(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 849 521 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.06.1998 Bulletin 1998/26

(51) Int. Cl.[6]: **F16L 55/00**, D06F 75/12

(21) Application number: **96830630.8**

(22) Date of filing: **18.12.1996**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV RO SI

(71) Applicant:
MICROMAX - SIMAC S.r.l.
22070 Beregazzo con Figliaro (Como) (IT)

(72) Inventor: **Tessarolo, Piero**
31100 Treviso (IT)

(74) Representative:
Petraz, Gilberto Luigi
GLP S.r.l.
Piazzale Cavedalis 6/2
33100 Udine (IT)

(54) Device for controlling the flow of steam in domestic steam using electrical appliances

(57) In domestic electrical appliances with a steam generator, a steam using component and a tube (T) for conveying the steam from the generator to the steam using component, a device (10) is provided for controlling the flow of steam having parts (13,16) that constrict the tube (T) when actuated by an external control (19). This device (10) is reliable and can be fitted without having to cut the tube (T).

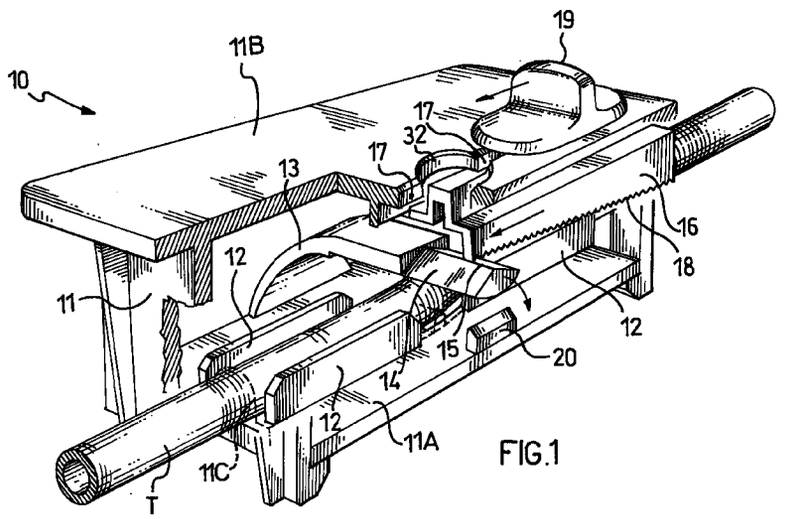

FIG.1

EP 0 849 521 A1

Description

The subject of the present invention is a device for controlling the flow of steam in domestic electrical appliances that use steam, such as steam irons, steam cleaning machines, coffee machines with separate steam dispensing outlet, and so on.

In general, steam flow is controlled in such domestic electrical appliances by means of an externally operated valve fitted to the tube connecting the steam generator to the part that uses the steam. In many cases this valve is a needle valve in which the needle moves towards or away from a steam passage hole to vary its section and thus regulate the flow. There are also, though less common, valves in the form of a step in which an action of varying the section of a passage hole takes place in a similar way to that in needle valves.

One of the drawbacks with these valves is that they can be subject to failure, especially because their internal parts are in contact with the steam.

Moreover, in order to fit the valve to the tube through which the steam is conveyed, the tube has to be cut and the valve connected up leaktightly to both ends of the tube. Clearly, the leaktight connections may deteriorate and result in dangerous leakage of steam.

The object of the present invention is to overcome these drawbacks.

This object is achieved with a device for controlling the flow of steam in domestic electrical appliances comprising a steam generator, means for using the steam, and a tube for conveying the steam from the steam generator to the steam using means, the device being characterized in that it comprises tube constricting means connected to an external control for operating the constricting means.

The invention will be understood more clearly from the following description of three non-restrictive examples of embodiments thereof, illustrated in the accompanying drawings in which:

Fig. 1 is a sectional perspective view of a device for controlling the flow of steam according to the invention;

Figs. 2 and 3 are side views showing how the device of Fig. 1 works;

Figs. 4 and 5 are transverse sections corresponding to the views shown in Figs. 2 and 3, respectively;

Figs. 6 and 7 are transverse sections corresponding to the views shown in Figs. 4 and 5, respectively, of a second control device according to the invention;

Figs. 8 and 9 are exploded perspective views showing a third control device according to the invention;

Figs. 10 and 11 are transverse sections showing how the device of Figs. 8 and 9 works; and

Fig. 12 is a perspective view of an iron with a separate boiler to which the control device of Fig. 1 is fitted.

The device of Fig. 1, indicated by the general reference 10, comprises a boxlike supporting structure 11, housed inside which is part of a tube T connecting a steam generator to a component that uses the steam in a domestic electrical appliance.

The tube T is made of elastically deformable material and is contained between side walls 12 internal to the supporting structure 11 rising from a bottom wall 11A of the structure 11 and defining an S path for the length of tube within the supporting structure 11. The supporting structure includes suitable openings 11C (only one of which is shown, in dashes) through which the tube enters and exits from this structure with interference.

Fixed inside this supporting structure 11 to the bottom wall 11A is one end of an elastic tongue 13 which projects out over the tube T, its end portion 14 being shaped in such a way as to include a longitudinal ridge 15 on its upper surface. Pressing on the tongue 13 is a slider 16 of longitudinal shape movable perpendicularly to the tongue in a straight guide 17 formed in an upper wall 11B of the supporting structure 11; in particular the slider 16 has a toothed edge 18 that presses on the ridge 15 of the portion 14 of the tongue 13; the edge 18 lies on a plane parallel to the guide 17 and is inclined with respect to the latter. Outside the supporting structure 11, on the wall 11B, a control part 19 forming part of the slider 16 is provided. On the bottom wall 11A of the structure 11, underneath the portion 14 of the tongue 13, is a stop tooth 20.

