A. L. SOHM.

ELECTRIC SIGNAL SOUNDING APPARATUS.

APPLICATION FILED SEPT. 4, 1908.

961,036.

Patented June 7, 1910.

5 SHEETS—SHEET 1.

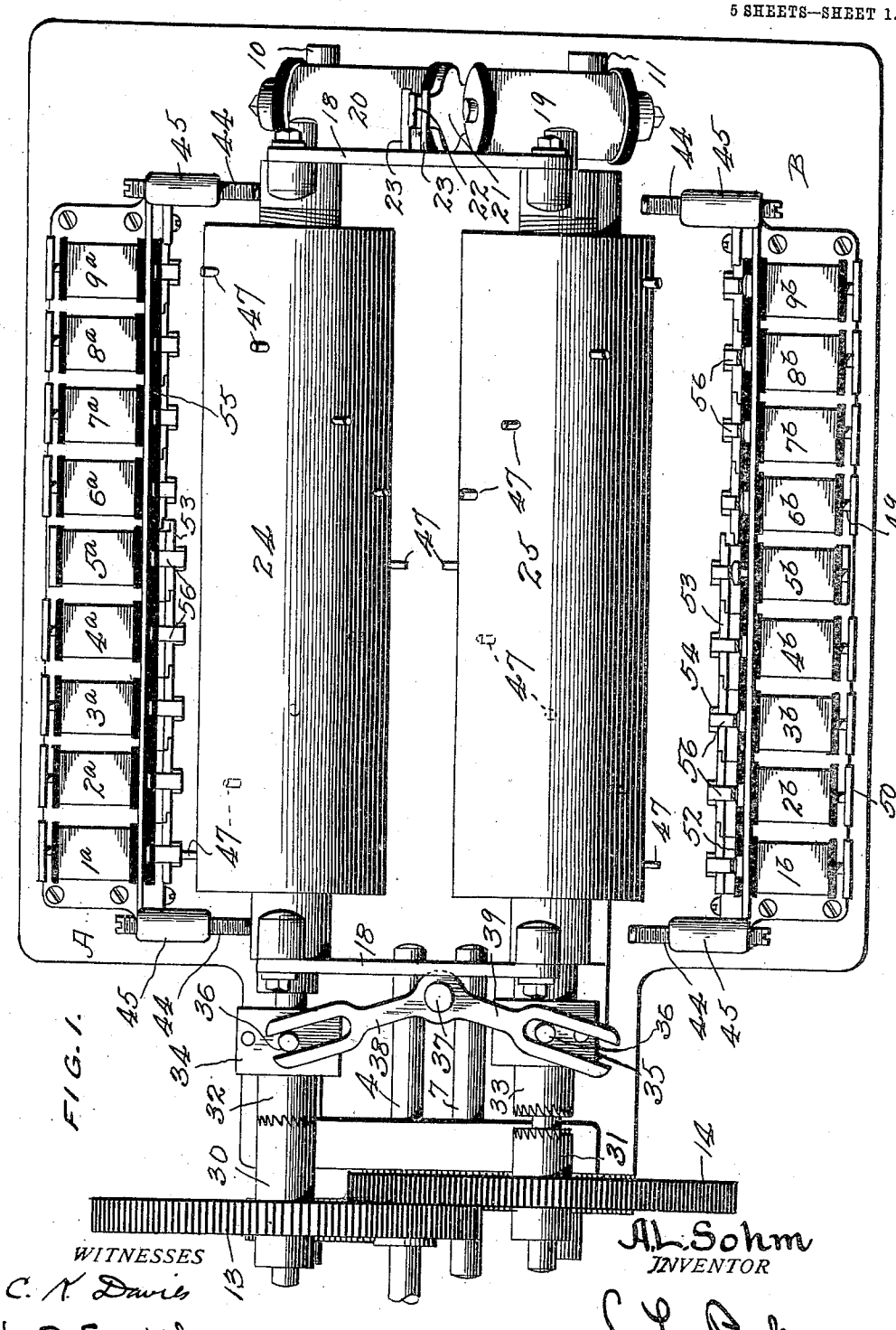

FIG. 1.

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5 SHEETS—SHEET 2.

FIG. 2.

