H. M. ELDRED.

ELECTRICAL SIGNALING SYSTEM.

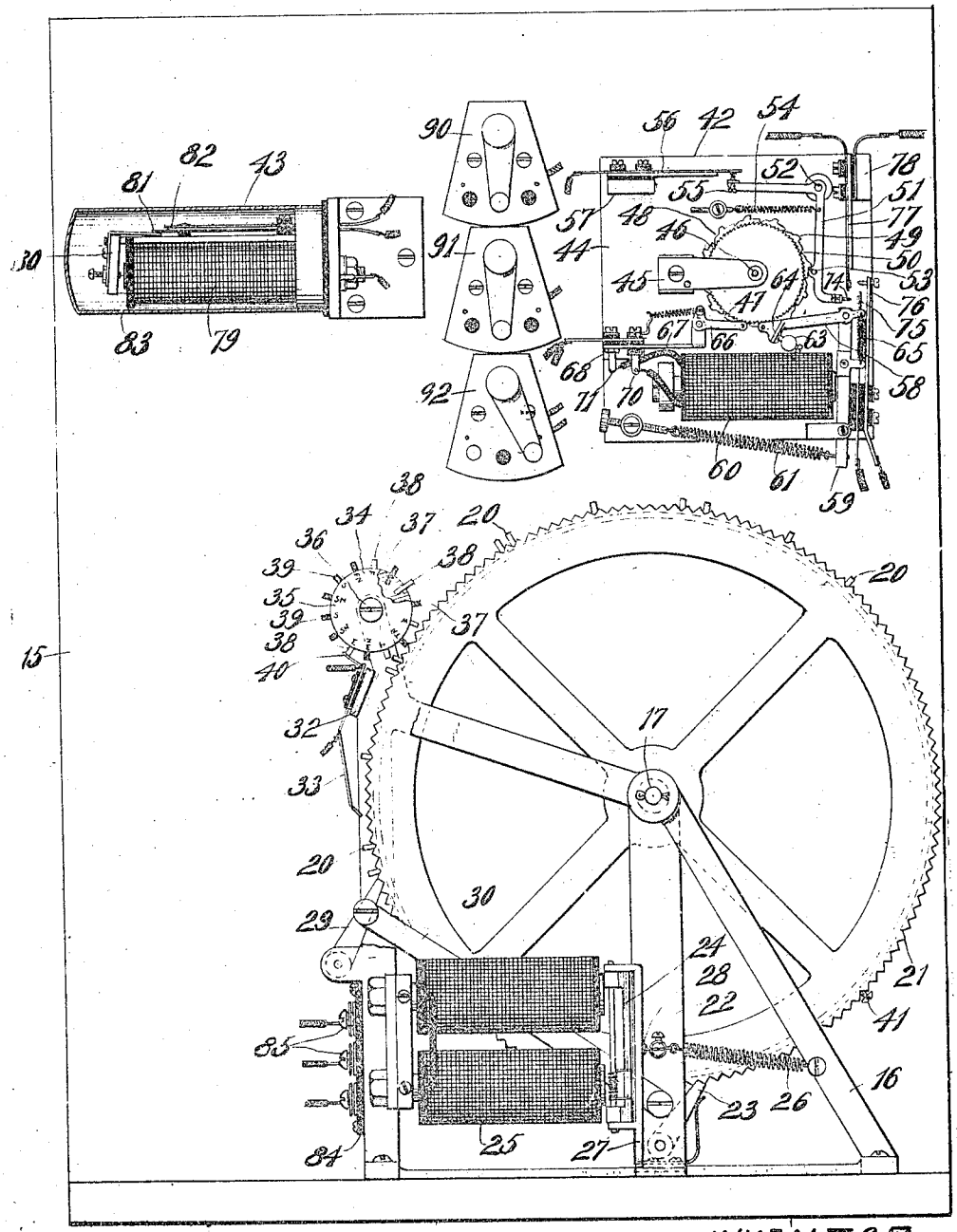
APPLICATION FILED JULY 20, 1910.

1,042,096.

Patented Oct. 22, 1912.

5 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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5 SHEETS—SHEET 2.

FIG. 4.

