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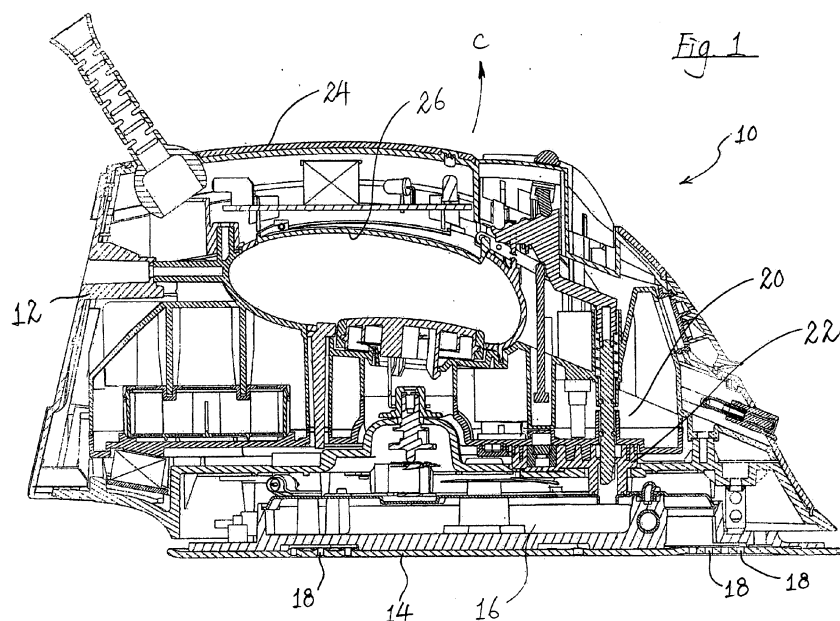
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BA ME(30) Priority: **26.11.2010 HK 10111052**(71) Applicant: **Ascentway Industrial Limited****Wanchai, Hong Kong (HK)**(72) Inventor: **Tsang, Fan Kwong****Wanchai****Hong Kong (CN)**(74) Representative: **Ward, David Ian****Marks & Clerk LLP****Alpha Tower****Suffolk Street****Queensway****Birmingham****B1 1TT (GB)**(54) **A steam iron**

(57) An electric steam iron (10, 100) is disclosed as including a body (12), a soleplate (14) with a number of steam outlets (18), a steam chamber (16) formed between the soleplate (14) and the body (12), in which the steam chamber (16) is in a fluid-communicable relationship with the steam outlet (16), a water tank (20) within the body (12) and in a fluid-communicable relationship with the steam chamber (16), a valve (22, 156) downstream of the water tank (20) and upstream of the steam chamber (16), the valve (22, 156) having at least a valve orifice (42, 154), and a controlling mechanism for con-

trolling opening and closing of the valve orifice (42, 154), in which the controlling mechanism includes a valve closure member (34, 134) and a pin (38, 138) with an actuating head (48, 148), in which the valve closure member (34, 134) is a magnet and the actuating head (48, 148) is made of a ferromagnetic or ferrimagnetic metal or metal alloy, e.g. steel or iron, and the valve closure member (34, 134) is movable relative to the actuating head (48, 148) and the valve orifice (42, 154) between a valve closing position in which the valve orifice (42, 154) is closed and a valve opening position in which the valve orifice (42, 154) is open.

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Description

[0001] This invention relates to a steam iron, and in particular a steam iron capable of controlling the emission of steam.

[0002] There are in existence various steam irons from which steam may be emitted. Such steam irons generally have a body with an interior water tank into which water may be introduced for storage. Water may pass from the water tank to a steam chamber formed between a soleplate and the body. The soleplate may be heated to a high temperature to convert water in the steam chamber into steam for emission through a number of steam outlets of the soleplate.

