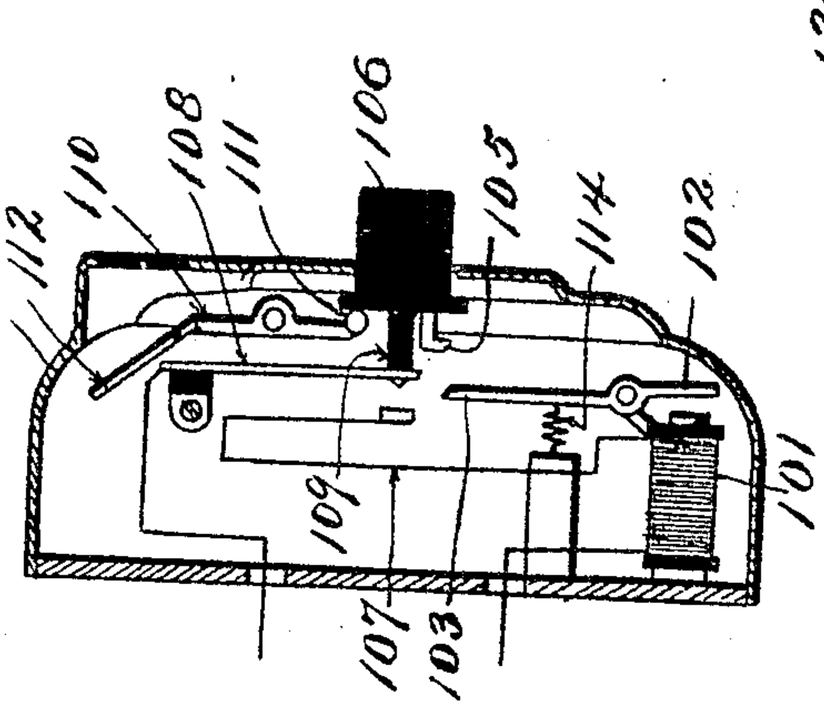


FIG. 11.

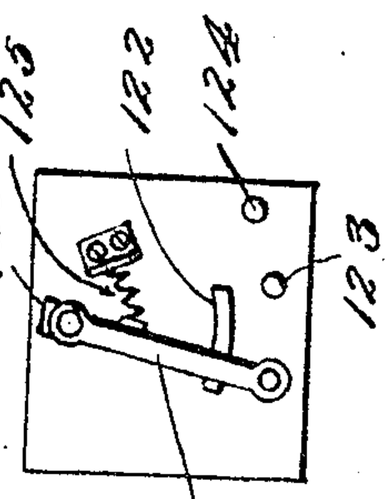
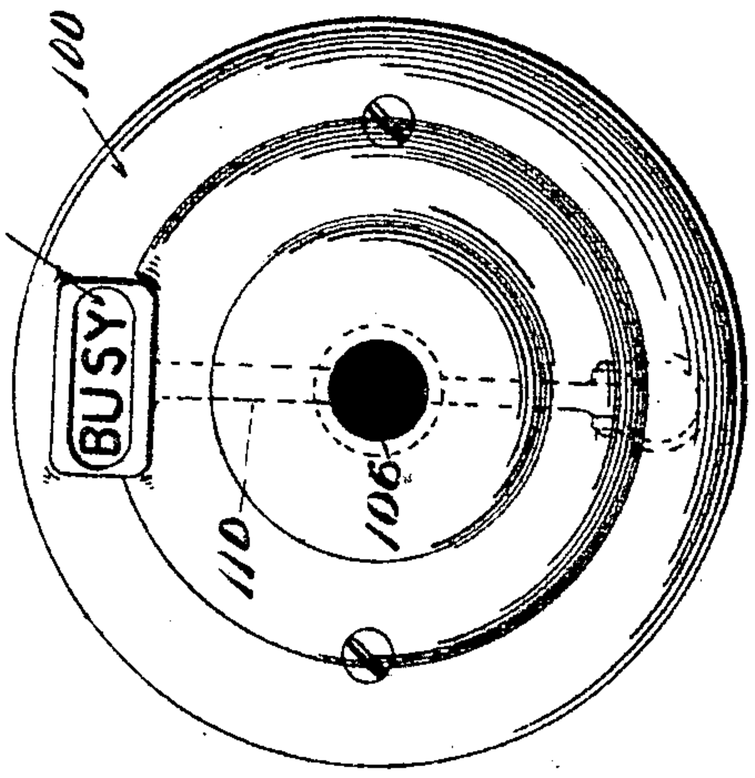


FIG. 9.



