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

Vorrichtung zur Kontrolle der Dampfströmung in elektrischen Dampf gebrauchenden Haushaltgeräten

Dispositif pour contrôler l'écoulement de vapeur dans les appareils domestiques électriques utilisant la vapeur

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(56) References cited:
EP-A- 0 485 827
FR-A- 947 662
FR-A- 1 343 057
FR-A- 2 512 473

- **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,**

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Description

[0001] 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.

[0002] 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.

[0003] 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.

[0004] 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.

[0005] JP-A-05-192498 discloses a device for controlling the flow of stream in a domestic electrical appliance comprising a steam generator, an iron body for using the steam, and a tube for conveying the steam from the steam generator to the iron body. The device comprises means for regulating the quantity of steam which flows towards the iron body. In this device the steam regulating means comprises an electromechanical valve system which is relative expensive and also can be subject to failure, especially because their internal parts are in contact with the steam.

[0006] EP-A-0.485.827 discloses a vapour controlling device for a domestic electric appliance, i.e. a vacuum cleaner, wherein a tube of elastically deformable material and able to convey the vapour from a vapour generator to the cleaning element is normally closed by a pressure element for the action of a spring. The pressure element is part of a lever which can rotate on a fixed pin. An electrical motor and a plurality of reduction gears associated thereto are provided for causing the rotation of the lever against the action of the spring. The electric motor can be operated by the user through drive elements mounted on a handle. The lever also comprises an external element by means of which it can be manually and temporarily rotated for removing the pressure element from the tube. This device has some drawbacks: first of all the tube, wherein the vapour flows, is normally closed by the action of the spring; further, for allowing the passage of the vapour, the electric motor must be actuated or a relative high force must be manually applied to the external element of the lever, against the action of such a spring; moreover, the quantity of vapour which flows through the tube (5) is very difficult to regulate, both with the electric motor and with the manual operable element.

[0007] The object of the present invention is to overcome these drawbacks.

[0008] 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, a tube for conveying the steam from the steam generator to the steam using means, and regulating means for regulating the quantity of steam flowing to said steam using means, characterized in that the tube is made of elastically deformable material and in that the regulating means comprises a presser part able to cooperate with the tube and connected to an external actuating elementthrough mechanically operating means.

[0009] The invention will be understood more clearly from the following description of three 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.

[0010] 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.

[0011] 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.

[0012] 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.

[0013] The control device 10 works as follows, with reference to Figs. 2,3,4 and 5.

[0014] 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

[0015] 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.

[0016] 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.

[0017] 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.

[0018] The structural and functional simplicity of the device should also be stressed, as these confer great reliability.

[0019] 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.

[0020] 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.

[0021] In this second version, therefore, control is achieved by means of a rotary movement, whereas in the first version this movement was linear.

[0022] The advantages of this second version are however the same as those seen in the case of the first version.

[0023] It should be added that it is extremely advantageous, in terms of manufacturing economy, to design a single supporting structure for both versions.

[0024] Figs. 8,9,10 and 11 show a third version, in which control is once again by means of a rotary movement.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] 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.

[0029] 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.

[0030] 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.

[0031] 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.

[0032] 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.

[0033] 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.

[0034] 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.

Claims

1. Device (10, 30, 40) for controlling the flow of steam in domestic electrical appliances comprising

(a) a steam generator (A), means (B) using the steam, a tube (T) made of elastically deformable material for conveying the steam from the steam generator (A) to the steam using means (B), and
(b) regulating means for regulating the quantity of steam flowing to said steam using means (B), **characterized in that**
(c) said tube (T) is normally in an open position due to the effect of its elasticity and that
(d) said regulation means comprise a presser element (13, 50) able to cooperate with said tube (T) in order to press it and make it assume an at least partly closed position against the action of the elastic force of said deformable material and
(e) connected to an external actuating element (19, 33, 53) through mechanically operating means (16, 49) and movable between an inactive position to which said open position of said tube (T) corresponds and at least an operating position to which said at least partly closed posnion of said tube (T) corresponds.

2. Device according to Claim **1**, 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).

3. Device according to Claim **2**, in which the edge (18) of the slider (16) is toothed and acts on a ridge (15) formed on the tongue (13).

4. Device according to Claim **1**, 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).

5. Device according to Claim **2** or **4,** in which a stop tooth (20) is provided, which the tongue (13) strikes in a position of maximum constriction of the tube (T).

6. Device according to Claim 2 or 4, in which the supporting structure (11) includes openings through which the tube (T) enters and exits from the structure with interference.

7. Device according to any one of Claims 2, 3 and 6, in which the supporting structure (11) includes means (12) that define an S path for the tube (T) through the structure (11).

8. Device according to Claim 1, 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).

9. Device according to Claim 8, 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.

10. Device according to Claim 8, in which the supporting structure (41,46) includes openings (45,48) through which the tube (T) enters and exits from the structure with interference.

