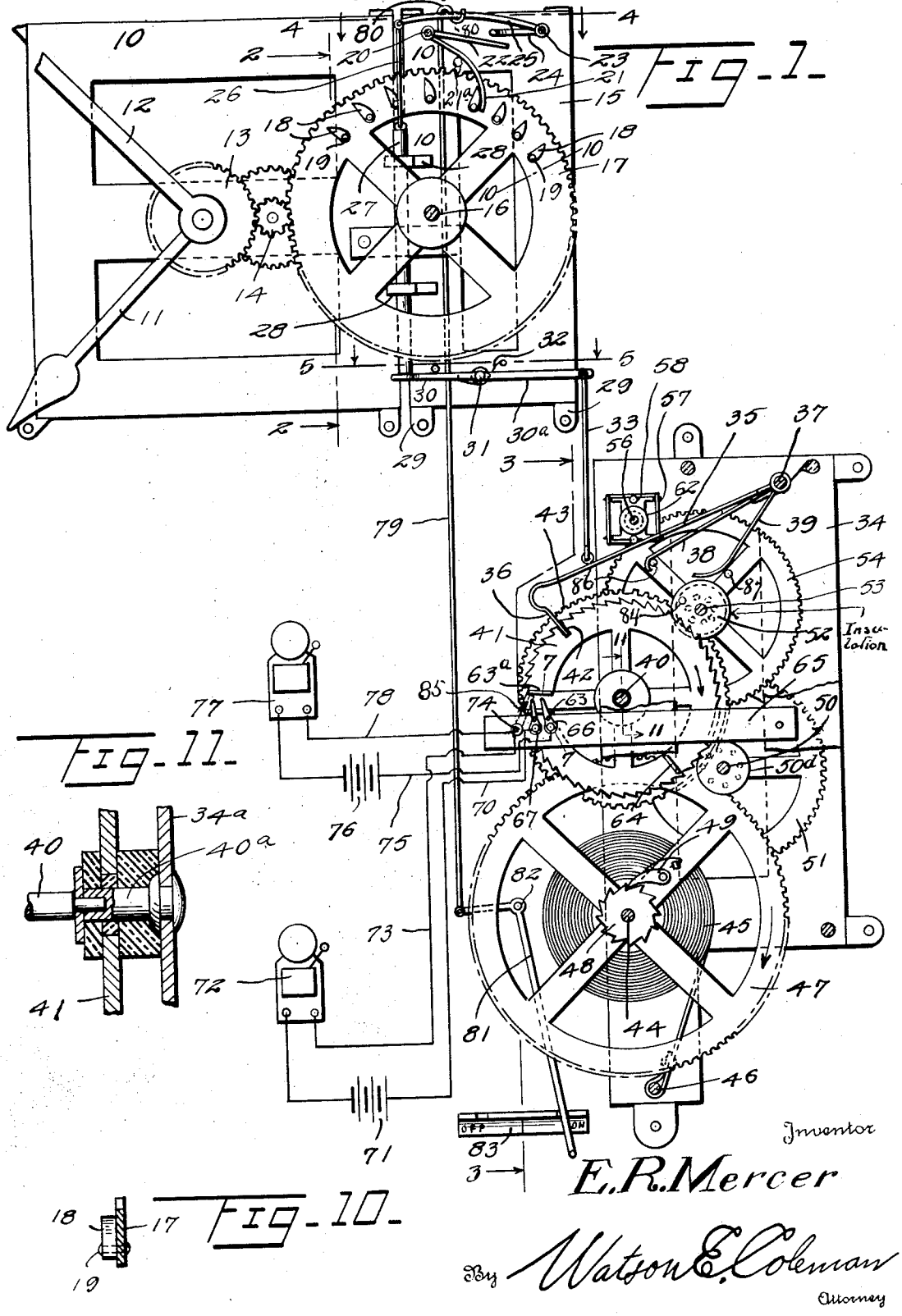
July 4, 1933. E. R. MERCER 1,916,769

AUTOMATIC SIGNALING MECHANISM FOR SCHOOLS

Filed May 28, 1932 3 Sheets-Sheet 1



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AUTOMATIC SIGNALING MECHANISM FOR SCHOOLS

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FIG. 2.