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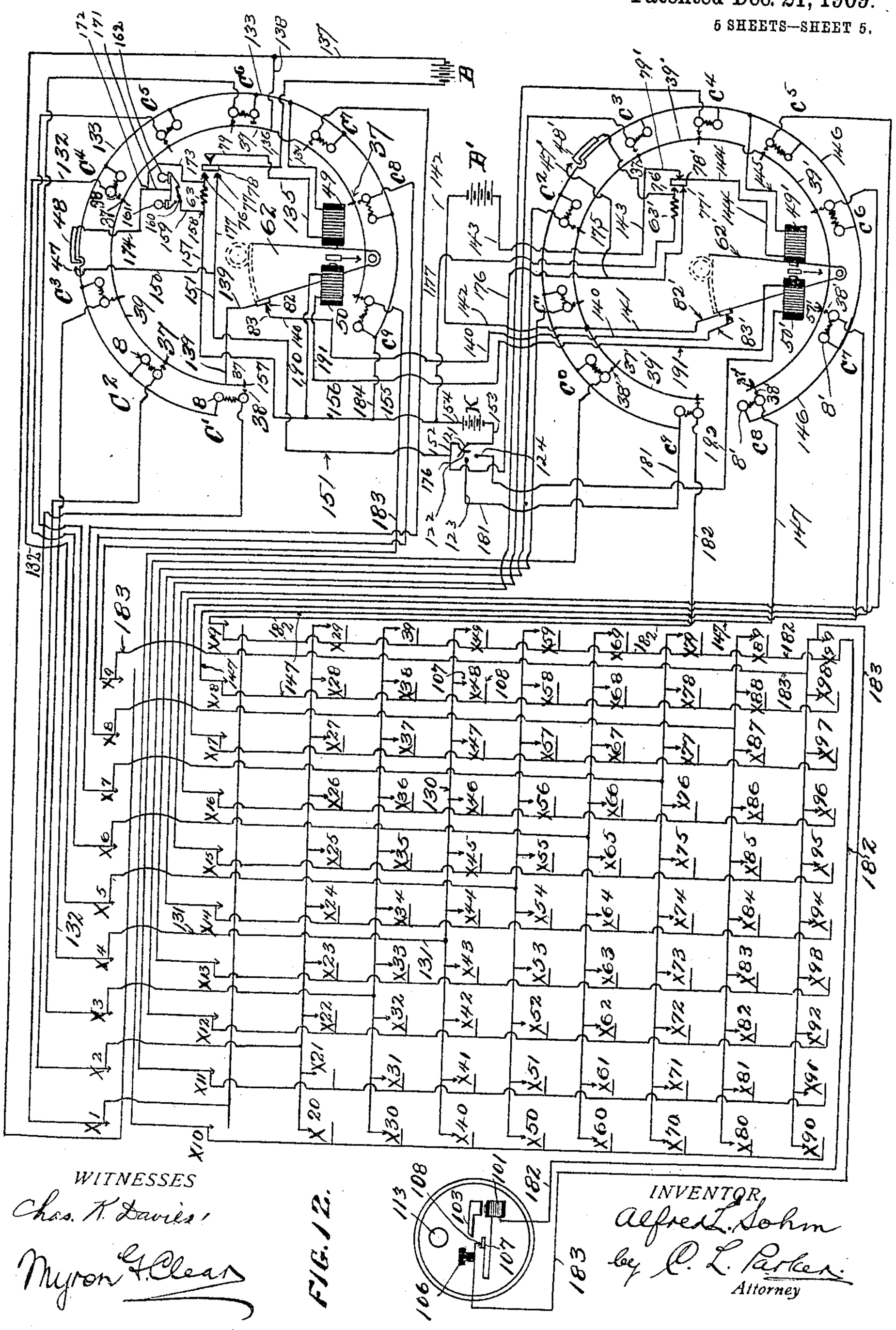

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FIG. 12.

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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNAL SYSTEM.

944,003. Specification of Letters Patent. **Patented Dec. 21, 1909.**

Application filed September 24, 1907. Serial No. 394,385.

To all whom it may concern:

Be it known that I, ALFRED L. SOHM, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Electric Signal Systems, of which the following is a specification.

This invention relates to electric signal systems and has particular reference to certain improvements therein adapted for use in connection with call bells and annunciators, burglar and fire alarms, telephone systems and the like.

An important object of my invention is to provide for the electrical connection of the outlying signal stations with the annunciator, switch board or other signal indicating means with the minimum wiring.

Another object of my invention is to provide means to automatically disconnect the outlying signal stations from the signal indicating means after a signal has been sent from any signal station until the signal indicating means is reset.

A further object of my invention is to provide visual means at each signal station to indicate automatically to a person endeavoring to signal the central station or signal indicator whether or not the central station or indicator can be signaled.

A still further object of my invention is to provide means at each signal station to automatically indicate, after each aforesaid indication that the central station cannot be signaled, that the line is closed between said signal station and central station, whenever said indicating means is reset.

Other objects of my invention are to provide a signal system whose cost of manufacture and maintenance is low, which requires only a small amount of current for its operation, which is rapid and reliable in its action, is perfectly adapted for use in connection with call bells, telephones, burglar and fire alarms and the like and whose receiving station or signal indicating mechanism occupies but a small part of the space required by devices at present in use for the same purpose.

In the following description and accompanying drawing I have described and shown my invention as embodied in a call bell and annunciator system comprising 99 signal stations and employing two dials to indicate the number of any station from which a call or signal is sent.

