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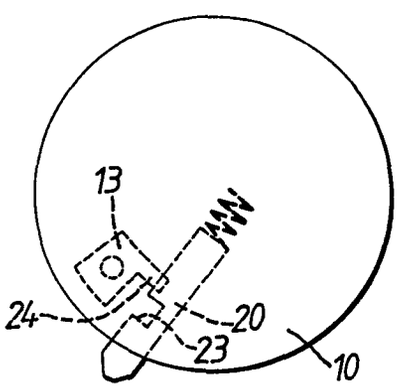
(54) Rotary electric switches.

(57) A rotary electric switch, for example an automotive ignition switch, has a rotor, a case holding the fixed contacts and an interlock mechanism. The interlock mechanism comprises a plunger and an interlock member carried by the rotor and a camform on the case which cooperates with the plunger to limit movement of the rotor relative to the case. The interlock member and plunger coact to normally retain the plunger out of contact with the camform. At a given position of the rotor the plunger is released, whereby subsequent movement of the rotor again to the given position is prevented by engagement of the plunger with the camform.



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ROTARY ELECTRIC SWITCHES

This invention relates to rotary electric switches comprising a rotor and a case carrying cooperating contacts.

An example of a rotary electric switch is an automotive ignition switch, which is frequently provided with an interlock mechanism designed to prevent damage to the starter motor. The interlock mechanism allows the rotor to be moved from the IGNITION position to the START position and to be returned to the IGNITION position. If a subsequent attempt to move the rotor again to the START position is made, the movement will be prevented by the interlock mechanism, until the rotor is first moved back from the IGNITION position to the ACCESSORY position, which resets the interlock mechanism.

An object of the invention is to provide a simple form of interlock mechanism for a rotary electric switch and, in accordance with the invention, a rotary electric switch has a rotor and a case holding the fixed contacts, and includes an interlock mechanism comprising a plunger and an interlock member carried by the rotor, and a camform on the case capable of cooperating with the plunger to limit movement of the rotor relative to the case, the interlock member coacting with the plunger normally to retain the plunger out of contact with the camform, but to release the plunger at a given position of the rotor relative to the case, whereby

subsequent movement of the rotor again to the given position is prevented by engagement of the plunger with the camform.

In the case of an automotive ignition switch, the given position is the START position of the rotor and the plunger is brought out of contact with the camform, when the rotor is moved to the ACCESSORY position, in order to reset the interlock member.

Preferably, the interlock member is operated by a second camform in the case, both the plunger and the interlock member being biased towards the respective camforms. The plunger may be movable in a direction parallel to the axis of the rotor and the interlock member movable approximately radially with respect to the rotor.

The invention will be more readily understood by way of example from the following description of an automotive ignition switch in accordance therewith, reference being made to the accompanying drawings, in which

Figures 1a and 1b show the rotor of the switch in side and plan views respectively, the interlock mechanism being in an OFF state,

Figures 2a and 2b are similar to Figures 1a and 1b, but with the interlock mechanism in the ON state,

Figure 3 is a plan view of the case of the switch, and

Figure 4 is a section on the line A-A of Figure 3.

In the Figures, the switch rotor is shown at 10 and the case at 11. The case has an upstanding wall 12 in which is

received the rotor 10.

The interlock mechanism comprises a plunger 13, which is spring biased downwardly, i.e. parallel to the rotor axis, towards a camform 14, which is shown in enlarged form in Figure 4 as being in the form of a recess 15 in the floor of the case 11, with a sharp ledge 16 and a resetting ramp 17. Ledge 16 is located approximately at the IGNITION position, and the ramp 17 is disposed closer to the ACCESSORY position.

A second plunger 20 constituting an interlock member is located in an approximately radial passage in the rotor 10 and is spring biased outwardly so as to protrude beyond the rim of the rotor and against the wall 12 of the case. A second camform 21 is located on the interior of wall 12 with a ramp 22, leading to the START position. Interlock member 20 has a side slot 23 facing towards the plunger 13.

When the rotor is in the OFF position or the ACCESSORY position, member 20 is fully extended, being in engagement with the wall 12, and an ear 24 of plunger 13 overlies member 20, which thereby retains the plunger in its upper, inoperative, position as shown in Figures 1a and 1b. The rotor can then be turned to the START position, without the plunger 13 dropping into the recess 15.

As the rotor is moved from the IGNITION position to the START position (Figure 3), the protruding end of the interlock member 20 engages the camform 21, with the

consequence that it is forced inwardly to the position shown in Figure 2b, so that the slot 23 becomes axially aligned with the ear 24. Plunger 13 is thus released and moved into engagement with the floor of the case 11. When the rotor is turned back to the IGNITION position, the plunger drops into the recess 15, thereby preventing immediate return of the rotor to the START position through the engagement of the plunger with the ledge 16.

The interlock mechanism is reset by moving the rotor back to the ACCESSORY position; the plunger 13 is forced upwardly against its bias by the ramp 17 and, at the same time, the interlock member 20 is caused to move outwardly under the ear 24, again to retain the plunger in its inoperative position. The rotor can then be moved again to the START position.

