May 13, 1952 J. J. EVERARD 2,596,330

TIME SWITCH

Filed Aug. 13, 1949 3 Sheets-Sheet 1

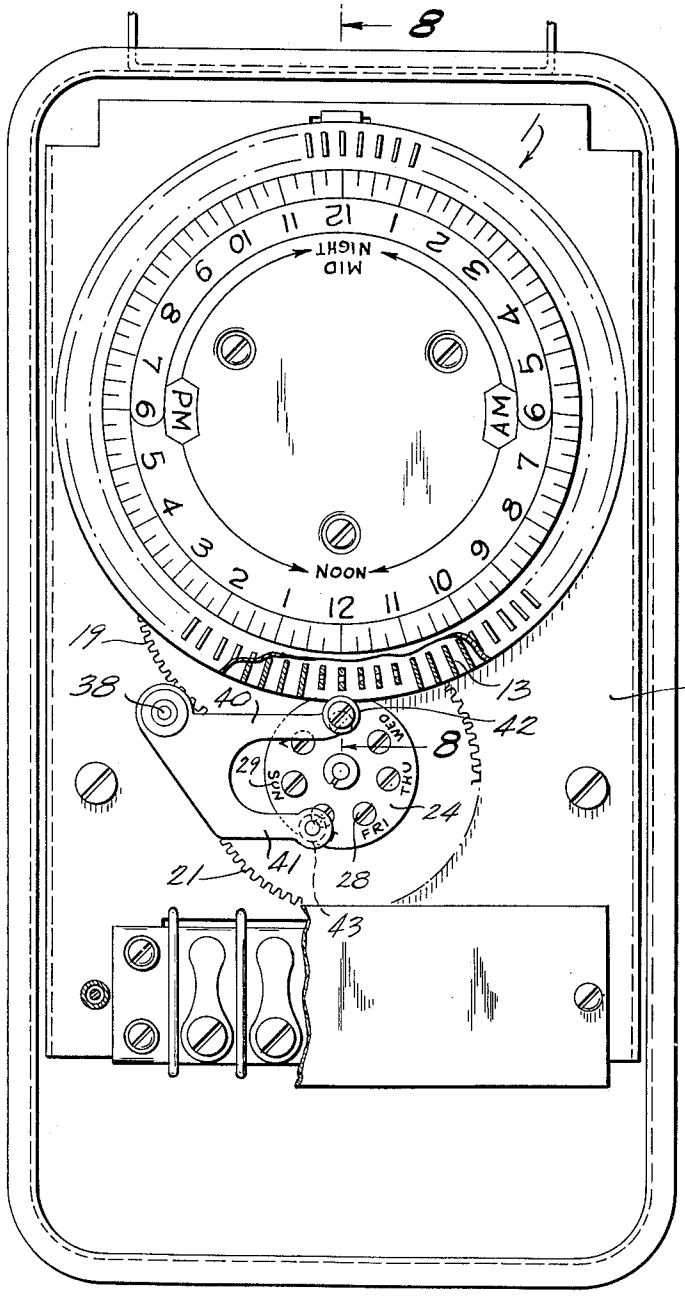


Fig. 1

INVENTOR.
Joseph J. Everard
BY
Arthur R. Woolfolk
Attorney

May 13, 1952 J. J. EVERARD 2,596,330