11. Device according to Claim 8 or 10, 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).

Patentansprüche

1. Vorrichtung (10, 20, 30) zur Steuerung des Dampfstromes in einem elektrischen Haushaltgerät, welches umfasst:

(a) einen Dampferzeuger (A), Mittel (B) zum Handhaben des Dampfes, ein Rohr (T), welches aus elastisch verformbaren Material zur Förderung des Dampfes vom Dampferzeuger (A) zu den Dampf-Handhabungsmitteln (B) hergestellt ist, und
(b) Reguliermittel zur Mengenregulierung des Dampfstromes zu den Handhabungsmittein (B),
(c) das Rohr (T) ist in der Regel auf Grund seiner elastischen Fähigkeiten in einer geöffneten Position und
(d) die Regulierungsmittel weisen einen Press-Einsatz (13, 50) auf, welcher mit dem Rohr (T) zusammenwirkt, um dieses zusammen zu pressen und um mindestens eine teilweise geschlossene Position unter Einwirkung der elastischen Kraft des verformbaren Materials einzunehmen und
(e) verbunden mittels mechanischer Betriebsmittel (16, 49) mit einem externen Betätigungselement (19, 33, 53) und bewegbar zwischen einer nicht aktiven Position, zu welcher die geöffnete Position des Rohres (T) entspricht und mindestens einer Betriebsposition, zu welcher mindestens die teilweise geschlossene Position des Rohres (T) entspricht.

2. Vorrichtung nach Anspruch 1, in welchem das Pressteil eine elastische Zunge (13) ist, welche an einem Ende mit einer Stützstruktur (11) fixiert ist, auf welche ein Schieber (16) wirkt, mit längsförmiger Ausbildung entlang einer geraden Führung (17) geführt, welche in der Stützstruktur (11) ausgebildet ist, und eine Kante (18) aufweist, welche in Bezug zur Führung (17) geneigt ist, und in Kontakt mit der Zunge (13) ist, wobei die Bewegung des Schiebers (16) eine zunehmende Presswirkung mit seiner Kante (18) auf die Zunge (13) ausübt.

3. Vorrichtung nach Anspruch 2, in welcher die Kante (18) des Schiebers (16) gezahnt ist und auf einen Kamm (15) wirkt, der an der Zunge (13) ausgebildet ist.

4. Vorrichtung nach Anspruch 1, in welcher das Pressteil eine elastische Zunge (13) ist, welche mit einem Ende an der Stützstruktur (11) fixiert ist, auf welches eine Schraube (31) wirkt, welche sich in eine Bohrung (32) schraubt, welche in der Stützstruktur (11) ausgebildet ist.

5. Vorrichtung nach den Ansprüchen 2 oder 4, in welcher ein Stopzahn (20) angeordnet ist, welcher die Zunge (13) in einer Position maximaler sattelförmiger Einschnürung der Leitung (T) begrenzt.

6. Vorrichtung nach den Ansprüche 2 oder 4, in welcher die Stützstruktur (11) Öffnungen beinhaltet, durch welche die Leitung (T) durch Presspassungen in die Struktur ein- und wieder austritt.

7. Vorrichtung nach einem der Ansprüche 2, 3 und 6, in welcher die Stützstruktur (11) Einheiten (12) beinhaltet, welche einen S-förmigen Verlauf der Leitung (T) durch die Struktur (11) definiert.

8. Vorrichtung nach Anspruch 1, in welchem das Pressteil ein Kolben (50) ist, welcher linear in einem Sitz bewegt werden kann, welcher in einer Stützstruktur (41, 46) ausgebildet ist, die externe Kontrolleinheit (53) drehbar ist, und Kupplungseinheiten (49, 51, 52) zur Verfügung stehen, um die Drehbewegung der Kontrolleinheit (53) in eine gradlinige, längsgerichtete Bewegung des Kolbens (50) umsetzt.

9. Vorrichtung nach Anspruch 8, in welcher die Kupplungseinheiten beinhalten, eingeschlossen in besagtem Sitz, einen Aktivierungszylinder (49) welcher steif mit der externen Kontrolleinheit (53) verbunden ist und mit sich gegenüberliegenden Schlitzen (51) ausgebildet ist, welche sich entlang eines Abschnitts einer Helix erstrecken, in welcher zwei korrespondierende, sich radial gegenüberliegende Stifte (52), welche an dem Kolben (50) ausgebildet sind, gleiten können.

10. Vorrichtung nach Anspruch 8, in welcher die Stützstruktur (41, 46) Öffnungen (45, 48) beinhaltet,

durch welche die Leitung (T) durch Presspassungen in die Struktur ein- und wieder austritt.

