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(54) Electromagnetically controlled switching apparatus.

(57) An electromagnetically operated switch, provided with a fixed magnetic core and a spring raised armature, which is locked against undesired switching-on by mechanical shocks, the locking consisting of two movable impact plates positioned according to the direction of switching and situated between the fixed magnetic core and the armature near the magnetic field of the switch. The impact plates are arranged on the armature so as to be rotatable in opposite directions in order to deviate into a cavity of the armature in the opposite directions when the switch is energized. Moreover, the impact plates can be maintained in the locking position under spring pressure.

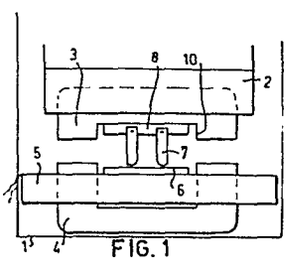

FIG. 1

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AN ELECTROMAGNETICALLY OPERATED SWITCHING APPARATUS

The invention is concerned with electromagnetically operated switching apparatus, provided with a fixed magnetic core and spring-raised armature, which is locked against undesired switching on by mechanical shocks.

A similar electromagnetic switch is required for military installations and war-ships, for example, a switching apparatus needing to be shock-resistant in all directions.

A similar switch is known from US patent specification 1 921 272, the locking member consisting of a lip which falls into the active position under the influence of gravity. Except for the fact that this switch is, as a result of this, only suitable for stationary installations and is not employable on board ships, for example, the locking member is positioned in an area of the leakage flux of the switch where the field which is active on the lip is relatively small when the switch is switched on, so that this locking may give rise to problems.

An electromagnetically operated switch according to the invention is characterized, however, in that the locking consists of two movable impact plates positioned according to the direction of switching and situated between the fixed magnetic core and the armature near

the path of the magnetic field of the switch.

The invention is characterized further in that the impact plates are arranged on the armature so as to be rotatable in opposite directions in order to deviate into a cavity of the armature in opposite directions when the switch is energized.

A further characterizing feature of the invention is that the impact plates are maintained in the locking position under spring pressure when the switch is not energized.

It will be clear that when the electromagnetic switch is switched on the impact plates are attracted by the magnetic field, which makes the way clear for the armature, so that the contacts operated by the armature can be closed.

The above-mentioned action of the apparatus according to the invention is much more positive, owing to the use of the main magnetic field on the movable impact plates, than the action of the leakage flux as in the above-mentioned known switch.

From Dutch patent application 66 09867 another locking of a smilar switch is known, in which use is made of two equal switches which are connected to each other by means of a bascule arm, as a result of which the whole is mechanically balanced. In this way, it forms a certain kind of locking against shocks. The result of this, however, is that an apparatus having a double ground surface is used and extra heat develops because the auxiliary switch remains under electric tension during the switched off position of the main switch.

The invention will be illustrated more clearly below with the aid of the drawing of an embodiment.

Figure 1 shows an electromagnetically operated switch according to the invention with impact plates in the locking position when the switch is not energized.

Figure 2 shows the switch according to the invention, the impact plates being attracted at the moment of energisation.

Figure 3 shows the switch of the invention with the impact plates in the hidden position after switching on.

Figure 4 shows the switching apparatus in a locking position of the impact plates in the case of a shock from the direction of the arrow A.

Figure 5 shows a cross-section of figure 1 where one can see a view of one of the impact plates of the invention.

The electromagnetically operated switch is provided with a housing 1 wherein a fixed magnetic core 4 is arranged, around which a coil 5 has been positioned. The movable armature 3 with a contact holder 2 is situated above the fixed magnetic core. In an electromagnetically operated switch the armature 3 moves towards the magnetic core 4 when current is fed through the coil 5. At the same time the switching contacts are closed.

If a shock were to occur when the switch is not energized, which may be the case with military installations, in particular, the armature 3 could be moved to the fixed magnetic core 4, while this is not desirable at that moment, as a result of which the contacts of the switch cause an incorrect switching on of an electric circuit.

However, provisions have been made in the switch of the invention to lock the anchor 3 in its position according to figure 1 in relation

to the fixed magnetic core 4.

One can see in figure 1 that a safety plate 8 is positioned in a cavity 10 of the armature 3. Two movable impact plates 7 are rotatably positioned on this safety plate 8 and, in the locked position of figure 1, can strike a pressure distributing plate 6, which is arranged on the fixed magnetic core 4.