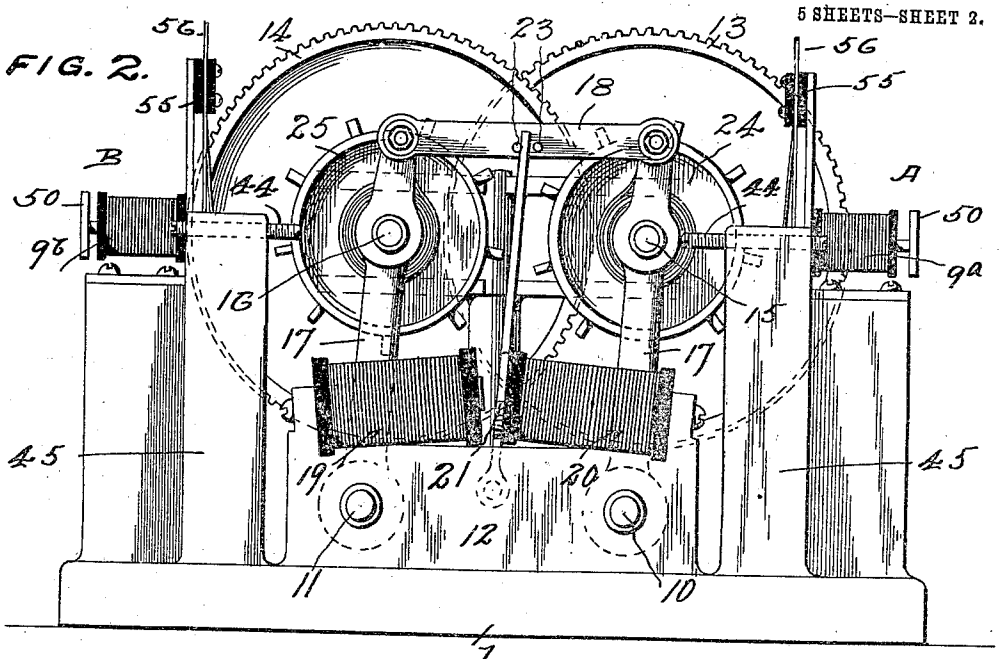

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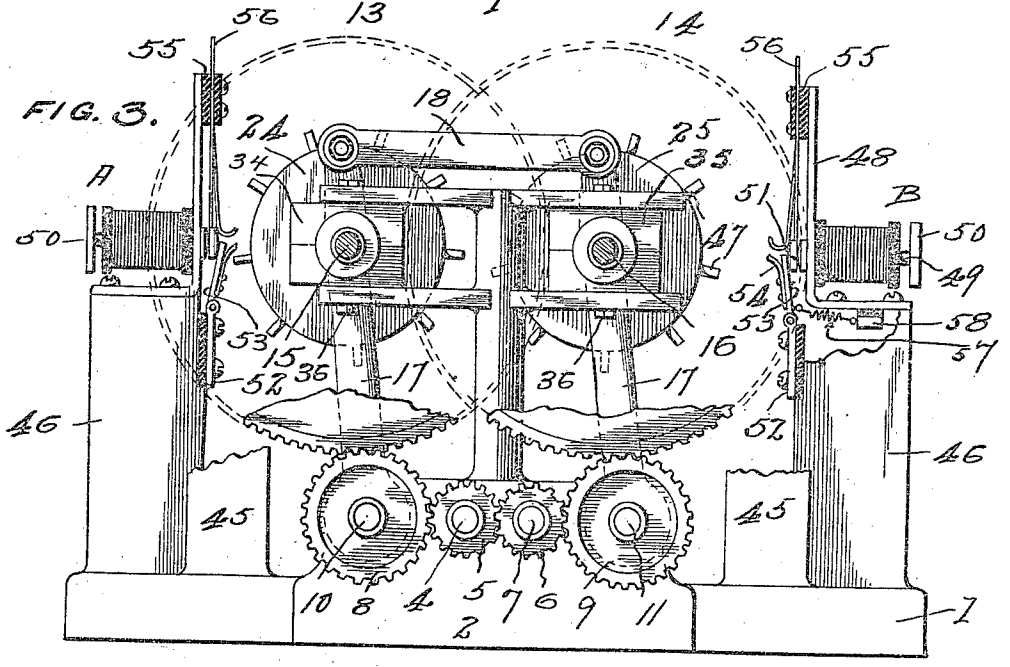
FIG. 3.



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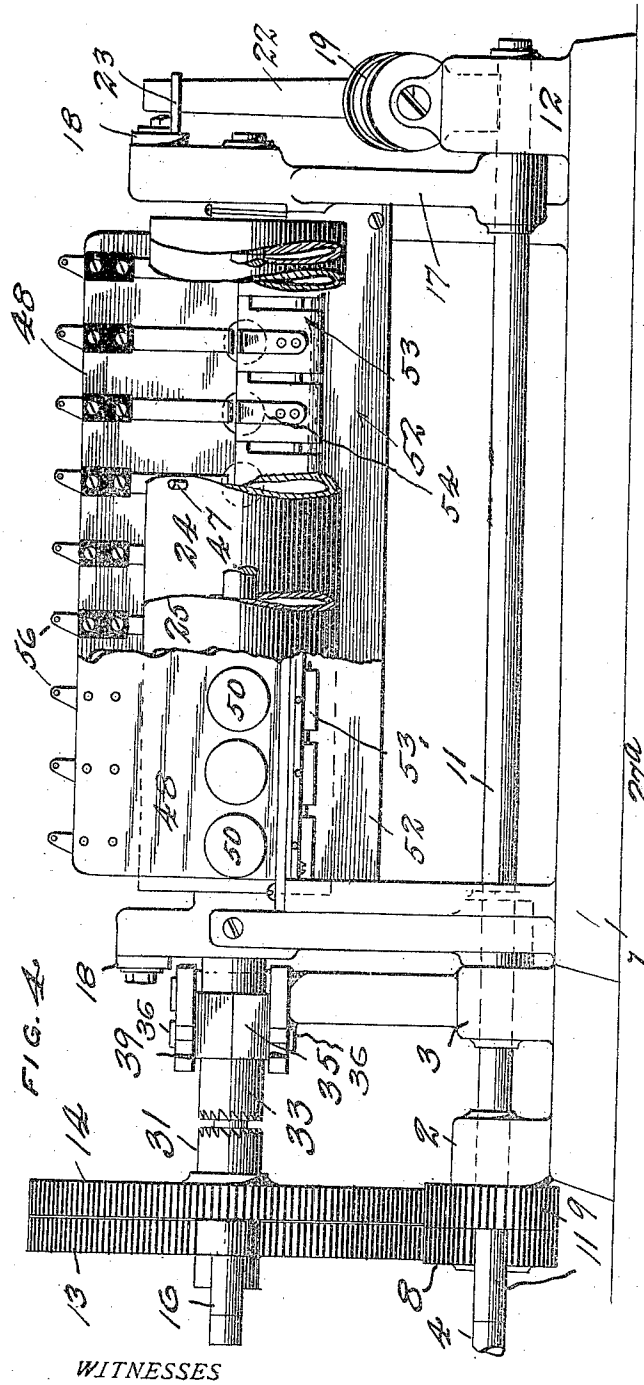