In the drawing, Figure 1 is a front view partly in section of my signal indicating means. Fig. 2 is a section on line 2—2 thereof. Fig. 3 is a section on line 3—3 of Fig. 2. Fig. 4 is a detail section of contact springs shown in Fig. 3. Fig. 5 is a detail section of contact springs shown in Fig. 2. Fig. 6 is a section on line 6—6 of Fig. 3. Fig. 7 is a detail view of the disk partially shown in Fig. 6. Fig. 8 is a detail plan and elevation of a spring shown in Fig. 6. Fig. 9 is a front elevation of my signal sending means. Figs. 10 and 10ª are cross sections thereof showing different positions of the parts. Fig. 11 is a plan view of a switch which may be used in resetting the dial and Fig. 12 is a diagrammatic view of a signal system embodying my invention.

In the drawings 1 designates a back plate to which are secured two coils supporting disks 2 of non-magnetic metal, connected by a web 3 with plates or strips 4 which are secured to plate 1 by means of hinges 5 and thumb screws 6 in such manner that disks 2 and parts carried thereby may be swung outward for inspection or adjustment.

Secured to each of the disks 2 by means of screws 7 are a plurality of stop coils 8 by means of which the station indicating dial 9 having the flanged number-carrying portion 10 may be stopped in position to indicate the numbers of stations from which signals are sent.

Each of the coils 8 comprises a core 11 secured within a recess 12 in the closed end of a soft iron cylinder 13. The core is surrounded by the winding 14 and fiber disks 15, as shown. The right hand or units dial carries the digits from 0 to 9 and the tens dial the digits from 1 to 9. The stop coils, adjacent the dials, correspond in number and arrangement with the digits on said dials, the right hand disk 2 carrying ten coils and the corresponding left hand disk nine coils.

Each dial is suitably secured to the disk 16 carried upon one end of the shaft 17, upon the other end of which is mounted the pinion 18 through the medium of which the disk is rotated as will be hereinafter described.

The shaft 17 is journaled in the standard 19 secured to the disk 2 by means of pins or screws. Around the shaft 17 the standard

is provided with a chamber for a suitable lubricant, supplied through opening 20.

A plate or disk 21 is rigidly secured upon the outer end of standard 19 by means of pins or screws 22 engaging within openings 23.

Upon the plate or disk 21 are pivotally mounted stop coil armatures 24, the said armatures having ears 25 pivoted to similar ears 26 on the said plate or disk by means of pintles 27.

Each armature comprises a circular portion or disk which is mounted opposite one of the stop coils, a lug 28 extending outward from one side thereof and an arm 29 carrying a hard rubber finger or projection 30 extending outward from the other side.

The lug 28 is arranged to engage within the slot or opening 31 in the offset portion 32 of a metal spring 33 mounted upon the inner side of the flange 10, when its adjacent stop coil is energized, and to thereby bring the dial 9 to rest with a figure thereon corresponding to the number of the stop coil, opposite a sight opening 34 provided in the casing 35.

The hard rubber finger or projection 30 passes through an opening 36 in the disk 21 and, when the adjacent coil is energized, engages a switch or contact spring 37 and forces it into electrical contact with a second switch or contact spring 38 for a purpose to be hereinafter described.

Each of the springs 37 is integral with a non-magnetic metal ring 39. Each of the springs 38 are separate and insulated from each other and each is provided with an outstanding portion 40 having an opening 41 therein within which a wire connection (not shown) may be secured.

By reference to Figs. 3, 4 and 6 it will be seen that each of the springs 38 is insulated from the ring 39 by a hard rubber ring 42 and that the metal ring 39 is insulated from the plate or disk 21 by a similar ring 43. The springs 38 and metal ring 39, with the insulating rings 42 and 43 are secured to the plate or disk 21 by means of screws 44 provided with hard rubber bushings 45 as shown.

Secured to the plate or disk 2, adjacent each stop coil are a series of pairs of switch or contact springs 47 and 48. These springs are insulated from each other and from the plate or disk 2 by suitable insulation, as shown in Fig. 3. The free ends of these springs are normally out of contact with each other and with the spring 33, the latter in its normal position being free to rotate without contacting with said spring. When however a signal is sent in and one of the stop coils is energized, the associated armature is attracted and the lug 28 is thrown into the path of movement of the offset portion 32 of the spring 33 and, as the latter moves in contact with said lug, it is moved outward until the lug is received within the opening 31, when the spring assumes its normal position. When the spring 33 is momentarily pressed outward by the lug 28 it is forced against spring 47 and presses it for a very short period against and into electrical contact with spring 48 for a purpose to be hereinafter described. When the stop coil is deënergized the lug 28 is moved out of the opening 31 by the tension of spring 37 and into its normal position, without again producing contact between springs 47 and 48.

The rotation of the dial 9 is effected by means of electro magnets 49 and 50, disposed opposite an armature 51 pivotally supported by a screw or pin 52 carried by the saddle or frame 53 secured to the electro magnets 49 and 50 by screws 54 as shown. Secured to the armature 51 is an elastic metal rod 55, the lower end of which is loosely engaged within a slot or opening between two projections 56 and 57 carried by a rigid arm 58 pivoted upon a pin 59, secured to a hanger 60 depending from disk 2.