When the switch is in the opened position according to figure 1, the two impact plates 7 are pressed against the safety plate 8 by springs 9 (see figure 5), so that there is a minimum of space between the fixed parts 4, 5 and 6 and the movable parts 2, 3, and 8. In the case of a mechanical shock one or both of the impact plates 7 prevent the switch from undesired moving and switching on its contacts, because the impact plates 7 are received by the pressure distributing plate 6, which distributes the pressure of the mechanical shock over a large surface.

The switch should normally be able to switch on when the currect is switched on. The two impact plates 7 are pulled outwards by the magnetic field drawn with dotted lines, in figure 2, which makes the way clear for the movable upper portion 3, after which these plates 7 are hidden in the cavity 10 of figure 3.

When the current is switched off, the impact plates 7 are pressed back into the starting position according to figure 1 by the springs 9 at the same time as the armature 3.

Should there be a mechanical shock in the case of an opened, non-energized switch, as indicated in figure 4 by an arrow A, the one impact plate 7 will be knocked outwards under its own weight, while the other impact plate 7 presses itself even more firmly into the locking position and prevents the movable parts of the

switch from moving to the fixed parts.

It will be clear from the above that each of the impact plates 7 is rotatable in a direction opposed to that of the other impact plate 7.

For the rest, each of the impact plates is rounded off at the end remote from the armature 3 in a direction opposed to the direction of movement of the impact plate 7 in question to facilitate their movement away from their cooperation with the pressure distributing plate 6. This serves to reduce any friction, while each impact plate 7 is formed at its extremity with two protruding legs, see figure 5.

Of course, the construction according to the invention can also be applied in apparatus which are electromagnetically controlled.

It should be noted that the invention is not limited to the indicated and described embodiment. Amendments are possible within the scope of the invention.

The reference figures in the claims should not have any limited action on the interpretation of the claims and are only inteded as a means of clarification.

CLAIMS:

1. An electromagnetically operated switch (1), provided with a fixed magnetic core (4, 5) and a spring raised armature (3), which is locked against undesired switching-on by mechanical shocks, characterized in that the locking consists of two movable impact plates (7) positioned according to the direction of switching and situated between the fixed magnetic core (4, 5) and the armature (3) near the path of the magnetic field of the switch.

2. A switch according to claim 1, characterized in that the impact plates (7) are arranged on the armature (3) so as to be rotatable in opposite directions in order to deviate into a cavity (10) of the armature (3) (figure 3) in opposite directions when the switch is energized.

3. A switch according to claim 2, characterized in that the impact plates (7) are maintained in the locking position (figures 1 and 5) under spring pressure (9) when the coil (5) is not energized.

4. A switch according to claim 1, 2 or 3, characterized in that a pressure distributing plate (6) is arranged on the fixed magnetic core (4, 5).

5. A switch according to one of the previous claims, characterized

in that each impact plate (7) is rounded off at the end remote from the armature (3) in a direction opposed to the direction of movement of each impact plate (7).

6. An apparatus substantially as described in the specification and/or shown in the drawing.

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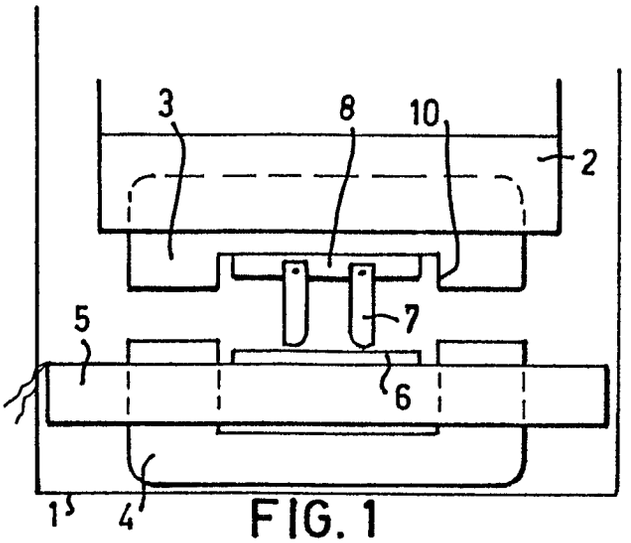

