

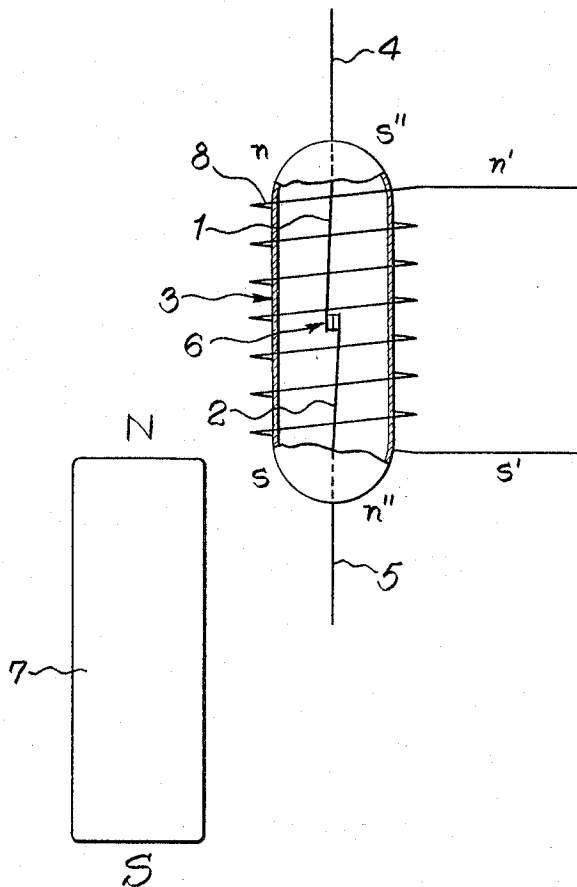
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POSITION INDICATING ELECTRIC SWITCH

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POSITION INDICATING ELECTRIC SWITCH

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2 Claims. (Cl. 200—87)

Our invention relates to an improvement in electric switches for valve position indicators or other indicators.

Switches of the type to which our invention relates comprise a pair of electrically conductive reeds enclosed in a capsule, one reed being sealed in and extending through one end of the capsule and the other reed being sealed in and extending through the other end of the capsule. The ends of the reeds outside of the capsule may be electrically connected into an electric circuit to be controlled by the switch. The portions of the reeds within the capsule extend to a slightly spaced, overlapping, position. The reeds are preferably of metal, have sufficient resilience to bend into contact at their overlapping positions under a small magnetic force and to spring apart upon the termination of the magnetic force. When in contact they close the switch and when they swing apart they open the switch. The reeds are of magnetizable material, or contain magnetizable material so that when a magnet is moved to a position closely adjacent the switch, the switch will be magnetized one outer end of one reed being the north pole and the outer end of the other reed being the south pole. The overlapping portions of the reeds are therefore of opposite polarity and are attracted into contact, closing the switch. When the magnet is withdrawn, the reeds are demagnetized and spring apart, opening the switch.

It is desirable to ascertain whether the switch has actually closed when the movable magnet has moved to closing position, that is, whether the two reeds have moved to effective contact. It has been proposed or attempted to test the switch for this purpose by moving an encircling magnetized ring into position to create a neutralizing magnetic flux or field about the actuating magnet and switch thereby to neutralize the field of the actuating magnet and demagnetize the reeds and thus enable them to spring to open position. However, this neutralizing magnet has the effect upon successive neutralizations to demagnetize the actuating magnet and thereby to render it ineffective.

Our present invention provides a means whereby the magnetizing field at or about the switch may be neutralized without risk of demagnetizing the energizing magnet.

To this end we provide, closely encircling the switch, capsule, a solenoid through which may be passed an electric current in a direction to create about the switch an electromagnetic field opposed to that of the movable actuating magnet. As this solenoid does not encircle the actuating magnet it does not tend to demagnetize it but rather to strengthen it. As the field of the solenoid magnetism is localized about the capsule, it need not be as strong as a magnet spaced further from the capsule. When the current through the solenoid is interrupted or discontinued and the actuating magnet is in operative position, the switch reeds are immediately demagnetized and spring apart opening the switch.

