

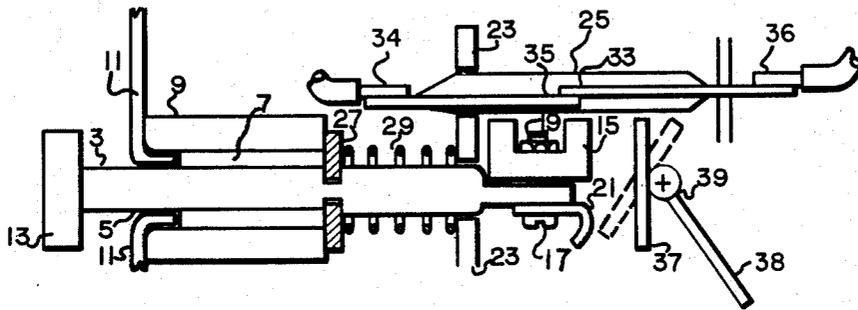
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PUSHBUTTON MAGNETIC SWITCH WITH A MEMORY

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PUSHBUTTON MAGNETIC SWITCH WITH A MEMORY

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This invention relates to a pushbutton device, and more particularly to a pushbutton device with an associated memory.

Pushbuttons are widely used for many purposes. One use is for entering coded information into control systems. A plurality of pushbuttons are depressed corresponding to the code to be entered and the code is stored in an associated memory device. The pushbuttons then are spring-returned to their original position. One or more of the memory locations may be connected to indicating lights to indicate that one or more pushbuttons have been depressed.

The memory elements associated with each pushbutton in the past have usually been electronic elements such as magnetic cores or transistors. Such memory elements are relatively expensive. Indicating lights are also relatively expensive, and it is usually not economically feasible to provide one indicating light for each pushbutton.

It is therefore an object of this invention to provide a new and improved pushbutton.

Another object of this invention is to provide a new and improved pushbutton device with a memory.

A further object of this invention is to provide a new and improved pushbutton device with a memory and associated indicating device.

Still another object of this invention is to provide a new and improved pushbutton device with a memory and associated indicating device which is relatively inexpensive.

According to this invention, a pushrod of a nonmagnetic material is spring loaded. A permanent magnet is secured to one end of the pushrod. A magnetic reed switch having two contacts is associated with the pushrod so that when the pushrod is in a normal position the permanent magnet does not close the contacts of the magnetic reed switch. A bar of magnetic material is positioned with respect to the pushrod so that when the pushrod is in its normal position the spring loading of the pushrod overcomes any magnetic attraction between the permanent magnet and the bar of magnetic material. When the pushrod is depressed, the permanent magnet is moved over the intersection of the two contacts of the magnetic reed switch to close the two contacts. The air gap between the permanent magnet and the hold bar of magnetic material becomes such that the permanent magnet is attracted to the bar of magnetic material and the pushrod is held in a depressed position. The depression of the pushrod indicates that the contacts are closed, and the closed contacts act as a memory. The hold bar may be moved to increase the air gap between the permanent magnet so that the spring loading overcomes the magnetic attraction to release the pushrod and open the contacts of the magnetic reed switch.

The invention is set forth with particularity in the appended claims. The principles and characteristics of the invention, as well as other objects and advantages are revealed and discussed through the medium of the illustrative embodiments appearing in the specification and drawing which follow.

In the drawing:

The one figure shows a cut-away view of a pushbutton device with a memory constructed according to this invention.

Referring now to the drawing, a pushrod 3, of a non-

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magnetic material such as stainless steel or aluminum, is slidably secured in a channel 5. Channel 5 is shown cut away with the pushrod 3 sliding in an insert 7 made of a nonfrictional material. The insert 7 is secured to a frame 9 with a face plate 11 also secured to the frame 9. A head 13 is secured to one end of the pushrod 11 and a permanent magnet 15 secured to the other end. A bolt 17 and nut 19 secure a stop 21 and the permanent magnet 15 to the end of the pushrod 3.

A plate 23 has a hole therein through which the pushrod travels and hole in which a magnetic reed switch 25 is secured. A retaining ring 27 secured to the pushrod 3 in notches limits the movement of the pushrod 3. A compressible spring 29 is compressed between retaining ring 27 and plate 25 to urge the pushrod 3 upward. This allows the pushrod to be depressed and to return after it has been depressed.