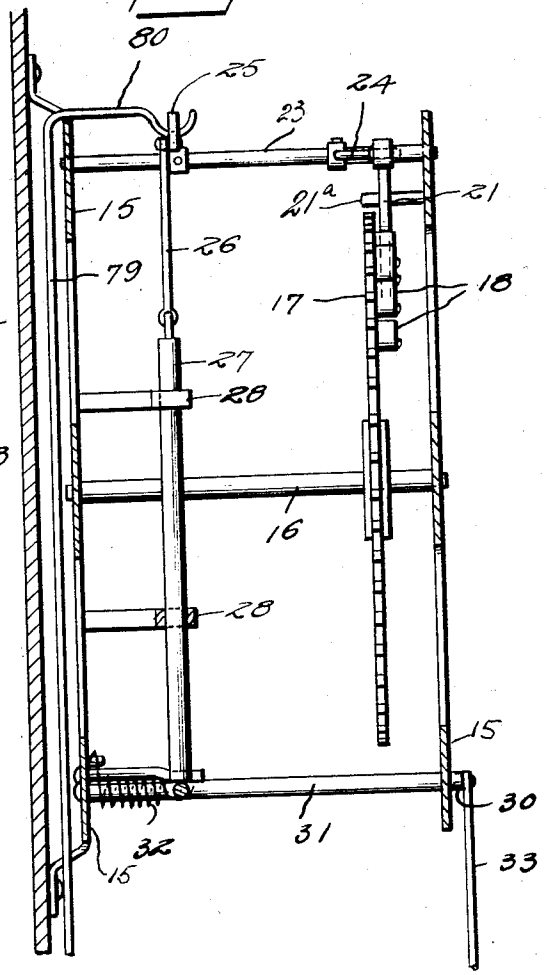


FIG. 4.

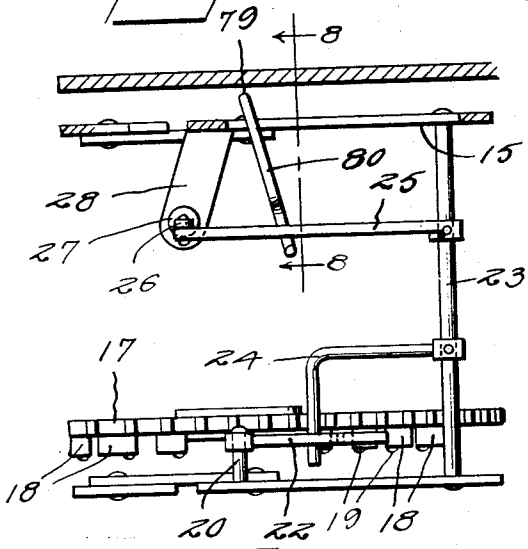
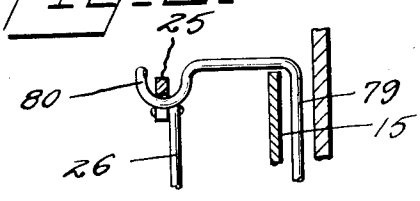


FIG. 3.



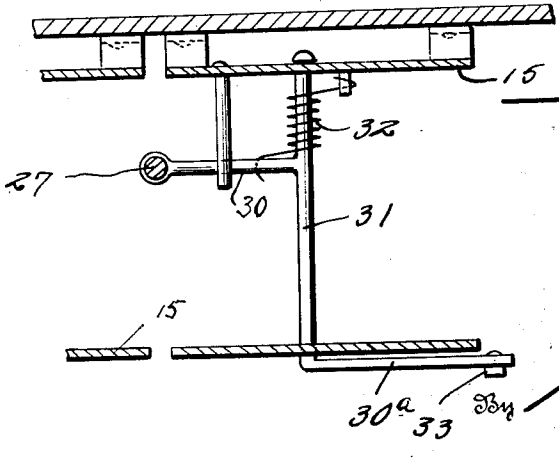


FIG. 5.