TIME SWITCH

Filed Aug. 13, 1949 3 Sheets-Sheet 2

Fig. 2

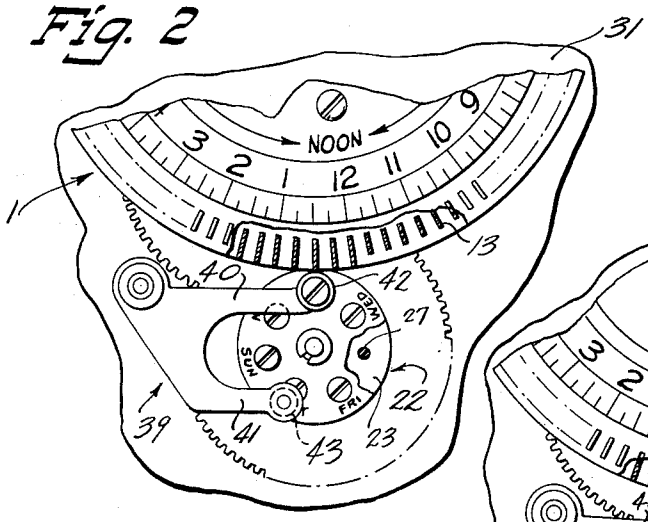


Fig. 3

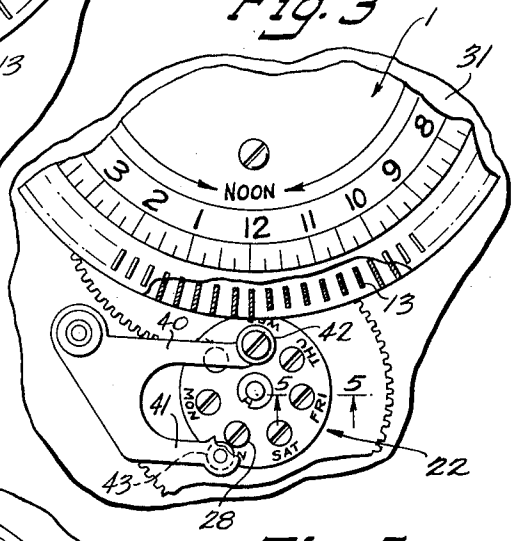


Fig. 4

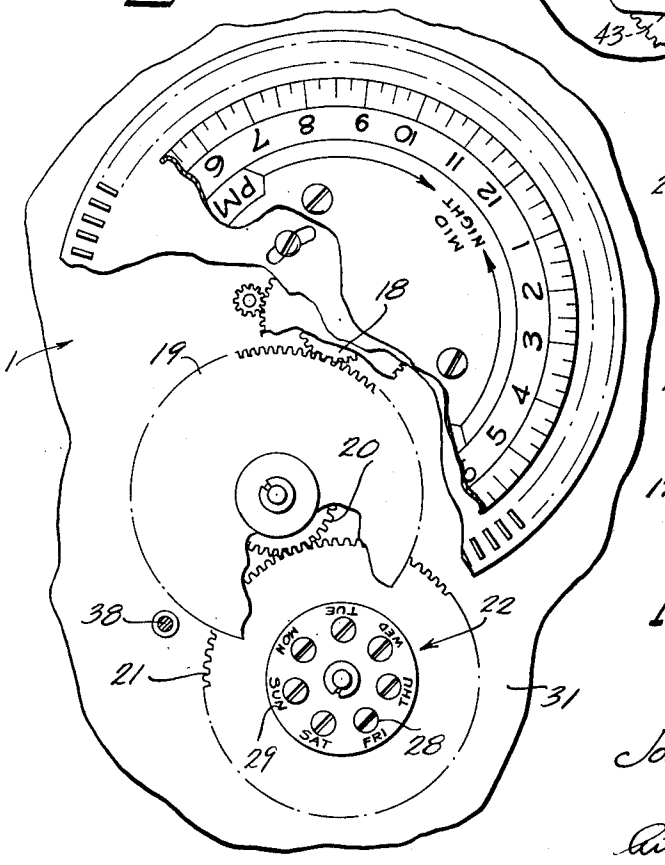
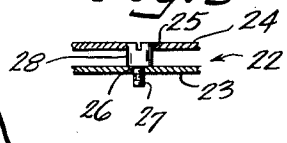