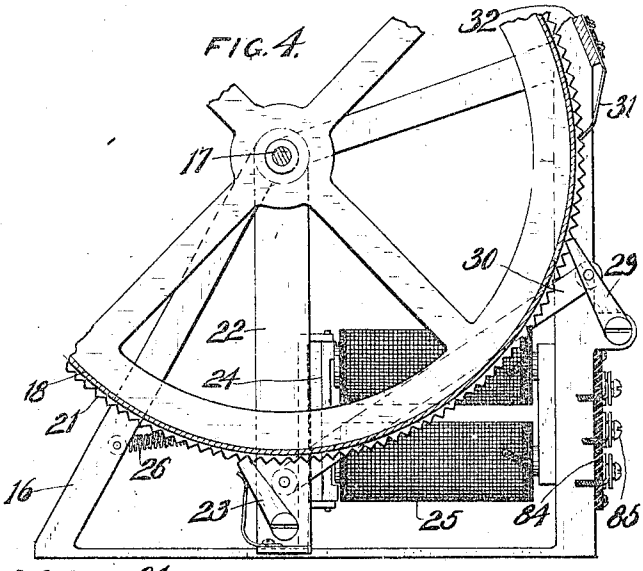


FIG. 2.

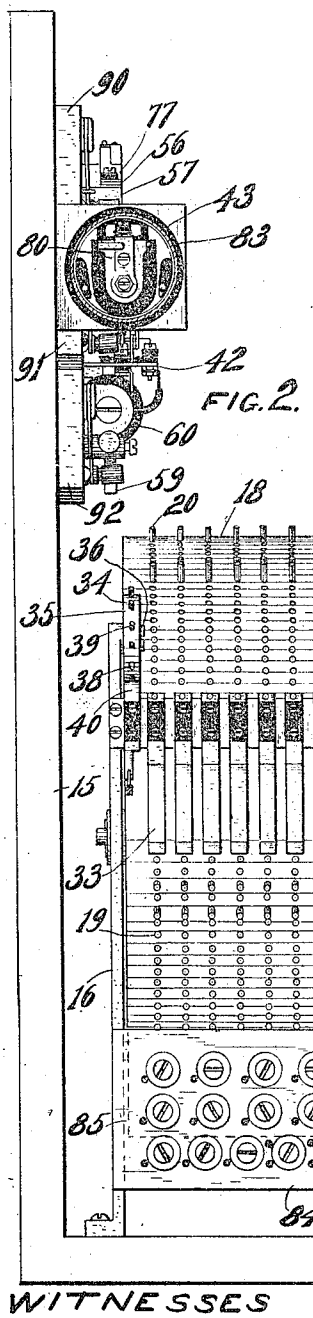
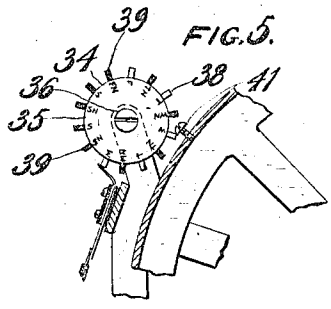


FIG. 5.



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5 SHEETS—SHEET 3.

FIG. 2.