FIG. 1

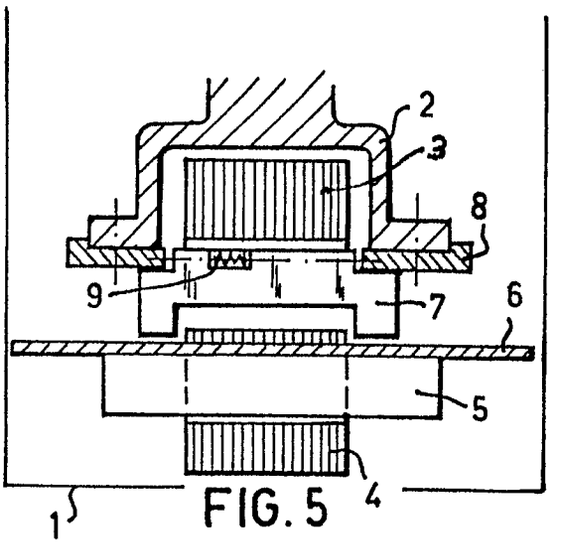

FIG. 5

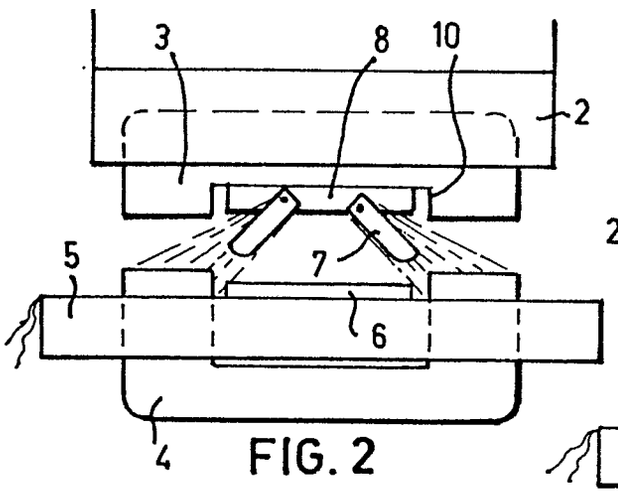

FIG. 2

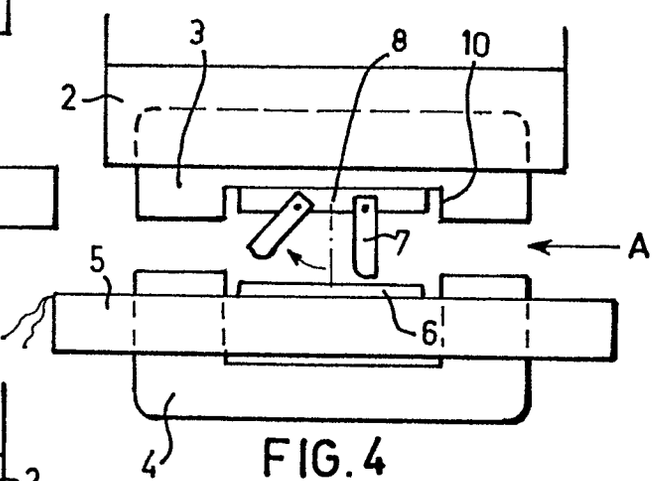

FIG. 4

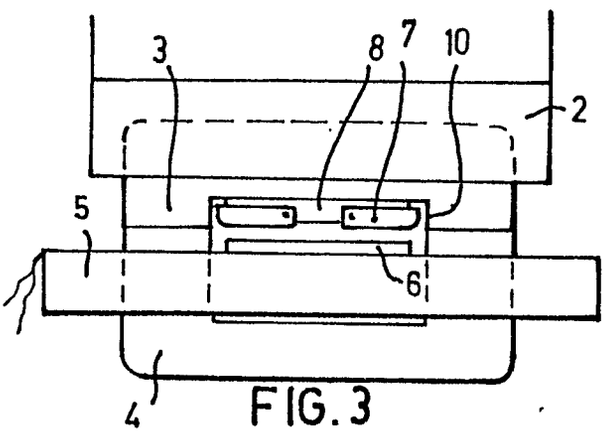

FIG. 3

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EUROPEAN SEARCH REPORT

0086906
Application number

EP 82 20 0198

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Y	GB-A- 795 369 (CRABTREE) * page 1, lines 26 to 42 *	1-3	H 01 H 50/30
Y	GB-A- 750 019 (ENGLISH ELECTRIC) * page 1, lines 33 to 54 *	1-3	
Y	US-A-2 814 691 (ESMENARD) * column 2, lines 46 to 72; column 3, lines 1 to 18 *	1-3	
Y	FR-A-1 194 362 (AFO) * page 2, left-hand column, last alinea, right-hand column, alineas 1 to 4 *	1-3	
Y	CH-A- 240 048 (SCHWEIZERISCHE WAGONS- UND AUFZÜGEFABRIK) * page 1, lines 35 to 50; page 2, lines 1 to 19 *	1-3	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) H 01 H 50/00 H 01 H 51/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17-12-1982	LIBBERECHT L.A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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