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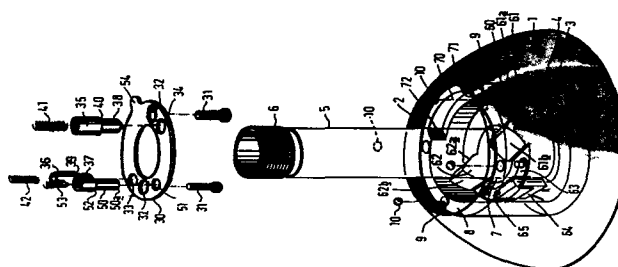
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⑤④ **Switch operating device and table lamp incorporating such device.**

⑤⑦ A table lamp incorporates a switch (64) operating device consisting of two members (4, 30), one member (1) being located in the base (1) of the lamp and the other in the stem (11). The stem (11) is mounted in the base (1) for rotational movement between first and second positions representing "on" "off" positions of the lamp switch. The member (4) located in the base (1) includes a horizontal annular portion (60) from which projects two upwardly directed triangular shaped cam surfaces (61, 62) positioned at either end of a diameter of the annulus. One end of a spring loaded plunger (65) projects through the annular portion (60) between the cam surfaces (61, 62) and the other end acts, when depressed, to close the contacts in a micro-switch (64) located in the base (1). The other member (30) located in the stem (11), includes a surface adjacent and parallel to the annular portion from which depend two spring loaded plungers (35, 36) spaced apart to co-operate with the cam surfaces (61, 62) such that rotation of the stem (11) with respect to the base (1) causes movement of the plungers (35, 36) over the cams (61, 62) from one side to the other i.e. between the first and second positions. A stop means (54, 70) is provided to restrict the degree of rotational movement. A third plunger (50) depends from the surface of the second member (30) and is positioned such that when the members are in the first position it acts to depress the

plunger (65) in the first member (4) so that the switch (64) is "on", and when the members are in the second position it is out of contact with said plunger so that the switch (64) is "off".



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TITLE:

"SWITCH OPERATING DEVICE AND TABLE LAMP
INCORPORATING SUCH DEVICE"

The present invention relates to a device for
5 operating a switch, such as a micro switch, and to a
table lamp incorporating such a switch operating device.

From one aspect the present invention provides a
switch operating device comprising first and second
members movable relatively to each other between first
10 and second positions; said first member including two
spaced apart elements projecting from a first face
thereof; each element having oppositely directed cam
surfaces meeting at the furthestest point from said
face; said second member including a second face
15 portion opposite and parallel to said first face of said
first member and two plunger members projecting from
said second face portion and spaced apart by a distance
equal to the distance between the said elements projec-
ting from the first member, said plungers operating
20 against resilient means, whereby when said members are
in said first position each plunger is in contact with
one cam surface of each said projecting element and when
said members are in said second position each plunger
is in contact with the other cam surface of each projec-
25 ting element; one of said members including first

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means operable to close contact elements in a switch to complete an electrical circuit, and the other said member including second means to operate said first means when said members are in one of said first or
5 second positions.

Preferably said first means comprises a resiliently loaded plunger projecting from one said face and arranged to close said contact elements when depressed against said resilient means and said second means comprising a third
10 element projecting from said other face and arranged to depress said plunger when the said members are in one of the first or second positions.

The first member preferably includes an annular portion and said first and second projecting elements
15 are positioned at each end of a diameter thereof, relative movement between said first and second members being effected by rotation of one of said members, whereby the plungers projecting from said second face are in contact with the opposite cam surfaces of said
20 projecting elements when viewed along a line parallel to the said diameter when the said first and second members are in one of said first or second positions.

The cam faces of said projecting means may be of any desired shape, for example they may be straight,
25 in which instance the elements will be triangular in

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shape, or they may be convex, in which instance the elements may be hemispherical in shape.

The means projecting from the face portion of said second member may be a spring loaded plunger.

5 The switch operated by the first mentioned plunger may conveniently be a micro-switch.

A stop means may be provided to restrain relative movement of said first and second members beyond said first or second position.

10 The said stop means may comprise a lug projecting from one of said first or second members and movable relatively to two fixed abutments formed on or in the other said member, whereby said lug contacts one abutment when the members are in the said first position and
15 the other abutment when the members are in the said second position.