[0003] In some such convention steam irons, a control knob is provided for controlling the emission of steam from the iron and the rate of emission of steam. If the user would like the iron to not to emit steam, e.g. when not ironing a piece of clothing so as to save water, he/she has to turn the control knob to the "No Steam" position, but when he/she takes up the iron to iron a piece of clothing and would like the iron to emit steam, he/she has to turn the control knob to one of several steam emission positions (each signifying a different steam-emission rate). As it is well known that an iron will be taken up and placed down numerous times even for ironing one single piece of clothing, such conventional steam irons are inconvenient to use.

[0004] In some other existing steam irons, there are provided a controller for controlling whether steam is to be emitted and an adjuster for adjusting the rate of emission of steam. While such conventional steam irons are easier to operate, it is found in practice that a user has to exert a relatively large force to operate the controller. One reason for this is that as a movement part of the controller is in contact with a valve through which water passes from the water tank to the soleplate, sealing gaskets have to be installed for preventing water leakage. Such sealing gaskets increase the frictional force during movement of the movement part of the controller and thus a relatively large force has to be exerted to overcome such frictional force.

[0005] It is thus an object of the present invention to provide a steam iron in which the aforesaid shortcomings are mitigated, or at least to provide a useful alternative to the trade and public.

[0006] According to the present invention, there is provided a steam iron including a body, a soleplate with at least one steam outlet, a steam chamber formed between said soleplate and said body, said steam chamber being in a fluid-communicable relationship with said steam outlet, a water tank within said body and in a fluid-communicable relationship with said steam chamber, a valve member between said water tank and said steam chamber, said valve member having at least a first valve orifice, and means for controlling opening and closing of said first valve orifice, wherein said controlling means includes a valve closure member, an actuator and a controller,

wherein said controller is manually operable to control movement of said actuator, wherein at least one of said valve closure member and actuator is a magnet and the other of said valve closure member and actuator is a magnet or is made of a ferromagnetic or ferrimagnetic metal or metal alloy, and wherein said valve closure member is movable relative to said actuator and said first valve orifice between a valve closing position in which said first valve orifice is closed and a valve opening position in which said first valve orifice is open.

[0007] Embodiments of steam irons according to the present invention will now be described, by way of examples only, with reference to the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view of an electric steam iron according to a first embodiment of the present invention;

Fig. 2 is a top perspective view of the electric steam iron shown in Fig. 1 with the outer casing and some components removed, for clarity purposes;

Fig. 3 is a top perspective view of the valve of the electric iron shown in Fig. 2;

Fig. 4 is a bottom perspective view of the valve shown in Fig. 3;

Fig. 5 is a top view of the valve shown in Fig. 3;

Fig. 6 is a front view of the valve shown in Fig. 5;

Fig. 7 is a bottom view of the valve shown in Fig. 5;

Fig. 8 is a sectional view taken along the line A-A of Fig. 5;

Fig. 9 is a sectional view taken along the line B-B of Fig. 5;

Fig. 10 is an exploded view of the controlling mechanism of the electric steam iron shown in Fig. 1;

Fig. 11 is a schematic longitudinal sectional view of the electric steam iron shown in Fig. 1, with the controlling mechanism in a valve-closed configuration and the adjustment mechanism in a no-steam configuration;

Fig. 12 is a schematic longitudinal sectional view of the electric steam iron shown in Fig. 1, with the controlling mechanism in a valve-closed configuration and the adjustment mechanism in a minimum-steam configuration;

Fig. 13 is a schematic longitudinal sectional view of the electric steam iron shown in Fig. 1, with the controlling mechanism in a valve-opened configuration and the adjustment mechanism in a minimum-steam configuration;

Fig. 14 is a schematic longitudinal sectional view of the electric steam iron shown in Fig. 1, with the controlling mechanism in a valve-closed configuration and the adjustment mechanism in a maximum-steam configuration;

Fig. 15 is a schematic longitudinal sectional view of the electric steam iron shown in Fig. 1, with the controlling mechanism in a valve-opened configuration and the adjustment mechanism in a maximum-

steam configuration;

Fig. 16 is a transverse sectional view of an electric steam iron according to a second embodiment of the present invention with a controlling mechanism in a valve closing configuration; and

Fig. 17 is a transverse sectional view of the electric steam iron of Fig. 16 with the controlling mechanism in a valve opening configuration.