11. Vorrichtung nach den Ansprüchen 8 oder 10, in welcher die Stützstruktur (41, 46) Einheiten (44) beinhaltet, die einen geneigten Verlauf für die Leitung (T) innerhalb der Stützstruktur (41, 46) in Bezug der Richtung der Bewegung des Kolbens (50) definieren.

Revendications

1. Dispositif (10, 30, 40) pour commander l'écoulement de vapeur dans des appareils domestiques électriques comprenant :

(a) un générateur de vapeur (A), un moyen (B) utilisant la vapeur, un tuyau (T) fait d'un matériau déformable élastiquement, pour transporter la vapeur depuis le générateur de vapeur (A) au moyen (B) utilisant la vapeur, et
(b) un moyen de régulation pour réguler la quantité de vapeur s'écoulant vers le ledit moyen (B) utilisant la vapeur,
caractérisé en ce que
(c) ledit tuyau (T) est normalement dans une position ouverte du fait de l'effet de son élasticité, et **en ce que**
(d) ledit moyen de régulation comprend un élément de pression (13,50) apte à coopérer avec ledit tuyau (T) de manière à le comprimer et à lui faire adopter une position au moins partiellement fermée à l'encontre de l'action de l'effort élastique dudit matériau déformable et
(e) connecté à un élément d'actionnement externe (16, 49) par l'intermédiaire d'un moyen d'actionnement mécanique (16, 49) et déplaçable entre une position inactive à laquelle correspond ladite position ouverte du dit tuyau (T) et au moins une position de fonctionnement à laquelle correspond ladite position au moins partiellement fermée dudit tuyau (T).

2. Dispositif selon la revendication 1, dans lequel la partie de pression est une languette élastique (13) fixée à une première extrémité à une structure de support (11) sur laquelle agit un curseur (16) d'une forme longitudinale déplaçable le long d'un guide rectiligne (17) formé dans la structure de support (11) et ayant un bord (18) qui est incliné par rapport au guide (17) et en contact avec la languette (13), le déplacement du curseur (16) entraînant une interférence progressive de son bord (18) avec la languette (13).

3. Dispositif selon la revendication 2, dans lequel le bord (18) du curseur (16) est denté et agit sur une nervure (15) formée sur la languette (13).

4. Dispositif selon la revendication 1, dans lequel la partie de pression est une languette élastique (13) fixée à une première extrémité à une structure de support (11) sur laquelle agit une vis (31) qui se visse dans un trou (32) ménagé dans la structure de support (11).

5. Dispositif selon la revendication 2 ou 4, dans lequel une dent d'arrêt (20) est prévue, que la languette (13) heurte dans une position d'étranglement maximal du tuyau (T).

6. Dispositif selon la revendication 2 ou 4, dans lequel la structure de support (11) inclut des ouvertures à travers lesquelles le tuyau (T) entre et sort de la structure avec interférence.

7. Dispositif selon l'une quelconque des revendications 2, 3 et 6, dans lequel la structure de support (11) inclut un moyen (12) qui définit un trajet en S pour le tuyau (T) à travers la structure (11).

8. Dispositif selon la revendication 1, dans lequel la partie de pression est un piston (50) qui peut être déplacé linéairement dans un siège formé dans une structure de support (4, 46), la commande externe (53) est rotative et des moyens de couplage (49, 51, 52) sont prévus pour convertir le mouvement rotatif de la commande (53) en un mouvement de translation rectiligne du piston (50).

9. Dispositif selon la revendication 8, dans lequel les moyens de couplage comprennent, reçus dans ledit siège, un cylindre d'actionnement (49) connecté de manière rigide à la commande externe (53) et prévu avec des fentes opposées (51) s'étendant le long d'une partie d'une hélice, dans lequel deux broches radiales opposées correspondantes (52) sur le piston (50) peuvent coulisser.

10. Dispositif selon la revendication 8, dans lequel la structure de support (41, 46) inclut des ouvertures (45, 48) à travers lesquelles le tuyau (T) entre et sort de la structure avec interférence.

11. Dispositif selon la revendication 8 ou 10, dans lequel la structure de support (41, 46) inclut des moyens (44) qui définissent un trajet incliné pour le tuyau (T) à l'intérieur de la structure de support (41, 46) par rapport à la direction de déplacement du piston (50).