Rigidly secured to the arm 58 by sleeve 61 is an arm 62 having at the upper end thereof a toothed sector meshing with the pinion 18. It will be evident that when electro magnet 49 is energized armature 51 will be drawn toward it rapidly through its entire range of movement in that direction. This produces flection of the elastic rod 55 which, by pressure upon projection 57, produces a rocking movement of arms 58 and 62 to the right, on the pin 59. This movement of the arm 62 produces a rotation of the dial 9, which, if unchecked will bring the numbers carried thereby, from 1 to 9 in the case of the left hand dial and from 0 to 9 in the case of the right hand dial, consecutively before the sight aperture 34.

The operation of the electro magnet 50 causes a reverse movement of the dial and serves to reset it, ready to indicate a new signal.

Secured to the disk 2 is a shutter-operating coil 63 similar in construction to the stop coils 8. Adjacent the outer end of coil 63 is pivotally mounted an armature 64, pins 65 extending outward therefrom engaging within openings in ears 66 carried by the disk 2. Secured to the armature 64 is a spring arm 67 having at the lower end thereof an inwardly extending projection 68 shown in dotted lines in Fig. 1. The projection 68 engages a downwardly extending rib 69 carried by the rock shaft 70, which is mounted in loose bearings 71 and 72 secured to the disk 2, as shown. Secured to the outer end of shaft 70 is a shutter 73 normally covering part or all of the sight aperture 34. When the shutter coil is energized the armature 64 will be attracted and the projection 68 on the end of spring arm

67 will press against the rib 69 and rock the shaft, thereby raising the shutter from in front of the sight aperture 34 to the position shown in Fig. 1 and exposing a number opposite the sight opening.

The armature 64 is provided with an upwardly extending arm 74 carrying a hard rubber finger 75, which is adjacent, but normally out of contact with switch or contact springs 76, 77 and 78, which are themselves normally out of electrical contact with each other. Adjacent spring 78 is a switch or contact spring 79, which is normally in contact with the spring 78. The springs 76, 77, 78 and 79 are separated from each other and from disk 2 by suitable insulation 80, and are secured to said disk by screw 81.

When the shutter coil 63 is energized the armature 64 is attracted and the projection 75 is pressed against spring 78, breaking the contact between it and spring 79, and pressing it into contact with spring 77 and the latter into contact with spring 76 as illustrated in Fig. 1.

At the left of the sector carried by arm 62 and in the path of its movement are disposed switch or contact springs 82 and 83, carried by supports 84 and 85, which are secured to and are suitably insulated from disk 2.

The springs 82 and 83 are normally out of contact with each other, but are forced into contact when the arm 62 moves to the left under the action of electro magnet 50, in resetting the dial. The purpose of this contact will be hereinafter explained.

In Figs. 9, 10 and 10ª, I have illustrated a signal sending means or push button, which I employ in my system. Secured within the casing 100, to the rear wall thereof, is an electromagnet 101, having the pivoted armature 102, mounted adjacent thereto. The armature 102 carries a pointed arm 103, which is arranged to engage and hold the offset finger or latch 105, carried by the hard rubber button 106, when the latter is depressed, as shown in Fig. 10ª.

Contact springs 107 and 108 are arranged within the casing 100 as shown and the circuit is closed through the push button by pressing button 106 against the hard rubber finger or projection 109, carried by spring 108 until the latter is brought into contact with spring 107.

Pivoted to the side of the casing is an arm 110, whose lower end carries a rounded offset projection 111, which loosely engages the back of button 106. The upper end of said arm is flattened at 112 as shown and carries the word "Busy" or equivalent word or symbol thereon. When the button 106 is pressed this arm is rocked on its fulcrum and the word "Busy" is displayed through the aperture 113. If the circuit is broken between the push button and central station or signal indicator, the button 106, will be held in the position shown in Fig. 10ª by the action of the retractile spring 114, which is somewhat stronger than spring 108 and the sign "Busy" will be displayed through aperture 113, as long as the circuit is broken. If however, the push button is in circuit with the central station, when springs 107 and 108 are brought into contact by pressure applied to the button 106, current from the central station batteries will flow through the coil 101 and will move the arm 103 out of a position to engage latch 105 and prevent its outward movement. It will thus be seen that when button 106 is pushed, such button will be held in the position shown in Fig. 10ª if the line circuit is open, and the "Busy" sign will be held in sight, but if the line circuit is closed, the magnet 101 will be energized as described, and the button and "Busy" sign will return to their normal position as shown in Fig. 10 as soon as pressure on the button is removed. This enables a person attempting to signal the central station to determine whether or not his signal has been indicated at such station.

It will be noted that closing the circuit between springs 107 and 108 serves to energize either the magnet 49 or the magnet 50 of the indicator and thereby open the circuit at this point, but the action of magnets 49 and 50 on the heavy armature 51, whose movement is hampered by the pressure of elastic rod 55, is much slower than that of the magnet 101 upon armature 102 so that the operation above described occurs only when the button 106 is released almost instantly after being pushed. Otherwise the operation of closing the springs 107 and 108 will open the circuit at the indicator before push button 106 moves out of the position shown in Fig. 10ª in which case the button 106 is kept in its depressed position and the busy sign held in sight whether the line is busy or not. A little practice will enable the user to manipulate the button 106 so as to assure himself positively as to whether the line is busy. Even if the user fails to manipulate the button in the manner described, his call is recorded by the indicator unless the indicator is already in use. The fact that a certain amount of instruction and dexterity is required in manipulating the button 106 in such manner as to realize all of the advantages of the invention is recognized as an objection and improvements to overcome the objection are contemplated. Similarly if current is sent through the line when the parts are in the position shown in Fig. 10ª, the armature 102 will be attracted by the magnet 101 and the button 106 released, thereby permitting it and the "Busy" sign to return to the positions shown in Fig. 10.