[0008] A longitudinal sectional view of an electric steam iron according to a first embodiment of the present invention is shown in Fig. 1, the electric steam iron being generally designated as 10.

[0009] The iron 10 has a body 12 fixedly engaged with a metal soleplate 14. The soleplate 14 may be heated, e.g. by a heating coil. A steam chamber 16 is formed between the soleplate 14 and the body 12. When the soleplate 14 is heated to a high temperature, the temperature in the steam chamber 16 is also raised, and so water introduced into the steam chamber 16 is converted to steam due to the high temperature in the steam chamber 16. A number of steam outlets 18 are formed through the soleplate 14, so that steam formed in the steam chamber 16 can exit the steam chamber 16 (and thus the iron 10) via the steam outlets 18.

[0010] The iron 10 has a water tank 20 within the body 12, through an inlet of which water may be poured into the water tank 20. The water tank 20 is connected with the steam chamber 16 through a valve 22. The valve 22 is downstream of the water tank 20 and upstream of the steam chamber 16. Thus, when the valve 22 is open, water in the water tank 20 may pass to the steam chamber 16 via the valve 22.

[0011] The iron 10 has a handle 24 to which a manually operable lever 26 is pivotally engaged for relative pivotal movement between a lower position and an upper position. The lever 26 can be pivotally moved relative to the handle 24 in a direction indicated by the arrow C in Fig. 1 to the upper position to operate a controlling mechanism, the function and purpose of which will be discussed below. A spring (not shown) is provided for biasing the lever 26 to the lower position.

[0012] As shown in more detail in Fig. 2, a bi-metallic anti-drip mechanism 28 is provided, which prevents undesired entry of water into the steam chamber 16 when the soleplate 14 is not of a sufficiently high temperature. The valve 22 also has an anti-drip valve 30.

[0013] The valve 22 can be operated by manually manoeuvring the controlling mechanism and an adjustment mechanism. The controlling mechanism includes, in addition to the lever 26, a pin 38 with a cylindrical actuating head 48, and a valve closure member 34. The pin 38 is pivotally linked with the lever 26. As to the adjustment mechanism, such includes a sliding button 36, a bent part 56, and a pin 54 which is biased by a spring 40.

[0014] Figs. 3 to 9 show various views of the valve 22. The valve 22 has, in addition to the anti-drip valve 30, a valve orifice 42 which may be closed by the valve closure

member 34, and a valve orifice 44 which may be closed by the pin 54. The anti-drip valve 30 is in fluid communication with the valve orifice 42, which is in turn in fluid communication with the valve orifice 44. More particularly, water may enter the valve 22 via the anti-drip valve 30, pass through the valve orifice 42 (when it is open), then a channel 46, and then exit the valve 22 through the valve orifice 44 (again when it is open).

[0015] Fig. 10 shows in more detail the structure and arrangement of the controlling mechanism. It can be seen that the lever 26 is pivotally linked with the pin 38 which is fixed with the cylindrical actuating head 48. The head 48 is movable linearly within a tube 50 which guides the movement of the head 48 and the pin 38. As to the valve closure member 34, such is contained and linearly movable within a valve tube 52 formed with the valve orifice 42.