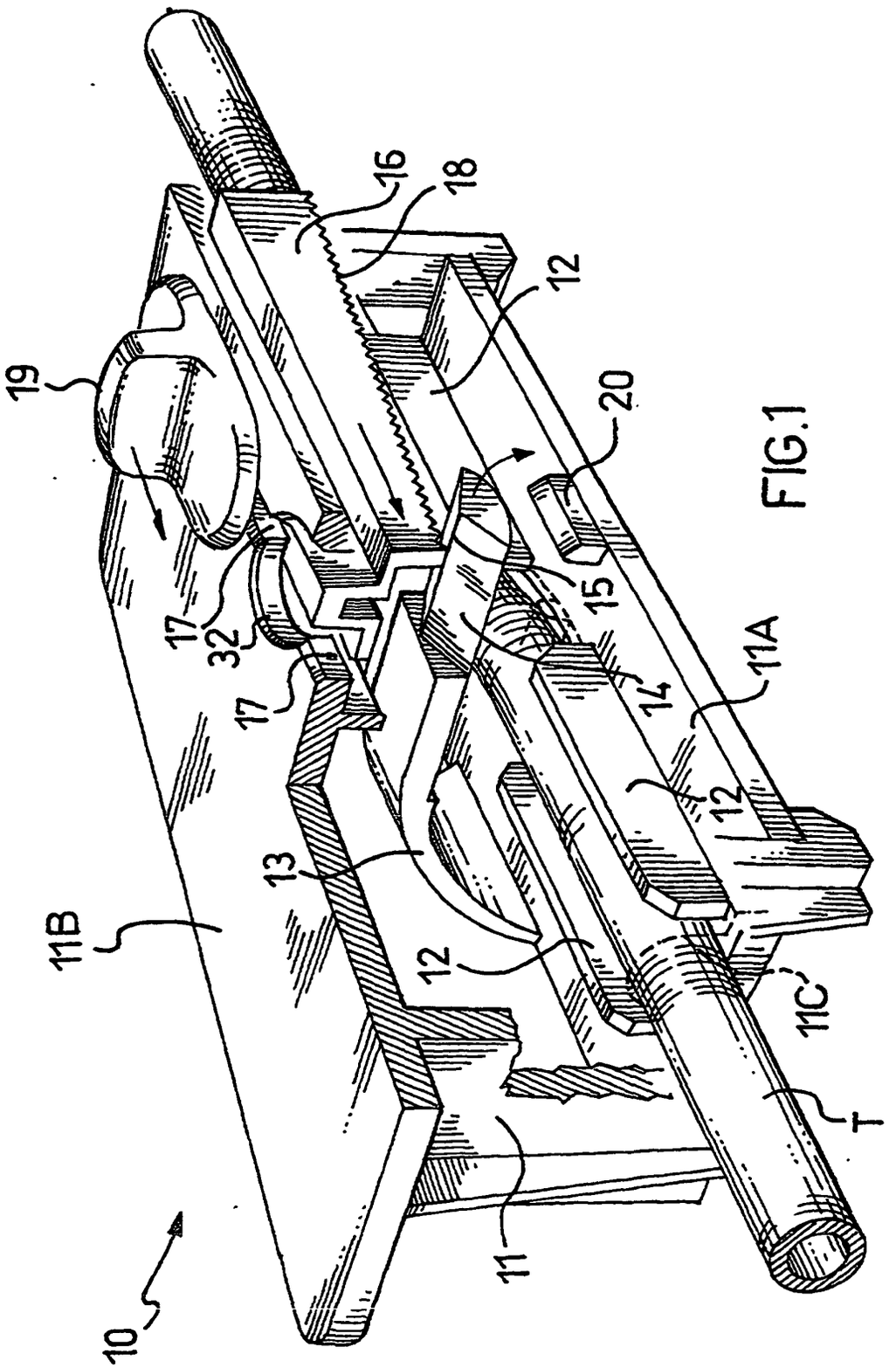


FIG.1

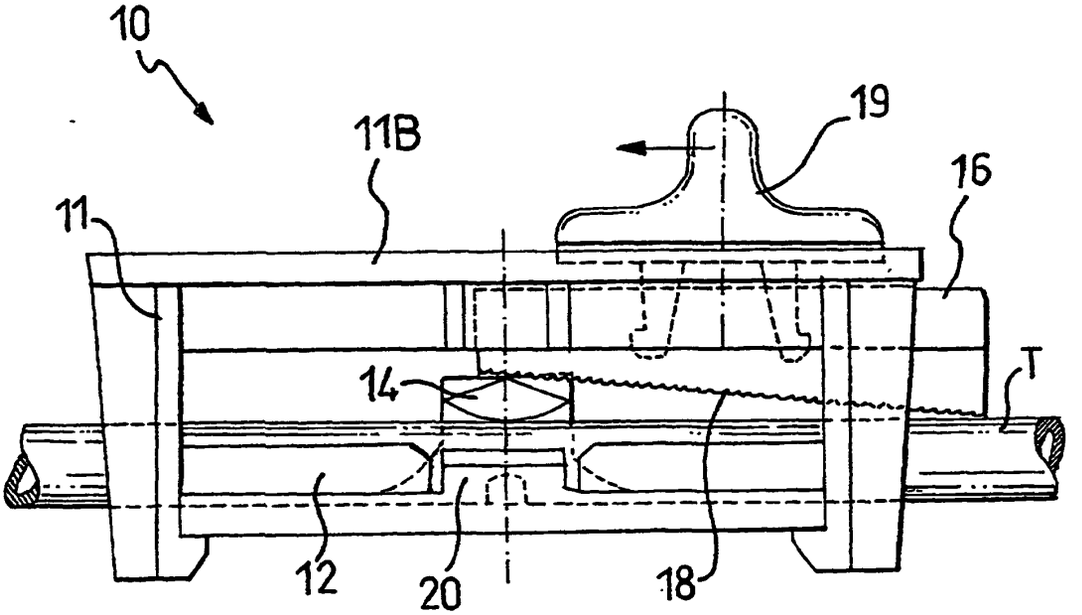


FIG.2

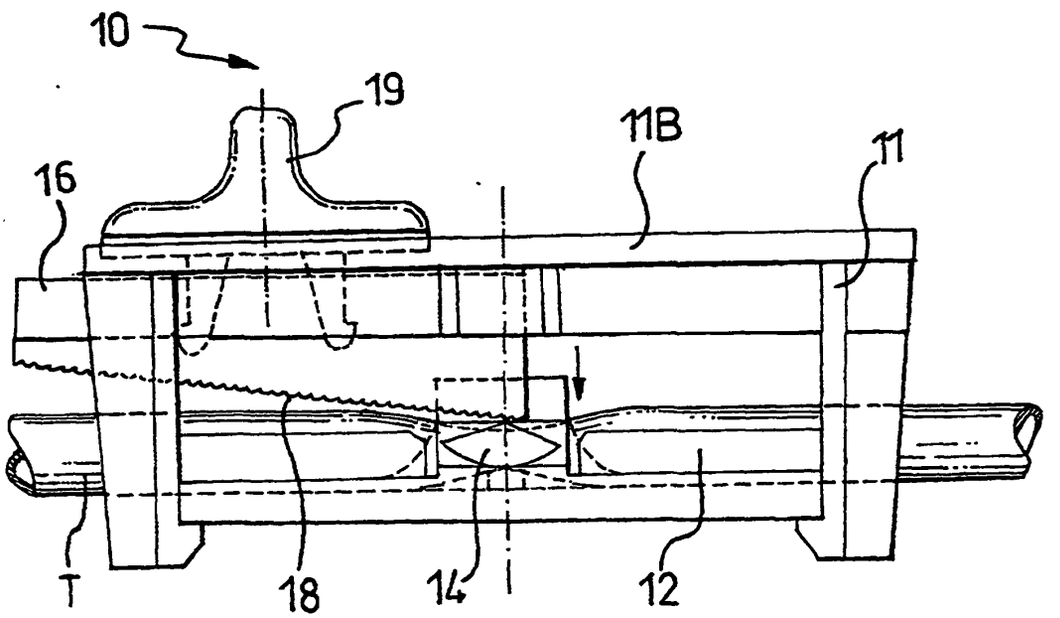


FIG.3