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Fig. 3.

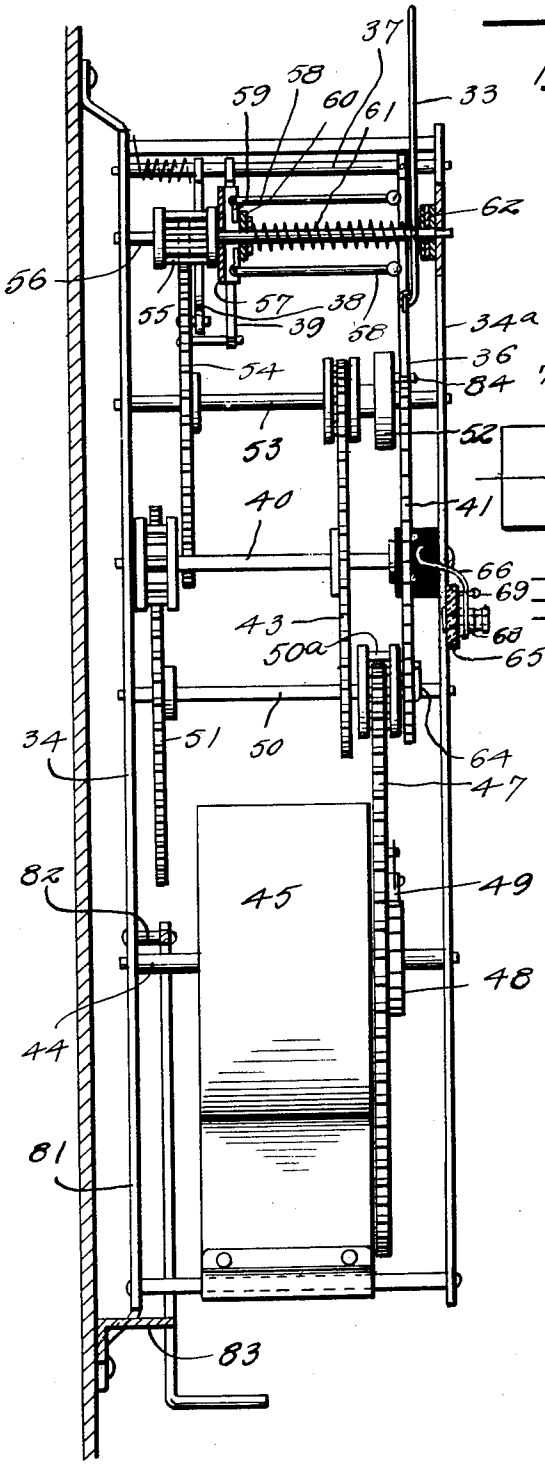


Fig. 6.

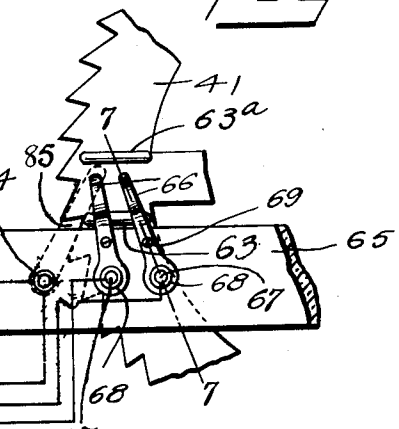


Fig. 7.

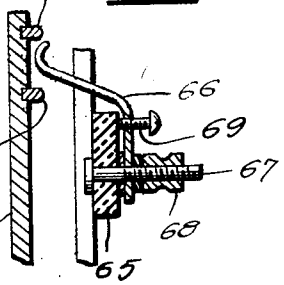
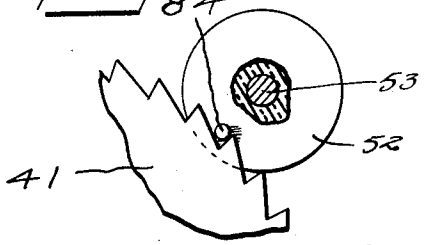


Fig. 9.