The control device 10 works as follows, with reference to Figs. 2,3,4 and 5.

The linear movement of the slider 19 along the guide 17 brings about a progressive interference of the toothed edge 18 with the ridge 15 of the portion 14 of the tongue 13, bending the tongue 13 towards the bottom wall 11A so that it progressively constricts the tube T and thus regulates the flow of steam through this tube. Obviously, moving the slider 19 in the opposite direction brings about a progressive return of the tongue 13 to its starting position and hence a progressive return of the tube T to its normal configuration, thanks to the elasticity of the tongue and of the tube. When bending towards the bottom wall 11A, the tongue 13 is stopped by the tooth 20 which thus serves as a stop motion defining a position of maximum constriction of the tube T.

In this way, by moving the control part 19, it is possible to control the flow of steam along the tube T from the steam generator to the part that uses the steam.

Because control is achieved simply by constricting the tube T, the device includes no parts in contact with the steam so that the failures associated with known valves are avoided.

Furthermore, in contrast to the prior art of known valves, there is no need to cut the tube in order to fit the device and in consequence there are no leakages of

steam.

The structural and functional simplicity of the device should also be stressed, as these confer great reliability.

The interference of the openings 11C with the tube T, and the S path of the tube defined by the walls 12, prevent sliding of the tube with respect to the supporting structure 11.

The control device illustrated in Figs. 6 and 7, bearing the general reference 30, has the same boxlike supporting structure 11 seen in the previous device 10. In this case, however, the ridge 15 of the tongue 13 is depressed not by the slider 16 but by a screw 31 that screws into a hole 32 formed in the supporting structure 11. The head 33 of the screw 31 is on the outside of the structure 11, over the wall 11B, and is in the form of a knob. Turning this head 33 in one direction causes the end of the screw 31 progressively to bend the tongue 13, which in turn progressively constricts the tube T as shown in Fig. 7, and, of course, by turning the head 33 in the opposite direction the tube T returns progressively to its normal configuration.

In this second version, therefore, control is achieved by means of a rotary movement, whereas in the first version this movement was linear.

The advantages of this second version are however the same as those seen in the case of the first version.

It should be added that it is extremely advantageous, in terms of manufacturing economy, to design a single supporting structure for both versions.

Figs. 8,9,10 and 11 show a third version, in which control is once again by means of a rotary movement.

The control device illustrated, bearing the general reference 40, comprises a cylindrical housing 41 with a rhomboidal base 42 having two opposing holes 43 (only one of which is illustrated). The housing 41 has an inclined base 44 and two U-shaped cutouts 45 on opposite sides and of different depths formed in the cylindrical wall of the housing.

Coupled to the housing 41 is a second cylindrical housing 46 having two opposing hollow columns 47 on its outside lined up with the holes 43 formed in the base 42 of the housing 41; two screws (not shown) pass through these columns 47 and holes 43 to fasten the two housings 41 and 46 together inside an apparatus that houses the device 40; the housings 41 and 46 thus form a supporting structure. The housing 46 contains two inverted U-shaped cutouts 48 of different depths superimposed on the cutouts 45 formed in the housing 41 to provide two openings on opposite sides; in particular the deeper cutout 48 is superimposed on the shallower cutout 45, while on the other hand the shallower cutout 48 is superimposed on the deeper cutout 45, so that the openings are at different heights.

Housed in the seat formed inside the housings 41 and 46 are an actuating cylinder 49 and, coupled to it, a plunger 50. In particular, the cylinder 49 is provided with two opposing slots 51 extending along a portion of helix, in which two corresponding opposing radial pins 52 on the plunger 50 can slide. The cylinder 49 is rigidly connected to an external control knob 53 through a pin 54 of asymmetric section, integral with the cylinder, which passes through a hole 55 in the housing 46 and passes into a corresponding seat 56 in the knob. The plunger 50 is arcuate on its underside, its convexity being outwards.

As shown in Figs. 10 and 11, the tube T passes with interference through the abovementioned openings staggered at different heights, formed by the superimposition of the cutouts 45 and 48, and rests on the inclined bottom 44 leading from one opening to the other. The plunger 50 is positioned with its arcuate end against the tube T.

Rotating the knob 53 in one direction rotates the cylinder 49 in the same direction and the slots 51 slide past the pins 52 in such a way that the plunger 50 is moved axially downwards, so that the rotary motion is converted into a translational motion. In this downward axial movement the plunger 50 progressively constricts the tube T, as shown in Fig. 11, so that the flow of steam through the tube is regulated. Obviously, by turning the knob 53 in the opposite direction, the plunger 50 is moved axially upwards and the tube T returns progressively to its normal configuration.

In this version there are the same advantages as already noted in the two previous versions. However, it should be pointed out that in this last version the supporting structure is different and the tube is prevented from sliding with respect to the device by the staggered heights of the openings, as described above, as well as by the interference of the openings with the tube as in the previous cases.

