Feb. 28, 1956 J. J. EVERARD 2,736,377

MULTIPLE DIAL TIME SWITCH

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Fig. 1.

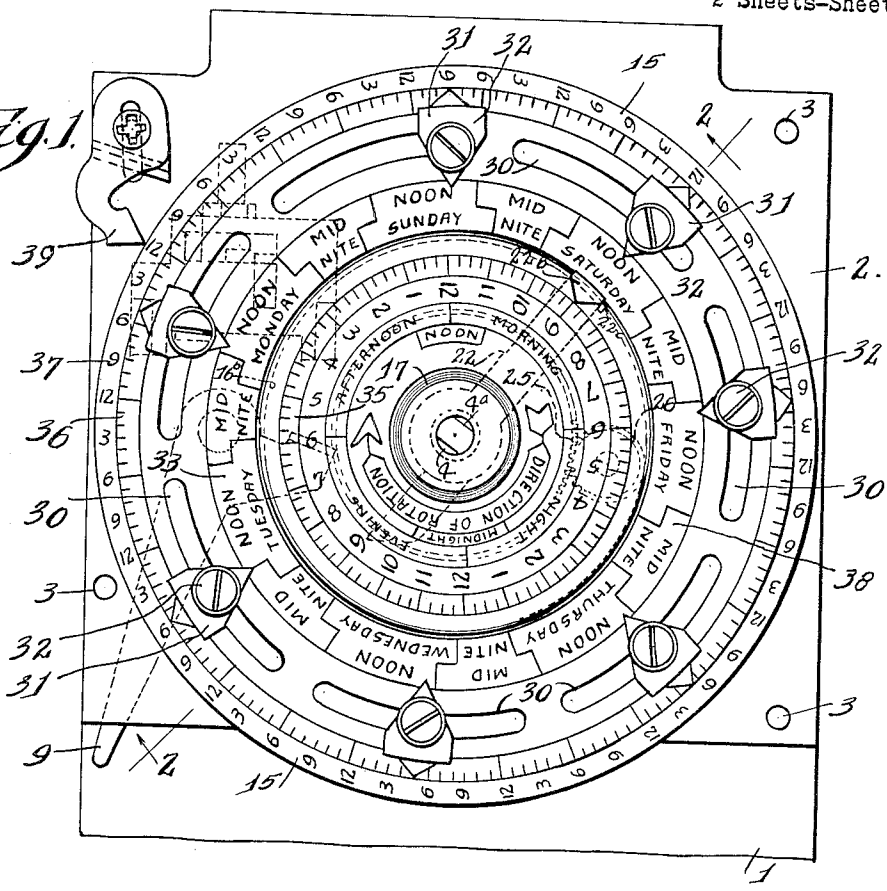
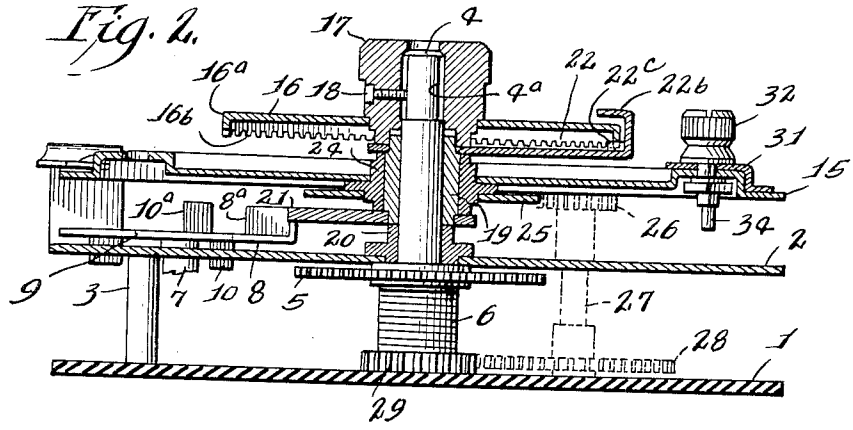


Fig. 2.