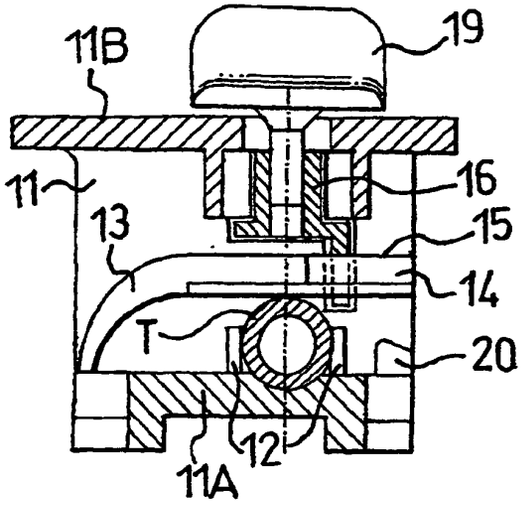


FIG.4

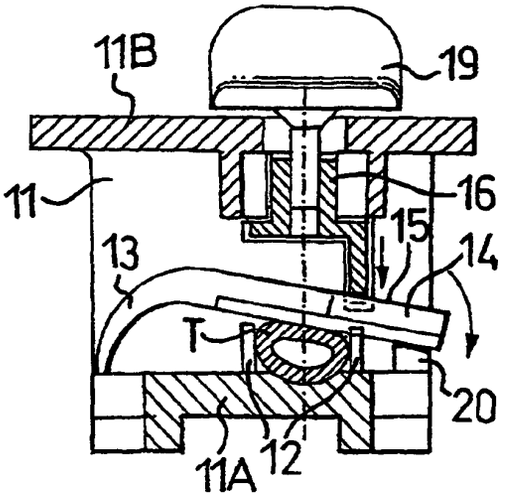


FIG.5

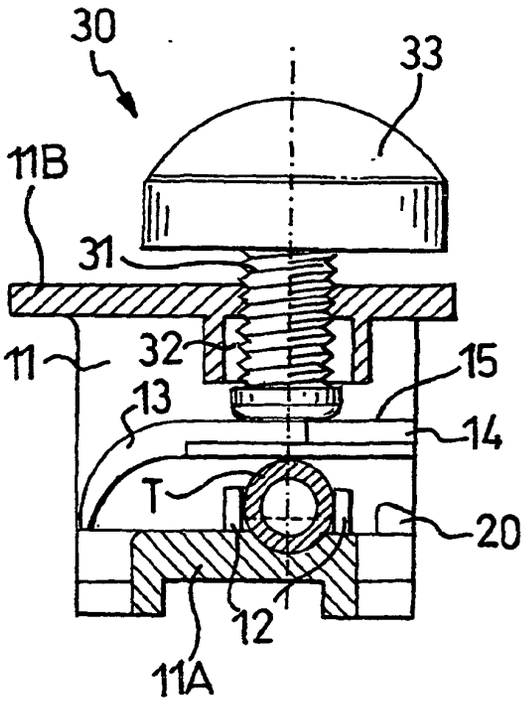


FIG.6

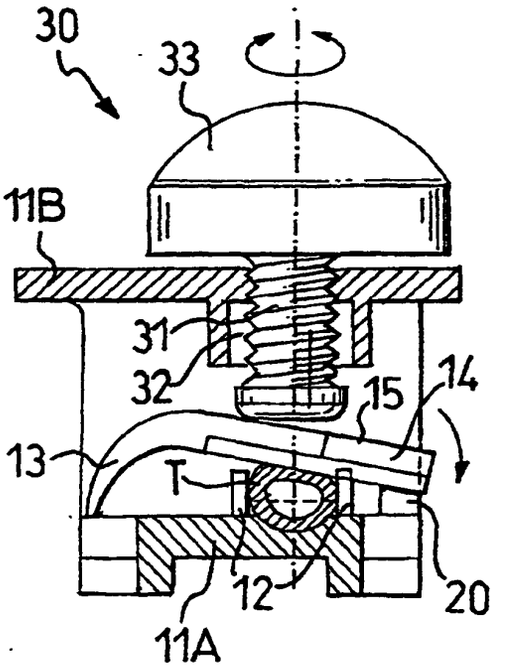