Magnetic reed switch 25 is a conventional magnetic reed switch of the type widely used. Such magnetic reed switches are hermetically sealed in a capsule of a nonmagnetic material such as glass. Within the capsule 25 are two opposing magnetic reeds 33 and 35. The reeds are plated with any suitable contact metal and extend through the capsule to connect with terminals 34 and 36. The reeds 33 and 35 of the magnetic reed switch 25 are normally positioned so that the permanent magnetic 15 does not energize the reeds 33 and 35. The intersection of the reeds 33 and 35 is positioned so that when the pushrod 3 is depressed the permanent magnet 15 is positioned over the intersection of the reeds 33 and 35.

A hold bar 37 is secured to a rotatable member 39 which may be rotated either manually or by a solenoid. A handle 38 is secured to rotatable member 39. Hold bar 37 is of a magnetic material and is positioned so that the magnetic air gap between the hold bar 37 and permanent magnet 15 is such that the magnet 15 is not held by the hold bar 37. The rotatable shaft 39 may be rotated in a clockwise direction by pushing handle 38 in a clockwise direction to increase the magnetic air gap between the magnet 19 and the hold bar 37 to release the magnet 15, as shown by the dashed lines outlining the hold bar 37 in its released position.

Operation

When a pushbutton is selected, the pushbutton 13 is depressed compressing the spring 29 between the retaining ring 27 and the support plate 25. The pushrod 3 is depressed moving the magnet so that it is positioned over the intersection of reeds 33 and 35. The reeds 33 and 35 are energized closing the contacts to complete the electrical circuit connected to the electrical terminals 34 and 36. The positioning of the permanent magnet 15 over the intersection of the reeds 33 and 35 puts the permanent magnet 15 in such a position that the air gap between the permanent magnet 15 and the hold bar 37 is such that the magnet 15 is held by the hold bar 37.

The pushbutton 13 therefore remains depressed indicating to the operator that pushbutton 13 has been operated. The reeds 33 and 35 remain energized and closed to operate as a memory storing the fact that pushbutton 13 has been depressed. When the information stored in the magnetic reed switch 25 has been utilized the rotatable bar 39 is rotated in a clockwise direction increasing the air gap between the magnet 15 and the hold bar 37 so that the magnet 15 is released from the hold bar 37. The compressed spring 29 then expands pushing the pushrod 3 outward, removing the magnet 15 from over the intersection of reeds 33 and 35. Reeds 33 and 35 then open.

After the pushbutton has been released, the hold bar 37 is moved in a counterclockwise direction to its original position. The pushbutton is again ready for use.

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In summary a new and improved pushbutton with a memory and indicator has been described. Such a pushbutton is relatively inexpensive.

While the invention has been explained and described with the aid of particular embodiments thereof, it will be understood that the invention is not limited thereby and that many modifications retaining and utilizing the spirit thereof without departing essentially therefrom will occur to those skilled in the art in applying the invention to specific operating environments and conditions. It is therefore contemplated by the appended claim to cover all such modifications as fall within the scope and spirit of the invention.

What is claimed is:

In a pushbutton device including a permanent magnet, a switch having two magnetic reeds, a movable pushrod, said permanent magnet positioned on said pushrod to close the reeds of said switch when said pushrod is moved, a bar of magnetic material positioned to hold said permanent magnet when said pushrod is moved so that the reeds of said switch remain closed, means for moving said bar

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of magnetic material to release said permanent magnet, and means for moving said pushrod to open the reeds of said switch.

References Cited by the Examiner

UNITED STATES PATENTS

2,298,068	10/42	Pierce	200—87
2,923,791	2/60	Corbiit et al.	200—87
3,012,116	12/61	Boylan et al.	200—87
3,129,302	4/64	Postel	200—87

OTHER REFERENCES

IBM Technical Disclosure Bulletin, titled Toggle Switch, by J. W. Berkman, vol. 4, No. 11, dated April 1962.

IBM Technical Disclosure Bulletin, titled Magnetically Actuated Switch, by J. W. Berkman, vol. 5, No. 5, dated October 1962.

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