

[54] **PUSHER FOR ELECTRONIC DIGITAL WATCH**

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[51] Int. Cl. **G04b 37/08, G04b 19/30**

[58] Field of Search **58/23 R, 50 R, 90 B; 340/309.4**

[56]

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[57]

ABSTRACT

A manual actuating arrangement on electronic watches for illuminating the dial face of the watch or setting the time. A plunger is actuated against the force of a spring within a sleeve-shaped housing. Upon actuation of the plunger, a switch may be closed for connecting the battery within the watch to means for illuminating the dial face. The actuation of the plunger may also set the time for the watch. The plunger has either a cap-shaped head portion or a recessed head portion which may be actuated by the thumb of the user. O-rings between the plunger and the internal surface of the housing provide for waterproof construction.

5 Claims, 3 Drawing Figures

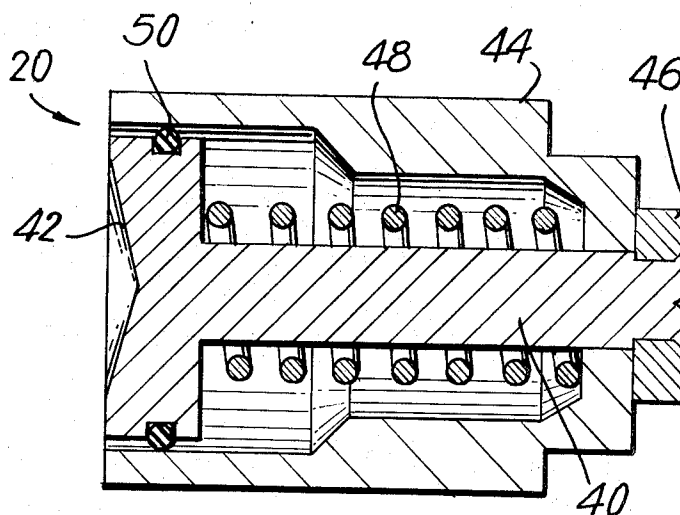


FIG. 1

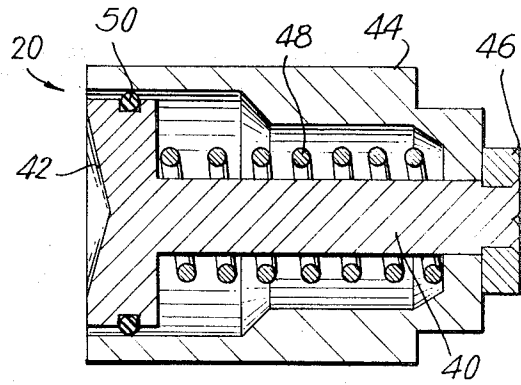
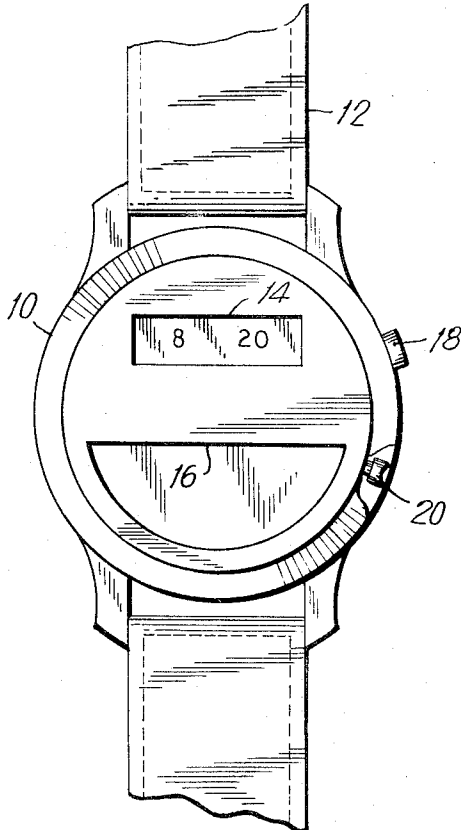


FIG. 2

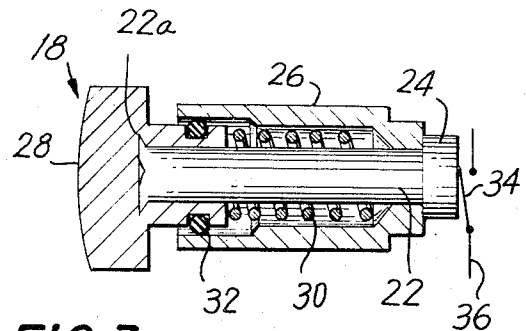


FIG. 3

PUSHER FOR ELECTRONIC DIGITAL WATCH

BACKGROUND OF THE INVENTION

In the use of electronic watches, particularly digital-type of watches, it is desirable to have available pusher type of mechanisms which enable the user or wearer of the watch to set the time of the watch or to illuminate the numerals whereby the time may be read in the dark, for example. Thus, when sitting in a darkened area, such as a theater, for example, the wearer of a watch often desires to know the time.

