Aug. 5, 1941. R. L. MORGAN 2,251,852

ELECTRIC TIME SWITCH

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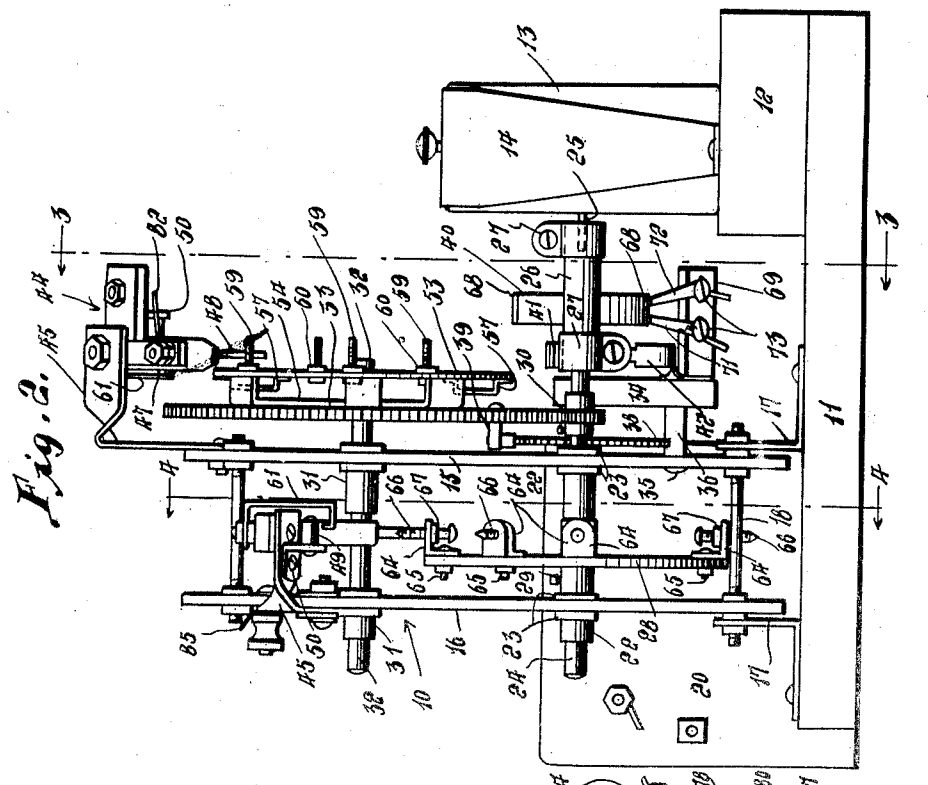


Fig. 2.