FIG. 4.

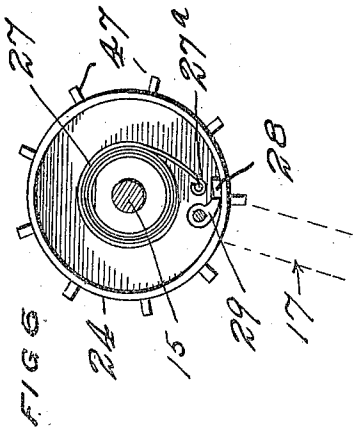

FIG. 6.

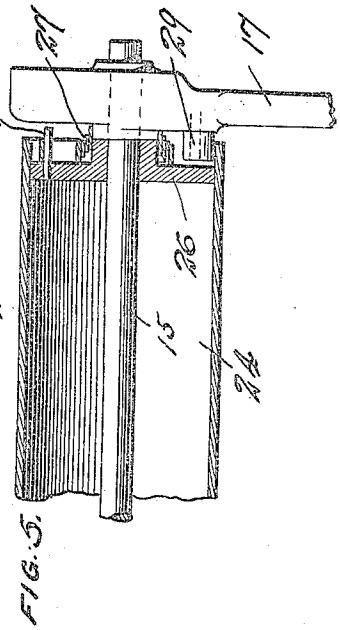

FIG. 5.

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5 SHEETS—SHEET 4.

FIG. 9.

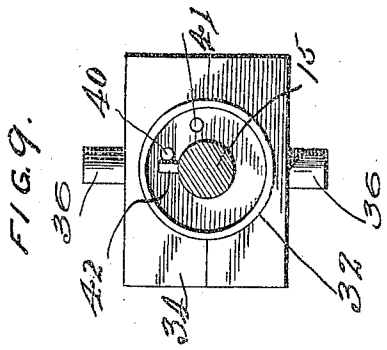


FIG. 8.

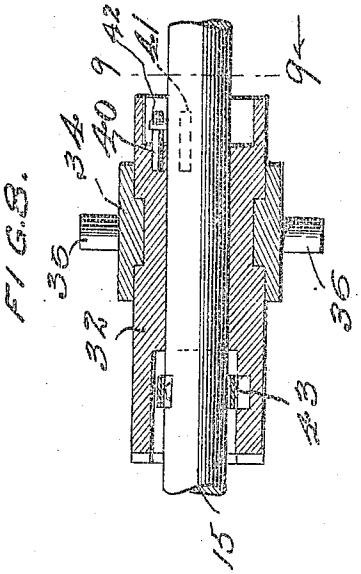
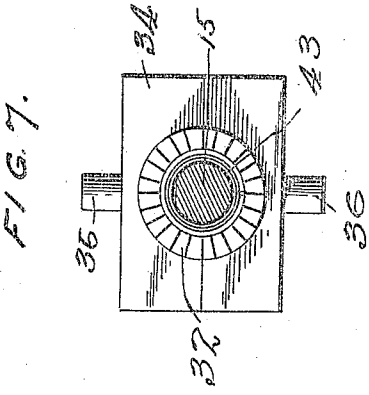


FIG. 7.



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5 SHEETS—SHEET 5.