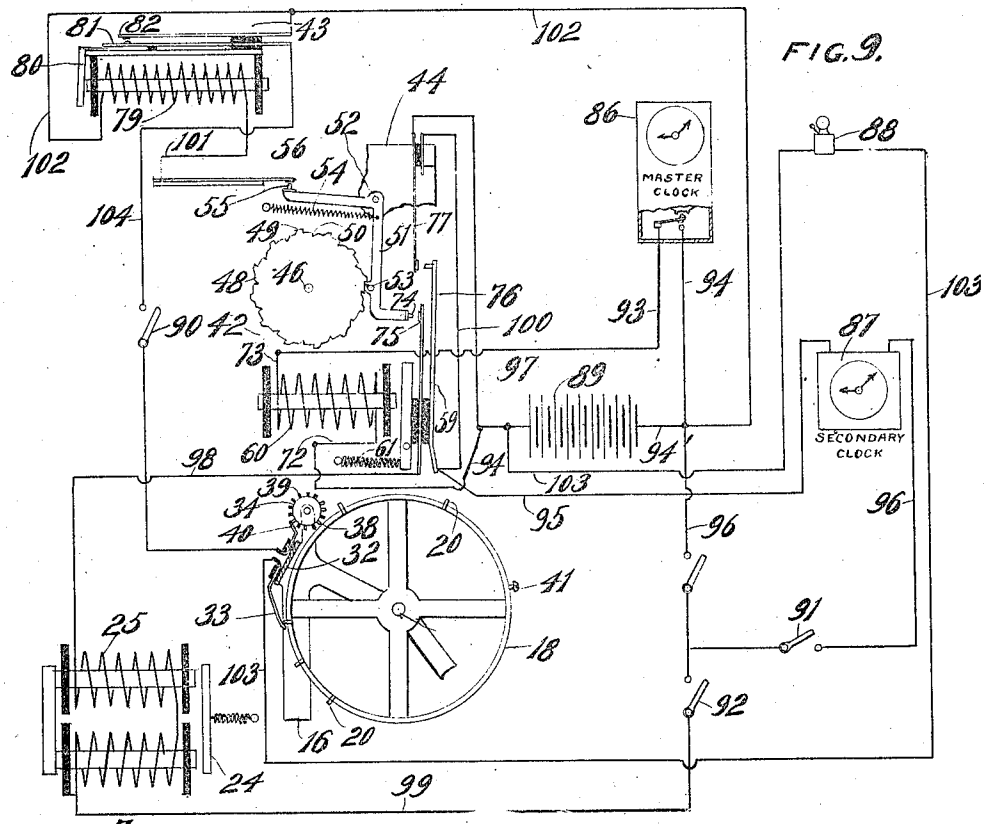
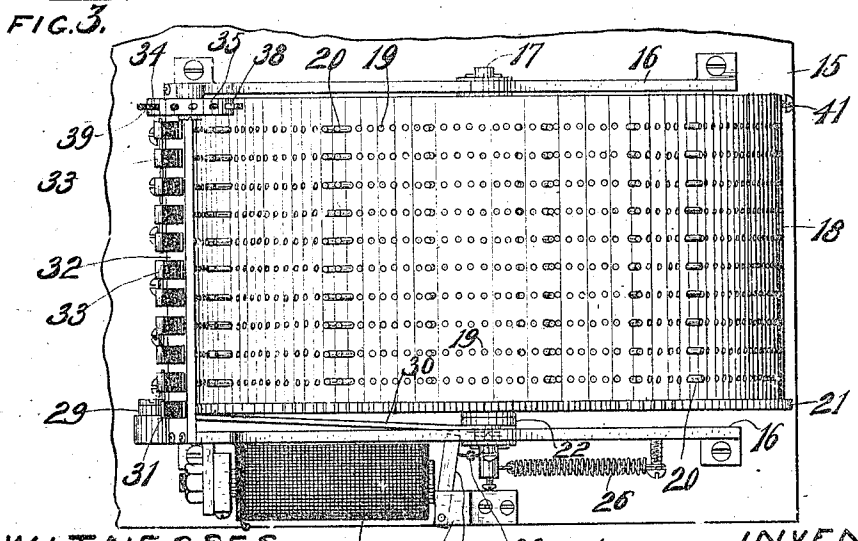


FIG. 3.



WITNESSES.

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5 SHEETS—SHEET 4.

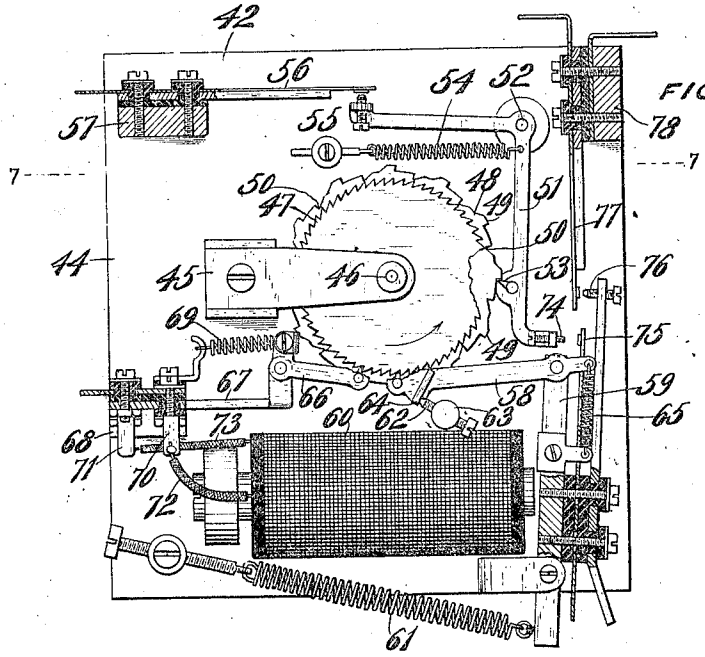

FIG. 6.

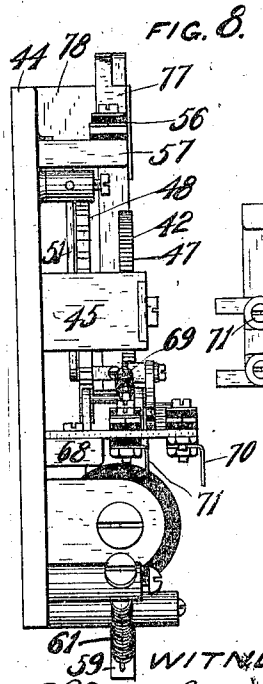

FIG. 8.