Many wearers of watches among the general public, furthermore, have poor eyesight to the extent that it would be helpful to them if they could illuminate the dial face when reading the time.

For purposes of setting the time in electronic digital watches, heretofore, pusher types of mechanisms have not been available which would function repeatedly with a high degree of reliability, and without displaying excessive wear under the usual conditions encountered by the user. Pusher types of mechanisms, in the past, have also not been extensively waterproof, so that moisture is prevented from penetrating into the interior of the watch case.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a pusher type of mechanism which may be manually actuated for use in electronic digital watches.

It is also an object to provide the foregoing device, which is simple and has a high degree of reliability in operation.

A further object of the present invention is to provide a device of the aforementioned character, which provides for waterproof construction.

A still further object of the present invention is to provide a manually actuated device, as set forth, which may be economically fabricated and easily assembled.

The objects of the present invention are achieved by providing a plunger which moves longitudinally within a sleeve-shaped housing. A compression spring surrounds a portion of the plunger within the housing. The spring is situated within an annular space within the housing surrounding a portion of the plunger. When the plunger is actuated by, for example, the thumb of a user, a force is applied against the spring. The spring then returns the plunger to its initial position, upon release of the plunger by the user. An O-ring held within a necked-down portion of the plunger, applies pressure against the interior walls of the sleeve-shaped housing for preventing moisture from entering the housing.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partial top view of an electronic digital watch equipped with a pusher device for setting the time and a pusher device for illuminating the dial face of the watch, in accordance with the present invention;

FIG. 2 is a sectional view of the pusher device used for the watch in FIG. 1;

FIG. 3 is a sectional view of another embodiment of the pusher device for the watch of FIG. 1, in accordance with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, an electronically operated watch 10 is provided with wrist-bands 12 for attaching to a hand of a user. A digital indicator 14 displays the instantaneous time on the dial face of the watch. The digital indicator 14 is operated through a source of electrical energy held within the watch as, for example, a rechargeable battery. The battery or cell may be charged from rays of sunlight impinging upon a predetermined surface 16, for example, on the watch surface.

To set the time of the watch at any instant, the watch case is provided with a pusher device 18 along the rim of the case of the watch 10. Another pusher device 20 also located along the rim of the watch case, serves for purposes of closing a circuit by which the dial face of the watch may be sufficiently illuminated for readily observing the time displayed by the indicator 14.

The pusher device 18 has a plunger with a shaft portion 22 movable within a sleeve-shaped housing 26. On one end of the shaft portion 22, is a circular-shaped portion 24 having a diameter larger than the shaft 22. The portion 24 is on the sleeve-shaped of the sleeve-shaped housing 26. The other end of the shaft portion 22 carries a cap 28. This cap 28 may, for example be pressed on the shaft 22 or it may be molded onto this shaft 22. To prevent the cap 28 from slipping off the shaft 22 while in service, the end of the shaft 22 has a flared portion 22a extending into the cap 28. A compression spring 30 surrounds the shaft portion 22 and abuts, at one end, the cap 28. The other end of the spring 30 abuts an interior ring-shaped surface of the sleeve-housing 26.

The cap 28 is provided with an annular or necked-down portion for carrying an O-ring 32 therein.

In operation of the pusher device 18, the wearer or user of the watch depresses the cap 28 by applying pressure with the thumb, for example. The cap 28 is exposed so that the wearer of the wristwatch may have access to it. When the cap 28 is depressed in this manner, the spring 30 becomes compressed, while the portion 24 is moved forward and away from the sleeve housing 26. During this motion of the cap 28, furthermore, the O-ring 32 applies pressure against the internal wall surface of the sleeve housing 26. The longitudinal motion of the shaft portion 22 and hence the portion 24, may be used to either set the time of the watch, or close a circuit contact whereby the battery within the watch is connected to illuminating means for illuminating, for example, the digits or numerals on the dial face. The O-ring 32, by applying pressure against the internal wall surface of the sleeve housing 26, prevents moisture from entering the interior of the housing and hence the watch case. With the forward motion of the plunger with the end portion 24, an electrical contact 34 may be closed for the purpose of closing a circuit 36 whereby the cell or battery in the watch is connected to the illuminating means.

