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(54) **Improved actuator device for household electrical appliances, in particular cooking hobs, electric ovens, microwave ovens, combination ovens or the like.**

(57) An actuator device for a household electrical appliance, in particular a cooking hob, electric oven, gas oven, microwave oven, combination oven or the like, comprises a knob (2) cooperating with a shaft (3) operationally connected to a usual actuator (4) for operating the household electrical appliance or a member thereof, said knob (2) being positioned on a control panel (5). The knob can be moved perpendicular to the control panel (5) along the longitudinal axis of the actuator shaft (3), the knob (2) being able to be distanced from the control panel (5) and moved out of the usual position in which it enables the appliance or its said member to be operated, means (15; 33, 34; 51) being associated with the shaft (3) to enable the actuator (4) to be operated even with the knob (2) in the position distanced from the control panel (5).

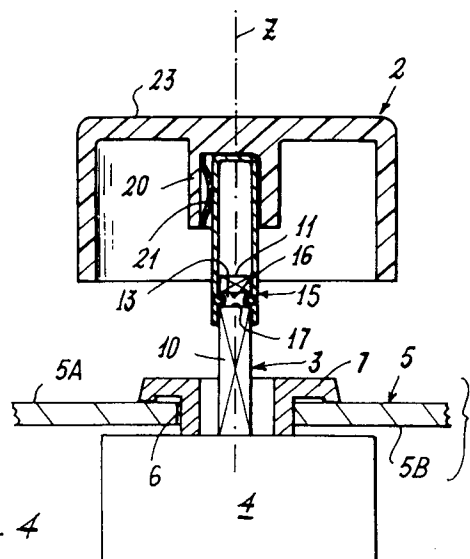


Fig. 4

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This invention relates to a device as described in the introduction to the main claim.

As is well known it is possible that during the operation of a household electrical appliance, the knob by which the user operates it may become separated from its control panel with the consequent impossibility of altering the operation of the appliance or of a part or member thereof. This can cause obvious problems. Consider for example the action of a young child who while playing removes (with relative force) a knob which operates one of the heating elements of a cooking hob of gas burner type. It is then no longer possible to adjust the burner associated with this knob, so making it impossible to turn off the gas to the burner when required.

With particular but not exclusive reference to a cooking hob or oven provided with any type of heating member, this action by the child can result in serious problems.

In addition, in a cooking hob it is often necessary to clean the hob. This is suitably achieved by removing the usual knobs present on the hob control panel from the respective actuator shafts.

After this cleaning, if the knobs are not replaced on their shafts, for example by forgetfulness, it is no longer possible to use the hob or oven.

An object of the invention is to provide a device of the stated type by which even if a knob has been removed from its usual position on the control panel, the state of operation of the household electrical appliance and in particular of a cooking hob or oven can still be adjusted.

A further object is to provide a device of the stated type which allows adequate access to the control panel, for example for its cleaning, without making it impossible to operate the actuator of the appliance and in particular the heating element of the cooking hob or the like.

A further object is to provide a device which enables the appliance and in particular a cooking hob to be used even if the knob has been removed from its usual position on the appliance control panel.

These and further objects which will be apparent to the expert of the art are attained by a device as described in the characterising part of the main claim.

The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a perspective top view of a first embodiment of the invention with the knob in a first position of use;

Figure 2 is a view similar to that of Figure 1 but with the knob in a second position of use;

Figure 3 is a section on the line 3-3 of Figure 1;

Figure 4 is a section on the line 4-4 of Figure 2; Figure 5 is a partial cross-section through a second embodiment of the invention;

Figure 6 is a section on the line 6-6 of Figure 5 with certain parts omitted for greater clarity;

Figure 7 is a cross-section through a third embodiment of the invention in a first position of use;

Figure 8 is a view similar to that of Figure 7 but with the knob in a second position of use; and

Figure 9 is a perspective view of part of the invention with the knob in the position of Figure 8.