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Fig. 3.

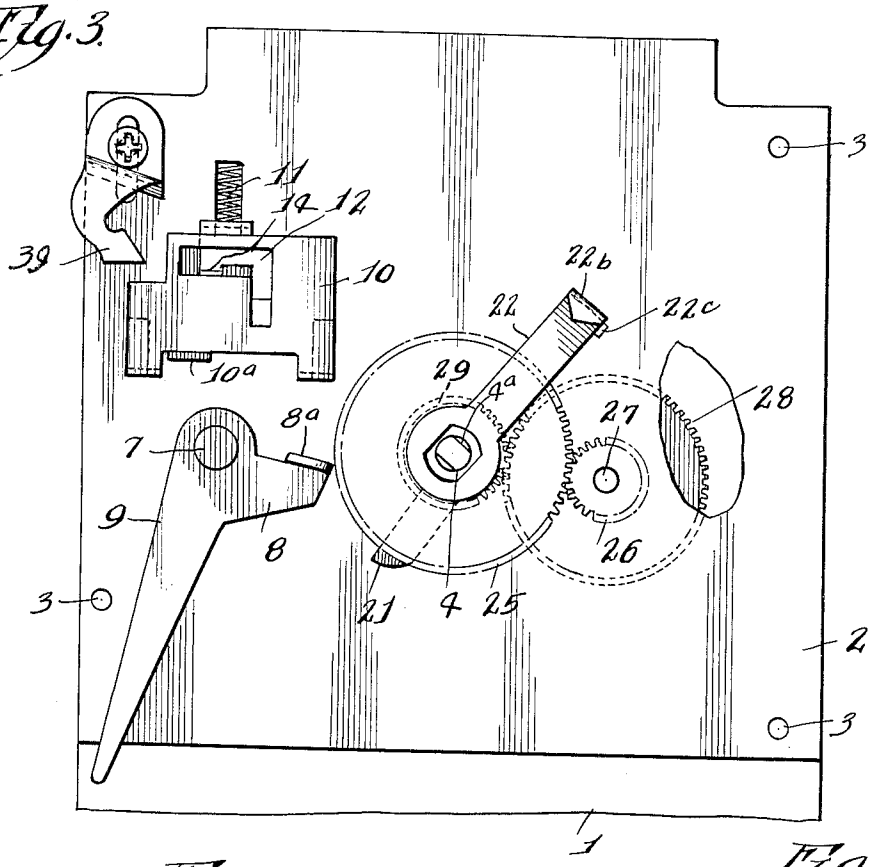


Fig. 4.

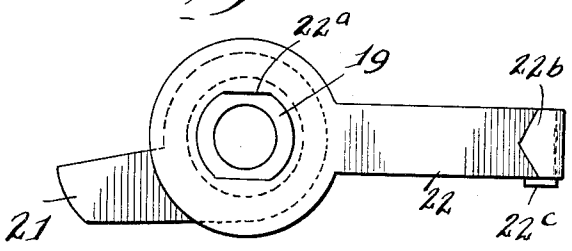


Fig. 6.

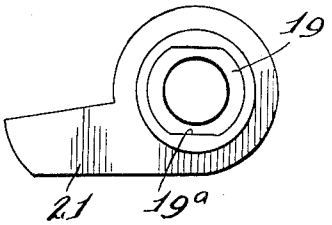
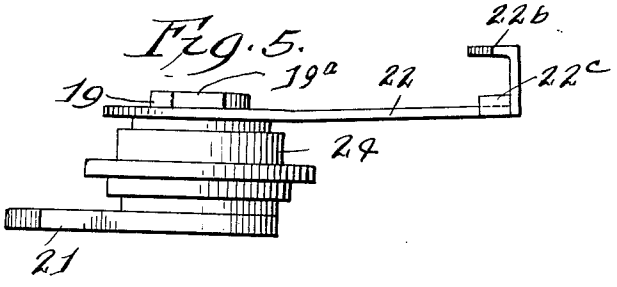


Fig. 5.