From another aspect the invention provides a table lamp incorporating the above defined switch operating device, at least one of said members being located in
20 the base of said lamp and the other on the stem thereof, the said stem being rotatably mounted on the said base, whereby rotation of the stem in one direction moves the said members from the said first to the said second position and rotation of the stem in the opposite
25 direction moves the members from the said second to the

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said first position.

One embodiment of the present invention will now be described with reference to the accompanying drawings in which figures 1 and 2 form an exploded representation of a table lamp and switch operating device of the present

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invention, viewed from above.

A metal table lamp base 1 includes a cylindrical hollow portion 2 in which is located an annular nylon member 3 containing a second concentric annular nylon member 4 in non-rotatable engagement with each other and with base 1. Attached to base 1 is a vertical electrically conducting member 5 having a threaded top portion 6 which extends through and is concentric with annular member 4 to provide an annular gap 7 therebetween.

Annular member 3 includes a flat upper face 8 containing four hemispherical recesses 9 in which are located ball bearings 10.

Stem 11 contains an axial passageway 12 of circular cross-section and a short downwardly extending cylindrical portion 13 concentric with and having the same internal diameter as passageway 12. A shoulder 14 provides an annular face 15 at bottom of stem 11.

Upper face 16 of stem 11 includes three hemispherical recesses 17 in which are located ball bearings 18, a fourth ball bearing 19 is located on a spring 20 contained in cylindrical recess 21, the length of spring 20 being sufficient to cause ball bearing 19 to project outwardly of face 16 to a greater extent than ball bearings 18.

A lower locking member 22 contains a screw threaded passageway 23 for engagement on screw threaded portion 6 of

member 5 and an upper locking member 24 contains a concentric axial passageway, the lower portion thereof (not illustrated) being threaded for engagement with screw threaded portion 6 of member 5, and the upper portion 25, of smaller diameter, being screw threaded to receive threaded joining element 26. A conventional lamp holder 27 is internally screw threaded to engage with element 26 to affix said lamp holder to said stem.

An annular brass plate 30 is non-rotatably attached to the lower face of stem 11 by means of screws 31 which pass through holes 38 plunged through plate 30. Holes 33 and 34 are formed at opposite ends of a diameter of plate 30 and are concentric with cylindrical passageways having closed ends that are formed in the lower face of stem 11. The said cylindrical passageways are of greater diameter than holes 33 and 34 and receive plungers 35 and 36 the lower portions 37 and 38 of which are smaller in diameter than the upper portions and pass through holes 33 and 34 in plate 30. Shoulders 39 and 40 formed between the upper and lower portions of plungers 35 and 36 rest on plate 30 thus allowing only the lower portions 37 and 38 to project from plate 30. The plungers are urged outwardly by compression springs 41 and 42.

A switch operated plunger 50 is located in a cylindrical recess in the base of section 11 and projects through hole 51

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in plate 30 under the influence of compression spring 53, shoulder 52 resting on plate 30 to retain the upper portion of the plunger and spring 53 in the said recess. A lug 54 projects horizontally from plate 30 at a position diametrically opposite to plunger 50.

Nylon insert member 4 is provided with a flat horizontal face 60 from which projects two integral triangular members 61 and 62 having cam faces 61a, 61b and 62a, 62b respectively. Members 61 and 62 are located at either end of a diameter of insert 4. A flat arcuate shaped brass plate 63 is located on face 60 between cam faces 61b and 62b of members 61 and 62.

A micro-switch 64 is contained within insert member 4 and has an off/on actuating plunger 65 projecting through a hole in brass plate 63 adjacent one end thereof. The said switch is connected in an electrical circuit between the lamp holder and mains supply leads (not shown). The switch is actuated to close the said circuit when plunger 65 is depressed.

An arcuate recess 70 having vertical faces 71 and 72 is formed in insert 3 on the opposite side thereof to brass plate 63 located on member 4 and is dimensioned to receive lug 54 of plate 30.

The lamp of figures 1 and 2 in the assembled condition and with switch 64 in the off position, has stem 11 located

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on member 5 with locking rings 22 and 24 engaging threaded portion 6, ring 22 bearing down on ball bearings 18 and 19 with sufficient pressure to prevent any vertical movement of stem 11 on member 5 and locking member 24 preventing inadvertant removal of locking member 22. In this condition extending cylindrical portion 13 of stem 11 is received within the annular gap 7 between member 5 and nylon insert 4 and the annular faces 15 of stem 11 is rotatable on ball bearings 10. Plunger 35 and 36 of stem portions 37 and 38 are in contact with face 60 of member 4 and cam faces 61a and 62b of elements 61 and 62 respectively; lug 54 of plate 30 is received within recess 70 and in engagement with face 72 thereof. A switch operating plunger 37 has a lower end portion with a flat portion 50a in contact with plate 63 at the opposite end thereof to micro-switch plunger 65, contact between portion 50a of switch 37 and plate 63 being maintained under the influence of compression spring 53.