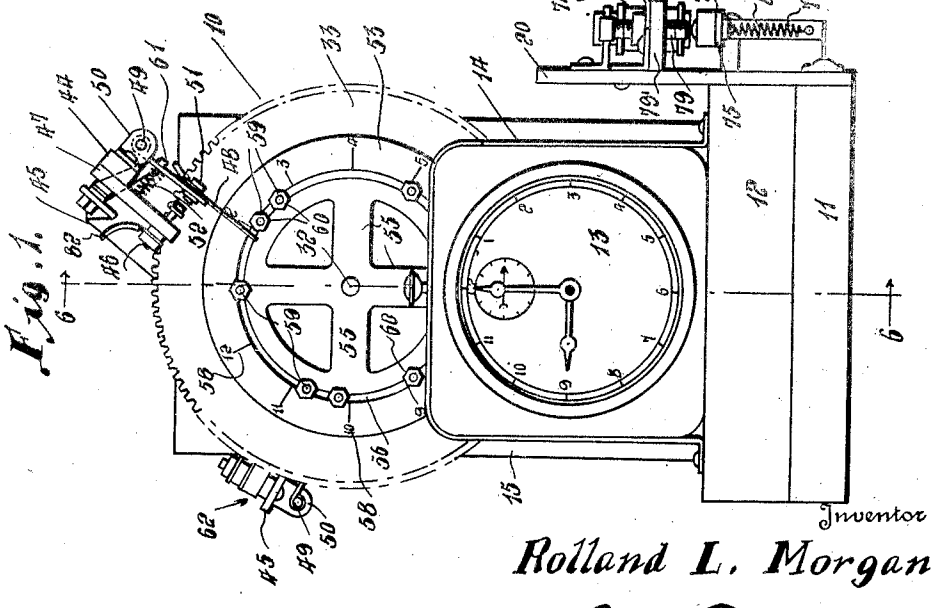


Fig. 1.

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Fig. 3.

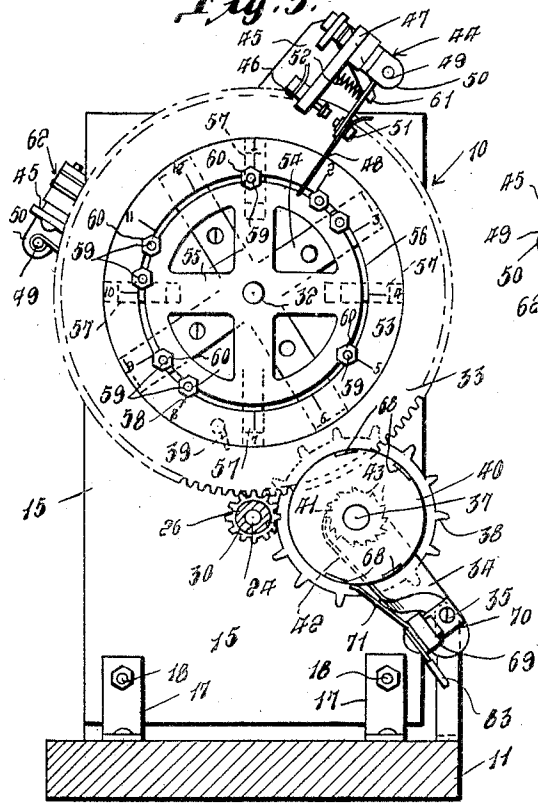
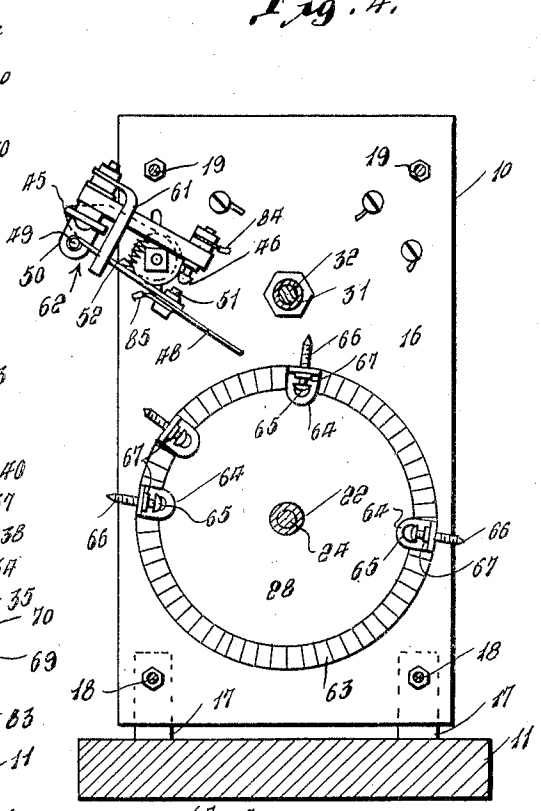


Fig. 4.