The invention is illustrated diagrammatically in the ac-

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companying drawing, constructional elements being omitted as they are not a part of the invention.

In the embodiment of the invention illustrated in the drawing, a pair of reeds 1 and 2 of electrically conductive, magnetizable, material are sealed in a capsule 3 of non-conductive, non-magnetizable, material so that their end portions 4 and 5 project through the ends of the capsule for connection in an electric circuit. The reeds extend within the capsule in slightly spaced overlapping relation at 6. The reeds, or at least one of them, are flexible and have a high magnetic permeability and easily are demagnetizable so that they are promptly magnetized when the actuating magnet is brought near the switch and are promptly demagnetized when the magnet is withdrawn. Normally the overlapping portions of the reeds are slightly spaced and the switch is open. When the reeds are magnetized they bend into contact to close the switch.

In the normal operation of the switch when a magnet 7 is moved by a positioning element, not shown, as it is not a part of the invention, preferably in the direction of its length into proximity to the switch, as shown in the drawing, it magnetizes the reeds by induction. Thus, if the north pole of the magnet as indicated by the letter N is in proximity to the switch it induces in the reeds a magnetism indicated by the letters *n* and *s*. The overlapping ends of the reeds have opposite polarity and are thereby attracted into contact, closing the switch.

According to the invention the capsule 3 is enclosed or encircled by a solenoid 8 so that when, for testing the switch or for any other purpose, it is desired to open the switch with the magnet 7 in magnetizing position a current may be sent through the solenoid to create a magnetic field of the opposite polarity about the switch to that induced by the magnet 7, the polarity created by the solenoid being indicated by the letters *s'* and *n'*. This field induces in the reeds a polarity indicated by the letters *s''* and *n''* balancing or neutralizing the polarity induced in the reeds by the magnet 7. The reeds then become demagnetized and spring apart, opening the switch. When the current through the solenoid is terminated, the magnet 7 again magnetizes the reeds to close the switch.

The magnetization of the solenoid tends to strengthen and maintain the magnetization of the magnet 7.

Having described our invention, we claim:

1. A position indicating electric switch which comprises a capsule of non-conductive, non-magnetizable material, a pair of magnetizable electrically conductive reeds sealed in said capsule, having spaced, overlapping, portions when not magnetized and biased into contact when magnetized and having terminals outside said capsule, a movable permanent magnet having a magnetic flux sufficient to magnetize said reeds to draw said reeds into contact, said magnet being outside said capsule and movable to a position to magnetize said reeds to draw their overlapping portions into contact and movable to a position to release said reeds from contact, and a solenoid encircling said capsule and between said capsule and said movable magnet to produce, when energized, a magnetic field of a polarity and magnetic flux sufficient to neutralize the magnetic flux of said movable magnet through said reeds thereby to demagnetize said reeds, said position of said magnet wherein the reeds are in contact being such that one pole of said magnet is orientated adjacent to the terminal portion of one of said reeds with said magnet

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extending parallel to and in the direction of the outermost extremity of the terminal portion of said one reed, said position of said magnet inducing a magnetic polarity across said reeds the same as that magnetic polarity produced by said solenoid when energized, whereby said magnet, when in reed operating position, is remagnetized by said solenoid.

2. The position indicating electric switch of claim 1 in which said capsule is tubular and in which said reeds extend from opposite ends of said capsule into spaced overlapping position, and said permanent magnet is movable parallel to the longitudinal axis of said capsule.

References Cited by the Examiner

UNITED STATES PATENTS

2,907,846 10/1959 Wilhelm 200—87

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3,046,370 7/1962 Adams et al. 200—93
3,115,018 12/1963 Mobarry 200—87

OTHER REFERENCES

Kreher, German application 1,147,656, printed April 25, 1963.

Hebel, German application 1,148,329, printed May 9, 1963.

Funk et al.: Variable Mode Pushbutton Switch, IBM Technical Disclosure Bulletin, vol. 6, No. 11, April 1964, p. 40.

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