FIG.7

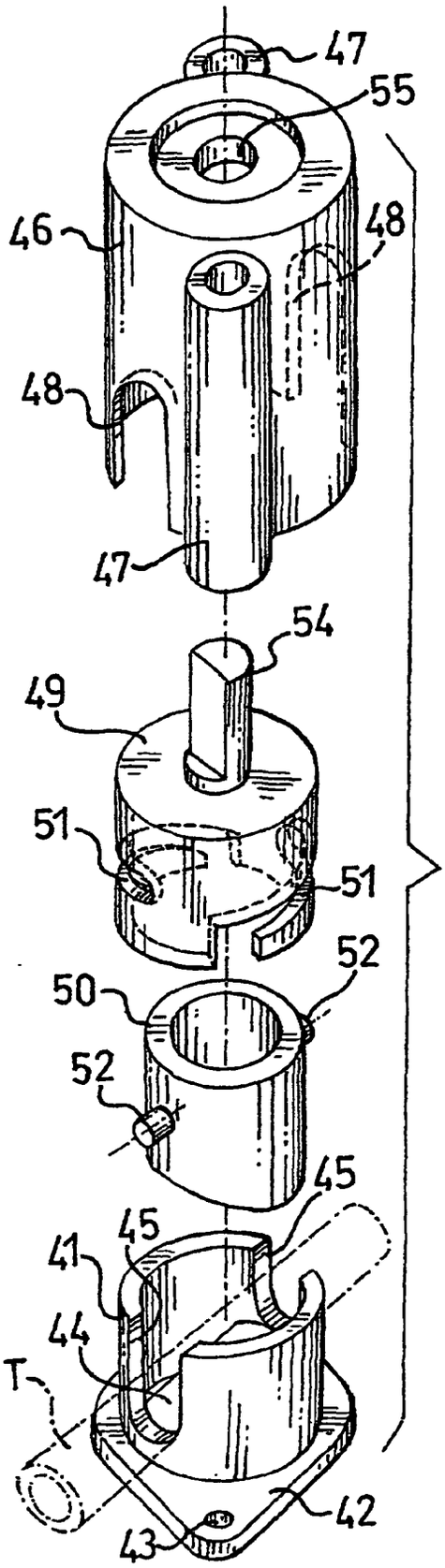

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FIG.8

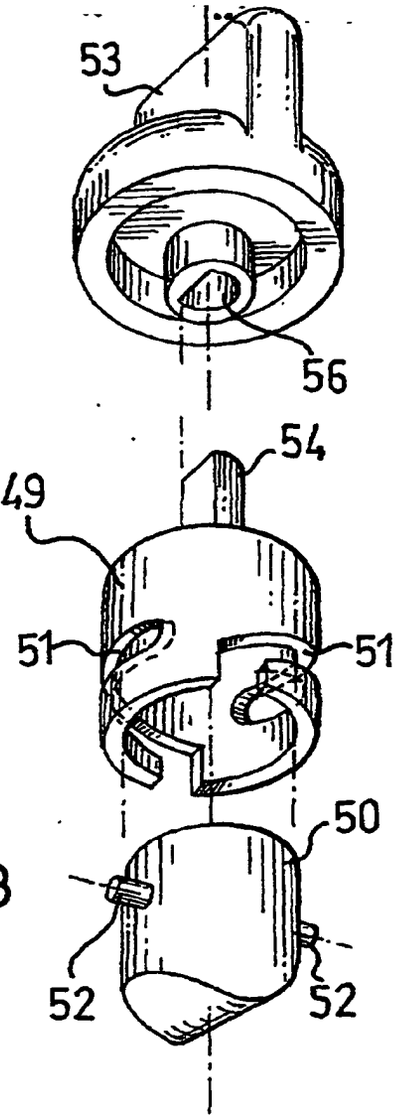