[0016] The head 48 (and possibly the pin 38 as well) and the valve closure member 34 are magnetically attractive to each other. Such may be arranged in a number of ways. Firstly, both the cylindrical head 48 and the valve closure member 34 may be magnets. In this case, the respective facing surfaces of the valve closure member 34 and the head 48 are of opposite magnetic polarity. In a second arrangement, the actuating head 48 may be a magnet, and the valve closure member 34 may be made of a ferromagnetic or ferrimagnetic metal or metal alloy (e.g. iron, steel). As a further alternative arrangement, the actuating head 48 may be made of a ferromagnetic or ferrimagnetic metal or metal alloy (e.g. iron, steel), and the valve closure member 34 may be a magnet.

[0017] In any event, the arrangement is such that when the actuating head 48 of the pin 38 is at or below a predetermined distance (e.g. 10mm) from the valve closure member 34, the magnetic attraction force between them is large enough to move the valve closure member 34 away from, and thus to open, the valve orifice 42; and when the actuating head 48 of the pin 38 is beyond the predetermined distance from the valve closure member 34, the valve closure member 34 will return, on its own weight, to its normal position to close the valve orifice 42.

[0018] Thus, when the lever 26 is pivoted by a user in the direction indicated by the arrow C in Fig. 10 relative to the handle 24 (not shown in Fig. 10), the pin 38 is moved linearly in the direction indicated by the arrow D towards the valve closure member 34 and the valve orifice 42. If the head 48 is sufficiently close to the valve closure member 34, the valve closure member 34 will be attracted to move away from the valve orifice 42 and towards the head 48 of the pin 38, thus opening the valve orifice 42. The valve closure member 34 will remain in this valve opening position until the lever 26 is returned (upon release of the force exerted thereon by the user and the biasing action of a spring) in a direction opposite to that indicated by the arrow C to its normal lower position, in which case the pin 38 with the head 48 is moved linearly within the tube 50 and away from the valve closure member 34 and valve orifice 42. When the head 48

is sufficiently far away from the valve closure member 34, the valve closure member 34 will fall back, on its own weight, to its normal valve closing position to close the valve orifice 42. It can be seen that the head 48 of the pin 38 and the valve closure member 34 do not touch each other during operation and movement.

[0019] By way of such an arrangement, the valve orifice 42 is closed when the lever 26 is at its normal lower position and is open when the lever 26 is moved to and remains at its upper position.

[0020] As the pin 38 and head 48 do not come into contact with any water passing between the water tank 20 and the steam outlets 18, no sealing gasket is required between the head 48 of the pin 38 and the tube 50. Due to the absence of any sealing gasket, there is no additional frictional force hindering movement of the head 48 and pin 38 within and relative to the tube 50. It is thus found in practice that the lever 26 can be pivoted relative to the handle 24 to operate the controlling mechanism to control the opening and closing of the valve orifice 42 with a force of between 30g to 40g.

[0021] Fig. 11 also shows an adjustment mechanism including the sliding button 36, the pin 54 which are engaged with each other *via* the bent part 56. A lower end of the pin 54 is received through the valve orifice 44. An upper end of the pin 54 is fixedly engaged with a lower end of the bent part 56. An upper end of the bent part 56 has a series of stepped portions 58 engageable with the sliding button 36. A spring 60 is provided around the pin 54 which biases the pin 54 and the bent part 56 towards the sliding button 36 for better engagement.

[0022] By way of such an arrangement, the button 36 can be slid (e.g. by a user) along the series of stepped portions 58 to adjust the depth to which the lower end of the pin 54 is inserted into the valve orifice 44. As the lower end of the pin 54 is tapered, by adjusting the depth to which the lower end of the pin 54 is inserted into the valve orifice 44, the extent to which the valve orifice 44 is opened can be accordingly adjusted.

[0023] In Fig. 11, the sliding button 36 is engaged with and received within a topmost stepped portion 58 of the bent part 56. When the adjustment mechanism is in this configuration, the pin 54 is inserted into the valve orifice 44 to such an extent that the valve orifice 44 is fully closed. In the configuration as shown in Fig. 11, the valve closure member 34 is also in the valve closing position. Thus no water can pass from the water tank 20 to the steam chamber 16, as the valve 22 is closed.