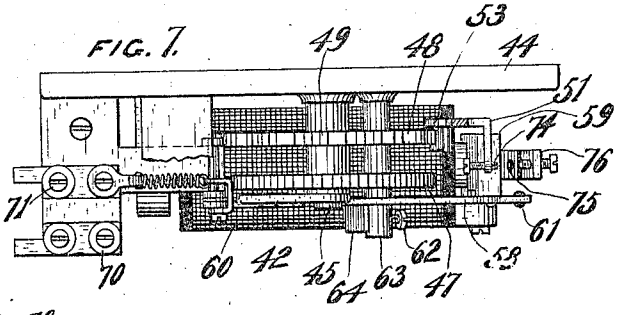

FIG. 7.

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1,042,096.

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5 SHEETS—SHEET 5.

FIG. 10.

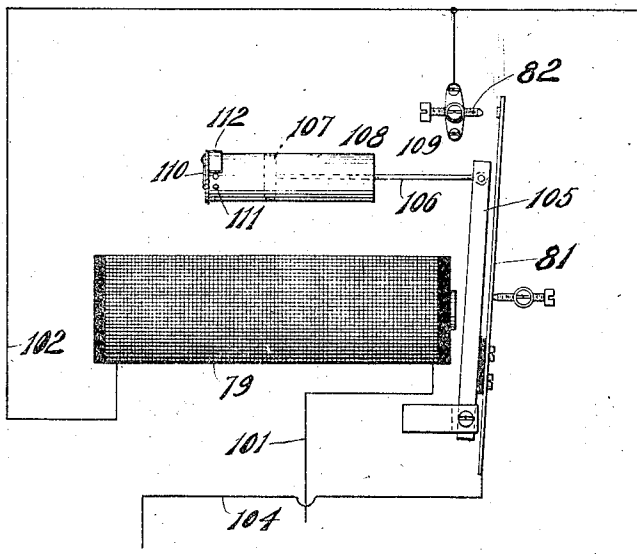


FIG. 11.

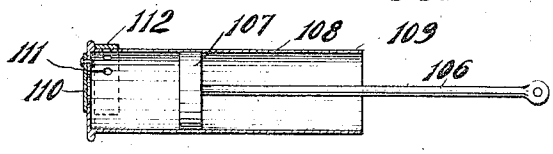
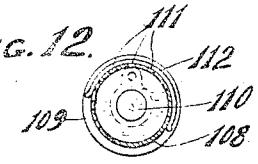


FIG. 12.



WITNESSES.

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ELECTRICAL SIGNALING SYSTEM.

1,042,096. Specification of Letters Patent. Patented Oct. 22, 1912.

Application filed July 20, 1910. Serial No. 572,837.

To all whom it may concern:

Be it known that I, HOWARD M. ELDRED, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Electrical Signaling Systems, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to improvements in an electric signaling system designed to automatically ring bells at various points and at various intervals of time and is particularly adapted for use in schools, colleges, factories, etc. where a daily program is followed.

One of the objects of this invention is to provide an electric signaling system which will ring bells at certain predetermined intervals of time at various points on certain days of the week and on other days to ring bells at different intervals of time so that different signal periods may be arranged for different points for each day and the signals changed from day to day if desired.

A further object of the invention is to provide an electric signaling system particularly adapted for school use which is provided with means whereby part of the mechanism may be cut out of the circuit at predetermined periods of time in order to stop the ringing of the signaling bells during the nights and Saturdays and Sundays.

A further object of the invention is to provide an electric signaling system which is simple and compact in construction, automatic in operation and capable of opening and closing electric circuits to control the operation of secondary clocks and the ringing of signaling bells at various points and at various times, and the operation of various devices such as water, gas or steam valves, dampers, etc.

With the above, and other objects in view, the invention consists of the electric signaling system as set forth in the claims and its parts and combinations and all equivalents thereof.

In the accompanying drawings in which the same reference characters indicate the same parts in all of the views; Figure 1 is a front view in elevation of the signaling operating mechanism, parts broken away and other parts in section; Fig. 2 is a side view in elevation thereof; Fig. 3 is a plan view of the drum and operating mechanism forming part thereof; Fig. 4 is a fragmentary vertical sectional view of the drum and operating mechanism; Fig. 5 is a detail view, parts being in section; Fig. 6 is an enlarged view of the mechanism for making and breaking the electric circuit of the system at fixed periods of time; parts broken away and other parts in section; Fig. 7 is a sectional view thereof taken on line 7—7 of Fig. 6, parts broken away; Fig. 8 is a side view thereof; Fig. 9 is a diagrammatic view of the system showing the electric circuits; Fig. 10 is a side view of a modified form of bell relay; Fig. 11 is a longitudinal sectional view of the dash pot thereof; and, Fig. 12 is a transverse section of the dash pot.