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FIG.9

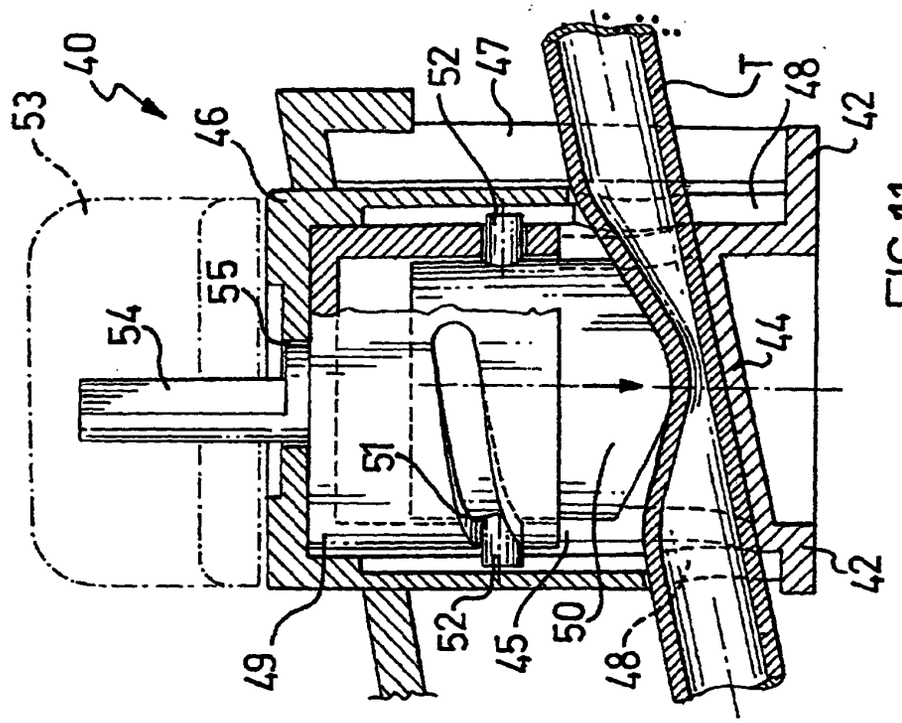

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FIG.11