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UNITED STATES PATENT OFFICE

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AUTOMATIC SIGNALING MECHANISM FOR SCHOOLS

Application filed May 28, 1932. Serial No. 614,183.

This invention relates to means for automatically sounding audible signals used in schools for the purpose of indicating class periods and the general object of this invention is to provide a mechanism of this character which can be applied to and used with almost any nonstriking clock.

A further object is to provide a structure of this character which, while particularly designed for use in schools, can be applied to various other systems of signals for other purposes.

A further object is to provide a structure of this character which is relatively simple, can be easily adapted to special uses, and which is positive and certain in its operation.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a front elevation of a signaling mechanism combined with the clock, the signaling mechanism being constructed in accordance with my invention;

Figure 2 is a section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section on the line 5—5 of Figure 1;

Figure 6 is a fragmentary detailed elevation of the contacting fingers, the contact carrying wheel and allied parts;

Figure 7 is a fragmentary section on the line 7—7 of Figure 6 through the contact wheel and the insulating bar supporting the contact fingers;

Figure 8 is a section on the line 8—8 of Figure 4;

Figure 9 is a fragmentary elevation of the ratchet wheel and the means for driving it;

Figure 10 is a section on the line 10—10 of Figure 1;

Figure 11 is a fragmentary sectional view through the supporting shaft of the contact wheel and through a portion of the frame.

Referring particularly to Figure 1, 10 designates the frame of an ordinary non-striking clock having an hour hand 11 and a minute hand 12. The gearing whereby this clock is driven and the spring are not shown inasmuch as these parts are of the ordinary and usual construction. The hour hand is driven by the gear wheel 13 engaging with the usual pinion 14. So far the construction is that commonly found in clocks. My attachment includes the supporting frame 15 upon which is mounted the shaft 16 carrying upon it the toothed wheel 17 which engages with the pinion 14. Thus this toothed wheel is driven from the pinion.

Mounted upon the face of the toothed wheel are a plurality of lugs 18, which lugs are riveted, bolted or otherwise attached to the wheel as at 19 so that the lugs may be shifted somewhat to properly adjust them.

Pivotally mounted upon a shaft 20 above the wheel 17 is a downwardly extending curved finger 21 against which the lugs 18 successively strike as the wheel 17 moves in the direction of the arrow in Figure 1. Also mounted upon this shaft 20 and operating in conjunction with the finger 21 is the straight arm 22. Pivoted upon a shaft 23 is an angular arm 24, the angular extremity of which extends over the arm 22. This shaft carries upon it the upwardly bowed arm 25 which at its extremity is connected to a link 26 which in turn is connected to a plunger 27 or weight. When a lug 18 strikes the finger 21, it will lift this finger and coincidently lift the arm 22, which will lift up on the arm 24, causing the raising of the plunger weight 27 and as the finger 21 passes over the lug 18 and is released thereby, the plunger will drop. I have illustrated eight of these lugs 18 but as many of these lugs may be used as desired and preferably the lugs are curved upon that face which strikes the finger 21 so as to readily lift it or exert a wedging effect upon this finger.

The plunger weight 27 operates freely through the guides 28 attached to the frame 15. This frame is provided with lugs 29 whereby the frame may be supported on the same base as the clock frame 10. Pivotally supported below the weight 27 is a lever 30 pivoted at 31, one end of this lever project-

ing into the path of movement of the weight 27 so that when this weight 27 is allowed to drop, the rear end of the lever will be raised. A spring 32 acts to urge the weight engaging end of the lever upward. To the opposite end of the lever is connected a link 33.