Referring to the drawings the numeral 15 indicates a portion of a casing within which the operating mechanism is inclosed. A main frame 16 within the casing and connected to the bottom portion thereof has mounted therein a horizontal shaft 17 on which is journaled a cylinder 18 provided with circumferential lines of apertures 19 adapted to removably receive contact pins 20. A toothed wheel 21 formed integral with the cylinder and positioned on one end thereof is provided with one hundred and forty four teeth corresponding to twelve hours or one half day divided into five minute periods. The apertures of the cylinder are arranged in longitudinal lines with relation to the shaft 17 and in alinement with the teeth of the toothed wheel 21. The cylinder 18 is intermittently rotated the distance of one tooth of the toothed wheel once every five minutes by means of an oscillating arm 22 pivotally mounted on and depending from the shaft 17. A spring pressed pawl 23 pivoted to the lower end of the oscillating arm 22 is positioned to engage the teeth of the toothed wheel. The depending arm is oscillated by the armature 24 of an electro magnet 25 and a retrieving spring 26. The armature 24 is pivotally mounted on a standard 27 extending upwardly from the casing and is connected to the oscillating arms 22 by a link 28.

A stop pawl 29 pivoted to the main frame and pivotally connected to the oscillating arm 22 by a link 30 is adapted to be moved out of engagement with the teeth of the

toothed wheel 21 to permit the movement of said wheel by the movement of the oscillating arm, and a spring pawl 31 also connected to the main frame and engaging the teeth of the ratchet wheel is adapted to prevent said wheel from advancing a distance greater than the distance of one tooth. This spring pawl also prevents the accidental rotation of the toothed wheel and the cylinder when both pawls are momentarily out of engagement with the toothed wheel.

It will be noticed that the stop pawl and the spring pawl extend toward each other so that they engage opposite faces of the teeth in order to permit the movement of the wheel only in one direction and to permit this movement only when the stop pawl is disengaged from the teeth.

A brush bar 32 forming part of the main frame and extending from one side of the frame to the other has mounted thereon and insulated therefrom a plurality of spring contact arms or brushes 33 each one of which is positioned in alinement with one of the circumferential lines of apertures of the cylinder in order to contact with the pins 20 inserted in some of said apertures. As the cylinder makes a complete revolution once every twelve hours each individual pin inserted in the apertures of the cylinder will contact with its respective contact arms twice in one day or twenty four hours and as it is only desired, in many instances, to ring the signal bells during the day time, an adjustable automatic silencer or circuit maker and breaker 34 is provided which is adapted to break the circuits at certain predetermined periods of time. This silencer consists of a metal wheel 35 journaled on a stud pin 36 projecting from the main frame above the brush bar 32 and is provided with a circumferential line of apertures 37 in which are inserted metal pins 38 and pins 39 of insulating material. The silencer wheel is in electrical contact with the main frame and the metal pins 38 are adapted to make electrical contact with the silencer brush 40 which is mounted on the brush bar 32 and in the path of movement of said pins. The insulating pins 39 are adapted to form a break in the circuit when in contact with the silencer brush. A projecting pin or screw 41 carried by the cylinder is positioned to engage one of the pins of the silencer wheel and intermittently turn the wheel the distance of one pin each time the cylinder makes a complete revolution and the pins are so spaced with relation to the silencer brush that one of the pins will always be moved into engagement with said brush and remain in contact therewith until the wheel is again moved and the next pin moved into engagement with said brush. The metal pins are inserted in the wheel to complete the circuit during the day time, excepting Sundays, or other predetermined days, and the insulating pins are inserted to break the circuit to prevent the signals being sounded during the nights, Sundays and other predetermined days. If desired the silencer wheel may have characters marked thereon to indicate the proper apertures to insert the proper pins to give the desired signals.

A selector relay 42 connected to and positioned within the casing is adapted to control the circuits for actuating the operating mechanism of the cylinder and a bell relay 43 also positioned within the casing serves to protect the selector relay contact points from injury from excessive arcing.

The selector relay is provided with a metal back portion 44 carrying a bracket 45 and a shaft 46 on which is rigidly mounted a ratchet wheel 47 having preferably sixty teeth to correspond with the minutes of an hour. A selector wheel 48 also rigidly mounted on the shaft 46 is provided with teeth 49 preferably twelve in number to correspond with five minute periods of an hour and recessed portions 50 between the teeth represent two, three or four minute periods of time between said teeth. It is obvious that the time divisions of the wheels may be changed and modified without departing from the spirit and scope of the invention.