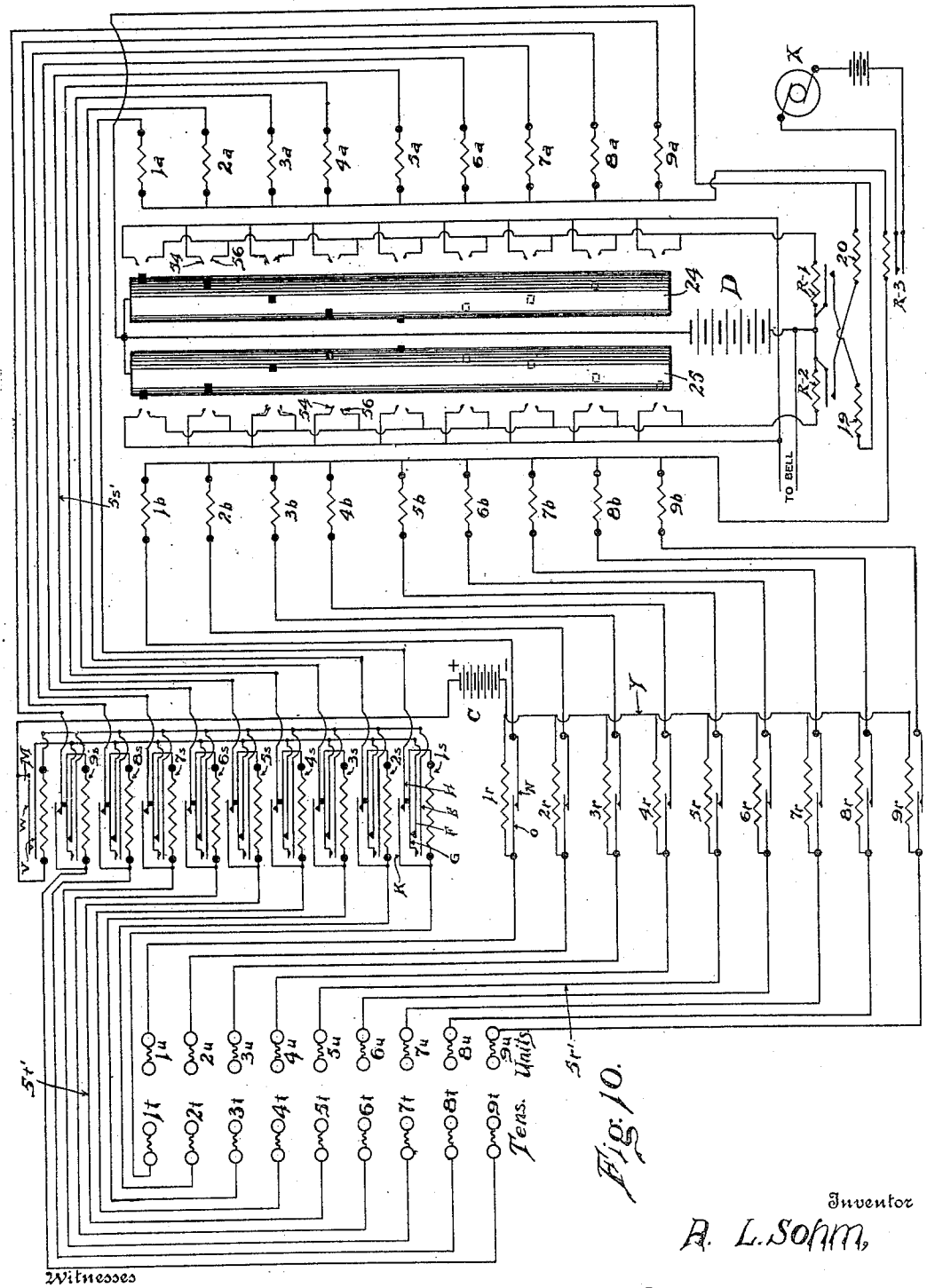

Fig. 10.

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UNITED STATES PATENT OFFICE.

ALFRED L. SOHM, OF WHITTIER, CALIFORNIA, ASSIGNOR TO NATIONAL ELECTRIC WORKS, OF WHITTIER, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ELECTRIC SIGNAL-SOUNDING APPARATUS.

961,036. Specification of Letters Patent. **Patented June 7, 1910.**

Application filed September 4, 1908. Serial No. 451,690.

To all whom it may concern:

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

This invention relates to electric signal sounding apparatus, and has particular reference to improvements in apparatus designed for sounding fire and other alarms.

The features of construction and arrangement which constitute the invention will be shown and described in the following specification, in which reference is made to the accompanying drawings, in which,

Figure 1 is a plan view of the machine. Fig. 2 is an end elevation of the machine. Fig. 3 is a cross-sectional view taken therethrough. Fig. 4 is a partial side elevation of the machine with parts broken away to show details of construction and arrangement. Fig. 5 is a detail view in longitudinal section of one of the revolving cylinders. Fig. 6 is an end elevation of the cylinder shown in Fig. 5. Fig. 7 is a detail sectional view of a cylinder-supporting shaft and a clutch bearing mounted thereon, and in elevation. Fig. 8 is a longitudinal sectional view of said shaft and clutch bearing, and, Fig. 9 is a cross-sectional view on lines 9—9 of Fig. 8.