With reference to Figures 1 to 4, a knob 2 positioned on a control panel 1 is connected to an actuator shaft 3 usually connected to an actuator 4 (for example for a solenoid valve in a gas pipe) for operating a household electrical appliance, and in particular a burner of a gas cooker hob. The knob 2 is located on the upper face 5A of the control panel 5 for the household electrical appliance concerned. This control panel comprises an aperture 6 for the passage of the shaft 3 which, as stated, connects the knob to the actuator 4, which is positioned on the lower face 5B of said control panel. A usual protection insert 7 is provided in the aperture 6.

The actuator shaft 3 comprises a body 10 (of known semicircular cross-section) with an upper free end 11 on which the knob 2 is forced. In proximity to this end the knob 3 comprises an annular recess 13 for cooperating with an elastic ring 14 supported in any known manner by a tubular cylindrical element 15 associated with the knob 2 and movable telescopically relative to the shaft 3. The ring 14 is supported internally by the element 15. Finally, the recess 13 comprises (in relation to said figures) an upper wall 16 and a lower wall 17 which connect smoothly to the rest of the body 10 of the shaft 3.

The element 15 is removably associated with the knob 2 and is partly inserted into a socket-shaped part 20 of this latter in which it is retained by a usual flat spring 21. Finally, the knob comprises a usual body 23 of known shape (cylindrical) to facilitate its gripping.

During the use of the cooking hob the ring 14 of the element 15 is withdrawn from the recess 13 in the shaft 3 (see Figure 3). As the cross-section through the element 15 and through the socket part 20 is identical to the cross-section through the shaft 3 in known manner, on rotating the knob 2 the shaft 3 rotates to operate on the actuator 4, in order for example to adjust the gas burner corresponding to this actuator to the desired flame level. When it is desired to clean the face 5A of the control panel 5, the knob 2 is moved along an axis Z perpendicular to the control panel 5 and coinciding with the longitudinal axis of the shaft 3, until

the ring 14 enters the recess 13. When this insertion takes place the movement of the knob along said axis Z ceases. The face 5A of the control panel 5 can hence also be cleaned below the knob 2. As the element 15 remains in contact with the shaft 3 and is consequently torsionally coupled to it, this latter can be moved even with the knob 2 in the position distant from the control panel 5.

To completely remove the knob from the control panel 5, for example in order to carry out maintenance on the shaft 3, the ring 14 is forced out of the recess 13 by pulling the knob 2 upwards (with reference to said figures). This however can be achieved only with a relatively large force which for example only an adult can exert. This prevents the knob being able to be removed by a young child with the obvious resultant problems related for example to the loss of the knob and the impossibility of operating the actuator 4.

The knob 2 is repositioned on the shaft 3 in its usual position of use (Figure 1) by the opposite procedure to that used for separating the two members, and hence deducible from the foregoing description. The repositioning will therefore not be further described. It should however be noted that because of the form of the walls 16 and 17 of the recess 13 the force required for removing the knob from and returning it to the shaft 3 is not excessive for an adult.

Figures 5 and 6 show a modification of the invention. In these figures, parts corresponding to those of the already described figures are indicated by the same reference numerals.

In the embodiment shown in Figures 5 and 6, in the body 23 of the knob 2 there is embedded a ferromagnetic metal piece 30 arranged to cooperate with a magnetic insert 31 provided in the actuator shaft 3. This insert projects from a sunken part 32 of the end 11 provided between two opposing projections 33 and 34 which rise from this end. The piece 30 sits in the recess 35 between these projections.

The projections 33 and 34 fit into recesses 37 and 38 provided in the bottom 39 of the knob 2 so as to torsionally couple the shaft 3 and knob 2.

When the knob 2 is withdrawn along the axis Z from the control panel 5 (for example for cleaning this latter), the knob completely separates from the shaft 3. However this latter can still be rotated about its longitudinal axis by acting on the projections 33 and 34. In this manner, even without the knob 2 the actuator 4 can be operated without any problem.