In Fig. 11, I have shown a form of switch

which, I may use in resetting the dials of my signal indicator after a signal has been indicated. Conductors are connected to the point 120 to which switch arm 121 is pivoted, and to the plate 122 and buttons 123 and 124. It will be noted that, in the normal position of the switch, which is that, illustrated, current may pass from point 120 to plate 122. When the switch arm is moved to the right, against the pressure of spring 125, the arm remains in contact with plate 122 until it has contacted with button 123, so that for a time point 120 is in electrical connection with plate 122, and button 123. In resetting the dials the arm 121 is swung until it contacts with button 124, when it is released and is returned to its normal position by spring 125.

The electrical connections of the various parts hereinbefore described are clearly shown in Fig. 12, from which, and the following description of the operation of the system, such connections will be clearly apparent. Each station in the system numbered from 1 to 9 is in circuit with a stop coil adjacent the tens dial adapted to stop said dial in position to display the number of the station in circuit therewith, opposite the sight aperture 34. Each station in the system numbered from 10 to 99 is in circuit with a stop coil adjacent the units dial corresponding to its units digit and also with a stop coil adjacent the tens dial corresponding to its tens digit. Thus any station numbered from 1 to 9; from which a signal is sent, will be indicated on the tens dial and any station numbered from 10 to 99 will be indicated by the numbers displayed on the tens and units dials. To avoid confusion the parts hereinbefore referred to by reference, numerals are designated by such numerals with a prime associated therewith where said parts are shown in connection with the units dial in Fig. 12, and the stop coils are designated in this figure by the numerals, which they are adapted to display, associated with the letter C.

In the operation of the system if, for example, a signal is sent from station X^{48}, closing contact points 107 and 108 will cause a current to pass along lines 130, 131 and 132 to stop coil C^4, which is arranged to stop the dial in a position to display the number 4 of the tens dial. From coil C^4 the current will pass along lines 133, and 134 through disk actuating coil 49, then along line 135 through contact springs 79 and 78, then along line 136 through battery B, then along lines 137, 138, metal ring 39 line 139 contact springs 83 and 82, line 140, contact springs 83′ and 82′, lines 141 and 142 battery B′, line 143 contact springs 79′ and 78′ line 144 dial actuating coil 49′, lines 145 and 146 to stop coil C^s arranged to stop the units dial in a position to display the numeral 8. From coil C^s the current passes by way of lines 147 to contact spring 108 thereby completing the circuit. The effect produced by this initial current is as follows: The dial actuating coils 49 and 49′ and stop coils C^4 and C^s, are energized, thereby starting the rotation of the dials and throwing the lugs 28, on the armatures opposite coils C^4 and C^s into the path of spring 33 to engage therewith and stop the movement of the dials at the right points. The first movement to the right of arms 62 and 62′ however, opens spring contacts 82 and 83, and 82′ and 83′, thereby opening the circuit above described and destroying the electrical connection between all of the signal stations and station indicator.

It will be remembered that the movement of the stop coil armature 24 produces contact between the spring 37, and the spring 38 which are adjacent the stop coil energized, through the medium of the projection 30, as shown in Fig. 3. It will thus be seen that springs 37 and 38, adjacent coil C^4 and springs 37′ and 38′ adjacent coil C^s will be in contact when coils C^4 and C^s are energized. This permits a local current from battery B to pass from spring 38 adjacent coil C^4, through said coil, then through lines 133 and 134, dial actuating coil 49 line 135, springs 79 and 78, line 136 battery B, lines 137 and 138 and ring 39 back to spring 37. Similarly current from battery B′ will pass from spring 38′ adjacent coil C^s through said coil then through lines 146 and 145, dial actuating coil 49′ line 144, springs 78′ and 79′ line 143 battery B′, lines 142 to ring 39′ to spring 37′ back to spring 38′. While the initial momentary current which started the movement of the dials passed through both the units and tens dial systems, the movement thus begun is completed by two independent currents, one through the units and one through the tens dial. These two currents acting upon the coils 49 and 49′ and the coils C^4 and C^s, effect the rotating of the dials and their stoppage at the right points to display 4 on the tens dial and 8 on the units dial. As soon as the two dials are in position to display the number of a station from which a signal is sent, the local current last mentioned is broken and new local circuits which I will term the "shutter circuits" are established, as will be described.