In the drawings, 1 designates the base or supporting plate of the apparatus. Within upwardly extending portions 2 and 3 adjacent the forward portion of the base plate 1, is mounted a short driving shaft 4, which receives its motion from a suitable source of power, as a driving motor X. The shaft 4 carries a driving pinion 5 thereon, beyond the forward end of the base plate 1, which pinion 5 is in mesh with an idle pinion 6 mounted upon a stud shaft 7, extending through the base portions 2 and 3 parallel and at one side of the driving shaft. At relatively opposite sides thereof, the pinions 5 and 6 are in mesh with pinions 8 and 9 respectively mounted upon shafts 10 and 11 extending the entire length of the base plate 1 and journaled through said forward upwardly extending portions 2 and 3 thereof, and through an upwardly extending portion 12 at the rear end thereof. The outer pinions 8 and 9 are in mesh with relatively larger gear wheels 13 and 14 loosely rotatable upon shafts 15 and 16 respectively, which shafts 15 and 16 are journaled parallel with and above shafts 10 and 11, with their ends projecting through intermediate transverse apertures in upwardly extending pivot bars 17, pivotally mounted upon the said shafts 10 and 11 adjacent their forward and rear ends, and pivotally connected at their upper ends above said shafts 15 and 16, by connecting rods 18, whereby said shafts 15 and 16 may be swung in one direction or the other from direct vertical alinement with shafts 10 and 11. Upon the rear upwardly extending portion 12 of the base plate 1, are mounted a pair of opposing electromagnets 19 and 20 inclined upwardly toward one another, at a slight angle, and upon being energized, are adapted to attract the armature 21 forming part of an upright bar 22 pivotally mounted at its lower end upon the base portion 12 and extending with its upper end loosely projecting between pins 23 projecting rearwardly from the rear connecting bar 18 of the swinging frame. Thus when either of the magnets 19 and 20 is energized, the armature 21, and consequently the bars 22, will be pulled toward the same, and the frame supporting shafts will be swung in the corresponding direction by the contact of its upper end against one of the pins 23.

Mounted about the shafts 15 and 16 are the "tens" and "units" cylinders 24 and 25 respectively, closed at their ends by hubs 26, which are secured to their respective shafts and which abut the upright pivot bars 17 through which the ends of said shafts project. In the operation of my apparatus, the shafts 15 and 16 are rotated, and consequently the cylinders 24 and 25, which cylinders, when such rotation is stopped, are adapted to be returned to their normal position as before starting. For this reason, and as shown, in Figs. 5 and 6, I provide the rear hubs 26 of the cylinders 24 and 25, with spiral springs 27 mounted about a portion thereof, and having their outer ends secured to a portion of the upright pivot bars 17, which springs return said cylinders to their normal position after rotation. A stop piece 28 carried by said cylinders engages a stop member 29, carried by the pivot bars 17 and checks the movement of said cylinders under actuation of said springs 27, and at the normal position.

The gear wheels 13 and 14, which have been before mentioned as loosely rotatable upon the cylinder shafts 15 and 16, are secured upon sleeves 30 and 31 respectively, which are rotatable upon said shafts. The sleeves 30 and 31 are each provided with ratcheted inner ends adapted to be engaged by the ratcheted ends of slidable and rotatable sleeves 32 and 33 respectively, mounted upon shafts 15 and 16, within blocks 34 and 35 having vertical pins 36 projecting upwardly and downwardly therefrom. The shaft sleeves 32 and 33 are moved into engagement with their respective gear sleeves 30 and 31 simultaneously with the swinging movement of the shafts 15 and 16 and their cylinders 24 and 25, that is the clutch members 30 and 32 are engaged when the shafts are swung toward their side of the apparatus, and the members 31 and 33 are clutched when said shafts are swung toward their side. The means for accomplishing this result comprises a rigid vertical post 37 extending centrally and upwardly from the base portion 3 and provided with upper and lower pairs of rigid arms 38 and 39 adjacent its upper end, extending in relatively opposite directions, transversely of the base plate 1, and forwardly at a slight uniform angle, said arms being provided with longitudinally slotted ends for engagement about the projecting pins 36 of the slidable sleeve bearings 34 and 35 respectively. The arms 38 and 39 being rigid, the sleeves 32 and 33 and their bearings 34 and 35 will be forced to move in relatively opposite directions along shafts 15 and 16, when the same are swung upon the pivot bars 17, as described. The normal position of the apparatus is shown in Figs. 1, 2 and 3, with the tens cylinder 24 swung toward its respective side of the apparatus and its clutch members 30 and 32 in engagement to rotate the same, when the driving motor is started.

For a purpose to be hereinafter described, I do not desire the rotation of shafts 15 and 16 to immediately follow the engagement of their respective clutches. I desire that the sleeve 32 of shaft 15 shall rotate three-quarters of a revolution before actuating the shaft, and that sleeve 33 of shaft 16 shall rotate one-quarter of a revolution before actuating its shaft. In order to accomplish this, I provide the said sleeves 32 and 33 with circular bores at their inner ends surrounding their respective shafts 15 and 16, and with actuating pins 40 and 41 extending therefrom within said bores and parallel with said shafts to move therearound.

The shafts 15 and 16 are provided with pins 42 extending therefrom at right angles to and in the path of the sleeve pins 40 and 41, the shaft pin 42 within each of said sleeves being located to engage said sleeve pin 40 at the normal position, while the sleeve pins 41 are located to receive the shaft pins 42 of the shafts 15 and 16 thereagainst, when the same have traveled three-quarters and one-quarter of a full rotation, respectively. Thus, when the clutch members of shafts 15 and 16 are released, and said shafts rotated rearwardly to their normal positions, by means of the cylinder springs 27, the clutch sleeves 32 and 33 will be returned to their normal positions against the shaft pins 42, by means of spiral springs 43 located within a bore in each of sleeves 32 and 33 adjacent their ratcheted outer edges, and having one end thereof attached to the shaft.

The swinging movement of the cylinders 24 and 25 and their supports is limited by adjustable rubber tipped screws 44 mounted through tubular upper ends of uprights 45 at the ends of upright portions 46 extending longitudinally along the sides of the base plate 1. Said cylinders are further provided upon their periphery with a spirally arranged series of spaced projecting pins 47.