[0024] In Fig. 12, the sliding button 36 is engaged with and received within a next-to-topmost stepped portion 58 of the bent part 56. In this configuration, the pin 54 is inserted into the valve orifice 44 to such an extent that the valve orifice 44 is slightly open. However, as the valve closure member 34 is still in the valve closing position, no water can pass from the water tank 20 to the steam chamber 16, as the valve orifice 42 of the valve 22 is still closed.

[0025] In Fig. 13, the sliding button 36 is still engaged

with and received within the next-to-topmost stepped portion 58 of the bent part 56, and so the valve orifice 44 is slightly open. The valve closure member 34 is now away from the valve orifice 42 (because of the movement of the head 48 of the pin 38 of the controlling mechanism towards the valve closure member 34), and the valve orifice 42 is thus open. Thus, water may pass from the water tank 20 through the valve 22 to the steam chamber 16 at a low rate for conversion to steam for emission through the steam outlets 18.

[0026] In Fig. 14, the sliding button 36 is engaged with and received within a lowermost stepped portion 58 of the bent part 56. When in this configuration, the pin 54 is inserted into the valve orifice 44 to such an extent that the valve orifice 44 is maximally open. However, as the valve closure member 34 is in the valve closing position, no water can pass from the water tank 20 to the steam chamber 16, as the valve orifice 42 of the valve 22 is still closed.

[0027] Finally, in Fig. 15, the sliding button 36 is engaged with and received within the lowermost stepped portion 58 of the bent part 56. Because of the movement of the head 48 of the pin 38 of the controlling mechanism towards the valve closure member 34, the valve closure member 34 is now away from the valve orifice 42, thus opening the valve orifice 42. Thus, water may pass at a high rate from the water tank 20 through the valve 22 to the steam chamber 16 for conversion to steam for emission through the steam outlets 18.

[0028] By way of the above arrangement, the controlling mechanism is manually operable to control whether steam is emitted from the iron 10, the adjustment mechanism is manually operable to adjust the rate at which steam is emitted from the iron 10, although the adjustment mechanism is also operable to stop emission of steam from the iron 10.

[0029] A transverse sectional view of an electric steam iron according to a second embodiment of the present invention is shown in Figs. 16 and 17, the electric steam iron being generally designated as 100. As the basic structure of the steam iron 100 is very similar to that of the steam iron 10, we will here focus on the controlling mechanism for controlling steam emission.

[0030] The controlling mechanism of the steam iron 100 includes, in addition to a manually operable lever (not shown), a pin 138 with a cylindrical actuating head 148, a valve closure member 134, and a silicone rubber valve membrane 152. An upper end of the pin 138 is pivotally linked with the lever (not shown), and a lower end of the pin 138 is fixedly engaged with the actuating head 148. The valve closure member 134 is normally maintained at the position shown in Fig. 16 ("valve closing position") by a spring 150 acting on the valve closure member 134 from below. The valve closure member 134 is pivotally engaged with the silicone rubber valve membrane 152 about a pivoting axis. When the valve closure member 134 is in the valve closing position, the valve membrane 152 closes an orifice 154 of a valve 156 down-

stream of a water tank (not shown) and upstream of a steam chamber (not shown) of the steam iron 100.

[0031] The actuating head 148 (and possibly the pin 138 as well) and the valve closure member 134 are magnetically repulsive to each other. Both the cylindrical head 148 and the valve closure member 134 are magnets, and the respective facing surfaces of the valve closure member 134 and the head 148 are of a same magnetic polarity, i.e. either both are south poles or both are north poles.

[0032] By reason of this arrangement, when a user operates the lever (not shown), the pin 138 is moved downwardly to push the head 148 towards the valve closure member 134. Because of the magnetic repulsion force between the head 148 and the valve closure member 134, the valve closure member 134 is moved to pivot downwardly (against the upward biasing force of the spring 150) to the position as shown in Fig. 17 ("valve opening position"), thus pivoting the valve membrane 152 upwardly to open the orifice 154 of the valve 156, as shown in Fig. 17.