It will be remembered that when the spring 33, secured to the inner periphery of the dial engages a lug 28, in its rotation, the spring is first pressed outward so as to produce momentary contact between springs 47 and 48 just before the rotation of the dial is stopped by the engagement of the lug within the opening or slot 31 of said spring. This momentary contact of the springs 47 and 48 establishes the first shutter circuit

through the shutter operating coils 63 and 63′ as follows: Current from spring 47 flows through lines 150, 151 and 152, plate 122 (see Fig. 11), switch arm 121, line 153, battery K, lines 154, 155, 156, and 157 to point 158 where it divides, part passing through line, 159 switch 160, then through the bell or buzzer 161 or signal lamp 162, according to the position of the switch 160, then along line 171 to point 172. The other part of the current passes through shutter coil 63 and along line 173 to point 172 from which the whole current passes along line 174 to spring 48. A similar current passes from spring 47′ by way of lines 175 and 176, switch arm 121 battery K, line 177, shutter coil 63′ back to spring 48′.

The passage of current through the shutter coil 63 energizes it and attracts the armature 64, thereby pressing the projection 75 (see Fig. 5) against spring 78 and forcing it out of contact with spring 79 and into electrical contact with springs 77 and 76. In like manner spring 78′ is moved out of contact with spring 79′ and into electrical contact with springs 77′ and 76′.

The current last described is of very short duration being broken when the spring 33 moves out of contact with springs 47 and 48. When, however, springs 76, 77 and 78 are brought into contact, a second shutter current is established which continues until the switch arm 121 is manipulated to reset the apparatus. This second shutter current passes from spring 77 through lines 177, 151, and 152, plate 122, switch arm 121, line 153, battery K, lines 155, 156 and 157 to point 158 where it divides, part passing through bell or buzzer 161 or lamp 162 and part through shutter coil 63 through springs 76 and 78, back to spring 77.

When the indicated number on the dial is observed and it is desired to reset the dials, the switch arm 121 (see Fig. 11) is moved against the pressure of spring 125 along plate 122 into contact, first with button 123 and then with button 124.

When arm 121 contacts with button 123 a circuit is momentarily established from the central stations through all outlying stations exhibiting the "Busy" sign, the current in said circuit energizing the magnet 101 at each of said stations and thereby releasing the button 106 and the arm 110 permitting the "Busy" sign, carried by the latter, to fall back into the position shown in Fig. 10 and thereby visually indicate that the line is open for use. This circuit is as follows, considering for illustration that the "Busy" sign is exhibited at station X^{99}: The current passes from switch arm 121 through button 123 line 181, units coil C^9 line 182, coil 101, contacts 107 and 108, line 183, tens coils C^9, lines 184, 155 and 154, battery K and line 153 back to switch arm 121. The current passing through coil 101 releases the "Busy" sign permitting it to move out of sight as before fully explained.

It is to be understood that, before a signal is sent to the central station, contact springs 107 and 108 at each signal station are in electrical connection with a battery at the central station and that when said springs are brought into contact, a signal is sent to the central station and each signal station in the system is thereupon thrown out of circuit with the said central station battery and remains out of circuit therewith until contact springs 107 and 108 are momentarily connected with the central station battery by the contact of switch arm 121 with button 123. When the dials have been reset as heretofore described the switch arm 121 is released and it is returned by spring action to its normal contact with plate 122. After this has been done each contact spring 107 and 108 is again in electrical connection with the central station battery and the apparatus is ready for use.

After each signal station is cut off from its connection with the central station battery; whenever a "Busy" sign is pushed into position it will remain there until, in the action of resetting the dial by manipulation of spring arm 121, said arm is momentarily brought into contact with button 123, when current from battery K will flow for an instant, through coils 101 of all of the push buttons exhibiting the "Busy" sign and the sign will thereupon move out of sight, signifying that the line is ready for use.

When the switch arm 121 contacts with button 124 in its movement to the right, a circuit is established by which the dials are reset ready for further use. This circuit is as follows: From switch arm 121 current passes along line 153 through battery K, lines 154, 155, 156, 190, the tens dial actuating coil 50, line 191 through the units dial actuating coil 50′, line 192, button 124 back to switch arm 121, thus completing the dial resetting circuit.

Having thus described my invention, I claim:

1. An electric signal system comprising a plurality of signal stations and a signal indicator in circuit therewith, means operable by a signal current from any signal station in the system from which a signal is sent, to open said circuit and simultaneously close a local circuit in the signal indicator and means in said local circuit to indicate the station from which the signal is sent.

2. An electric signal system comprising a plurality of signal stations and a station-indicator in circuit therewith, means operable by a signal current from any signal station in the system from which a signal is sent, to open the circuit between all signal

stations in the system and the station indicator and simultaneously close a local circuit in the signal indicator, and electrically operated means in said local circuit to indicate the station from which the signal is sent.

3. An electric signal system comprising a plurality of signal stations and a signal indicator in circuit therewith, means operable by a signal current from any signal station in the system from which a signal is sent, to open the said circuit and simultaneously close a local circuit in the signal indicator, means in said local circuit to indicate the station from which the signal is sent, and means to open said local circuit when the said station is indicated.

4. An electric signal system comprising a plurality of signal stations and a signal indicator in circuit therewith, means operable by a signal current from any signal station in the system from which a signal is sent, to open the said circuit and simultaneously close a local circuit in the signal indicator, means in said local circuit to indicate the station from which the signal is sent, means to open said local circuit and simultaneously close a second local circuit and shutter operating means in said second local circuit.