Mounted along and upon each of the upright portions 46 of the base plate 1, and respectively outside of and adjacent the tens and units cylinders 24 and 25, are series of tens and units electromagnets A and B, each series comprising nine magnets in accordance and alined with, the pins 47 of each cylinder, and numbered from 1^a up to 9^a, and 1^b up to 9^b, respectively. The series of magnets A and B are directly connected upon the upright portions of angle plates 48 having their horizontal portions screwed upon said base portions 46, and provided with openings therethrough opposite the center of each of said magnets, through which and through each of said magnets, project shafts 49, provided with armatures 50 upon their outer ends, and with headed inner ends 51. Thus when one of the magnets is energized, its armature 50 is drawn toward the same, moving its shaft longitudinally and projecting the inner headed end 51 inwardly toward the adjacent cylinder. Hinged at their lower edges to insulated strips 52 secured longitudinally along the inner surface of the base portions 46, are plates 53, arranged adjacent the headed shaft end 51 of each of the magnets of the series A and B, and overlapping one another rearwardly throughout each series, in such manner that when one of the plates 53 of either series is pressed inwardly by the energizing of its respective magnet, it causes inward movement of each of the plates 53 forwardly thereof in its series, as shown in Fig. 1. Each of the plates 53 is provided with spring contact arms 54, adapted when their respective armatures are pressed inwardly, and the cylinder supporting frame is swung toward its respective magnet se-

ries, to be contacted by its respective pin 47 of the adjacent cylinder, each such contact causing one sound of the alarm bell. Extending downwardly in alinement with each of the magnets of the series A and B, and connected at their upper ends by insulated strips 55 to the upper edge of the upright portion of the angle plate 48, are spring contact members 56 adapted to be independently pressed toward the adjacent cylinder by the inward movement of the magnet shaft alined therewith. The contact members 56 of each magnet series are connected to one of the actuating magnets 19 and 20 farthest removed therefrom, whereby when any one of said members of one magnet series is contacted by a pin 47, the cylinder supporting frame will be swung toward the opposite magnet series. The plates 53 are held against the headed ends 51 of the magnet shafts by means of springs 57 connected thereto and extending from, insulated strips 58 secured below the angle plates 48.

By referring now to Fig. 10 the electric circuits used in transmitting the signals from a distant alarm or other numbered box to the apparatus above described, said apparatus being a part of the circuits, will be explained. At the left of the diagram are represented two columns of digits, the "tens" and "units" columns, respectively, from which may be taken any two figures, to represent a given called box number, such for example as "55." 1^r to 9^r represent auxiliary relays and 1^s to 9^s represent a set of selective auxiliary relays. A primary battery C operates the respective sets of relays 1^r to 9^r and 1^s to 9^s while a secondary battery D rings the bell (not shown) by virtue of the action of that part of the apparatus described in the first part of the specification. Relays R^1 and R^2 serve to throw into circuit the electromagnet coils 19 and 20, respectively, for shifting the movable contacts, as above described. Relay R^3 when closed sets the driving motor X in motion which in turn actuates the revolving contact cylinders 24 and 25. Within the various selective auxiliary relays 1^s to 9^s the connections are identical; likewise, the connections in the various relays 1^r to 9^r are the same. In the first instance there are five spring members in each, represented by the letters E, F, G, H, K, respectively, while in the latter case, each relay has but two contact members designated by N and O, respectively. In the master relay M there are also two contacts V and W, which govern the selective set of relays and prevent confusion when one station number is being run and another is started before the completion of the first, as will be hereinafter described.

The operation of my improved apparatus is as follows, it being understood that the same is in the position shown in Fig. 1 when the operation is started. As before stated, a different combination of the terminals of the sets 1^t to 9^t and 1^u to 9^u is used for each individual station. For illustration, let us consider the operation of the apparatus when box number "55" is pulled. In this case current flows from the terminal 5^t along the conductor $5^{t'}$ through the selective relays 5^s, contact springs F and G (the springs in each relay being designated as shown in relay 1^s), along the common conductor of springs F, through springs V and W of the master relay M to the positive side of the battery C, from the opposite or negative side of said battery C along the common conductor Y, through the relay 5^r, along the conductor $5^{r'}$ to the units terminal 5^u and out of the box again.

The primary current following the course above described, energizes the auxiliary relay 5^r and the selective auxiliary relay 5^s, closing springs N and O of relay 5^r (the springs in each auxiliary relay being designated as in relay 1^r), and springs E and G and H and K of relay 5^s, also breaking the contact between springs F and G of the last named relay, and energizing the master relay M, opens springs V and W of that relay.

In closing the spring contacts cited an auxiliary or local circuit is completed through relays 5^s, 5^r and R^3, also the respective "tens" and "units" digit magnets, 5^a and 5^b, of the striking mechanism, and this circuit will remain closed and in operation until broken by the timing gear, the contacts of which are in series with the battery. The following action now takes place: From the positive side of battery C the current passes through the master relay M, spring contacts E and G of the relay 5^s, through the coil of said relay, between the contacts H and K, thence to the "tens" digit coil 5^a to relay R^3, "units" digit coil 5^b, contacts N and O, the relay 5^r itself, and back to the battery along the conductor Y. In passing through the relay R^3 the contacts therein close another secondary circuit which starts the motor X which in turn revolves the cylinders 24 and 25. The driving shaft will thus be rotated, causing rotation of the shaft 15 of tens cylinder 24, since its clutch is engaged, and after an interval during which the shaft pin 42 moves three-quarters of a revolution about the shaft 15 into engagement with the sleeve pin 41.