Fig. 5



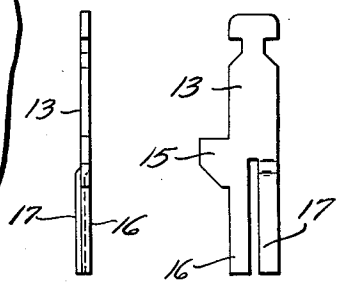


Fig. 6 Fig. 7

INVENTOR.
Joseph J. Everard
BY
Arthur R. Woolpole
Attorney

May 13, 1952 J. J. EVERARD 2,596,330

TIME SWITCH

Filed Aug. 13, 1949 3 Sheets-Sheet 3

Fig. 8

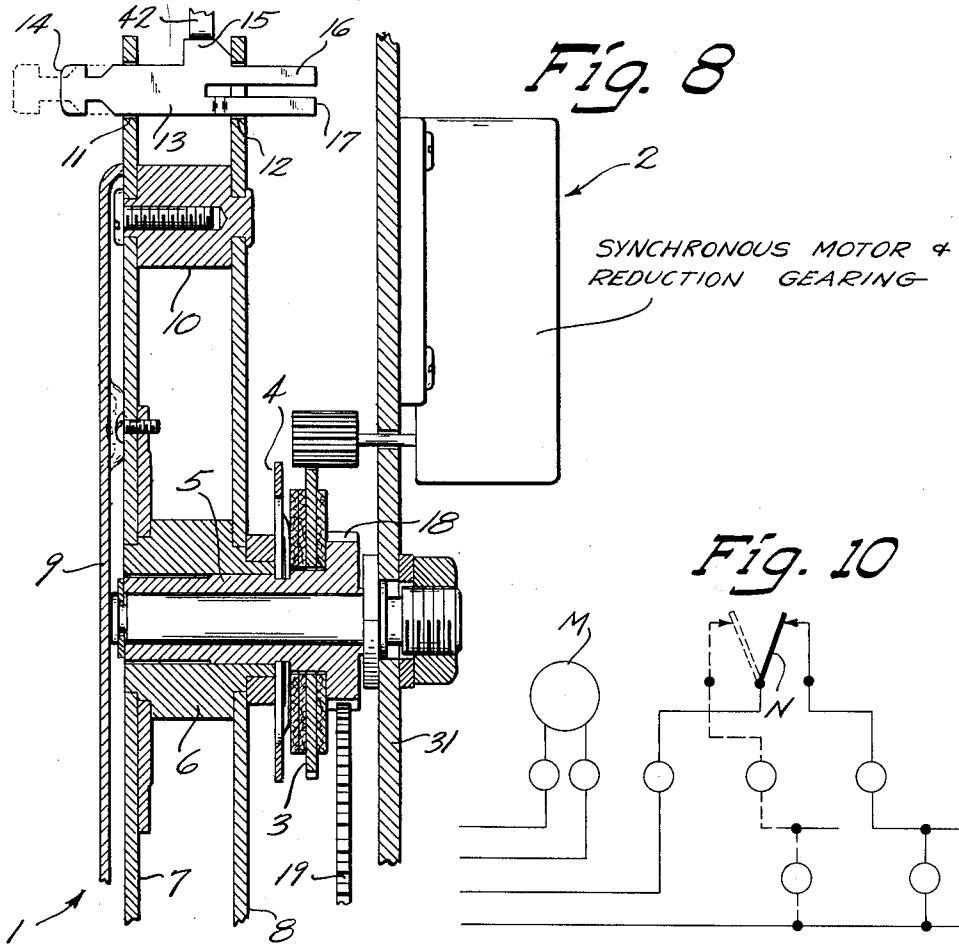
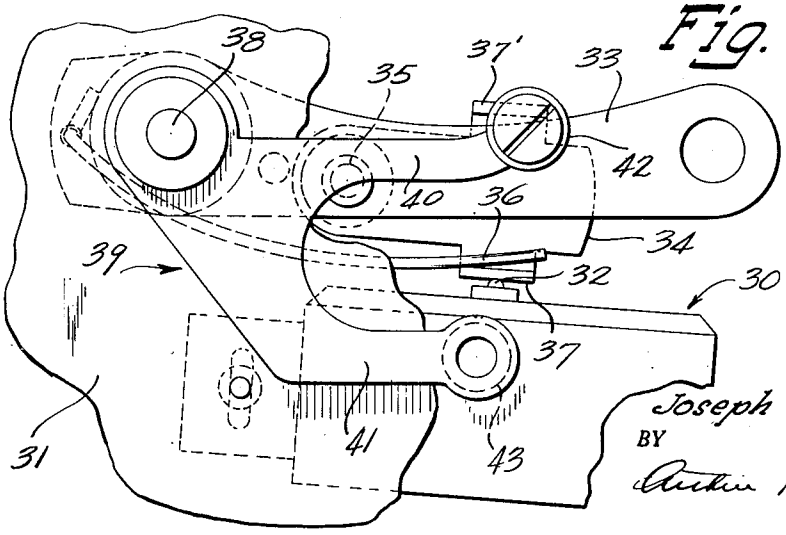


Fig. 10

Fig. 9



INVENTOR.
Joseph J. Everard
BY
Arthur R. Woolfolk
Attorney

Patented May 13, 1952

2,596,330

UNITED STATES PATENT OFFICE

2,596,330

TIME SWITCH

Joseph John Everard, Manitowoc, Wis., assignor to Paragon Electric Company, Two Rivers, Wis., a corporation of Wisconsin

Application August 13, 1949, Serial No. 110,218

3 Claims. (Cl. 161—1)

1

This invention relates to time switches.