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MULTIPLE DIAL TIME SWITCH

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Application March 29, 1954, Serial No. 419,455

11 Claims. (Cl. 161—1)

The present invention relates to time switch mechanisms and particularly to improvements in the dial mechanism of the time switch disclosed in the application of David Morrison, filed January 8, 1954, Ser. No. 402,949, now Patent No. 2,688,366.

The time switch in said application is adapted to effect automatically various switching operations at any selected hour of each day or of any or all of the days of a predetermined series of days, such as a week, for example; the time and duration of each switch operation being determined by two continuously rotating, concentric dials one of which turns faster than the other. Where the repetitive series comprises the seven days of a week, the fast dial makes one revolution in twenty-four hours, while the slowly moving dial requires a week to complete a revolution.

The purpose of the present invention is to simplify the construction of the dial mechanism of said prior time switch and make it simpler and easier to create and to adjust the settings for any desired, complete series of switch operations.

The switch proper may be identical with that in the aforesaid time switch, namely a double throw switch that tends constantly to assume its open position and is provided with an automatic latch to hold it closed until the latch is tripped. The fast-turning dial closes the switch and the slow-moving dial simply trips the latch, as in the aforesaid time switch.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a face view of so much of an apparatus embodying the present invention, as is needed to show the dials.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a face view similar to Fig. 1, the dials being omitted while the finger or pointer cooperating with the smaller dial remains in place.

Fig. 4 is a face view, on a larger scale, of a small assembly, including the aforesaid finger and a detent for tripping a latch, that is loose on the dial shaft.

Fig. 5 is a view looking upwardly at Fig. 4 from a point below the latter.

And Fig. 6 is a view similar to Fig. 4 with the finger or pointer omitted.

Referring to the drawings, 1 and 2 are two parallel supporting plates spaced apart from each other and secured together by conventional posts 3. Rising from the lower of the two plates and extending up through the upper plate is a rotatable shaft 4. This shaft is driven by means of a suitable motor, not shown, through a suitable gear train only the final element of which, a gear wheel 5, is shown. The driving connection between

shaft 4 and gear wheel 5 is a conventional one-way clutch 6.

The switch and the immediate controls therefor are assumed to be the same as in the aforesaid application, the switch, not shown, tending constantly to open. The actuator for closing the switch is a shaft 7 parallel to shaft 4 and extending through and rotatable in plate 2; together with two lever arms 8 and 9 radiating therefrom; arm 8 being short and used for automatic action, whereas arm 9 is long and is intended for manual operation.

On plate 2, not far from shafts 4 and 7 is a slide 10 that is constantly pressed toward shaft 7 by a spring 11. This slide contains an L-shaped slot 12 into which extends a locking tongue 14 on that part of the rockable actuator on the rear side of supporting plate 2. When the tongue is in the position shown in Fig. 3 the switch is locked in its closed position; but, when the slide is pushed up, the tongue is unlatched and allows the switch to open. This is not part of the present invention which relates solely to the means for rocking shaft 4 and pushing the slide up against the resistance of its spring.

As in the aforesaid application, there are two disc-like dials 15 and 16, mounted on shaft 4; the upper dial, 15, having a diameter approximately half that of the lower dial. Dial 16 has at the center a hub or knob 17 for turning the same. The shaft has two oppositely disposed flat faces 4^a extending down a short distance from the top. A set screw 18 extends laterally into the knob into engagement with one of these faces and secures dial 16 to the shaft so as to rotate therewith. A sleeve or bushing 19 surrounds shaft 4, rests at its lower end on a stationary bearing 20 for the shaft where the latter passes through supporting plate 2, and extends up into the hub or knob. Fixed to the lower end of this bushing is a radial finger or detent 21 that cooperates with a lip 8^a on arm 8 of actuator 7, once during each revolution of dial 16, to close the switch. Set loosely on the upper end of bushing 19, and interlocked therewith to prevent relative rotation, is a radial finger or pointer 22 that serves to lock the bushing to dial 16 in any desired relative angular positions; the interlock being effected by providing the bushing with a non-circular end portion fitting into a complementary hole 22^a in the finger.