As the tens magnet 5^a, and the units magnet 5^b have been energized, the plates 53 of magnet 1^a, 2^a, 3^a, 4^a and 5^a of the tens series, and the plates 53 of magnets 1^b, 2^b, 3^b, 4^b and 5^b of the units series will be pressed inwardly, with their contacts 54. The contact springs 56 of the energized magnets only, will be pressed inwardly however, inasmuch as each of said springs is independent of

one another. Thus, as the tens cylinder rotates, its pins 47 will successively strike the contacts 54 of the magnets 1^a to 5^a in the order given, and will, upon striking contact 54 of magnet 5^a, strike also contact 56 thereof, thus energizing the actuating magnet 19 by the action of the contacts of relay R′ and causing the cylinders and the frame to swing toward the magnet series B, or the units series, at the same time releasing the tens clutch 30 and 32, and engaging the units clutch 31 and 33. Thus after an interval during which the sleeve 33 rotates one-quarter of a revolution about shaft 16 before its pin engages the shaft pin, as before described, the contacts 54 of the units magnets 1^b to 5^b will be struck by the pins 47 of the units cylinder, thereby completing the full alarm number. When the magnet 5^b is reached, the contact 56 thereof will be struck, energizing the actuating magnet 20 by virtue of the relay R^2 and returning the cylinders and their frame back to the first position, the alarm being repeated thereby as often as desired. From this it will be seen that the interval between the beginning of rotation of the driving shaft, and the rotation of the tens cylinder 24 forms the interval between the complete alarms when the same are repeated and is longer than the interval between the alarm digits as before described.

The object of the selector contacts in the auxiliary relays 1^s to 9^s is to prevent confusion on the striker, as in the case of one station's number being pulled before the sounding of the first station's number by the striker, has been completed. In this case the second alarm will be cut out until the first has been finished, by virtue of the broken contact between the contacts V and W of the master relay M.

Having fully described my invention, I claim:

1. In an apparatus of the character described, a plurality of movable contact elements, a plurality of movable contact elements adapted to be moved into the normal path of movement of said first named contact elements, and means for altering the path of movement of said first named contact elements to avoid contact with said second named contact elements.

2. In an apparatus of the character described, a plurality of rotative contact elements, a plurality of movable contact elements, electrically actuated means to advance said last named contact elements into the normal path of movement of the rotative contact elements, and means for moving the rotative contact elements out of contacting relation with said movable contact elements.

3. In an apparatus of the character described, a plurality of movable contact elements, a plurality of contact elements adapted to be moved into and out of the path of movement thereof, and means to advance a selected group of said last named contact elements into the path of movement of said first named contact elements.

4. In an apparatus of the character described, a plurality of rotative contact elements, a plurality of contact elements each adapted to be moved into and out of the path of movement thereof, and means to advance a selected group of said last named contact elements into the path of movement of said rotative contact elements.

5. In an apparatus of the character described, a plurality of approximately alined contact elements, corresponding to the digits from 1 to 9, a similar number of movable contact elements, means adapted to move a contact element corresponding to a selected digit into the path of movement of one of the said movable contact elements, and means actuated by the movement of said contact elements to simultaneously move all contact elements corresponding to lesser digits into the path of movement of said movable contact elements.

6. In an apparatus of the character described, a rotative member carrying a plurality of contact elements, and a plurality of approximately alined contact elements adapted to be moved into and out of the path of movement of the first named contact elements, said first named contact elements being adapted to be moved into and out of the path of movement of said second named contact elements.

7. In an apparatus of the character described, a plurality of approximately alined contact elements, a rotatorally mounted cylinder adjacent thereto and provided with a corresponding number of contact elements, means to advance one or more of the alined contact elements into the path of movement of the last named contact elements, and means to move the cylinder toward and away from the alined contact elements, substantially as and for the purpose specified.

8. In an apparatus of the character described, the combination of digit coils arranged in groups, means adapted to be shifted between said group for energizing the selected coils thereof, and means for providing an interval between the actuation of each group, substantially as described.

9. In an apparatus of the character described, the combination of digit coils arranged in groups, automatically shiftable means between said groups for energizing selected coils thereof, and means for providing an interval between the actuation of each group, substantially as described.

10. In an apparatus of the character described, the combination of digit coils, each provided with contact elements movable to an operative position upon the energizing

thereof, and arranged in groups, means for moving one or more of said contact elements upon the engaging of one of said coils, means for energizing the said contact elements of said coils, when in operative position, and means for providing an interval between the engagement of each group, substantially as described.

11. In an apparatus of the character described, the combination of digit coils, each provided with contact elements movable to an operative position upon the energizing thereof, and arranged in groups, means to successively engage the said contact elements of said groups when in operative position, and means adapted to provide an interval between the engagement of each of said groups, substantially as described.