This last version also has the advantage that by an appropriate inclination of the slots of the cylinder, small rotations of the knob result in a relatively large stroke of the plunger, making it unnecessary to rotate the knob excessively to pass from one to the other of the two extreme control positions. The ends of the slots define these extreme control positions.

Fig. 12 shows the application of the control device 10 to a steam iron with a separate boiler. The boiler is shown at A and the iron at B. The control device 10 is incorporated in the boiler A and all that can be seen of it is the control part 19. The tube T connects the boiler A to the iron B so that the steam is carried, as is known, from the boiler to the perforated plate of the iron B, from which the steam escapes during ironing. It is this flow of steam that can be controlled by means of the control part 19, through the process of constricting the tube T as has already been seen.

The control devices described above can however be incorporated in any domestic electrical steam appliance in which control of the flow of steam along the tube is required.

Variations and/or additions to that which has been described and illustrated are of course possible.

The configuration of the various components of the

three devices seen above can of course be varied, for example in order to satisfy different applications As an example, the tongue used in the first two versions can be replaced by some other functionally equivalent presser part.

In general any form of tube constricting means connected to any external control that operates the constricting means can be used.

Claims

1. Device (10;30;40) for controlling the flow of steam in domestic electrical appliances comprising a steam generator (A), means (B) for using the steam, and a tube (T) for conveying the steam from the steam generator (A) to the steam using means (B), the device being characterized in that it comprises tube (T) constricting means (13,16;13,31;49,50) connected to an external control (19;33;53) for operating the constricting means.

2. Control device according to Claim 1, in which the tube (T) is made of elastically deformable material and in which the constricting means comprise a presser part (13;49;50) that presses on the tube (T) and is actuated mechanically.

3. Device according to Claim 2, in which the presser part is an elastic tongue (13) fixed at one end to a supporting structure (11), on which there acts a slider (16) of longitudinal shape movable along a straight guide (17) formed in the supporting structure (11) and having an edge (18) that is inclined with respect to the guide (17) and in contact with the tongue (13), the movement of which slider (16) brings about a progressive interference of its edge (18) with the tongue (13).

4. Device according to Claim 3, in which the edge (18) of the slider (16) is toothed and acts on a ridge (15) formed on the tongue (13).

5. Device according to Claim 2, in which the presser part is an elastic tongue (13) fixed at one end to a supporting structure (11), on which there acts a screw (31) that screws into a hole (32) formed in the supporting structure (11).

6. Device according to Claim 3 or 5, in which a stop tooth (20) is provided, which the tongue (13) strikes in a position of maximum constriction of the tube (T).

7. Device according to Claim 3 or 5, in which the supporting structure (11) includes openings through which the tube (T) enters and exits from the structure with interference.

8. Device according to any one of Claims 3, 5 and 7, in which the supporting structure (11) includes means (12) that define an S path for the tube (T) through the structure (11).

9. Device according to Claim 2, in which the presser part is a plunger (50) that can be moved linearly in a seat formed in a supporting structure (41,46), the external control (53) is rotary, and coupling means (49,51,52) are provided to convert the rotary motion of the control (53) into a rectilinear translational motion of the plunger (50).

10. Device according to Claim 9, in which the coupling means comprise, housed in said seat, an actuating cylinder (49) rigidly connected to the external control (53) and provided with opposing slots (51) extending along a portion of helix, in which two corresponding opposing radial pins (52) on the plunger (50) can slide.

11. Device according to Claim 9, in which the supporting structure (41,46) includes openings (45,48) through which the tube (T) enters and exits from the structure with interference.

12. Device according to Claim 9 or 11, in which the supporting structure (41,46) includes means (44) that define an inclined path for the tube (T) inside the supporting structure (41,46) with respect to the direction of movement of the plunger (50).