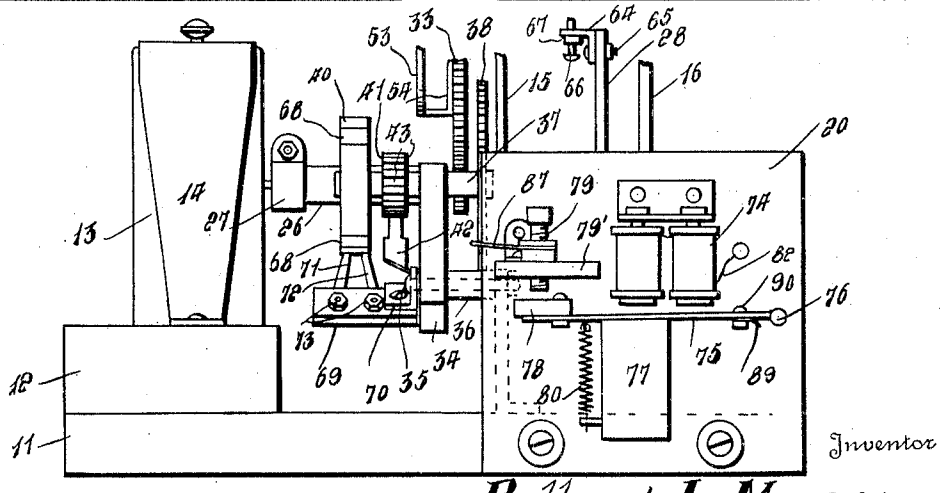


Fig. 5.

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Fig. 6.

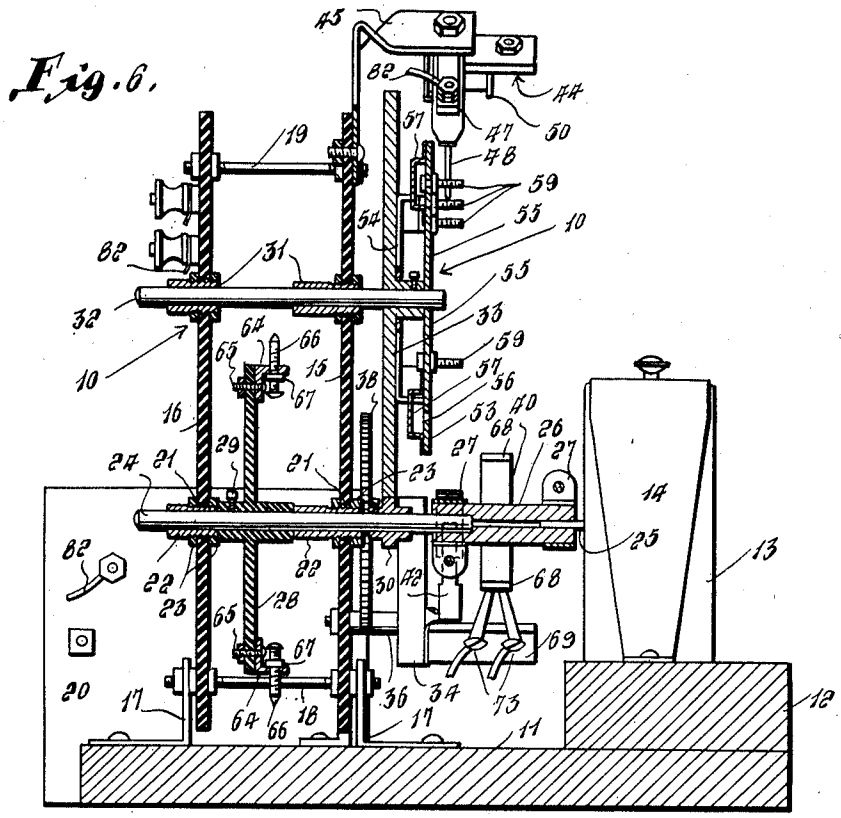
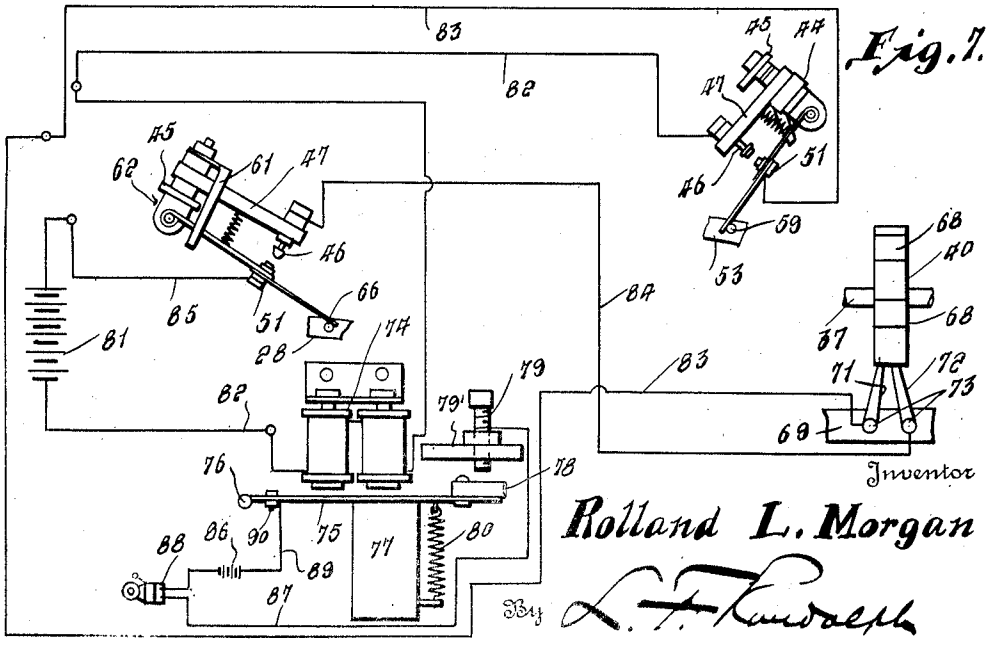