A bell crank lever 51 pivotally mounted on a stud 52 projecting from the back portion is provided on its lower arm with a pawl 53 rigidly connected to the arm and bearing against the periphery of the selector wheel so it will be engaged by the teeth of said wheel and swung to different positions. A coiled spring 54 serves to hold the pawl yieldingly against the selector wheel. The upper arm of the bell crank lever is provided with a screw contact 55 which is adapted to contact with the spring contact arm 56 insulated from and connected to a lug 57 projecting from the metal back 44.

A pawl 58 pivotally connected to the upper end of the pivoted armature 59 of the electromagnet 60 is adapted to intermittently rotate the ratchet wheel the distance of one tooth every minute. A spring 61 connected to the armature and to the back serves to retrieve the pawl and in retrieving to move said wheel as before mentioned. The movement of the pawl is limited, adjustably, by a stop screw 62, threaded in a lug 63 projecting from the metal back, which engages an angular positioned projection 64 extending from the pawl 58. A coiled spring 65 connected to the outer end of the pawl 58 and to the armature 59 holds said pawl yieldingly in engagement with the ratchet wheel.

A stop pawl 66 pivotally connected to a

bracket 67 bolted to a lug 68 projecting from the back plate is positioned to engage the teeth of the ratchet wheel 47 and prevent retrograde movement thereof. The stop pawl is held yieldingly against the ratchet wheel by a coiled spring 69 which is connected to the pawl and to an arm mounted on the lug 68. The bracket 67 also serves to support the binding posts 70 and 71 which form the terminals of the lead wires 72 and 73 extending to the coil of the electromagnet 60. The binding posts are insulated from said bracket and from each other. The lower end of the bell crank lever is provided with a contact screw 74 which is positioned to contact with the spring contact arm 75 once every five minutes when the pawl 53 is resting on one of the high teeth 49 of the selector wheel and the armature 59 is drawn toward the magnet 60. The spring contact arm 75 is mounted on and insulated from the armature 59. Another contact arm 76 is also mounted on and insulated from the armature 59 which is adapted to contact once every minute with a spring contact arm 77 mounted on and insulated from a lug 78 projecting from the back 42.

The bell ringing relay 43 before mentioned is provided to protect the contact points of the selector relay from injury from arcing, and while of great value when using a high voltage or a large number of signal bells, it is not essential to the successful operation of the apparatus and in some cases may be dispensed with. This relay consists of the usual coil 79 and pivoted armature 80 which closes a circuit between spring contact arms 81 and 82. A tubular shell 83 serves to protect the relay from injury.

The main frame is provided with an insulating plate 84 having a plurality of binding screws 85 connected thereto to which are connected the wires of the circuit for operating the cylinder and the wires of the circuit extending to the signal bells.

Referring now particularly to the diagram shown in Fig. 9 the numeral 86 indicates a master clock provided with the usual means for making and breaking an electric circuit at minute intervals, 87 a secondary clock, 88 a signal bell and 89 a battery providing current for operating the different parts of the apparatus. Switches 90, 91 and 92 provide means for disconnecting the different circuits manually when desired. A wire 93 connected to the circuit maker of the master clock extends to one of the terminals of the electro-magnet 60 and as 94′ extends from the other terminal of said magnet the return wire 94 extends to the battery 89 and from the battery back to the circuit maker of the master clock thus providing a complete circuit for energizing the selector magnet which is made and broken at intervals of one minute causing a movement of the armature 59 of said magnet once every minute. The movement of the armature 59 causes the contact arm 76 carried thereby to contact with the spring contact arm 77 and complete another circuit through the wire 95 connected to the end of contact arm 76 which extends to the secondary clock 87 and from said clock a wire 96 leads to and joins the wire 94′ at the right of the battery and from the opposite pole of the battery a wire 97 connected to the wire 94 extends to the spring contact 77 thus completing this circuit through the battery to the secondary clock and actuates the same. The five minute contact arm 75 which is also carried on the armature 59 and moves once every minute thereby contacts with the lower contact 74 of the bell crank lever once every five minutes when the pawl of the arm is engaged by one of the high teeth 49. This movement completes the circuit through the wire 98 leading to the cylinder electro-magnet 25 and from the said magnet a wire 99 extends to and joins to the wire 96 and as before described the wire 96 connects to wire 94′ to battery, from battery to wire 97 to contacts 77 and 76 and thence to a wire 100 which is connected to the metal back 44 and to which the bell crank lever and its contact is electrically connected. The completion of this circuit energizes the cylinder electro-magnet which actuates the pawls to rotate the cylinder the distance of one tooth and cause the pins 20 which may be in the apertures registering with the contact brushes 33 to contact with said brushes and to remain in contact until the cylinder is again moved.