In order to move micro-switch 64 into closed position, i.e. to turn "on" the lamp, stem 11 is rotated in a clockwise direction. As the rotation starts plungers 35 and 37 are moved up cam faces 61a and 62b of elements 61 and 62 respectively, the plungers retracting in to the lower end of stem 11 against the springs 41 and 42. When the plungers move over the apex of element 61 and 62 they then move down

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cam faces 61b and 62a under the influence of spring 41 and 42 until they reach the level of face 60. During rotation of stem 11 lug 5 moves around recess 70 into engagement with face 71 and simultaneously plunger 37 moves over plate 63 and face 50a contacts and depresses micro-switch actuating plunger 65 at the same time as plungers 35 and 36 complete their movement over element 61 and 62. Further rotation of stem 11 in a clockwise direction, which would cause face 50a of plunger 37 to move out of contact with actuating plunger 65, is prevented by the aforesaid engagement of lug 5 with face 71 of recess 70. Inadvertant rotation in the opposite direction is prevented by the engagement of plungers 35 and 36 against face 61b and 62a of elements 61 and 62.

To return the switch to the "off" position, stem 11 is rotated in an anti-clockwise direction to cause plungers 35 and 36 to move up cam faces 61b and 62a against springs 41 and 42 and subsequently to move down cam faces 61a and 62b under the influence of the said springs. Undue rotation of stem 11 being prevented by engagement of lug 54 against face 72 of recess 70 as previously noted.

Springs 41 and 42 are sufficiently strong to provide a position on completion of the switch operation once plunger 35 and 36 are passed over the apex of elements 61 and 62 and also to resist inadvertant rotation in the opposite direction, thereby providing that face 50a of plunger 37 is

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positively maintained in or out of contact with micro-switch actuating plunger 65.

Micro-switch 64 may be located in recess formed in insert 4 by any suitable means, that maintains the switch in a stationary position with its actuating plunger 65 projecting through its respective hole in plate 63 when the switch is in the off position.

Micro-switch 64 may be replaced by any suitable switching means that can be actuated by a plunger projecting through lug 63.

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CLAIMS:

1. A switch operating device comprising first (4) and second members (30) movable relatively to each other between first and second positions; characterised
5 in that said first member (4) includes two spaced apart elements (61,62) projecting from a first face (60) thereof, each element having oppositely directed cam surfaces (61a, 61b, 62a, 62b) meeting at the furthest point from said face; said second member
10 (30) including a second face portion opposite and parallel to said first face (60) of said first member (4) and two plunger members (35,36) projecting from said second face portion (30) and spaced apart by a distance equal to the distance between the said
15 elements (61,62) projecting from the first said member (4), said plungers (35,36) operating against resilient means (41,42), whereby when said members (4,30) are in said first position each plunger (35,36) is in contact with one cam surface of each said projecting element
20 (61,62) and when said members (4,30) are in said second position each plunger (35,36) is in contact with the other cam surface of each projecting element (61,62); one of said members (4) including first means (65) operable to close contact elements in a switch (64) to
25 complete an electrical circuit, and the other said member (30) including second means (50) to operate said first means (65), when said members (4,30) are in one of said first or second positions.

2. A device according to claim 1 characterised in
30 that said first means (65) comprises a resiliently loaded plunger projecting from one said face (60) and arranged to close said contact elements when depressed against said resilient means and said second means (50) comprising a third element projecting from said face
35 (30) of said other member and arranged to depress said plunger (65) when the said members are in one of the first or second positions.

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3. A device according to claim 2 characterised in that said third element (50) also comprises a resiliently loaded plunger.

4. A device according to any one of claims 1 to 3 characterised in that the said first face (60) includes an annular portion and said first and second projecting elements (61,62) are positioned at each end of a diameter thereof, relative movement between said first (4) and second members (30) being effected by rotation of one of said members (30), whereby the plungers (35, 36) projecting from said second face thereof are in contact with the opposite cam surfaces of said projecting elements (61,62) when viewed along a line parallel to the said diameter when the said first and second members (4,30) are in one of said first or second positions.