Fig. 7.



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# UNITED STATES PATENT OFFICE

2,251,852

## ELECTRIC TIME SWITCH

Rolland L. Morgan, Merna, Nebr.

Application September 26, 1940, Serial No. 358,513

6 Claims. (Cl. 200—35)

This invention relates to a novel electric time switch adapted to be operated by a clock for closing a circuit for energizing a signal, such as a bell, siren or other audible or visual signal.

More particularly, it is an aim of the invention to provide a switch that may be readily adjusted for closing a circuit to a signal at certain periods of the day or night and on certain days of the week to thereby provide a device especially adapted for use in schools, factories and other places where it is desirable to have the signal energized only at certain times during the day or night and only on certain days or nights of the week.

Still a further aim of the invention is to provide a time controlled switch having three separate switches interposed in a circuit, all of which must be simultaneously closed for energizing the circuit for operating the signal.

Still another aim of the invention is to provide a time controlled switch having means which may be readily adjusted for varying the times at which the signal will be given and for varying the duration of the signal.

Other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, which illustrate a preferred embodiment thereof, and wherein:

Figure 1 is a front elevational view of the electric time controlled switch,

Figure 2 is a side elevational view of the same,

Figure 3 is a transverse vertical sectional view taken substantially along the plane of the line 3—3 of Figure 2,

Figure 4 is a similar view taken substantially along the plane of the line 4—4 of Figure 2,

Figure 5 is a fragmentary side elevational view of the device taken from the opposite side to Figure 2,

Figure 6 is a longitudinal vertical sectional view taken substantially along the plane of the line 6—6 of Figure 1, and

Figure 7 is a diagrammatic view of the electric circuit of the time controlled switch and also of the signal.