Two, three or four minutes after the pawl 53 engaged one of the high teeth 49 or when the minute ratchet wheel has moved the distance of two, three or four teeth of the ratchet wheel the said pawl will enter one of the recesses or lower teeth 50 and the contact 55 on the upper arm of the bell crank lever will contact with the contact arm 56 and complete the circuit to energize the bell relay coil 79. A wire 101 connects the contact 56 to the bell relay magnet 79 and a wire 102 connected to the other lead wire of the magnet extends to and is connected to one pole of the battery 89 through the wire 94′ and from the other pole of the battery the circuit is completed through the wires 94 and 97, contacts 77 and 76, wire 100, and from said wire to the metal back 44 and back to the bell crank lever 51 and its contact 55. The energization of the bell relay coil causes its armature to move the contact arm 81 into contact with the arm 82 and complete a circuit through the wire 102 extending to the battery 89 and from the other pole of the battery through wire 103 leading to the signal bell 88 and from the signal

bell to one of the cylinder brushes 33. From the brush 33 the circuit is continued through one of the contact pins 20 to cylinder and frame 16 and thence to silencer wheel 34, contact brush 40 and back to the contact brush 81 through the wire 104 thus completing the circuit and ringing the signal bell for the period of time the bell crank pawl 53 is in engagement with one of the lower teeth 50.

In some cases it is desirable to prolong the ringing of the signal bells for a period of time longer than the relay just described will effect and to accomplish this result a modified form of bell relay is provided which is shown in Figs. 10 and 11. In this form of relay the pivoted armature 105 extends above the coil 79 and is connected to the piston rod 106 of a piston 107 which is reciprocated in the cylinder 108 of a dash pot 109 positioned above the coil.

The closed end of the cylinder is provided with an outwardly opening check valve 110 which is adapted to permit the free movement of the piston toward the closed end and to retard the movement of said piston toward the open end of the cylinder. The cylinder is provided with a plurality of air inlet openings 111 near the closed end thereof and with an adjustable member 112 adapted to be moved over some of the air inlet openings 11 to adjust the period of time the contact 81 will engage the contact 82′ and thus prolong the ringing of the signal bells.

While only one signal bell and one secondary clock are shown it is to be understood that the apparatus is adapted to ring a number of bells and actuate a number of secondary clocks and also to operate other devices.

In operation the cylinder pins are placed in the proper apertures corresponding to the time periods it is desired to ring the signal bells and the proper metal pins and pins formed of insulating material are inserted in the apertures of the silencer wheel to correspond with the periods of time in which it is desired to silence the signals. The operation of the master clock completes a contact once every minute and actuates the selector magnet to turn the ratchet wheel and the selector wheel and complete a circuit to the secondary clock and cause its operation and by means of the selector wheel, at regular intervals of time, to actuate the contacts controlling the circuits to the cylinder and to the bell relay. The circuit to the cylinder magnet is first made to cause its partial rotation to bring its contact pins into contact with the brushes so that when the circuit to the bell relay is later completed the signal bells will be actuated. Once every revolution of the cylinder the silencer wheel engaging screw or projection of the cylinder will engage one of the pins of the silencer wheel and rotate said wheel the distance of one pin and move another pin into contact with the silencer wheel brush contact in place of the one moved out of contact with said brush. If it is desired to change the time period during which the signals are to remain silent it is only necessary to substitute an insulating pin for the metal pin and when it is desired to change the order of the signals it is only necessary to insert the cylinder pins in different apertures in the cylinder.

From the foregoing description it will be seen that the apparatus is very simple in construction and operation and is well adapted to perform the functions desired.

What I claim as my invention is—

1. An electrical signaling system, comprising a cylinder provided with circumferential lines of openings representing certain successive periods of time, contact brushes positioned to register with the lines of openings, removable pins inserted in some of said openings to contact with said brushes, means for intermittently rotating the cylinder, the intervals of rest between the intermittent movements of the cylinder coinciding with the periods during which some of the pins inserted in the openings are in contact with the brushes, a signaling mechanism, a plurality of electric circuits in which the signaling mechanism, the cylinder and its rotating means and the brushes are included, a bell relay and a selector relay included in said circuits, and a clock also included in one of said circuits provided with means for successively making and breaking its circuit at certain regular periods of time to actuate the selector relay, the movement of the selector relay closing the circuit to the cylinder rotating means and actuating the same and also to the bell relay after certain successive movements of said selector relay, the closing of the bell relay circuit causing the actuation of the signal bells.