Mounted upon a frame 34 disposed downward and to the right of the frame 15 is a detent 35 to which the lower end of the link 33 is pivotally connected. The free end of this detent 35 is formed with a hook-shaped or angular portion 36 which extends into a notch in one of the gear wheels of the signal controlling mechanism. The outer end of the lever 35 is pivotally mounted upon a shaft 37 and also mounted upon this shaft for coincident movement with the detent 35 is the stop arm 38 which is slightly curved or hooked at its extremity. Also mounted upon this shaft 37 for coincident movement with the parts 35 and 38 is a lifting arm 39, the free end of which is somewhat curved toward the extremity of the arm 38. Rotatably mounted upon the frame 34 is a shaft 40. One end of this shaft rotates in a fixed hub or shaft section 40*a* riveted to the frame 34*a* and thus held from rotation. Loosely mounted upon this shaft section 40*a* (see Figure 11) and insulated therefrom is a ratchet wheel 41 formed with a relatively deep notch 42 within which the angular extremity of the detent 35 normally engages. Also mounted upon the same shaft 40 as the ratchet wheel 41 is a toothed wheel 43. For the purpose of driving the shaft 40, I provide a shaft 44. This shaft is driven by the spring 45, one end of which is attached to the shaft and the other end of which is rigidly engaged with the frame 34 as at 46. Mounted upon the shaft 44 is the toothed wheel 47 and also mounted upon the shaft 44 is the ratchet wheel 48. The wheel 47 is loose upon the shaft 44 but is rotated therewith in the direction of the arrow by means of the ratchet wheel 48 and a pawl 49 mounted upon the wheel 47. This permits the spring 45 to be wound up from time to time. The wheel 47 engages a lantern wheel or pinion 50*a* mounted upon a shaft 50 carrying a gear wheel 51, this wheel 51 engaging a pinion on the shaft 40 and thus driving this shaft 40 and driving the wheel 43.

The wheel 43 engages with the lantern wheel or pinion 52 mounted upon a shaft 53, this shaft carrying upon it the gear wheed 54. This gear wheel engages with the lantern wheel or pinion 55 mounted upon a governor shaft 56. The governor shaft carries upon it the disk 55 carrying the two governor arms 58 pivoted thereto and weighted at their outer ends so that as the speed increases the arms will swing outward under centrifugal force. The arms 58 have angular extensions 59 which bear against a washer or disk 60 loosely surrounding the governor shaft in turn bearing against a coiled compression spring 61 mounted upon the governor shaft. The outer end of this spring bears against a plurality of friction disks 62 which in turn bear against the outer element 34*a* of the frame 34. This is most clearly shown in Figure 3. Obviously as the speed increases the friction disks will act as a brake and thus the movement of the train of gearing will be kept uniform and constant at all times. I may say that I have tried the use of the usual flutter wheel for the purpose of controlling the action of the clock movement but have found that the flutter wheel is entirely too uncertain in its action and that it is necessary to use a governor in order to secure the certainty of regulation which the governor supplies.

It will be seen that I have described means for driving the controlling wheel 17 which controls the operation of the detent 35 and that I have described means whereby the signal controlling wheel 41 may be operated when released by the detent 35.

The means for causing the sounding of a signal or signals at a predetermined time is as follows:—

Mounted upon the wheel 41 are a pair of contacts 63 and 63*a* disposed relatively closely together (see Figure 7) and disposed in spaced relation to this pair of contacts is a contact 64. The contact 63 and the contact 64 are disposed so as to project outward from the surface of the wheel 41 as shown clearly in Figure 7.

Mounted upon a transverse bar 65 of insulating material as shown in Figure 7 are a pair of contact fingers 66 which are so adjusted that the tips of these fingers will just touch the contacts 63 but not touch the wheel 41. These contact fingers at their rear ends are connected to a binding screw 67 having the usual binding nut 68 thereon. An adjusting screw 69 is provided whereby the fingers may be adjusted so as to bring their tips in exactly the position to just touch the upper edges of the contacts 63. From one of the contacts 66, a conductor 70 extends to a battery 71 or other source of current and to the bell or other signal 72. From the other pole of this signal the conductor 73 extends to a binding post 74 carried by the bar 65. From the other contact 66 a conductor 75 extends which includes a source of current 76, a bell 77 and a return conductor 78 coming back to the binding post 74. Thus it will be seen that each time the fingers 66 wipe across a contact 63 or the contact 64, a circuit will be closed through these bells or other signals 72 and 77.