Referring more particularly to the drawings, wherein like reference characters designate like or corresponding parts throughout the different views, 10 designates generally the time controlled electric switch, comprising the invention, which includes a base member 11 having a raised portion 12 at one end thereof on which is mounted a conventional clock 13 which is attached thereto by means of a strap 14 which extends over the clock and which is secured at its ends to the upper side of the portion 12. A pair of spaced walls 15 and 16 project upwardly from the base member 11, adjacent the opposite end thereof and are supported by means of a plurality of pairs of angle brackets 17, each of which pairs of brackets is provided with bolt and nut fastenings 18 which extend through and are secured to each of the walls 15 and 16 for mounting said walls at their lower ends in spaced apart relationship relatively to one another, as best seen in Figures 2 and 6. The walls 15 and 16 are retained in spaced apart relationship at their upper ends by means of similar bolt and nut fastenings 19. A side wall 20 is secured to and rises from one side edge of the base member 11 and is disposed adjacent the last mentioned end thereof.

The walls 15 and 16 are provided with alined openings 21 to receive bearings 22 which are externally threaded for engaging nuts 23 which are disposed on opposite sides of the walls 15 and 16 for securing the bearings 22 in the openings 21. A shaft 24 is journaled in the bearings 22 and is connected to the minute hand shaft of the clock 13, designated 25, which projects outwardly from the back of the clock, by means of a coupling 26 which may be in the form of a thick rubber tube having clamps 27 engaging over the ends thereof for clamping the joint 26 to the shafts 24 and 25. Between the walls 15 and 16, a disk 28 is mounted on the shaft 24 and keyed thereto by means of a set screw 29 which extends through the hub portion of the disk 28. A pinion 30 is similarly connected to the shaft 24 between the forward wall 15 and the clock 13.

A pair of alined bushings 31 are mounted in the upper portions of the walls 15 and 16 in the same manner as the bearings 22 for journaling a shaft 32 to which is keyed a gear wheel 33 which is disposed on the forward side of the wall 15 and which meshes with the pinion 30. As best seen in Figures 2 and 5, an arm 34 is attached to the front wall 15 adjacent its bottom and adjacent the side edge thereof which is disposed adjacent the wall 20 by means of a nut and bolt fastening 35 which is provided with a sleeve 36 for spacing the arm 34 from the forward side of the wall 15. The arm 34 extends upwardly and inwardly of the wall 15. A shaft 37 is journaled intermediate of its ends in the upper free end of the arm 34. A toothed wheel 38 is keyed to one end of the shaft 37 and is disposed between the wall 15 and the gear wheel 33. The gear wheel 33, as best seen in Figure 2, is provided with a detent 39 which is arranged to engage the teeth of the

wheel 38 for turning said wheel in a manner and for a purpose which will hereinafter be described. A disk or wheel 40 is keyed to the opposite end of the shaft 37 and a ratchet wheel 41 is also keyed to the shaft 37 between the arm 34 and the wheel 40. A spring dog 42 is attached to the fastening 35 at one end and has its opposite end disposed to engage the notches or grooves 43 in the periphery of the ratchet wheel 41.

A switch, designated generally 44, is supported by means of a bracket 45 which is secured to the wall 15 adjacent its top and adjacent one side thereof for positioning the switch 44 in front of, above and to one side of the gear wheel 33. The switch 44 includes a fixed contact 46 which is mounted in the free end of the main supporting arm 47 of the switch 44, which arm is formed of a non-conducting or insulating material. An arm 48 is pivotally connected at 49 to a bracket 50 which is fastened to the secured end of the arm 47 and is provided intermediate of its ends with a contact 51 which is normally held out of engagement with the contact 46 by means of an expansion coil spring 52 which is disposed between the arm 47 and the arm 48 for urging the latter away from the former.