5. An electric signal system comprising a plurality of signal stations and a signal indicator in circuit therewith, means operable by a signal current from any signal station in the system from which a signal is sent, to open the said circuit and simultaneously close a local circuit in the signal indicator, means in said local circuit to indicate the station from which the signal is sent, and manually operated means to momentarily close the circuit between each of the signal stations and the signal indicator and to close a local circuit adapted to reset the signal indicator ready for use.

6. In an electric signal system comprising a plurality of signal stations, a signal indicating device in circuit therewith and adapted to indicate the number of a station in the system from which a signal is sent, automatic means adapted to open the circuit in which each of said signal stations is located when a signal is sent therefrom and visual means at each station in the system adapted to indicate whether the circuit in which said station is located is open or closed.

7. An electric signal system comprising a plurality of signal stations and a central station or signal indicator in circuit therewith, means to open the line between each signal station and the signal indicator when a signal is sent in from any station in the systems, signal sending means at each station, means to close the circuit through said signal sending means, means to maintain said last named circuit closed, if closed when the line between the station and the signal indicator is open, until said line is closed, and means to thereafter automatically open the circuit through the signal sending means when said last named line is closed.

8. An electric signal system comprising a plurality of signal stations and a central station or signal indicator in circuit therewith, means to open the circuit when a signal is sent from any station in the system, signal sending means at each station, means to close a circuit through said signal sending means, and means operated by closing said last named circuit to visually indicate whether the circuit between said station and the central station is open or closed.

9. An electric signal system comprising a plurality of signal stations and a signal indicator in circuit therewith, means to open said circuit when a signal is sent from any station in the system and means to close said circuit when the station signal indicator is reset, signal sending means at each signal station, means adapted to close the circuit therethrough, means adapted upon closing said circuit to maintain said circuit closed when the line is open between the signal station and the signal indicator, and means to open the circuit through said signal sending means when the said line is closed.

10. In an electric signal system, a signal indicator comprising a rotary station indicating element, a pivoted arm adapted upon its movement, to rotate said element, an electrically actuated armature and a spring arm carried thereby, adapted to move said pivoted arm to effect the rotation of said indicating element.

11. In an electric signal system, a signal indicator comprising a rotary station indicating element, a pair of coils, an armature mounted therebetween, a spring arm carried by said armature, and means actuated by said arm to rotate said station indicating element.

12. In an electric signal system, a signal indicator comprising a rotary station indicating element, a pair of coils, an armature mounted therebetween, a spring arm carried by said armature and a pivoted arm adapted upon its movement to rotate said station indicating element, said spring arm being loosely engaged between fixed portions of said pivoted arm.

13. In an electric signal system, a signal indicator comprising a rotary station indicating element, a pinion carried thereby, a pair of coils, an armature pivoted therebetween, a spring arm carried by said armature, a pivoted arm having a toothed sector engaging said pinion and adapted upon its movement to rotate the same, and means adapted to transmit motion from said spring arm to said pivoted arm.

14. In an electric signal system, a signal indicator comprising a rotary dial, a pair of dial actuating coils, an armature mounted therebetween, a spring arm carried by said armature, and a pivoted arm adapted upon its movement to rotate said dial, said spring arm being loosely engaged within a slot or recess in said pivoted arm, substantially as described.

15. In a signal system, a signal indicator comprising a rotary dial, a coil adapted to rotate said dial, a pair of contact points in circuit with said coil, said points being adapted to be separated when said dial is moved, thereby opening the said circuit through the said coil, stop coils adapted to stop the dial in position to display the number of a station from which a signal is sent and simultaneously close a local circuit through the dial actuating coil and the stop coil corresponding to the number of said station.

16. In a signal system, a signal indicator comprising a rotary dial, a spring carried by said dial, a plurality of normally separated contact points adjacent but out of the normal path of movement of said spring, a plurality of stop coils adapted to advance a stop into the path of movement of said spring and press the same against said contact points to close the same, said stop being also adapted to bring said dial to rest in a position to display the number of a station from which a signal is sent.

17. In a signal system, a signal indicator comprising a rotary dial, an abutment carried thereby, a plurality of stop coils adjacent the dial, armatures adapted to be actuated by the said coils, a local battery circuit normally separated contact points in said circuit, a lug carried by the armature adapted to be moved into the path of the abutment to stop the rotation of the dial, means carried by said armature to close said contact points and the said local battery circuit.

18. In a signal system, a signal indicator comprising a rotary dial, stop coils adapted to arrest the movement of said dial, a plate adjacent said stop coils, stop coil armatures mounted upon one side of said plate and carrying beaks or projections extending through openings therein, a metal ring having a series of spring contact arms extending inward therefrom mounted upon the opposite side of said plate, and a plurality of spring contact arms insulated from each other and from said metal ring, extending adjacent to the arms of said ring but normally out of contact therewith, the said beaks or projections being adapted to produce contact between said contact arms upon the actuation of the armatures by the said coils.