In a number of applications, for instance in oil fields where they have wells which are practically exhausted but permit active pumping periods of fifteen minute duration, or half-hour duration, or an hour duration once a day or twice a day, or at other intervals, it is desirable to have time switches which will start the pumping motors and stop them at these selected times and for the predetermined intervals. Also it frequently happens that there are certain days on which it is not desirable to have any active pumping periods whatsoever.

This invention is designed to provide a time switch which fulfills these needs and which provides a very simple means whereby the twenty-four hour dial may be set for any desired time and for any desired interval, so that it will close the switch or open the switch as required and maintain it in such condition for the desired intervals of time and to so relate this main dial to an auxiliary dial that the auxiliary dial rotates once every seven revolutions of the main dial and to provide the auxiliary dial with means whereby the operation of the switch is prevented for any selected day or for any selected days.

Further objects are to provide a time switch having the above characteristics which nevertheless is of extremely simple construction and permits ready adjustment for any one of the multitude of intervals from fifteen minutes up, for instance, and which nevertheless is always permanently associated or geared to the auxiliary seven-day dial so that the switch may be rendered ineffective for any selected day or days, the main dial being driven from a synchronous motor or other driving means and having a slip connection with its power driving means, though having a permanent and non-changing connection with the auxiliary dial.

An embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is a face view of the time switch with the cover of the housing removed and with parts broken away and in section.

Figure 2 is a fragmentary view of the main and auxiliary dials and switch operating levers and associated parts, such view showing the switch operating lever in its inoperative position due to the action of the main dial.

Figure 3 is a view corresponding to Figure 2 showing the switch operating lever in its inoperative position due to the action of a seven-day dial.

Figure 4 is a fragmentary view more fully

2

broken away showing the gear train for positively mechanically connecting the main dial or twenty-four hour dial and the seven-day dial.

Figure 5 is a section on the line 5—5 of Figure 3.

Figure 6 is an edge view of one of the dial tabs.

Figure 7 is a side view of the structure shown in Figure 6.

Figure 8 is an enlarged, sectional view on the line 8—8 of Figure 1.

Figure 9 is an enlarged view looking from the front face of the device with parts broken away showing the micro-switch and the switch operating arm and showing the switch operating lever.

Figure 10 is a wiring diagram of one of the many ways in which the device may be connected.

Referring to the drawings, it will be seen that the main or twenty-four hour dial is indicated by the reference character 1. This main dial is driven through suitable reduction mechanism from synchronous motor means, such synchronous motor means and reduction gearing being diagrammatically shown in Figure 8 and indicated by the reference character 2. This synchronous motor mechanism or other power mean drives a slip or friction clutch means consisting of a relatively large gear 3, see Figure 8, which is spring held between suitable washers by means of a spring spider 4. The spring spider 4 is so made that a relatively heavy friction is provided. The gear 3 is not attached to the reduced portion 5 of the hub part 6 of the main dial indicated generally by the reference character 1, but is, as stated, frictionally held. This is shown in Figure 8.

The main dial also, it will be seen, from Figure 3, consists of an outer plate 7 and an inner plate 8 rigidly held together on the hub portion 6. This main dial is also provided with an indicia carrying dial 9 on which the hours and other insignia are marked. It is to be noted that these dials 7 and 8 are spaced apart by spaced members 10 and are provided with registering slots 11 and 12, respectively, which slidably carry dial tabs 13. These dial tabs 13 consist of a finger piece 14 which projects outwardly from the outermost dial or top dial 7 and which is used to raise or lower the tabs 13. The tabs are provided with a projecting portion or cam portion 15 for a purpose hereinafter to appear. In order to provide sufficient frictional contact between the tabs and the main dial, the tabs are provided with a pair of lower arms 16 and 17. One of the arms, as may be seen most clearly

from Figures 6 and 7 for example the arm 17, is bent or outwardly displaced with reference to the other arm 16, so as to cause a certain degree of binding between the dial tabs and the lower or inner disk 8 of the main dial 1. This insures the retention of the tab either in its raised position or in its lowered position, the lowered position being shown in Figure 8 in full lines and the raised position being shown in such figure in imaginary lines.