A ring shaped member 53 is disposed in front of and spaced from the gear wheel 33 and secured thereto by means of the supporting straps 54. The ring 53 is also secured to the shaft 32 by the spokes 55. The ring 53 is provided with a circular slot 56 dividing the ring into inner and outer sections, the inner section of which is formed integral with the spokes 55 and the outer section of which is attached to the supporting straps 54. The sections of the ring 53 are connected by means of the straps 57 which are disposed on the back or inner side of the ring 53 and which are provided with intermediate portions which are offset away from the ring and contiguous with the slot portion 56 thereof. The forward side of the ring 53 is preferably calibrated, as seen at 58, similarly to the face of a clock with twelve equally spaced calibrations numbered consecutively from one to twelve. A plurality of headed bolts 59 are loosely mounted in the slot 56 with the shanks of the bolts projecting forwardly from the ring 53. A nut 60 is mounted on each bolt 59 to combine with the head thereof for adjustably clamping the bolt relatively to the ring 53. The shank ends of the bolts 59 form studs in the path of which is disposed the free end of the arm 43 of the switch 44 so that each of said studs will engage the arm 48 for moving the contact 51 into engagement with the contact 56 for closing the switch 44 and for maintaining it in a closed position for a predetermined period of time. The switch 44 is also provided with a stop member 61 which is disposed to engage the arm 48 to limit its movement away from the arm 47 to properly position the arm 48 to be engaged by the bolts or studs 59.

Referring particularly to Figures 2 and 4, a switch, designated generally 62 is connected by a bracket 45 to the wall 16 and adjacent the side edge thereof opposite to that adjacent which the switch 44 is positioned. The switch 62 is disposed between the walls 15 and 16 and above and to one side of the disk 28. The switch 62 is identical in construction with the switch 44 but is reversed in position so that its arm 43 will swing in the opposite direction to the arm 48 of the switch 44 in moving the contact 51 toward a closed position or toward an open position. The disk 28, on its forward side, as best seen in Figure 4, is calibrated, as indicated at 63, similarly to the face of a clock and including sixty equally spaced markings. The markings 63 provide guides for positioning angle shaped brackets 64 which are connected by fastenings 65 to the forward side of the disk 28 and adjacent its periphery. Each of the brackets 64 has a free end projecting outwardly from the forward side of the disk 28 and in which is adjustably mounted a set screw 66, each of which is provided with a lock nut 67. The free end of the arm 48 of the switch 62 is disposed in the path of the outer, free ends of the set screws 66 to be engaged thereby for moving the contact 51 into engagement with the contact 46. The set screws 66 are adapted to be adjusted for varying the period of time that they will hold the contacts 46 and 51 of switch 62 in closed positions, for a purpose which will hereinafter be apparent. Obviously, the brackets 64 may be adjusted to different positions relatively to the peripheral portion of the disk 28 and any number of brackets and set screws may be provided for closing the switch 62 any number of times during each revolution of the disk 28.

The wheel 40 is formed of insulating material and is provided with recesses in its periphery for receiving strips of conducting material generally designated 68. A bar of insulating material 69 is attached to the fastening 35 by means of an angular bracket 70 and extends outwardly from the arm 34. A pair of spring contact strips 71 and 72 are fastened by fastenings 73 to the arm 69. The free ends of the strips 71 and 72 are disposed for yieldably engaging the periphery of the wheel 40 and, when in contact with one of the strips 68, each of which is disposed transversely of the periphery of the wheel 40, said strip will bridge the gap between the arms 71 and 72.

A pair of electromagnets 74 are mounted on the outer side of the wall 20. An arm 75 of conducting material is pivotally connected at one end at 76 to the outer side of the wall 20 and is supported with its intermediate portion beneath and spaced from the electromagnets 74 by a block 77 attached to the wall 20. The arm 75 is provided on the upper side of its free end with a contact 78 which is normally disposed beneath and spaced from a fixed contact 79 which is mounted in a ledge 79' which extends outwardly from the wall 20. A contractile coil spring 80 is connected at one end to the arm 75 and at its opposite end to a stud which extends outwardly from the block 77 for urging the arm 75 downwardly for normally retaining the contact 78 out of engagement with the contact 79.