This pointer is made of spring metal and has its free end bent up and then back or inwardly to provide a tip 22^b that overlies the dial. Dial 16 is provided with a downwardly extending annular flange 16^a provided along its free edge with serrations 16^b. Pointer 22 has thereon an up-turned lip 22^c in position to enter any valley in the serrated edge of the dial; the lip being yieldingly held in any valley which it may enter, until the free end of the pointer is pressed down far enough for the lip to be clear of the serrations.

It will thus be seen that power to turn the switch actuator 7 in one direction is delivered from shaft 4 through dial 16, pointer 22, bushing 19 and detent 21 to lip 8^a on the actuator; the adjustable connection between the pointer and the dial permitting the switch to be closed at any selected time.

Dial 15 is fixed to a sleeve 24 that surrounds and is rotatable about bushing 19. Underlying this dial and also fixed to sleeve 24 is a large gear wheel 25. This gear wheel meshes with a pinion 26 on the upper end of a shaft 27 rotatably supported between and at right angles to supporting plates 1 and 2. On the lower end of shaft 27 is a large gear wheel 28 that meshes with a pinion 29 on the lower end of shaft 4.

As in the aforesaid application, dial 15 contains a series of arcuate slots 30 distributed in a circle of somewhat less radius than the dial. Pointer devices are se-

cured in these slots, one to each slot, and each may be shifted along its slot and be fastened at any point therein. These pointer devices are identical with those in the aforesaid application, each consisting of a pointer proper, 31, a large-headed bolt and nut 32 to clamp the latter to the disc, and a pin extension 34 on the screw; the parts being so proportioned that during each revolution of dial 15, each pin 34 engages an up-turned lip 19a on slide 19 and moves the slide to unlatch the switch if the switch is found to be closed.

Assuming that dial 15 makes one revolution each week and that dial 16 revolves once in twenty-four hours, this latter dial is provided with graduations or indexing characters 35 to indicate each hour of a day and night and such fractions of an hour as may be required. In the arrangement shown, the pointer 22 may be set to correspond to any quarter hour of a twenty-four hour day. Consequently, the switch actuator will be operated to close the switch at any given hour or quarter hour every day of the week.

Since each slot in dial 15 corresponds to a different day of a whole week, each pin on this dial will serve to unlatch the switch at any selected time on the corresponding day. In order to facilitate the setting of pointer devices 31 I place hour marks and numerals 36 and 37, respectively, outwardly from the slots in and close to the periphery of dial 15. Inwardly from the slots in dial 15, and surrounding dial 16, is another ring 38 of legends or indexing characters to designate major subdivisions of each day.

A stationary pointer, 39, mounted on supporting plate 2 near dial 15, cooperates with said graduation marks and numerals, enabling the user to set this dial to the proper day and hour at the time of installing the apparatus.

It will be seen that by placing the small dial outwardly from the large one, all markings, numerals and legends are always in plain sight, neither dial interfering with the reading of the other. Also, because of the manner in which the dials are connected to each other and to the supporting shaft, the large dial is not required to assume one of only seven relative positions angularly of the small dial when an initial setting is made. This is because dial 15 may take as many different angular positions, relative to dial 16, as there are teeth on gear wheel 25.

It will further be seen that, upon removing the knob 17 both dials as well as bushing 19 and sleeve 24 and gear wheel 25 can be lifted out of the assembly. This produces a structure that is easy to manufacture, set and adjust.