The knob can be easily fitted onto the shaft 3 again by virtue of the magnetic cooperation between the piece 30 and the magnetic insert 31.

Figures 7 to 9 show a further modification of the invention. In these figures, parts corresponding

to those already described are indicated by the same reference numerals.

In said figures, the end 11 of the shaft 3 comprises a widened portion 50 from which a diametrical crosspiece 51 rises. From this crosspiece there rises a pin 52 arranged to cooperate with the socket part 20 of the knob 2. The pin 52 is preferably of semicircular cross-section as is the recess 20A in the part 20. Torsional coupling between the parts is therefore achieved when they are in mutual cooperation.

The body 10 of the shaft 3 is preferably of ferromagnetic metal. In order to retain the knob on this latter, a magnetic annular piece 55 is associated with the part 20 of said knob.

The body 10 also comprises a recess 56 to receive the pin 57 of the actuator 4, this recess and the pin 57 being of such cross-section (for example semicircular) as to achieve torsional engagement between them.

Consequently with this embodiment the knob 2 can be removed (by pulling it along the axis Z perpendicular to the control panel 5) for cleaning the cooking hob 1. However even without the knob the shaft 3 can be operated by acting on the crosspiece 51 of the portion 50. In addition, by using a magnetic piece 55 generating a relatively large magnetic force, the knob 2 can be separated from the shaft 3 only by exerting a certain force which cannot be applied to the knob by a young child. Consequently this embodiment prevents undesired separation between said members by a child, with obvious advantages.

Various embodiments of the invention have been described. However in the light of the aforescribed embodiments other embodiments can be conceived, to be considered as falling within the scope of the present document.

Claims

1. An actuator device for a household electrical appliance, in particular a cooking hob, electric oven, gas oven, microwave oven, combination oven or the like, comprising a knob torsionally cooperating with a shaft operationally connected to a usual actuator for operating the household electrical appliance or a member thereof such as a heating element of the cooking hob or oven or the microwave generating member, said knob being positioned on a control panel provided on the appliance, characterised in that the knob (2) can be moved relative to the control panel (5) along an axis Z perpendicular to this latter and coinciding with the longitudinal axis of the actuator shaft (3), the knob (2) being able to be distanced from the control panel (5) and moved out of the usual position

in which it enables the appliance or its said member to be operated, operating means (15; 33, 34; 51) being associated with said shaft (3) to enable the actuator (4) to be operated even with the knob (2) in the position distanced from the control panel (5).

2. A device as claimed in claim 1, characterised in that the operating means are a tubular cylindrical element (15) movable telescopically along the actuator shaft (3) and associated with the knob (2), said element (15) cooperating torsionally with the actuator shaft (3), said cylindrical element (15) supporting locking means (14) arranged to cooperate with counter-means (13) associated with said shaft (3) when the knob (2) is in the position distant from the control panel (5), said cooperation still maintaining the knob torsionally associated with the actuator shaft (3).
3. A device as claimed in claim 2, characterised in that the locking means are an elastic ring (14) associated with the interior of the tubular element (15), the counter-means being a recess (13) provided in proximity to that end (11) of the actuator shaft (3) on which the knob (2) and said tubular element (15) are mounted, said recess (13) being smoothly joined to the remaining parts of the body (10) of the actuator shaft (3).
4. A device as claimed in claim 2, characterised in that the cylindrical element (15) is torsionally rigid with the knob and is inserted into a socket-shaped part (20) of this latter, said element (15) being retained in this part by an elastic element (21).
5. A device as claimed in claim 1, characterised in that the operating means for the actuator shaft (3) are opposing projections (33, 34) rising from the free end (11) of the actuator shaft (3) and arranged to cooperate with the knob (2).
6. A device as claimed in claim 5, characterised in that between the opposing projections (33, 34) of the actuator shaft (3) there is a recess (35) acting as a seat for a metal piece (30) associated with the knob (2), said piece cooperating with an insert (31) associated with the actuator shaft (3), of said piece (30) and said insert at least one being a permanent magnet and the other being ferromagnetic.
7. A device as claimed in claim 5, characterised in that the knob (2) can be removably asso-

ciated with the actuator shaft (3), said knob comprising seats (37, 38) for receiving the projections (33, 34) of said shaft (3), so as to torsionally couple this latter (3) to the knob (2).