For the purpose of lifting the arm 25 so as to prevent the actuation of the lever 30 and the release of the wheel 41, I have provided the vertical rod 79 which at its upper end is formed with the arm 80 which engages

beneath the arm 25 as shown in Figure 1, the lower end of this arm 79 being connected to an angular lever 81 pivoted at 82 and operating over a notched bar 83.

This bar on opposite ends is notched to engage this lever 81 which may be sprung out of the notches and when the lever is turned to the right in Figure 1, the mechanism is operated or "on". When the lever is turned to the left hand end of the bar 83, the mechanism is in "off" position. As before stated, the wheel 41 is loose upon the shaft 40 and is entirely insulated from the shaft. This wheel 41 is given a step by step movement by means of an insulated pin 84 carried by the lantern wheel or pinion 52. It is to be understood that this pin 84 is to be entirely insulated from the pinion 52 in any suitable manner. It will be seen that with this construction, the wheel 41 is rotated one step upon each complete rotation of the wheel 54 and that the wheel 41 is electrically engaged by contact finger 85 which extends from the binding post 74 as shown most clearly in Figure 6. The wheel 54 with its shaft 53 and, of course, all the train of gearing connected thereto and driven by the motor spring 45 is normally held from rotation by the arm 38 which at its end is hook-shaped and engaged with the stop pin 86 carried by the wheel 54.

Projecting from the wheel 54 is a pin 87 which coacts with the curved arm 39 to lift the arm 38 from engagement with the pin 86 and hold the detent 36 off of the wheel 41 while the pin 84 is engaging the ratchet teeth of wheel 41. This curved arm 39 lifts the detent on arm 36 out of the deep notch 42 and also lifts this detent over each cog as the wheel is being moved one cog at a time. When the detent 36 lands between the teeth on the rim of the wheel, pin 86 fails to engage with the hooked end of the arm 38. When pin 87 comes up under the curved arm 39, lifts this curved arm upward, and while the detent 36 is above the teeth, the pin 84 which constitutes a tooth moves into the space between the teeth on wheel 41 and moves this wheel another notch.

This movement continues until the deep notch 42 comes opposite the detent 36 whereupon the detent drops into this deep notch and at the same time the hooked end of the arm 38 moves into position in front of the stop pin 86 and the train of wheel is stopped ready for another operation upon the next succeeding operation of the plunger.

It will be understood that with the arm 21, in Figure 1, at rest on the stop 21*a* and with plunger 22 in its original position, there must be some clearance between the arm 22 on the shaft 20 and the angular arm 24 in order to allow the plunger 27 enough slack to trip the detent 35 when the lever 30 is struck by the plunger. Furthermore, the straight arm 22 must be separated from the angular arm 24 shown in Figure 1 sufficiently to allow the cut-out operating lever 81 to elevate the lifting arm 80 sufficiently to stop the plunger from striking the lever 30 when the plunger drops. This happens when the cut-out lever 81 is placed at its "off" position. It will be obvious that the lever 81 can be turned to "off" or "on" position at any time during the day or night without interfering with the correct ringing or requiring the apparatus to be reset. You can thus cut it out at 1:30 P. M., leave it until 4:00 P. M., throw the lever 81 back to "on" and it will ring the 4:08 bell just the same.

It will be seen that by changing the position of the lugs on the controlling wheel which operates the dropping of the weight or plunger, the bells may be caused to ring at any desired intervals of time and it is obvious that these lugs might be made adjustable around the wheel so as to adapt the mechanism to any desired cycle of operations.

It will be seen that normally the contact fingers are disposed between the contacts on the contact wheel, as shown in Figure 6, and that almost immediately after the plunger drops, the fingers engage the first contact of the series and ring the bells that two minutes afterwards the fingers engage the second contact of the series and ring a second bell and that three minutes after this, a third or final bell rings.

The lugs 18 represent a forty-five minute schedule and can be rotated or oscillated to vary the time of tripping several minutes earlier or later as the case requires. With this construction these lugs are knife edged and thus the time can be regulated to the second.