The pointers movable with the two dials are utilized in the same manner as in the aforesaid application. In Fig. 1, for example, pointer 22 is set at nine o'clock in the morning, so that the switch actuator will be operated to close a switch each morning at that hour; pointer 31, in the Sunday section of dial 15, is also set at nine o'clock in the morning so that the latch which holds the switch closed is tripped immediately following the closing of the switch; pointer 31 in the Saturday section of the latter dial is set at twelve o'clock, noon, thus permitting the switch to remain closed for three hours; and pointer 31 in the other five sections of such dial are set at five o'clock in the afternoon, whereby the switches on five days in each week will remain closed from nine o'clock in the morning to five o'clock in the afternoon.

It should be noted that while the pointer 39 must indicate the proper day of the week and the hour at the time of making an original setting, the setting is determined only by the manner in which gear wheel 25 and pinion 26 are brought into mesh; thereby eliminating the need for the separate indexing means used in the aforesaid application.

I claim:

1. A dial mechanism for a time switch apparatus wherein the closing of a switch is effected by power transmitted through a small dial and the opening thereof is controlled by elements on a large dial, both dials being driven by a continuously operating motor; composed of a shaft adapted to be power driven, a bushing loose and rotatable on the shaft, a sleeve, somewhat shorter than the bushing, loosely surrounding the latter, a large dial fixed to the sleeve in coaxial relation therewith and carrying trip pins adjustably disposed along the margin thereof, gearing connecting the inner end of the shaft to said large dial so as to cause the latter to turn more slowly than the shaft, a radial finger for operating a switch actuator connected to the inner end of the bushing for rotation therewith, a radial pointer interlocked with the outer end of the bushing for rotation with the same, a small dial mounted on the shaft, at the outer end of the bushing, so as to be slidable on and off the shaft, means to lock the small dial to the shaft, and cooperating elements on the small dial and the pointer to permit the pointer to be locked to the small dial for rotation therewith or be left freed to allow it to be turned about the axis of the shaft independently of that dial.

2. A dial mechanism as set forth in claim 1, wherein the radial pointer and the bushing are provided with interlocking shoulders for locking the pointer against rotation on the bushing while permitting the pointer to be moved onto and off the bushing by sliding movements lengthwise of the bushing.

3. A dial mechanism for a time switch apparatus wherein the closing of a switch is effected by power transmitted through a small dial and the opening thereof is controlled by elements on a large dial, both dials being driven by a continuously operating motor: composed of a shaft adapted to be driven through a one way clutch on the same near the inner end, a bushing loose and rotatable on the shaft, a sleeve, somewhat shorter than the bushing, loosely surrounding the latter, a large dial fixed to the sleeve in coaxial relation therewith and carrying trip pins adjustably disposed along the margin thereof, gearing connecting said end of the shaft to said large dial so as to cause the latter to turn more slowly than the shaft, a radial switch controlling finger loosely interlocked with the inner end of the bushing for rotation therewith, a radial, resilient pointer loosely interlocked with the outer end of the bushing for rotation with the same, a small dial mounted on the shaft, at the outer end of the bushing, so as to be slidable on and off the shaft, means to lock the small dial to the shaft, the small dial having a serrated periphery, and the pointer having a lip cooperating with the serrations to lock the pointer to the small dial for rotation therewith or be left freed to allow it to be turned about the axis of the shaft independently of that dial.

4. A dial mechanism as set forth in claim 3, wherein the small dial has an inwardly facing, peripheral flange in the free edge of which the serrations are located, and wherein the lip on the pointer is yieldingly held in engagement with the serrations by the resiliency of the pointer and is adapted to be released from the serrations by inward pressure on the free end of the pointer.