After pressure on the cap 28 is removed, the spring 30 returns the plunger and hence the portion 24 to the initial position, in which the electrical contact 34 is in open position. With this arrangement, the battery is dis-

connected from the illuminating means and hence the battery charge is conserved. When in the initial position of the plunger, the end portion 24 abuts the end face of the housing 26.

In another embodiment of the pusher device, the plunger has a shaft portion 40 carrying, at one end thereof, a head portion 42. The shaft portion 40 also is movable within a sleeve-shaped housing 44. The end of the shaft portion 40, opposite to that carrying the head 42, has mounted on it a retaining washer 46 which abuts the end face of the housing 44, when the pusher device is unactuated. The washer 46 is fixed to the shaft portion 40. A spring 48 surrounding the shaft portion 40 has one end abutting the head 42, and another end abutting the interior of the sleeve housing 44. The head portion 42 is partly recessed to accommodate comfortably the thumb of the wearer or user for actuating the plunger. This difference in the contact surface of the plunger furthermore, serves also to distinguish between the two pusher devices on the watch case.

An O-ring 50 carried in an annular space in the head portion 42, applies pressure to the interior wall surface of the housing 44.

In operation of the pusher device 20, the head portion 42 is depressed by the user of the watch so that the spring 48 becomes thereby compressed. The depressing of the head 42 serves to move forward the shaft portion 40 and hence the washer 46. As a result of such forward motion of the shaft 40 and the washer 46, the watch may be set, or a circuit contact may be closed for the purpose of illuminating the digits or numerals on the dial face. When the plunger is released by removing pressure applied to the head portion 42, the spring 48 returns the plunger to its initial position, in which the washer 46 abuts the face end of the sleeve housing 44. The O-ring 50 serves to prevent moisture from entering the interior of a housing 44, while permitting relative motion between the head 42 and the interior wall surface of the sleeve housing. The spring 48 is designed so as to have sufficient force to return the plunger to its initial position against the resistance resulting from the pressure being applied by the O-ring against the interior wall surface of the housing 44.

In the application to an electronically operated watch, either one of the pusher devices of FIG. 2 or FIG. 3 may be used. Thus, either one of the embodiments in these two FIGS. 2 and 3 may be used for the purpose of either setting the time on the watch or illuminating the indicating numerals.

It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of electronic watch

setting and actuating arrangements differing from the types described above.

While the invention has been illustrated and described as embodied in electronic watch setting and actuating arrangements, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

I claim:

1. A watch actuating arrangement for actuating means in said watch, comprising, in combination, a housing member having openings at opposite ends of said housing member; cylindrical shaft means slidably guided by at least one of said openings and movable axially within said housing member; spring means in said housing member and contacting said shaft means for urging said shaft means into an unactuated position, said shaft said housing member in said unactuated position; means between said shaft for inhibiting the passage of moisture into the interior of said housing member, said shaft means being displaced axially from said unactuated position and against said spring means when actuated, said spring means returning said shaft means to said unactuated position upon release of said shaft means, the displacement of said shaft means being limited substantially by the displaceable positions of said spring means and displacing said shaft means; and said O-ring being located between said head portion and the interior wall surface of said housing a head portion on one end of said shaft means integral therewith and having a circular cross section with a diameter substantially larger than the diameter of said shaft means and a recessed area exposed from one end of said opening for manually actuating.

2. The arrangement as defined in claim 1 wherein said shaft means comprises having at one end stop means abutting said housing member when said shaft means is in said unactuated position.

3. The arrangement as defined in claim 2 wherein said stop means comprises a substantially circular shaped portion integral with said cylindrical shaft member the diameter of said circular-shaped portion being substantially larger than the diameter of said cylindrical shaft member and being outside of said housing member.

4. The arrangement as defined in claim 2 wherein said stop means comprises washer means mounted on one end of said cylindrical shaft member and on the outside of said housing member.

5. The arrangement as defined in claim 1 wherein said spring means comprises a compression spring.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,783,607 Dated January 8, 1974
Inventor(s) Walter Alphonse Feurer

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, lines 18-20 in the claim, there being an omission which should be as follows:

line 18 the clause -- O-ring means for inhibiting the passage of moisture into the interior of said housing member, --;
line 19, cancel "between said shaft".

Signed and sealed this 24th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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