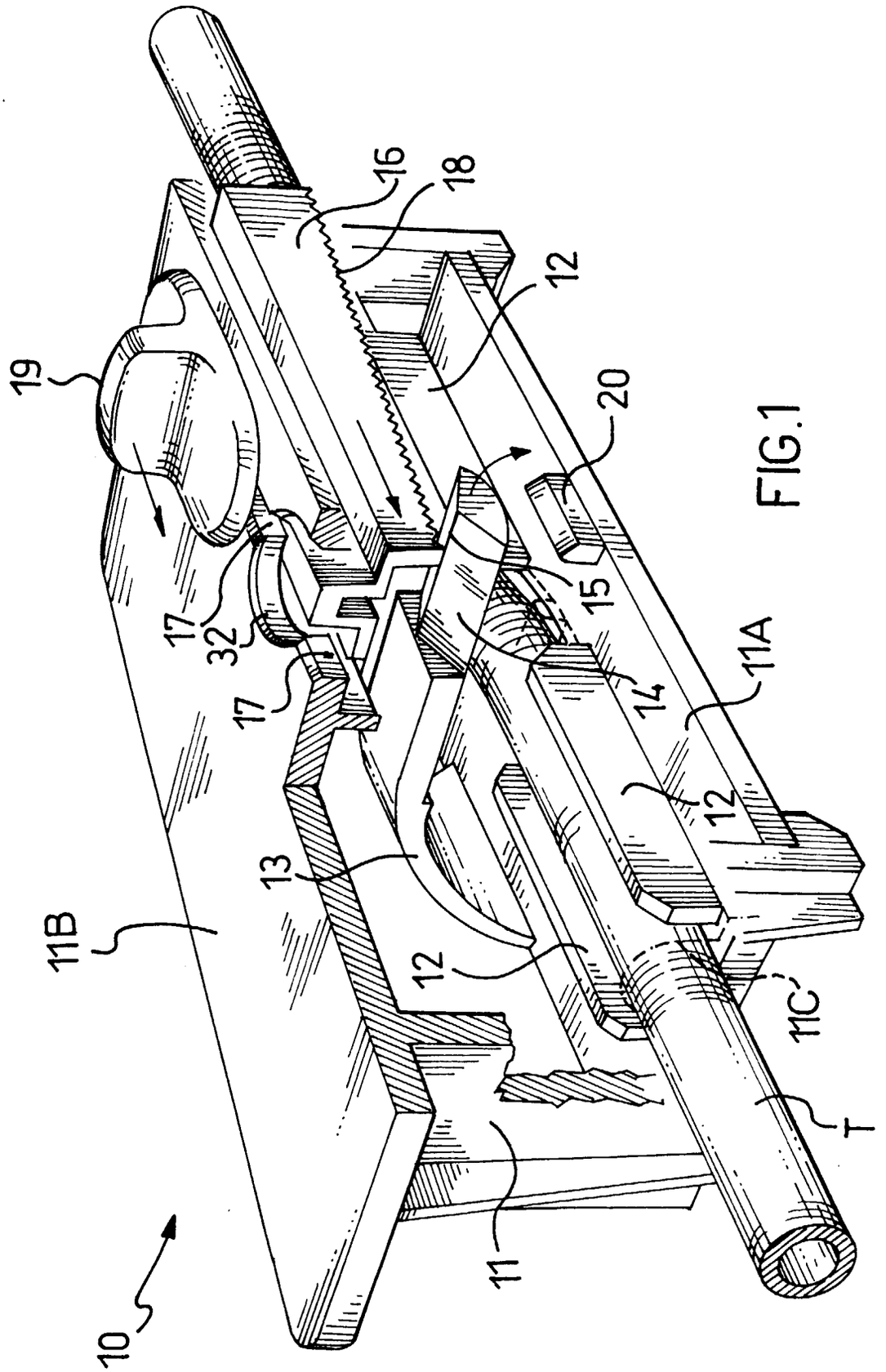

FIG.1

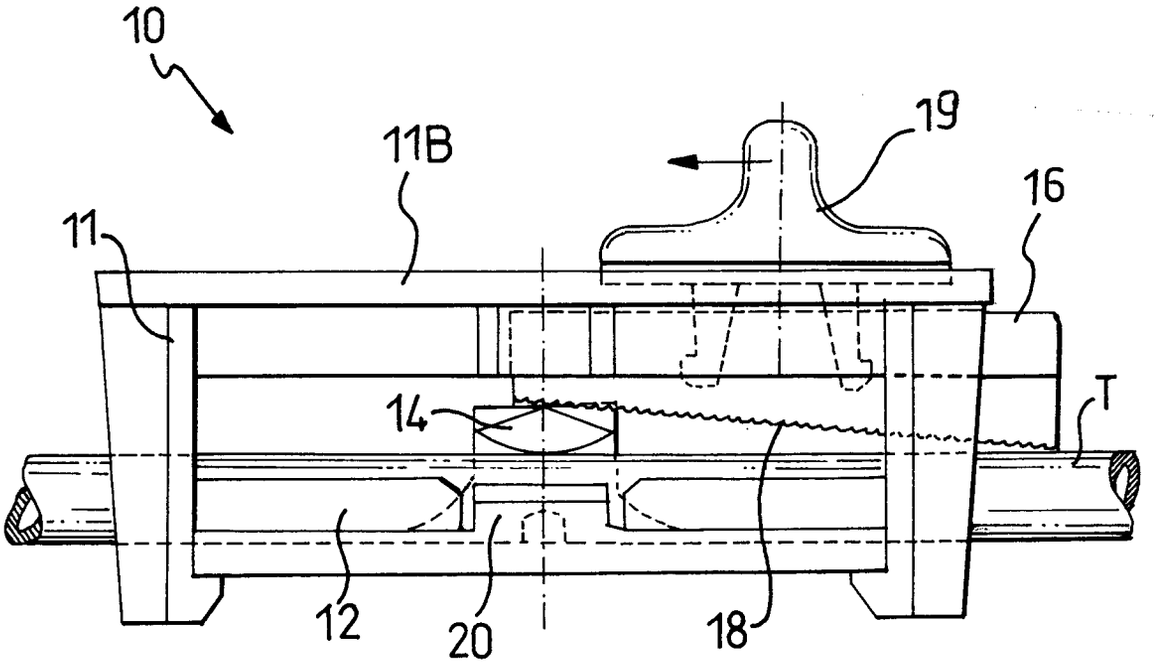

FIG.2

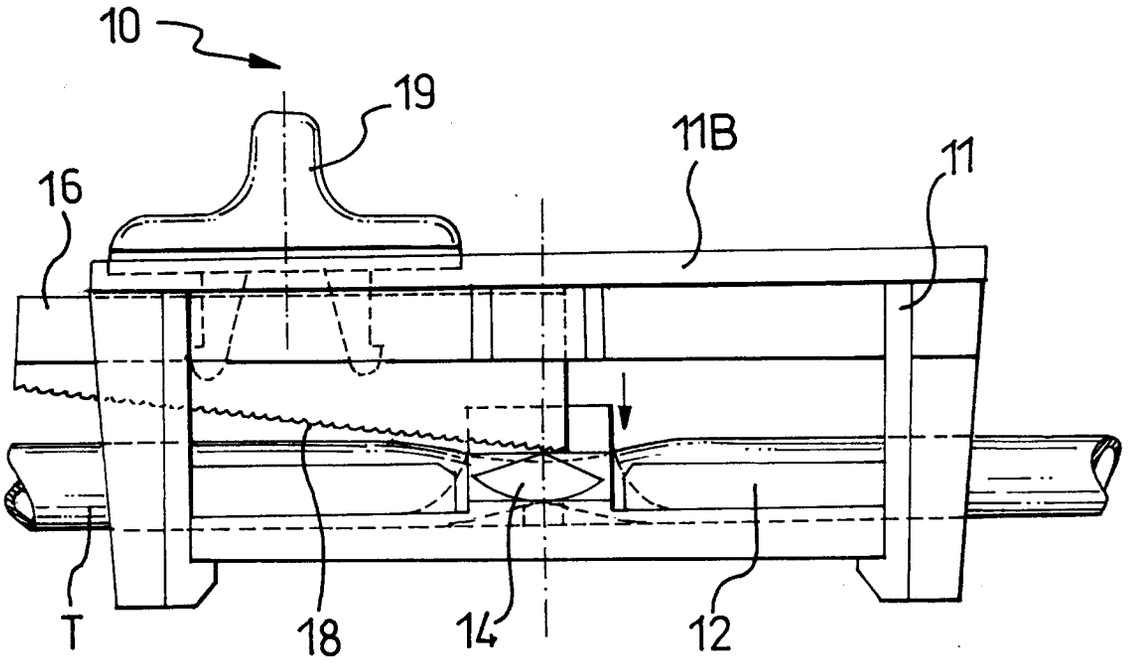

FIG.3