One of my objects in using the weight or plunger 27 to release the detent 36 is that the action is very quick and decided as it is only a matter of releasing this plunger and the tripping of this switch may be accomplished very quickly and very closely for the reasons above stated. Furthermore, by providing this releasable plunger, I can provide very simple means whereby the plunger may be shown lifted, so that its tripping finger will be entirely out of the path of movement of the tripping finger 22.

By using the twenty-four hour wheel as a control element in this device, I eliminate any chance for the schedule to be thrown off or interrupted in actual usage if the clock is kept running on time. I do away with any necessity of resetting the ringing mechanism after cutting off for Saturday and Sunday of each week. Ringing on schedule will start at the exact time each day and will be kept up without further attention and winding the clock.

It will be obvious that any number of bells or other signals may be operated by means

of this mechanism or that as before described, the mechanism may be prevented from operating by the shifting of the lever to its off position.

I claim:—

1. A time controlled switch including a contact wheel, a motor therefor, fixed contact fingers coacting with the contacts on the wheel, a detent holding the contact wheel and the motor from operation, and clock actuated means for momentarily lifting said detent and then permitting the detent to again detainingly engage with the contact wheel after the contact wheel has made one complete revolution.

2. A time controlled switch including a contact wheel, a motor, gearing connecting the motor to the contact wheel and including a pinion engaging the contact wheel and giving it a step by step movement in one direction, the contact wheel having a plurality of contacts thereon, contact fingers engageable with said contacts, a detent normally holding the contact wheel from operation and holding the motor operated gears from operation, and clock actuated means for momentarily raising said detent out of engagement with the contact wheel to permit the contact wheel to make one full revolution, the detent after such full revolution of the contact wheel then detainingly engaging the contact wheel and stopping the action of the motor operated train of gears.

3. A time controlled switch including a contact wheel having a pair of contacts disposed in close relation to each other, and a contact angularly spaced from the first-named contacts, a pair of fixed contact fingers adapted to be engaged by said contacts successively as the wheel is rotated, a motor, a train of gears driven by said motor and including a gear element giving a step by step rotation to the contact wheel, a detent engaging the contact wheel and when engaged with the contact wheel impeding the operation of the train of gears, clock actuated means for momentarily lifting said detent to permit the rotation of the contact wheel from said motor operated train of gears, and means for holding said detent out of operative engagement with the contact wheel until the contact wheel has made one complete rotation and the fingers are disposed between the first named pair of contacts and out of engagement with either.

4. A time controlled switch including a contact wheel having a plurality of contacts thereon, a motor, a train of gearing between the motor and the contact wheel to cause the rotation of the contact wheel, a contact finger engaging successively with the contacts on the wheel, a detent normally preventing the rotation of the contact wheel, and clock actuated means for lifting said detent including a lever connected at one end to said detent, a plunger disposed to engage said lever when dropped, a clock actuated wheel, and means on said wheel for dropping said plunger at predetermined times to thus cause the retraction of the detent.

5. A time controlled switch including a contact wheel having a plurality of contacts thereon, a motor, a train of gearing between the motor and the contact wheel to cause the rotation of the contact wheel, a contact finger engaging successively with the contacts on the wheel, a detent normally preventing the rotation of the contact wheel, and clock actuated means for lifting said detent including a lever connected at one end to said detent, a plunger disposed to engage said lever when dropped, a clock actuated wheel, and means on said clock actuated wheel for dropping said plunger at predetermined times to thus cause the retraction of the detent, including lugs on the wheel disposed at spaced intervals, a lifting arm for the plunger, and means actuated by said lugs for raising the lifting arm and then dropping it.

6. A time controlled switch including a contact wheel having a plurality of contacts thereon, a motor, a train of gearing between the motor and the contact wheel to cause the rotation of the contact wheel, a contact finger engaging successively with the contacts on the wheel, a detent normally preventing the rotation of the contact wheel, clock actuated means for lifting said detent including a lever connected at one end to said detent, a plunger disposed to engage said lever when dropped, a clock actuated wheel, and means on said clock-actuated wheel for raising and successively releasing said plunger at predetermined times to thus cause the retraction of the detent, including lugs on the wheel disposed at spaced intervals, a lifting arm for the plunger, a double armed lever having one of its arms extending into the path of movement of the lug, a double-armed lever having one of its arms connected to the plunger, the other arm of the first named lever engaging beneath the second arm of the second-named lever whereby to cause the lifting of the plunger as the first-named arm is struck by a lug and the dropping of the plunger when the first-named arm escapes from a lug.