2. An electrical signaling system, comprising a cylinder provided with circumferential lines of openings representing certain successive periods of time, contact brushes positioned to register with the lines of openings, pins inserted in some of said openings to contact with said brushes, means for rotating the cylinder to move the pins into contact with the brushes, a signaling mechanism, a plurality of electric circuits in which the signaling mechanism, the cylinder and its rotating means are included, a bell relay and a selector relay included in said circuits, and a clock also included in one of said circuits provided with means for successively making or breaking its circuit at

certain regular periods of time to actuate the selector relay, the movement of the selector relay closing the circuit to the cylinder rotating means and actuating the same and also to the bell relay after certain successive movements of said selector relay, the closing of the bell relay circuit causing the actuation of the signal bells.

3. An electrical signaling system, comprising a cylinder provided with circumferential lines of openings representing certain successive periods of time, contact brushes positioned to register with the lines of openings, removable pins inserted in some of said openings to contact with said brushes, means for intermittently rotating the cylinder, the intervals of rest between the intermittent movements of the cylinder coinciding with the periods during which some of the pins inserted in the openings are in contact with the brushes, a signaling mechanism, an electric circuit in which the signaling mechanism, the cylinder and its rotating means and the brushes are included, a circuit controlling clock included in said circuit and arranged to form a connection in said circuit, a bell relay included in said circuit, a selector relay also included in said circuit and arranged to actuate the bell relay to actuate the signals after a cylinder pin has been moved into contact with one of the cylinder brushes, and means for holding the bell relay contacts in engagement for a predetermined period of time.

4. An electrical signaling system, comprising a cylinder provided with circumferential lines of openings representing certain successive periods of time, contact brushes positioned to register with the lines of openings, removable pins inserted in some of said openings to contact with said brushes, means for intermittently rotating the cylinder, the intervals of rest between the intermittent movements of the cylinder coinciding with the periods during which some of the pins inserted in the openings are in contact with the brushes, a signaling mechanism, an electric circuit in which the signaling mechanism, the cylinder and its rotating means and the brushes are included, a circuit controlling clock included in said circuit and arranged to form a connection in said circuit, a bell relay having a contact arm moved by its armature, a dash pot controlling the movement of said contact arm to prolong the duration of the contact, and a selector relay also included in said circuit and arranged to actuate the bell relay to actuate the signals after a cylinder pin has been moved into contact with one of the cylinder brushes.

5. An electrical signaling system, comprising a cylinder provided with circumferential lines of openings representing certain successive periods of time, contact brushes positioned to register with the lines of openings, removable pins inserted in some of said openings to contact with said brushes, means for intermittently rotating the cylinder, the intervals of rest between the intermittent movements of the cylinder coinciding with the periods during which some of the pins inserted in the openings are in contact with the brushes, a signaling mechanism, an electric circuit in which the signaling mechanism, the cylinder and its rotating means and the brushes are included, a circuit controlling clock included in said circuit and arranged to form a connection in said circuit, a bell relay having a contact arm moved by its armature, an air dash pot provided with an outlet valve and with a plurality of openings, an adjustable member positioned to close some of the openings, a piston within the dash pot and having a piston rod connected to the contact, and a selector relay also included in said circuit and arranged to actuate the bell relay to actuate the signals after a cylinder pin has been moved into contact with one of the cylinder brushes.

6. A selector relay for an electrical signaling system, comprising a magnet coil and its pivoted armature, a plurality of contacts carried by said armature, a ratchet wheel positioned adjacent to said coil, a pawl carried by the armature for rotating the ratchet wheel, a selector wheel turned by the ratchet wheel and provided with a plurality of teeth and recesses intermediate of said teeth, an arm positioned to engage said teeth and recesses, a contact member positioned to contact with the arm when said arm is in engagement with one of the recesses of the selector wheel, said arm arranged to contact with one of the contacts carried by the armature when the arm is in engagement with one of the teeth of the selector wheel, and another contact positioned to be contacted with by one of the contacts carried by the armature, and a time mechanism operatively connected to said selector relay.

7. A selector relay for an electrical signaling system, comprising a magnet coil and its pivoted armature, a pair of contact arms carried by the armature and insulated therefrom, a ratchet wheel positioned adjacent to the magnet, a pawl carried by the armature for rotating the ratchet wheel, a selector wheel turned by the ratchet wheel and provided with a plurality of teeth and recesses intermediate of said teeth, a pivoted arm positioned to engage said teeth and recesses and to be moved thereby, a contact member positioned to contact with one end of the pivoted arm when said arm is in engagement with one of the recesses of the selector wheel, the other end of said pivoted arm ar-

ranged to contact with one of the contacts carried by the armature when the arm is in engagement with one of the teeth of the selector wheel, and another contact positioned to be contacted with by one of the contacts carried by the armature, and a time mechanism operatively connected to said selector relay.

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

HOWARD M. ELDRED.

Witnesses:
R. S. C. CALDWELL,
LAURA A. KELLEY.