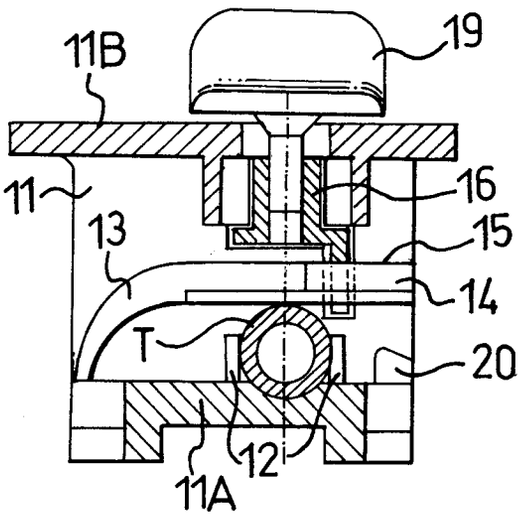

FIG.4

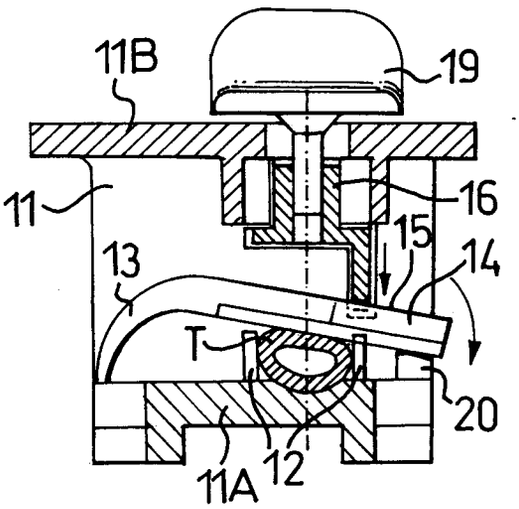

FIG.5

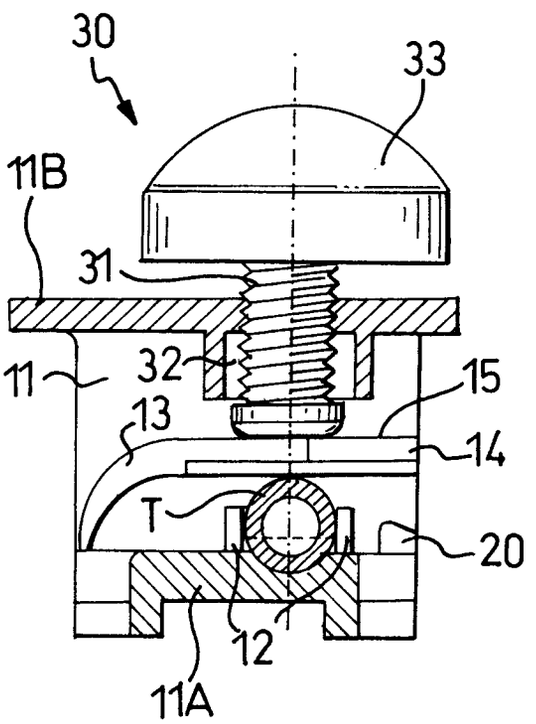

FIG.6