CLAIMS

1. A rotary electric switch comprising a rotor, a case holding the fixed contacts and an interlock mechanism characterised in that the interlock mechanism comprises a plunger (13) and an interlock member (20) carried by the rotor (10), and a camform (14) on the case (11) capable of cooperating with the plunger (13) to limit movement of the rotor (10) relative to the case (11), the interlock member (20) coacting with the plunger (13) normally to retain the plunger (13) out of contact with the camform (14) but to release the plunger (13) at a given position of the rotor (10) relative to the case (11), whereby subsequent movement of the rotor (10) again to the given position is prevented by engagement of the plunger (13) with the camform (14).

2. A rotary electric switch according to claim 1, characterised in that the interlock member (20) is operated by a second camform (21) in the case (11).

3. A rotary electric switch according to claim 2, characterised in that both the plunger (13) and interlock member (20) are biased towards their respective camforms (14, 21).

4. A rotary electric switch according to any one of claims 1 to 3, characterised in that the plunger (13) is movable in a direction parallel to the axis of the rotor (10).

5. A rotary electric switch according to any one of the preceding claims, characterised in that the interlock member (20) is movable approximately radially with respect to the rotor (10).

6. A rotary electric switch according to any one of the preceding claims, characterised in that the plunger (13) has an ear (24) which normally overlies the interlock member (20) to retain the plunger (13) out of contact with the camform (14) and the interlock member (20) has a slot (23) which releases the plunger (13) at a given position of the rotor (10) relative to the case (11).

7. A rotary electric switch according to any one of the preceding claims adapted for use as an automotive ignition switch, characterised in that the said given position is the START position of the rotor (10) and the plunger (13) is brought out of contact with the camform (14) when the rotor (10) is moved to the ACCESSORY position, in order to reset the interlock member (20).

8. A rotary electric switch according to claim 7, characterised in that the camform (14) comprises a recess (15) in the case (11) with a sharp ledge (16) located approximately at the IGNITION position and a resetting ramp (17) disposed closer to the ACCESSORY position.

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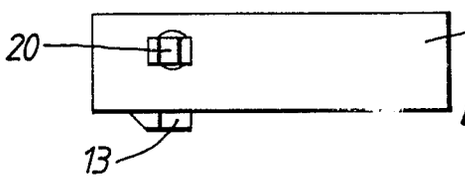

FIG.1A.

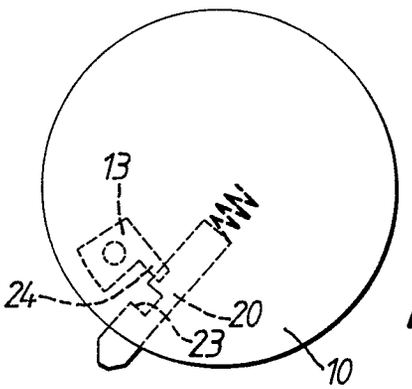

FIG.1B.

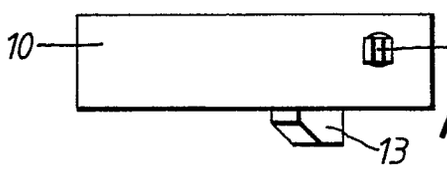

FIG.2A.

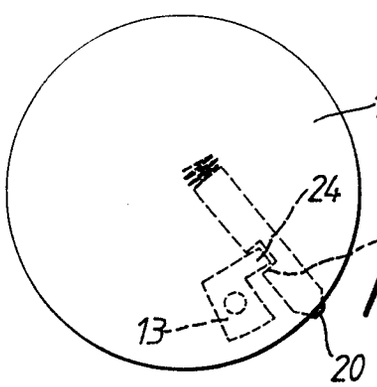

FIG.2B.

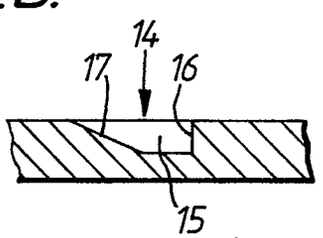

FIG.4.

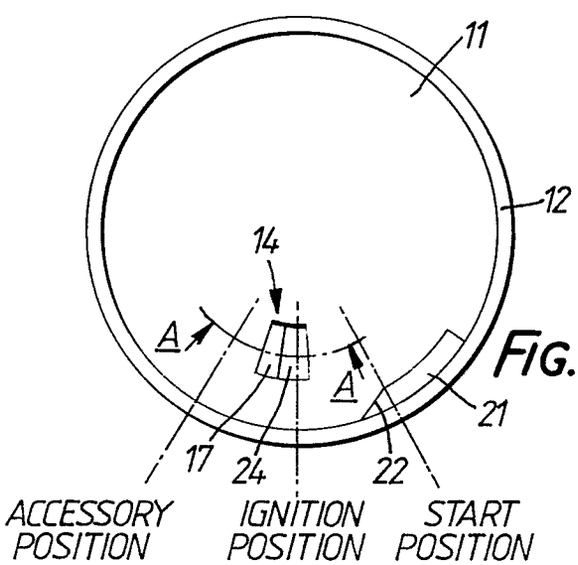

FIG.3.