5. A device according to any one of the preceding claims characterised in that the said switch (64) is a micro-switch.

6. A device according to any one of the preceding claims characterised in that there is included stop means (54 70), to restrain relative movement of said first (4) and second members (30) beyond said first or second position.

7. A device according to claim 6 characterised in that said stop means comprises a lug portion (54) projecting from one of said first or second members and movable relatively to fixed abutments (71,72) formed on or in said other member, whereby said lug (54) contacts one abutment (71,72) when the members are in the first said position and the other abutment (71,72) when the members are in the said second position.

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8. A table lamp characterised in that it includes the device of any one of claims 4 to 7, at least one of said members (4,30) being located in the base (1) of said lamp and the other on the stem (11) thereof
5 the said stem (11) being rotatably mounted on the base (1) whereby rotation of the stem (11) in one direction moves the said members (4,30) from the first to the second position and rotation of the stem (11) in the opposite direction moves the members (4-30) from the
10 second to the first position.

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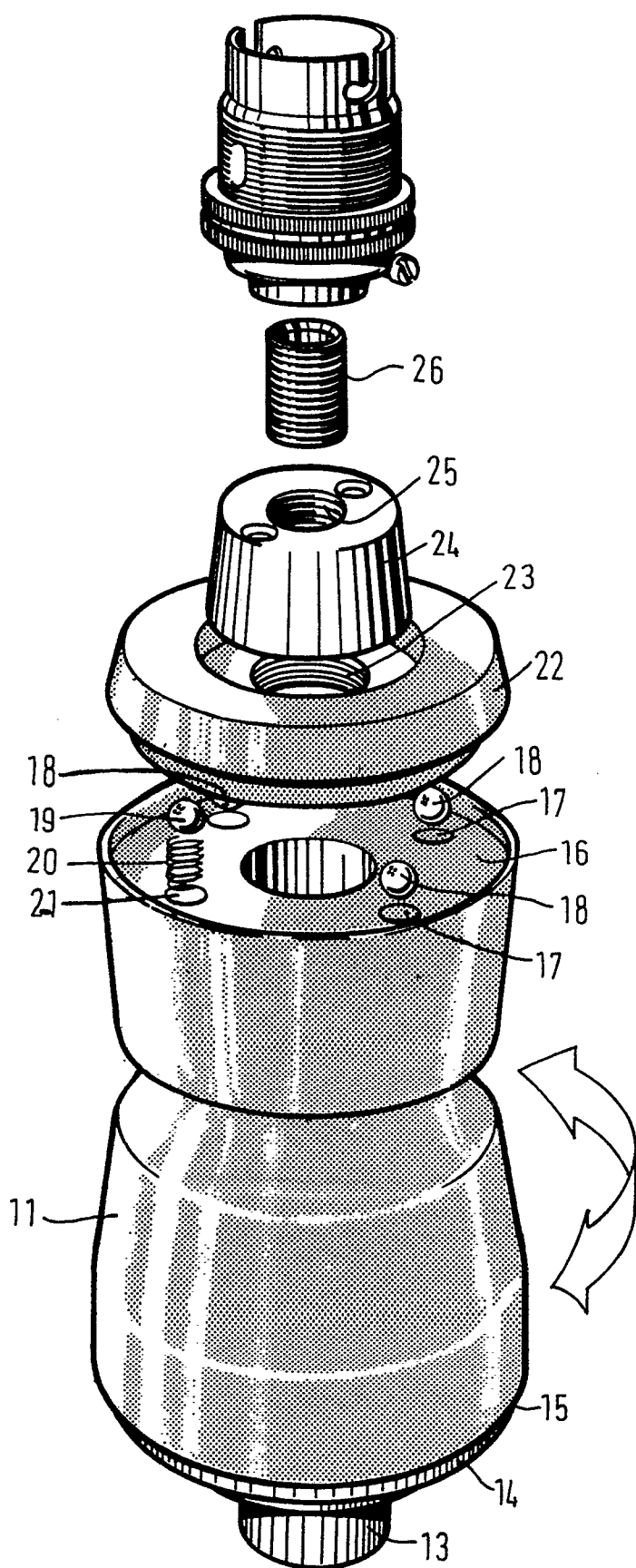
FIG. 1.

FIG. 2.