Referring to the diagrammatic view, of Figure 7, 81 designates one or more dry cell batteries or other source of electric current of low voltage from the positive side of which extends a conductor wire 82 to which is connected the electromagnets 74. The conductor wire 82 leads from the electromagnets to the fixed contact 46 of the electric switch 44. A conductor 83 leads from the movable contact 51 of switch 44 to the conductor strip 71. A conductor 84 extends from the other conductor strip 72 to the fixed contact 46 of the switch 62. A conductor 85 leads from the movable contact 51 of switch 62 to the negative side of the source of electric current 81. A source of electric current 86 preferably of 110 volts, such as a conventional outlet box, has

a positive electrical conductor 87 leading therefrom and connected to the stationary contact 79. An audible signal, such as a bell 88, is interposed in the conductor 87. A conductor wire 89 leads from the negative side of the electrical source 86 to a fastening 90 attached to the conductor arm 75 for connecting the conductor 89 with the arm 75.

The minute hand shaft 25 of the clock 13 makes one revolution an hour so that the shaft 24 which is connected thereto, likewise makes one revolution an hour for turning the disk 28 one revolution an hour. The diameter of the gear wheel 33 is twelve times the diameter of the pinion 30 so that the gear wheel 33 will complete one revolution each twelve hours. The toothed wheel 38 is provided with fourteen equally spaced teeth, one of which is engaged by the detent 39 each time that the gear wheel 33 completes a revolution for turning the toothed wheel 38, the ratchet wheel 41 and the wheel 40 one-fourteenth of a revolution. The ratchet wheel 41 is provided with fourteen notches or grooves 43 which the spring dog 42 is adapted to successively engage during each revolution thereof to cause wheels 38, 40 and 41 to turn the proper distance at each rotation of the gear wheel 33 so that after each movement of said wheels the free ends of the contact strips 71 and 72 will be disposed for engaging one of fourteen spaces on the periphery of the wheel 40, each of which is capable of being provided with a conductor strip 68 although only certain of which may be so equipped. Looking toward the front of the time controlled switch 10, as illustrated in Figure 1, it will be obvious that the minute hand shaft 25 will turn in a clockwise direction so that the shaft 24, the disk 28 and the pinion 30 will also turn in a clockwise direction. The pinion 30 being enmeshed with the gear wheel 33 will cause the latter to rotate in a counterclockwise direction for turning the toothed wheel 38, the ratchet wheel 41 and the wheel 40 all in a clockwise direction.

Assuming that the signal 88, for the purpose of example, is a school bell which it is desired to have energized a certain number of times during the day, five days of the week, namely, Monday through Friday, the studs or bolts 59 are fastened to the ring 53 at approximately the correct positions, as indicated by the calibrations 58 for the times when the signals are to be given, and a similar number of set screws 66 are mounted in the exact positions in minutes, as indicated by the calibrations 63 when such signals are to be given. The periphery of the wheel 40 is provided with five conductor strips 68 arranged in five of the fourteen spaces of the periphery thereof which spaces are recessed so that the strips 68 will be flush with the periphery of the wheel 40. These strips 68 are arranged in five alternate spaces correctly positioned so that the leading strip 68 will be in contact with the contact strips 71 and 72 during the day on Monday of each week. Where it is desired to have the switch 10 arranged to operate during the hours of the day the detent 39 is located behind and substantially in radial alinement with the calibration designated 6 of the calibrations 58 so that the wheel 40 will be moved one-fourteenth of a revolution at 6 a. m. and 6 p. m. o'clock. Therefore, during the twelve hours of the day on Monday through Friday the strips 71 and 72 will be in contact with one of the strips 68 for bridging the gap therebetween for closing the switch which these parts form. As the time approaches when the bell 88 is to be energized one of the studs 59 will contact the arm 48 of the switch 44 for closing the contacts 51 and 46 thereof for closing this switch. As the gear wheel 33 is revolving very slowly the switch 44 will be maintained in a closed position for several minutes or more during which period of time a set screw 66 will contact the arm 48 for moving the contact 51 of switch 62 into engagement with the contact 46 thereof to thereby complete the circuit to the electromagnets 74. This will attract the metallic arm 75 to cause it to swing upwardly on its pivot 76 so that the contact point 78 will move into engagement with the contact 79 for closing a circuit from the source of electricity 86 through conductors 87 and 89 for energizing the bell 88. The set screws 66 may be adjusted, as previously described to move them outwardly or inwardly relatively to the periphery of the disk 28 to vary the period during which the switch 62 will be maintained in a closed position from a few seconds to a half a minute or more.