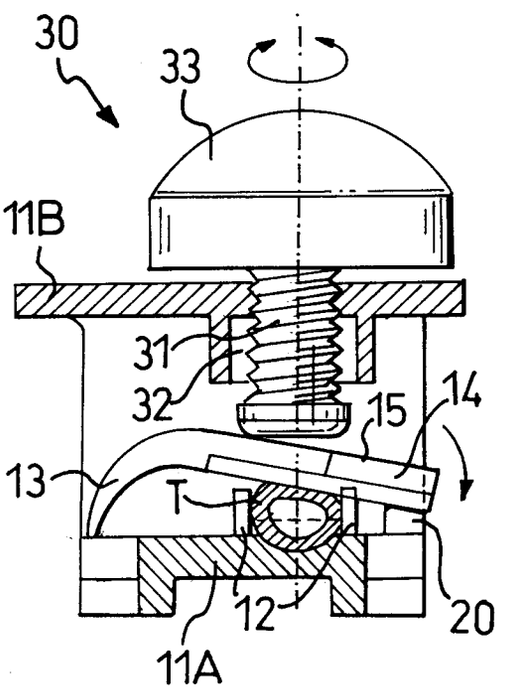

FIG.7

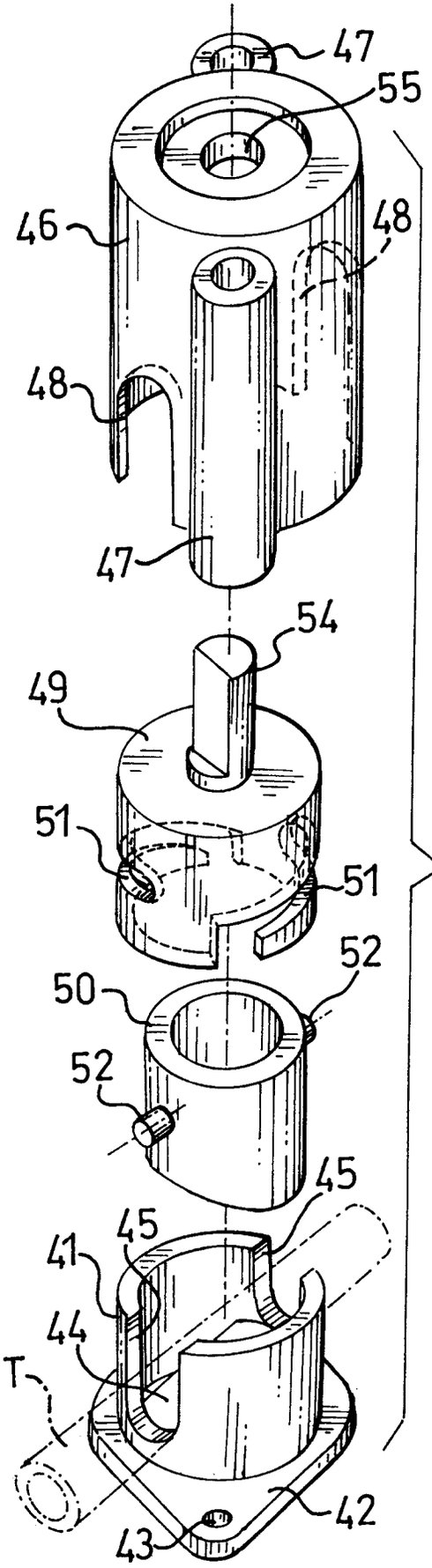
47
55
46
48
48
47
54
49
51
51
52
50
52
45
45
41
44
T
42
43