7. A time controlled switch including a contact wheel having a plurality of contacts thereon, a motor, a train of gearing between the motor and the contact wheel to cause the rotation of the contact wheel, a contact finger engaging successively with the contacts on the wheel, a detent normally preventing the rotation of the contact wheel, clock actuated means for lifting said detent including a lever connected at one end to said detent, a plunger disposed to engage said lever when

dropped, a clock actuated wheel, means on said wheel for raising and then successively releasing said plunger at predetermined times to thus cause the retraction of the detent, including lugs on the wheel disposed at spaced intervals, a lifting arm for the plunger, a double-armed lever having one of its arms extending into the path of movement of the lug, a double-armed lever having one of its arms connected to the plunger, the other arm of the first-named lever engaging beneath the second arm of the second-named lever whereby to cause the lifting of the plunger as the first-named arm is struck by a lug and the dropping of the plunger when the first-named arm escapes from a lug, and means for holding the plunger raised comprising a rod having a hook engaging beneath the plunger, and a manually operable lever shiftable to raise or lower said hook.

8. A time controlled switch of the character described, including a contact wheel having ratchet teeth and carrying a plurality of contacts, a pair of contact fingers engageable with said contacts, the contact wheel having a detent receiving notch, a spring motor, a train of gearing operatively connected to the motor to be driven thereby, a governor operatively engaged by the train of gearing to control its movement, the train of gearing including a wheel, a one-toothed pinion carried by the wheel and engaging a ratchet tooth on the contact wheel once upon each complete rotation of the pinion, a pivoted detent having an angular end normally disposed in said notch of the contact wheel, two arms carried by said detent and movable therewith, one of said arms having a hooked extremity, the last named gear wheel having a stop engaged by the hooked arm when the detent is in said notch, a second arm carried by the detent and having a curved end portion and a pin carried by the gear wheel and engaging said last-named arm when the tooth on the pinion is about to engage a ratchet tooth to cause the lifting of the detent above the teeth of the contact wheel.

9. In a time controlled switch mechanism of the character described, an insulated metallic contact wheel having thereon a pair of radially disposed metallic contacts projecting from one surface thereof and disposed closely contiguous to each other, and having thereon a contact spaced a predetermined distance from the first named pair of contacts, a pair of metallic contact fingers mounted opposite said face and engaging the crests of the metallic contacts on the wheel, clock controlled means causing the complete rotation of the contact wheel at predetermined intervals, and manually operable means for controlling the rotation of the contact wheel.

10. A time controlled switch mechanism including a supporting frame, a wheel carried by the frame and engageable with the driving pinion for the hour hand of a clock, the wheel having a plurality of lugs spaced at predetermined intervals upon one face, a weighted plunger mounted upon the frame, means engaged at intervals by said lugs lifting said plunger and then dropping it, a motor driven contact wheel having spaced contacts thereon, contact fingers engageable with said contacts, a detent for preventing the rotation of said wheel, and means actuated by a dropping of the plunger for lifting said detent and holding it lifted until the contact wheel has made a complete revolution.

11. A time controlled switch mechanism including a contact wheel carrying a plurality of contacts, motor controlled means for driving said contact wheel, a contact finger disposed to be engaged by said contacts of the contact wheel, a detent normally holding the contact wheel from operation under the action of said motor, clock actuated means acting to momentarily lift the detent from its detaining engagement with the wheel to permit the actuation of the wheel, means acing automatically to shift the detent to a position where it will not prevent the movement of the contact wheel under the action of the motor until said wheel has made one complete revolution, and manually operable means for preventing the release of said detent by the clock actuated mechanism.

In testimony whereof I hereunto affix my signature.

EDWARD R. MERCER.