5. A dial mechanism for a time switch apparatus wherein the closing of a switch is effected by power transmitted through a small dial and the opening thereof is controlled by elements on a large dial, both dials being driven by a continuously operating motor: composed of a shaft adapted to be driven through a one way clutch near the inner end, a bushing loose and rotatable on the shaft, a sleeve, somewhat shorter than the bushing, loosely surrounding the latter, a large dial fixed to the sleeve in coaxial relation therewith, said dial having thereon two rings of indexing characters concentric with the dial and separated from each other by an annular space, trip pins adjustably disposed in such space, a marker on each pin cooperating with the characters in each of said

rings, gearing connecting said end of the shaft to said large dial so as to cause the latter to turn more slowly than the shaft, a radial switch controlling finger secured to the inner end of the bushing for rotation therewith, a radial pointer on the outer end of the bushing for rotation with the same, a small dial mounted on the outer end of the shaft, wholly within the area surrounded by the inner ring of indexing characters, means to lock the small dial to the shaft, and cooperating elements on the small dial and the pointer to permit the latter to be locked to the latter dial for rotation therewith or be left freed to allow it to be turned about the axis of the shaft independently of the dial.

6. A dial mechanism as set forth in claim 5, wherein the small dial is provided with indexing characters in position to be selectively aligned with the markers on the large dial for dial setting purposes.

7. A dial mechanism for a time switch apparatus wherein the closing of a switch is effected by power transmitted through a small dial and the opening thereof is controlled by elements on a large dial, both dials being driven by a continuously operating motor: composed of a driven shaft, a bushing loose and rotatable on the shaft, a sleeve, somewhat shorter than the bushing, loosely surrounding the latter, a large dial fixed to the sleeve in coaxial relation therewith, said dial having thereon two rings of indexing characters concentric with the dial and separated from each other by an annular space, trip pins adjustably disposed in such space, a marker on each pin cooperating with the characters in each of said rings, a gear train connecting said shaft to said large dial so as to cause the latter to turn more slowly than the shaft, a radial switch controlling finger loosely interlocked with the inner end of the bushing for rotation therewith, a radial pointer loosely interlocked with the outer end of the bushing for rotation with the same, a small dial mounted on the outer end of the shaft, wholly within the area surrounded by the inner ring of indexing characters, so as to be rotatable and slidable thereon, means to lock the small dial to the shaft, cooperating elements on the small dial and the pointer to permit the latter to

be locked to the latter dial for rotation therewith or be left freed to allow it to be turned about the axis of the shaft independently of the dial.

8. A dial mechanism as set forth in claim 7, wherein the final gear in the gear train driving the large dial is fixed to the same sleeve as is that dial, and wherein the setting of that dial is determined by the angular position of that gear relative to the shaft at the time of interengaging the gear with the next gear in the train.

9. In a switch apparatus wherein the closing of a switch is effected by power transmitted through a rapidly rotating dial to a switch actuator and the opening of the switch is caused by tripping elements on a more slowly moving dial, with both dials driven by a continuously operating motor: a power driven shaft, a switch closing actuator including a bushing rotatable on the shaft, a sleeve somewhat shorter than the bushing loosely surrounding the latter, a large dial surrounding and fixed to the sleeve, gearing connecting the inner end of the shaft to said large dial to cause the same to turn at a lower speed than the shaft, a small dial detachably mounted on the outer end of the shaft, and means to secure the small dial to the outer end of the bushing in any selected relative position angularly of the bushing axis.

10. An apparatus as set forth in claim 9, wherein the gearing connecting the shaft to the large dial includes a large gear wheel concentric with and fixed to the large dial, and a pinion the axis of which is parallel to the shaft and which meshes with such gear wheel; whereby the large dial may be moved lengthwise of the shaft to disengage it from the pinion to engage it with the pinion in any position angularly of the shaft that permits the gear wheel and the pinion to mesh.

11. An apparatus as set forth in claim 9, wherein the means for connecting the small dial to the bushing is a combined latch and a pointer cooperating with the dial to give dial readings.

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