FIG.8

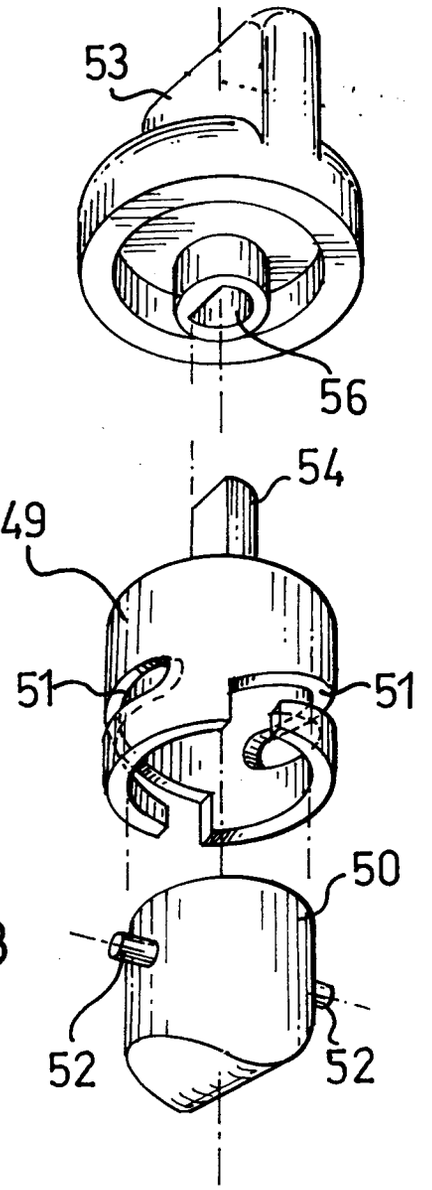
53
56
54
49
51
51
50
52
52

FIG.9

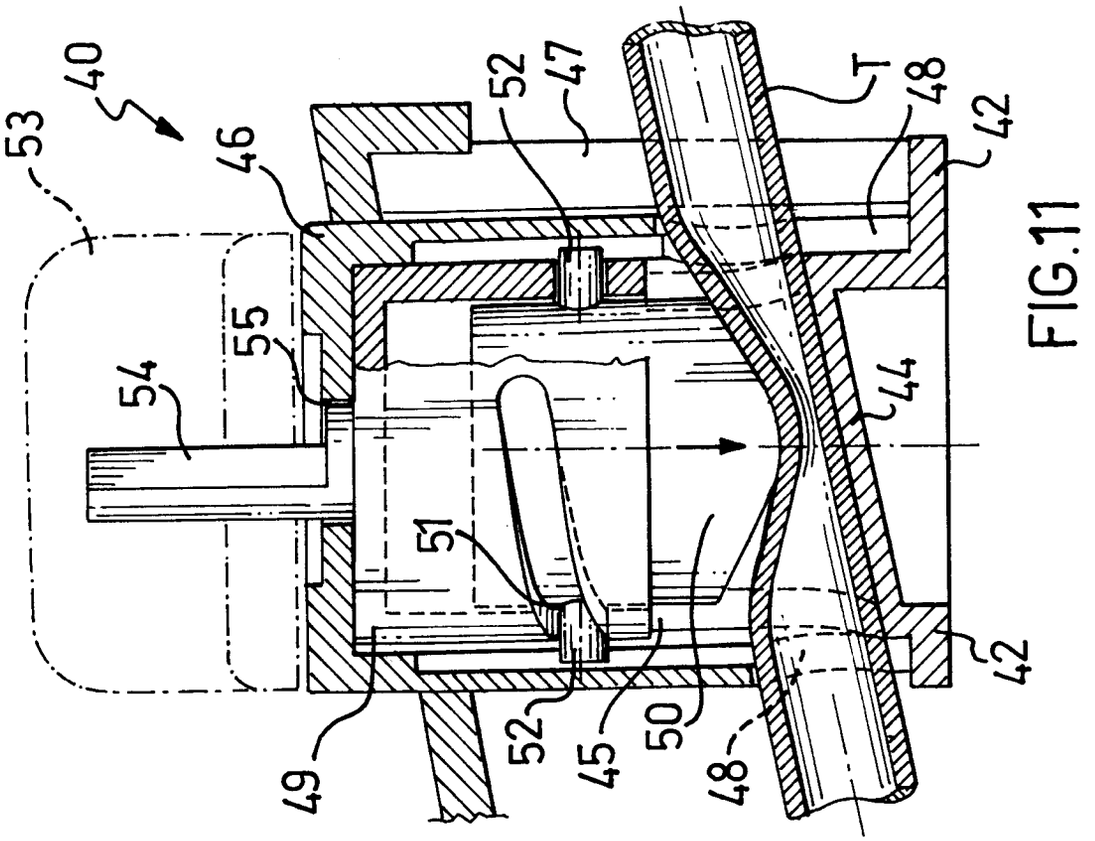
40
53
46
52
47
T
48
42
55
54
44
51
49
52
45
50
48
42

FIG.11

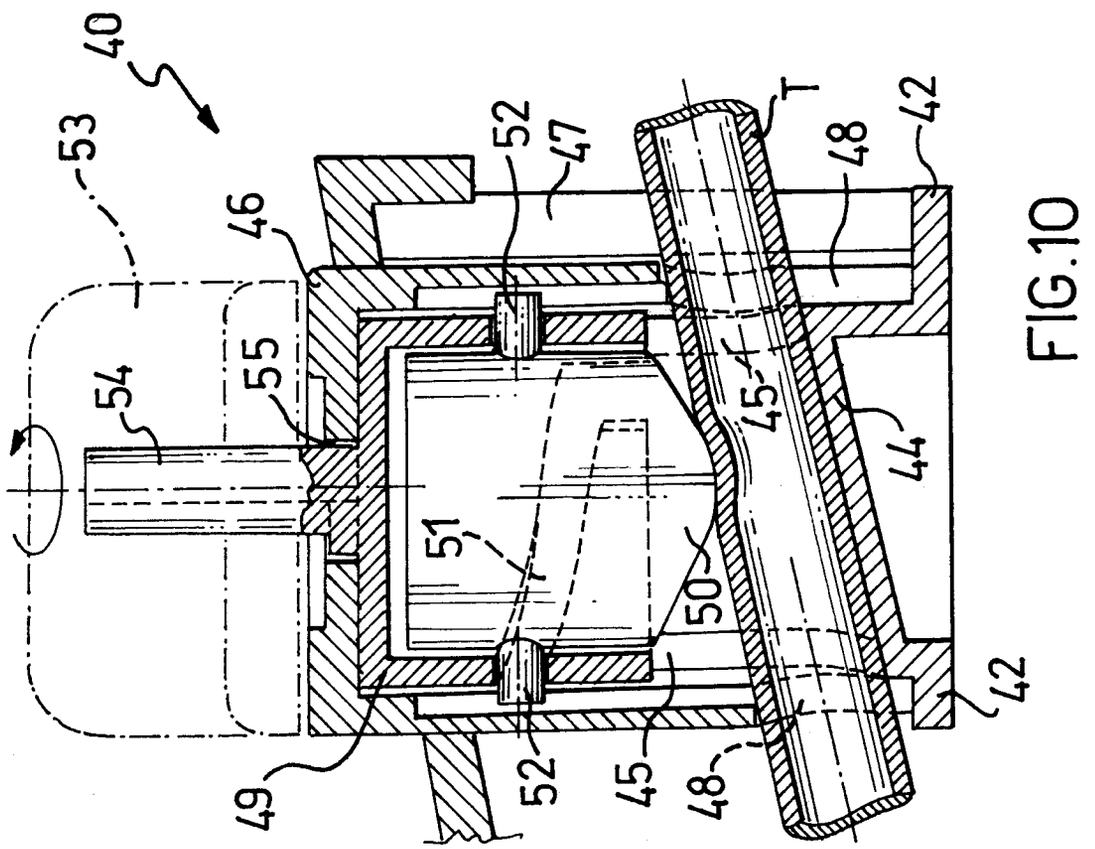
40
53
46
52
47
T
48
42
55
54
45
44
51
50
49
52
45
48
42