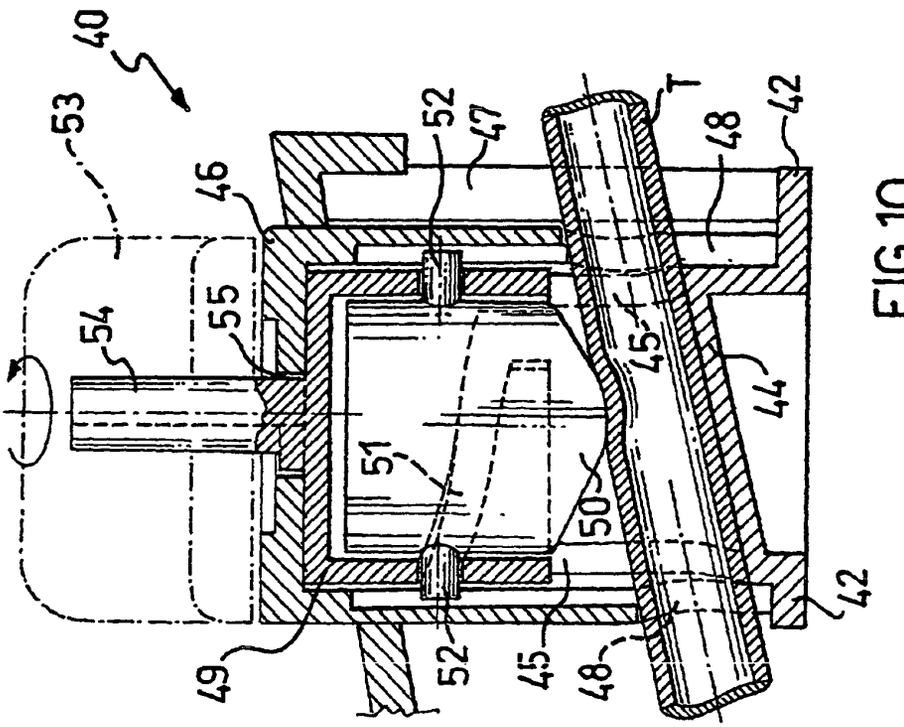

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FIG.10

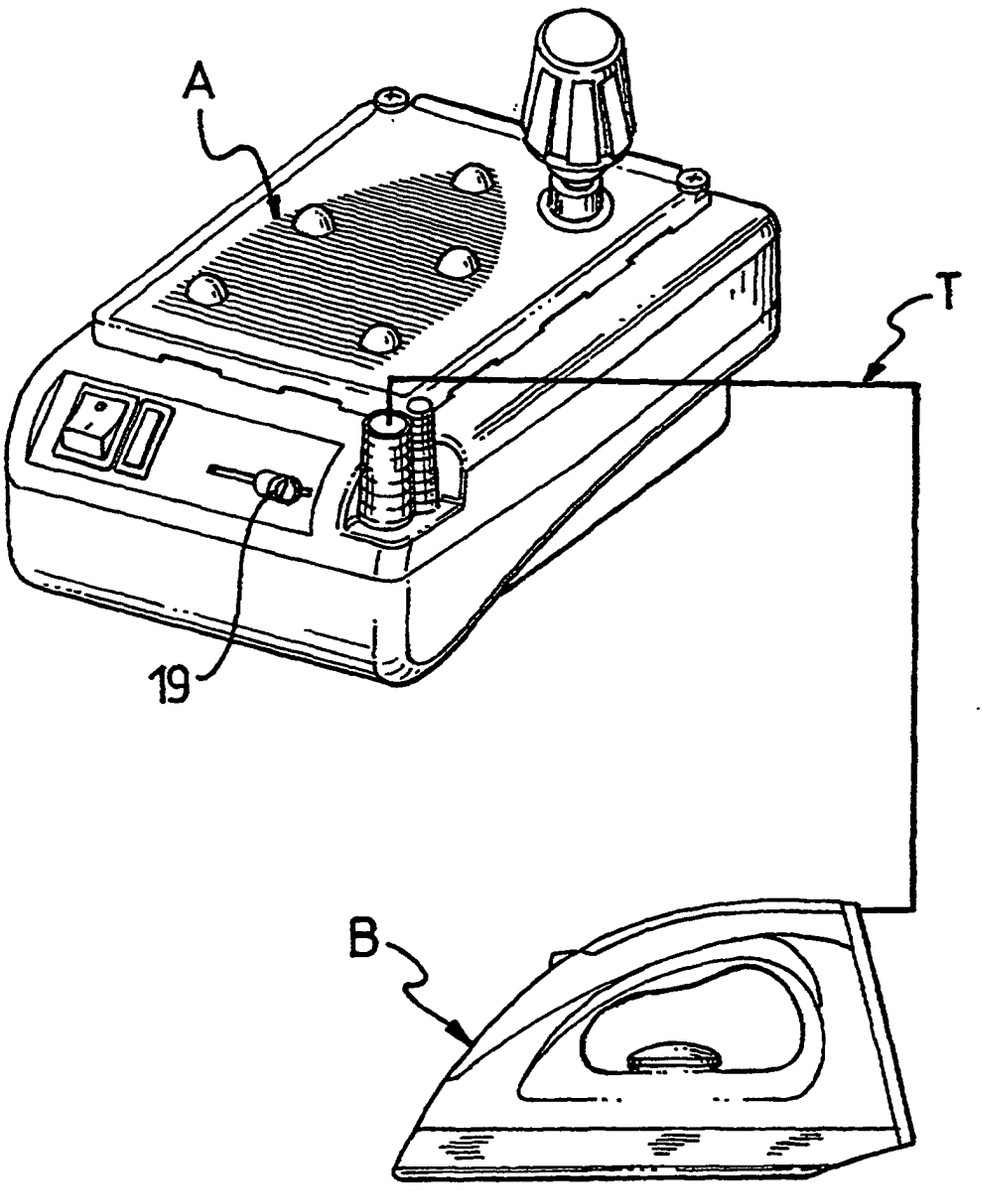


FIG.12