Attention is now directed to Figures 1 through 4, 8 and 9. It is to be noted that the main dial has a gear 18 which is rigid therewith, see Figures 4 and 8. This gear 18 is formed integral with the portion 5 of the hub structure 6. The gear 18 meshes with a larger intermediate gear 19 which larger gear is rigid with a small gear 20. The small gear 20 meshes with a larger gear 21 which is rigid with the seven-day dial indicated generally at 22. The reduction gearing consisting of the gears 18, 19, 20, and 21 is such that the seven-day dial 22 rotates once for every seven revolutions of the twenty-four hour or main dial 1. The seven-day dial indicated generally at 22 is provided with an inner disk 23 and an outer disk 24. The outer disk is provided with seven relatively large openings 25 and the inner disk with seven relatively small openings 26. The openings 26 are threaded and a reduced threaded shank 27 of a cam screw or cam member 28 is screwed between such disk 23 as shown in Figure 5. It is preferable to provide the holes 26 and the reduced threaded shank 27 with left-handed threads. Normally all of the screws or cam members 28 of the seven-day dial 22 are screwed down flush with the outer disk 24. However, if any day, for example Sunday, is selected during which it is not desired to have the switch operate, the screw corresponding to that day is backed outwardly or unscrewed so that it projects upwardly from the upper surface of the upper disk 24 of the seven-day dial 22. It is to be noted that the upper disk 24 of the seven-day dial 22 is provided with insignia indicating the different days, such insignia being indicated by the reference character 29.

The switch is preferably a micro-switch indicated generally by the reference character 30 in Figure 9. This micro-switch is secured to the inner face of the front plate 31 of the time switch, the main dial or twenty-four hour dial 1 and the seven-day dial or auxiliary dial 22 being located on the outer face of the front plate 31. This micro-switch 30 is provided with an operating plunger 32, see Figure 9, which is urged outwardly in the usual manner, not shown, which requires only a very small motion to operate the switch mechanism, not shown, such switch mechanism being diagrammatically indicated in Figure 10. This micro-switch is not detailed as it is a standard part well known in the industry.

The micro-switch 30 is operated by means of a switch operating arm 33 which is provided with a spring pressed small lever 34 pivoted as indicated at 35 and urged by means of the spring 36 towards the operating plunger or operating member 32 of the micro-switch. The lever 34 is provided with an ear 37 which engages the plunger 32 and is provided with an opposed ear 37' which limits the motion of the lever 34 in a downward direction as viewed in Figure 9. The spring yield between the levers 33 and 34 is provided so as to take up any excess motion of the lever 33 beyond that required for operating the plunger 32 of the micro-switch.

The switch operating arm 33 is rigidly carried by a rock shaft 38 and is located on the inner side of the front plate 31 of the time switch. The rock shaft 38 projects through the front plate 31 and carries a switch operating lever indicated generally at 39 located on the front side or outer side of the front plate 31 of the time switch. The switch operating lever 39 is rigid with the rock shaft 38 and consequently is rigid with the switch operating arm 33. The switch operating lever 39 is forked and is provided with what may be termed an inner arm 40 and an outer arm 41. These arms carry rollers or cam followers 42 and 43, respectively. The cam follower or roller 42 is adapted to coact with the cam portion 15, see Figures 7 and 8, of the tabs 13 and the cam follower or roller 43 is adapted to coact with the screws or cam members 28. Thus the cam followers 42 and 43 are respectively controlled from the main dial or twenty-four hour dial 1 and the auxiliary or seven-day dial 22.

When the switch operating arm 39 is in the position shown in Figures 2 and 3, the switch is held in what may be termed its inoperative position and when the switch operating arm 39 drops inwardly towards the main dial 1 as shown in Figure 1, the switch is in what may be called its operative position. In Figure 8 the cam follower 42 is shown in full lines separate from other portions of the apparatus in the position it occupies when the switch is in what may be termed its inoperative position or switch open position. In this position it will be seen from reference to Figure 8, that the cam portions 15 of the tabs 13 hold the roller or cam follower 42 outwardly and consequently prevent operation of the switch. Also the position shown in Figure 8 corresponds to that shown in Figure 3 where the cam follower also carried by the switch lever 39 is held outwardly by means of the screw or cam member 28 corresponding to Sunday for the seven-day dial 22.

When the tabs 13, at the desired time indicated on the main dial at which it is desired for the switch to operate, are raised as shown in dotted lines in Figure 8, it will be apparent that the cam follower or roller 42 will move inwardly. This corresponds to the position of the parts shown in Figure 1.