19. In a signal system, a signal indicator comprising a rotary dial, a shutter coil adapted to be energized when the dial is in a position to indicate a station from which a signal is sent, a rock shaft, a shutter rigid thereon, a rib carried by said shaft, an armature adjacent said coil and means carried by said armature to engage said rib and rock said shaft when the coil is energized.

20. In a signal system, a signal indicator comprising a rotary dial, a shutter, a shutter coil, a circuit in which said coil is located, means to close the circuit when the dial is in a position to indicate the number of a station from which a signal is sent, an armature adapted upon its movement to raise the shutter, a plurality of contact springs located adjacent the said armature two of which only are normally in contact, said two being in the said shutter coil circuit, and means carried by said armature to separate said last named spring contacts and press one of same into electrical communication with the other contact springs, substantially as described.

21. In a signal system having more than nine signal stations, a signal indicator comprising a plurality of dials, stop calls adjacent each of said dials adapted to control the indication or display of the figures of the number of any station in the system from which a signal is sent, each of said stations numbered above 9 being severally in circuit with coils adjacent more than one dial, a number of sources of electric current corresponding to the number of dials, in series in each of said circuits, and means in said circuits, operable by a signal current from each station in the system numbered above nine from which a signal is sent, to close a plurality of separate local circuits through stop coils, adjacent a plurality of dials, adapted to control the indication or display of the figures of the number of the station from which the signal is sent, one of the said sources of electric current being included in each of said last named circuits.

22. In a signal system, a signal indicator comprising a plate hinged at its lower portion and removably secured at its upper portion whereby the plate may be swung forward, a shaft mounted transversely of said plate, a rotary dial secured to said shaft, dial actuating coils mounted on said plate opposite said dial and coils adapted to arrest the movement of said dial secured to said plate between the latter and portions of the dial.

23. In a signal system, a plurality of signal stations, a central receiving station, in circuit with each of said signal stations, automatic means at said receiving station adapted to open the circuit in which each of said signal stations is located when a signal is sent from any station in the system, means

at said central station to close the circuit between said central station and each of the signal stations and signal sending means at each of the signal stations comprising normally separated contact points, means to close said contact points and means operable when the outside circuit is open to hold certain contact points together.

24. In a signal system, a plurality of signal stations, a central receiving station, in circuit with each of said signal stations, automatic means at said receiving station adapted to open the circuit in which each of said signal stations is located when a signal is sent from any station in the system, means at said central station to close the circuit between said central station and each of the signal stations and signal sending means at each of the signal stations comprising normally separated contact members, means to close said contact members and a latch adapted to automatically hold or lock said contact members together and electric means adapted to release said latch and enable the contact members to separate.

25. In a signal system, a plurality of signal stations, a central receiving station, in circuit with each of said signal stations, automatic means at said receiving station adapted to open the circuit in which each of said signal stations is located when a signal is sent from any station in the system, means at said central station to close the circuit between said central station and each of the signal stations and signal sending means at each of the signal stations comprising normally separated contact members, a movable sign, means to close said contact members and automatically bring said sign into a position to be observed, means to hold said contact members together and said sign in an observable position and electrically operated means to release said contact members and said sign, substantially as described.

26. In a signal system, a plurality of signal stations, a central receiving station, in circuit with each of said signal stations, automatic means at said receiving station adapted to open the circuit in which each of said signal stations is located when a signal is sent from any station in the system, means at said central station to close the circuit between said central station and each of the signal stations and signal sending means at each of the signal stations comprising normally separated contact members, means to close said contact members, a pivoted arm adapted to engage said means and thereby prevent the separation of the said contact members and a coil adapted to move said arm out of engagement with the means of closing the said contact members and permit the separation of said contact members.

27. In a signal system, a plurality of signal stations, a central receiving station in circuit with each of said signal stations, automatic means at said receiving station adapted to open the circuit in which each of said signal stations is located when a signal is sent from any station in the system, means at said central station to close the circuit between said central station and each of the signal stations and signal sending means at each of the signal stations comprising normally separated contact members, a button adapted upon being depressed to close said contact members, a pivoted armature carrying an arm adapted when the button is depressed to hold it in its depressed position and a coil adapted, upon being energized to attract said armature and release said button.

28. In a signal system, a plurality of signal stations, a central receiving station, in circuit with each of said signal stations, automatic means at said receiving station adapted to open the circuit in which each of said signal stations is located when a signal is sent from any station in the system, means at said central station to close the circuit between said central station and each of the signal stations and signal sending means at each of the signal stations comprising normally separated contact members, a button adapted upon being depressed to close said contact members, a sign adapted to be moved into a position to be observed when said button is depressed, means adapted when said button is depressed to hold the same in its depressed position and electrically actuated means to release said button and permit of the separation of the contact points and of the movement of the sign out of a position to be observed, substantially as described.

29. An electric signal system comprising a plurality of signal stations and a signal indicator in circuit therewith, means operable by a signal current from any signal station in the system from which a signal is sent to close a local circuit in said signal indicator, means in said local circuit to indicate the station from which the signal is sent, means to close a second local circuit in said indicator when the said station is indicated and means in said last named circuit to operate a shutter.

In testimony whereof I affix my signature in presence of two witnesses.

ALFRED L. SOHM.

Witnesses:
J. H. CRAIG,
F. B. CALL.