8. A device as claimed in claim 1, characterised in that the operating means are an elongate element (51) rising from a flat widened portion (50) provided at the free end (11) of the actuator shaft (3) and arranged to cooperate with the knob (2).
9. A device as claimed in claim 8, characterised in that the elongate element (51) supports a pin (52) arranged to cooperate torsionally with a seat (20A) provided in the knob (2).
10. A device as claimed in claim 8, characterised in that the knob (2) is removably secured to the actuator shaft (3).
11. A device as claimed in claim 8, characterised in that the knob (2) supports a magnetic piece (55), the actuator shaft (3) being of ferromagnetic material.
12. A device as claimed in claim 8, characterised in that the actuator shaft (3) is torsionally rigid with a shaft (57) associated with the actuator (4) for operating the household electrical appliance.

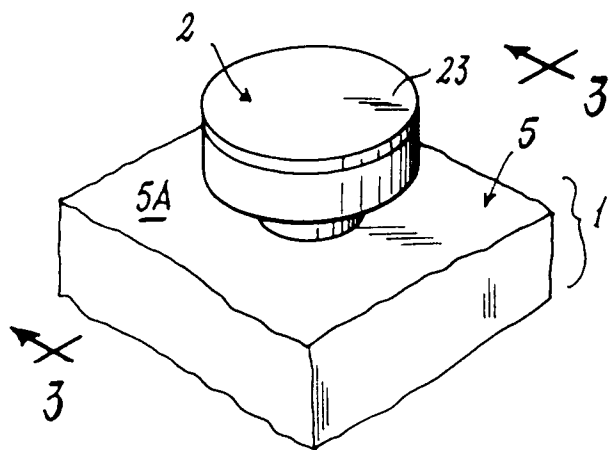


Fig. 1

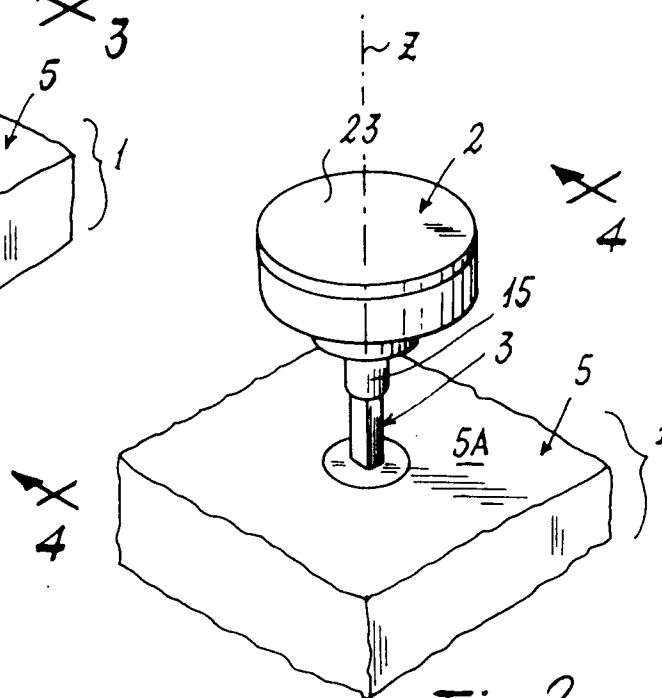


Fig. 2

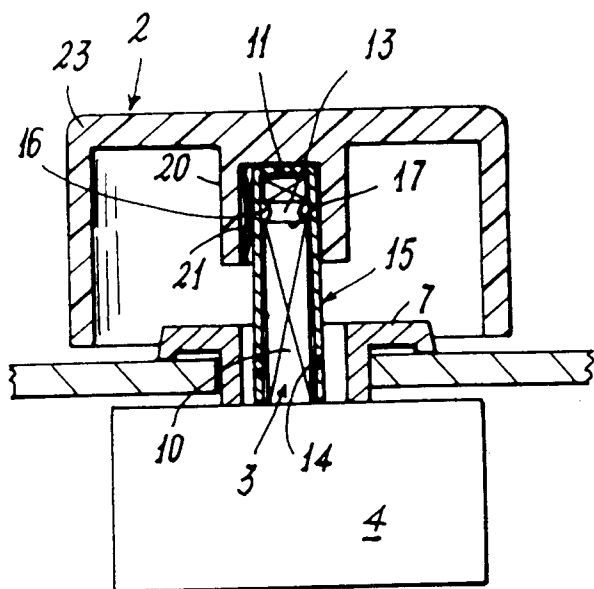
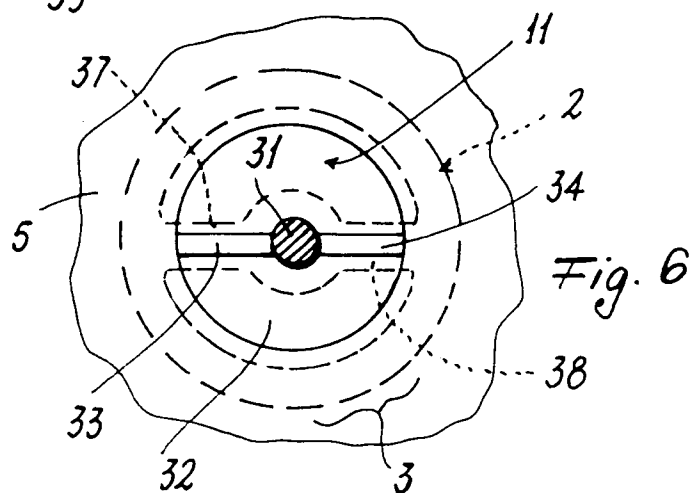
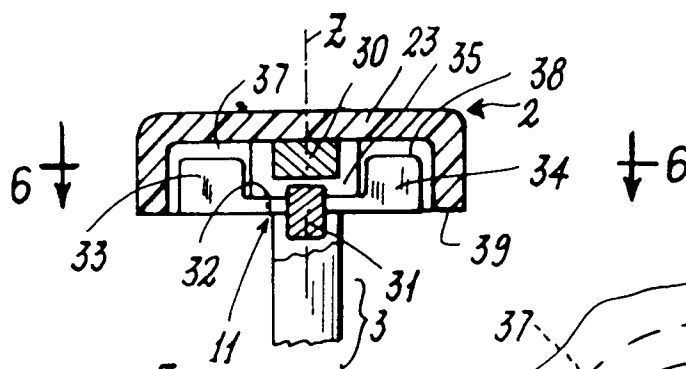
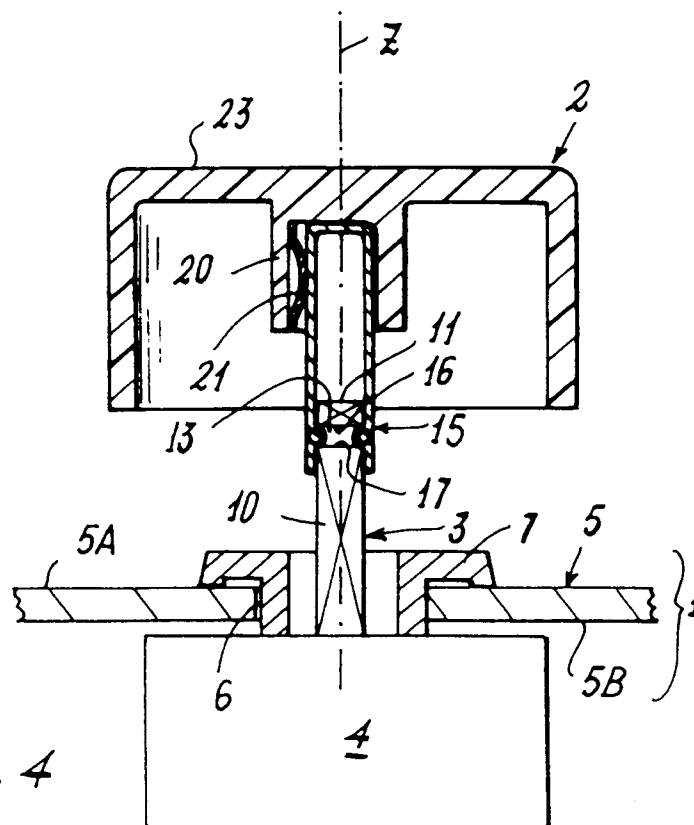