FIG.10

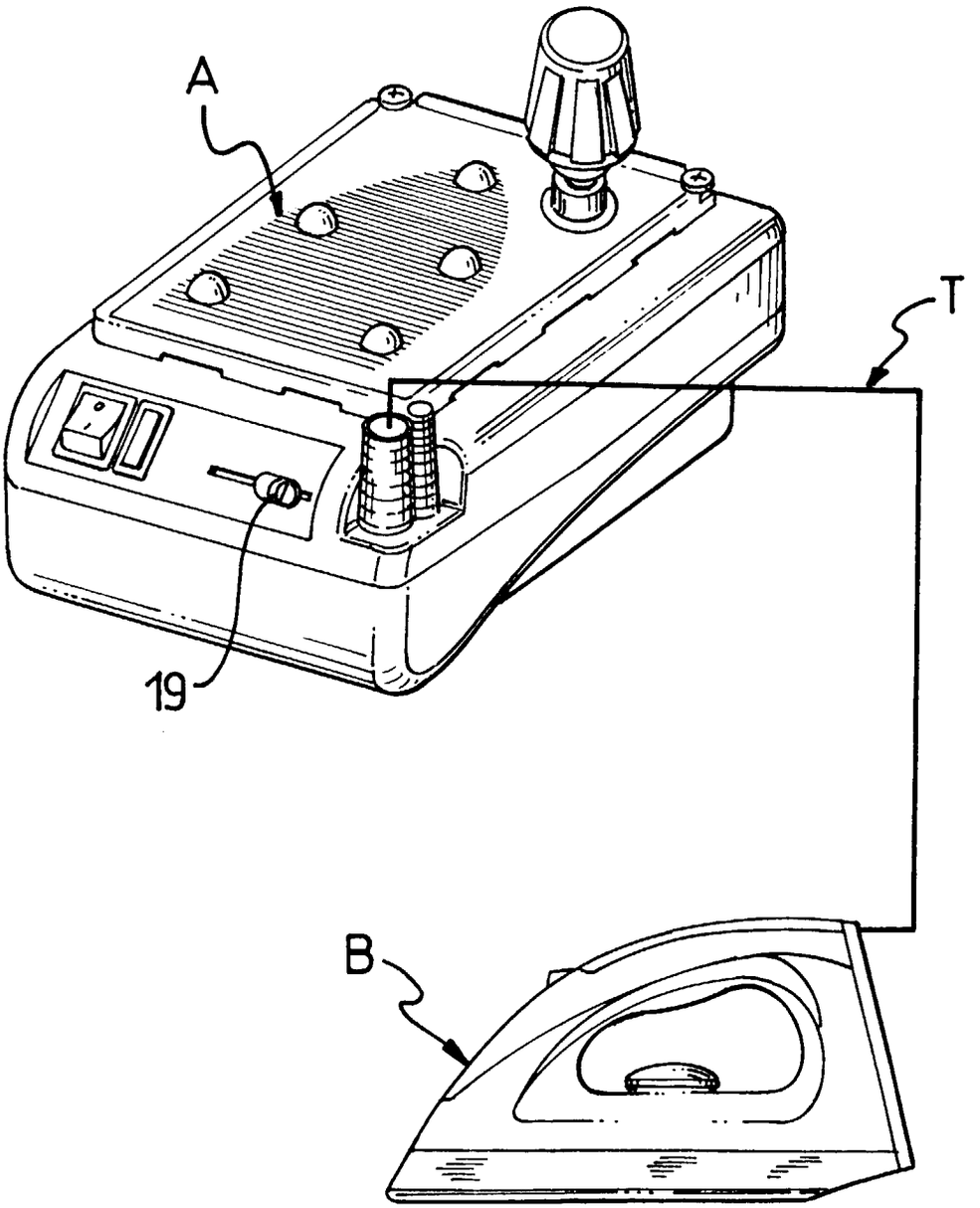

FIG.12

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0630

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.6)
X	EP 0 485 827 A (RADWULF S.A.) * column 1, line 39 - column 2, line 17; claims 2,4; figures 1,2 *	1,2	F16L55/00 D06F75/12
A		9	

X	FR 947 662 A (CALA,A.) * the whole document *	1	
A		9	

A	FR 1 343 057 A (CHILTZ,L.B.ET AL) * the whole document *	1,5	

A	FR 2 512 473 A (MAKSA,CHR.) * page 4, line 38 - page 5, line 12; claim 3; figure 1 *	1	

A	PATENT ABSTRACTS OF JAPAN vol. 17, no. 622 (C-1130), 17 November 1993 & JP 05 192498 A (MATSUSHITA ELECTRIC IND CO LTD), 3 August 1993, * abstract *	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

D06F
F22B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 May 1997	Munzer, E

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)