12. In an apparatus of the character described, the combination of digit coils, each provided with contact elements movable to an operative position upon the energizing thereof, and arranged in groups, means to successively engage the said contact elements of said groups, while in an operative position, means adapted to provide an interval between the engagement of each group, and means to return said last named means to its normal position after such engagement, substantially as described.

13. In an apparatus of the character described, the combination of digit coils, each provided with contact elements movable to an operative position upon the energizing thereof, and arranged in groups, means to successively engage the said contact elements of said groups when in an operative position, means adapted to provide an interval between the engagement of each of said groups, means for moving one or more of said contacts upon the energizing of one of said coils, and means for returning said engaging means back to its normal position after its said engagement, substantially as described.

14. In an apparatus of the character described, the combination of digit coils, each provided with contact elements movable to an operative position upon the energizing thereof, and arranged in groups, means for moving one or more of said contact elements upon the energizing of one of said coils, means mounted to shift between said coil groups to engage the said contact elements when in operative position, means adapted to shift said engaging means when its respective coil is energized, and means for providing an interval between the engagement of the said operative contacts of each of the coil groups, substantially as described.

15. In an apparatus of the character described, the combination of digit coils, arranged in separate groups, and each coil provided with a contact element, movable to an operative position upon the energizing thereof, having means to engage and move the adjacent coil contact element upon one side thereof and in one direction throughout each group, and means to engage the said contact elements of said groups when in operative position and means adapted to provide an interval between the engagement of the coil contact elements of each group, substantially as described.

16. In an apparatus of the character described, a plurality of groups of alined contact elements, a plurality of rotative members adjacent thereto, and provided with contact elements adapted to engage the alined contact elements in the said groups, means to rotate the said rotative members, means adapted to move said rotative members into an engaging or contacting relation with a group of alined contact elements, and means actuated by the movement of said members out of the engaging or contacting relation with a group of alined contact elements to disconnect said member from its rotating means, substantially as described.

17. In an apparatus of the character described, two spaced groups, each consisting of nine alined contact elements, two rotating members mounted adjacent thereto, and each provided with nine contact elements, said members being adapted to be simultaneously moved toward one and away from the other alined group to move the contact elements carried thereby, into and out of engaging or contacting relation with the groups of alined contact elements, and electrically actuated means adapted to automatically and alternately shift said rotative members toward and away from the said groups of alined contact elements, substantially as and for the purpose specified.

18. In an apparatus of the character described, the combination of a plurality of groups of contact elements, electrically operated means for moving selected ones of said elements into an operative position, rotative contact members mounted to move into and out of contacting relation with said first named contact elements, means to rotate said members, and means actuated by the movement of said contact members away from said elements, adapted to disconnect the said rotative means thereof, substantially as described.

19. In an apparatus of the character described, the combination of a plurality of electrically operated contact elements, rotative contact elements mounted to move toward and away from the same, means for rotating said last named elements, and means actuated by the movement of said rotative elements, to connect the same with and disconnect the same from, said rotative means upon relative movement thereof toward and away from said first named elements, substantially as described.

20. In an apparatus of the character described, the combination of a plurality of electrically operated contact elements arranged in spaced series, a swinging frame mounted between and movable toward and away from said elements, rotative contact members mounted in said frame to move therewith and carrying contact elements for engagement with selected elements of said series, connections for rotating said contact members, and means within said connections for connecting and disconnecting said members upon the respective movement of said members, toward and away from their corresponding series, substantially as described.

21. In an apparatus of the character described, the combination of a plurality of electrically operated contact elements arranged in spaced series, a swinging frame mounted between and movable toward and away from said elements, rotative contact members mounted in said frame to move therewith, a driving shaft for said members, means connecting said driving shaft and said members, having elements for disconnecting and re-uniting the same upon the respective movement of said members away from and toward their corresponding contact series, and means within said connecting means to retard the rotation of said elements when the same are re-united, the interval in the rotation of one of said members being greater than the other, substantially as described.

22. In an apparatus of the character described, the combination of a plurality of electrically operated contact elements arranged in groups, rotatable contact members mounted to move toward and away from their respective groups, means for rotating said members, means actuated by the movement of said members toward and away from said groups adapted to respectively connect and disconnect the same with their rotating means, and means to rotate said members to their normal position when disconnected from said first named rotative means, substantially as described.

23. In an apparatus of the character described, the combination of a plurality of electrically operated contact elements arranged in spaced groups, a frame mounted to swing toward and away from said groups, rotatable members mounted within said frame to move therewith, and provided with a spirally arranged series of contact elements for engagement with selected ones of said first named elements, a driving shaft, connections between said shaft and said members embodying movable clutches, means operated by a selected engagement of said contact elements to swing said frame and means to clutch and unclutch said members upon their relative movement toward and away from their respective groups, substantially as described.

24. In an apparatus of the character described, the combination of alined groups of contact elements, electrically operated means for operating a selected one of said elements to advance the same, means carried by each of said contact elements to advance the contacts at one side thereof throughout each group upon the operation thereof, rotatable contact members mounted to swing toward and away from said groups and limited in their movement to the advanced position of said elements, means for rotating said members, means for swinging the same, and means operated by the swinging movement thereof, to connect and disconnect the rotating means upon the respective movement of said members toward and away from said groups, substantially as described.

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

ALFRED L. SOHM.

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WILLIAM H. G. MILLER.