Obviously, other forms of signals such as a siren or a visual signal such as a lamp bulb can be substituted for the bell 88 or a plurality of signals may be interposed in the circuit to be rung simultaneously in various parts of a building. Likewise, by increasing, decreasing or varying the positions of the strips 68 the time controlled switch 10 may be adjusted for automatically closing a circuit to the signal 88 on additional days of the week, fewer days, during certain nights of the week or on certain days and certain nights. Likewise by varying the positions of the studs 59 and the set screws 66 and brackets 64 the signals may be given at different times and as frequently as required.

Various modifications and changes are contemplated and may obviously be resorted to as only a preferred embodiment of the invention has been disclosed.

I claim as my invention:

1. A time switch comprising a shaft connected to and actuated by the minute hand shaft of a clock, a disk keyed to said shaft, an electric switch, means carried by the disk for momentarily closing the switch, a pinion keyed to the shaft, a gear wheel meshed with the pinion to be rotated thereby one revolution every twelve revolutions of the shaft, a second electric switch, means carried by the gear wheel for closing the second switch, a toothed wheel, a stud on the gear wheel for engaging the teeth for turning the toothed wheel a revolution every fourteen revolutions of the gear wheel, a pair of spaced contacts, a shaft to which the toothed wheel is connected, and a wheel, of nonconducting material, keyed to said shaft and having spaced strips of conducting material selectively disposed in the periphery thereof for contacting the spaced contacts for bridging the gap therebetween, said switches and contacts being connected in circuit for energizing a signal when both of the switches are closed and the contacts bridged.

2. A device as in claim 1, said first mentioned means comprising a plurality of angle members adjustably connected to said disk, and a plurality of set screws each disposed in an angle member and having an end projecting outwardly from the periphery of said disk, said ends being disposed for engaging and closing said first mentioned electric switch, and said set screws being adjustable relatively to the angle members for vary-

the period that said first mentioned switch will be maintained in a closed position.

3. A device as in claim 1, said first mentioned means being adjustable relatively to said disk for closing the first mentioned switch one or more times during each revolution of the disk and for varying the period of time that said switch will be maintained in a closed position.

4. A device as in claim 1, each of said switches including a fixed contact and a pivotally mounted contact, expansion spring means for urging the pivotally mounted contacts out of engagement with the fixed contacts, and stop members for limiting the movements of the pivotally mounted contacts away from the fixed contacts.

5. A device as in claim 1, comprising a ratchet wheel keyed to said shaft, the teeth of said ratchet wheel being positioned to correspond to the teeth of said toothed wheel and certain of the teeth of the ratchet wheel being disposed to corresponding in positions with the strips of conducting material mounted on the periphery of the wheel, and a spring dog for engaging the teeth of the ratchet wheel for correctly positioning the wheel so that the conducting strips carried thereby will contact the spaced contacts.

6. A device as in claim 1, comprising a ring secured to said gear wheel and disposed in spaced apart relationship to one side thereof, said ring being provided with an annular slot, a plurality of studs adjustably fixed in said slot for engaging and closing the second electric switch.

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