It is to be noted particularly that the main dial can be grasped by the hand of the operator and adjusted to the correct time and correct day when the device is initially placed in operation. This is secured by merely rotating the main dial 1 in either direction to the correct position it being noted that such main dial has the slip clutch or friction slip connection with the synchronous motor driving means and has the permanent or non-shifting connection with the auxiliary dial.

It will be seen that a novel time switch has been provided which may be set to operate the switch at any desired interval as short, for instance as a fifteen minute interval at any day in the week and at any desired time. Also it is noted particularly that the above result is accomplished without an undue multiplication of parts and without the use of auxiliary driving mechanism for the switch.

It is to be distinctly understood that although a single circuit switch has been indicated in Figure 10, the motor being indicated by the reference character M and the switch arm by the reference character N, that nevertheless a double circuit switch may be employed if desired as

shown by the additional dotted lines in Figure 10.

It will be seen further that there is no possibility of the time dial and the seven-day dial getting out of step. There is no adjustment required whatsoever to insure their correct synchronization in the sense that the seven-day dial rotates once for every seven revolutions of the time dial.

It is to be understood distinctly that although the expression "switch closed" or "switch operative position" or "operative position" for the switch arm is employed, that nevertheless the switch may have two operative positions as shown in full and dotted lines in Figure 10. Therefore, although the expressions hereinabove noted are used, these expressions are to be interpreted not in any sense as limiting but merely with the understanding that they are used in order to simplify the description and claims.

It is to be understood further that where the expressions "power means" or "power driven timing mechanism" for driving the main dial are employed, these expressions are to be understood as meaning either a synchronous motor with reduction gearing mechanism or clock-work timing mechanism and that such expressions, therefore, are not to be interpreted as limiting other than as hereinabove stated.

Although this invention has been described in considerable detail, it is to be understood that such description is intended as illustrative rather than limiting, as the invention may be variously embodied and is to be interpreted as claimed.

I claim:

1. A time switch comprising a main dial, power driven timing mechanism for driving the main dial, said main dial being arranged to execute one revolution every twenty-four hours, a seven-day dial, gearing positively and permanently operatively connecting the seven-day dial and the twenty-four hour dial and arranged to impart one revolution to the seven-day dial for each seven revolutions of the twenty-four hour dial, switch means, a switch operating lever for operating said switch means, cam means carried by the twenty-four hour dial, cam means carried by the seven-day dial, and a first and a second cam follower carried by said switch operating lever and arranged to be selectively operated by the cam means of said twenty-four hour dial and said seven-day dial, respectively, said first and second cam means being distinct and separate and being spaced apart, the cam means of said seven-day dial being arranged to hold said switch lever in inoperative position when such cam means engages said second cam follower.

2. A time switch comprising a main dial, power driven timing mechanism for driving the main dial, said main dial being arranged to execute one revolution every twenty-four hours, a seven-day dial positively geared to said main dial and arranged to rotate once for every seven revolutions of said main dial, switch means, a switch operating lever for operating said switch means, said switch operating lever having two spaced arms each provided with a cam follower, and cam means on said main dial and said seven-day dial for selectively engaging the cam followers of the two arms of said switch operating lever, the cam means of said seven-day dial consisting of screws carried by said seven-day dial and normally positioned flush with the face of said seven-day dial.

3. A time switch comprising a main dial, power driven timing mechanism for driving the main dial, said main dial being arranged to execute one revolution every twenty-four hours, a seven-day dial positively geared to said main dial and arranged to rotate once for every seven revolutions of said main dial, switch means, a switch operating lever for operating said switch means, said switch operating lever having two spaced arms each provided with a cam follower, said main dial having pemanently positioned cam means arranged to occupy an operative and an inoperative position, and a plurality of screws carried by said seven-day dial and normally positioned flush with the face of said seven-day dial, said cam means and said screws being arranged to selectively engage the said cam followers.

JOSEPH JOHN EVERARD.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
871,553	Arndt	Nov. 19, 1907
876,416	Venner et al.	Jan. 14, 1908
1,074,813	Palmgren	Oct. 7, 1913
1,163,362	Pache	Dec. 7, 1915
1,511,893	Luttrell et al.	Oct. 14, 1924
1,685,481	DeHart	Sept. 25, 1928

FOREIGN PATENTS

Number	Country	Date
453,892	Germany	Dec. 22, 1927