Fig. 3



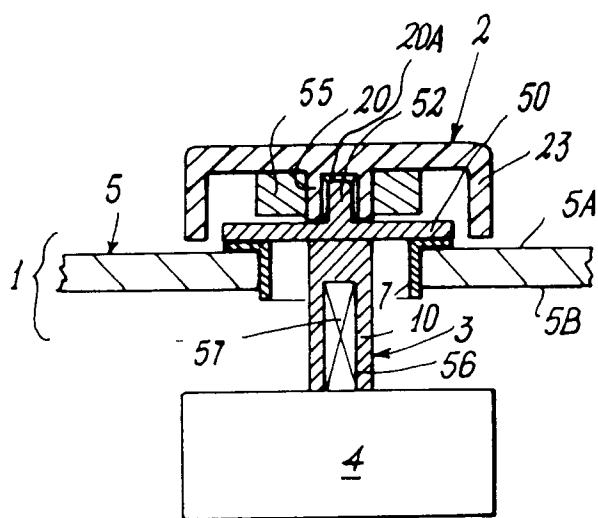


Fig. 7

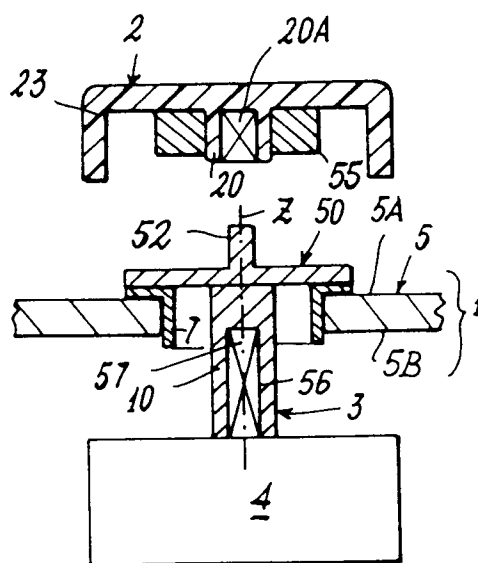


Fig. 8

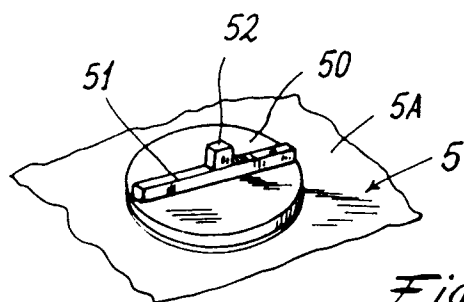


Fig. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 6703

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.5)
Y	DE-U-91 14 215 (HADOMED) * claims; figure 1 *	1,2	F24C3/12 F24C7/08 G05G1/12
A	---	5	
Y	US-A-2 850 307 (KINDL) * the whole document *	1,2	
A	---		
A	DE-A-39 11 413 (BOSCH-SIEMENS HAUSGERÄTE) * abstract *	4	
A	---		
A	US-A-2 861 467 (MUELLER) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			F24C G05G F16K H01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 1 February 1994	Examiner Vanheusden, J
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