[0033] When the downward force acting on the shaft 138 is released, and with the shaft 138 returning to its normal upper position (as shown in Fig. 16), the spring 156 will act on the valve closure member 134 to return it to its valve closing position, to thereby pivot the valve membrane 152 downwardly to close the orifice 154 of the valve 156. Simply stated, when the valve closure member 134 is at the valve closing position (as shown in Fig. 16), the orifice 154 of the valve 156 is closed; and when the valve closure member 134 is at the valve opening position (as shown in Fig. 17), the orifice 154 of the valve 156 is open.

[0034] It should be understood that the above only illustrates examples whereby the present invention may be carried out, and that various modifications and/or alterations may be made thereto without departing from the spirit of the invention.

[0035] It should also be understood that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any appropriate sub-combinations.

Claims

1. A steam iron including:

a body,
a soleplate with at least one steam outlet,
a steam chamber formed between said soleplate and said body, said steam chamber being in a fluid-communicable relationship with said steam outlet,
a water tank within said body and in a fluid-com-

municable relationship with said steam chamber,

a valve member between said water tank and said steam chamber, said valve member having at least a first valve orifice, and

means for controlling opening and closing of said first valve orifice,

wherein said controlling means includes a valve closure member, an actuator and a controller, wherein said controller is manually operable to control movement of said actuator, wherein at least one of said valve closure member and actuator is a magnet and the other of said valve closure member and actuator is a magnet or is made of a ferromagnetic or ferrimagnetic metal or metal alloy, and wherein said valve closure member is movable relative to said actuator and said first valve orifice between a valve closing position in which said first valve orifice is closed and a valve opening position in which said first valve orifice is open.

2. A steam iron according to Claim 1 wherein said valve closure member is adapted to move from said valve closing position to said valve opening position by attraction force or repulsion force between said valve closure member and said actuator.

3. A steam iron according to Claim 1 or 2 wherein said actuator is movable relative to said first valve orifice.

4. A steam iron according to any of the preceding claims wherein said valve closure member is adapted to move from said valve closing position to said valve opening position when said actuator is at or within a predetermined distance from said first valve orifice, and said valve closure member is adapted to move from said valve opening position to said valve closing position when said actuator is beyond said predetermined distance from said first valve orifice.

5. A steam iron according to any of the preceding claims wherein when said valve closure member moves from said valve closing position to said valve opening position, said valve closure member is adapted to move a valve membrane to open said first valve orifice, and when said valve closure member moves from said valve opening position to said valve closing position, said valve closure member is adapted to move said valve membrane to close said first valve orifice.

6. A steam iron according to Claim 4 wherein said actuator is movable linearly towards and away from said first valve orifice.

7. A steam iron according to any of the preceding claims

further including means for guiding movement of said actuator.

8. A steam iron according to any of the preceding claims wherein said actuator is linked with a manually operable controller. 5
9. A steam iron according to Claim 8 wherein said actuator is pivotally linked with said manually operable controller. 10
10. A steam iron according to any of the preceding claims wherein said controller is engaged with and movable relative to a handle of said body. 15
11. A steam iron according to Claim 10 wherein said controller is movable relative to said handle in a first direction to move said actuator towards said first valve orifice and in a second direction to move said actuator away from said first valve orifice. 20
12. A steam iron according to any of the preceding claims wherein said valve member includes at least a second valve orifice in fluid communication with and in series with said first valve orifice. 25
13. A steam iron according to Claim 12 further including means for adjusting the extent of opening of said second valve orifice. 30
14. A steam iron according to any of the preceding claims wherein said actuator is out of contact with fluid passing between said water tank and said steam outlet. 35

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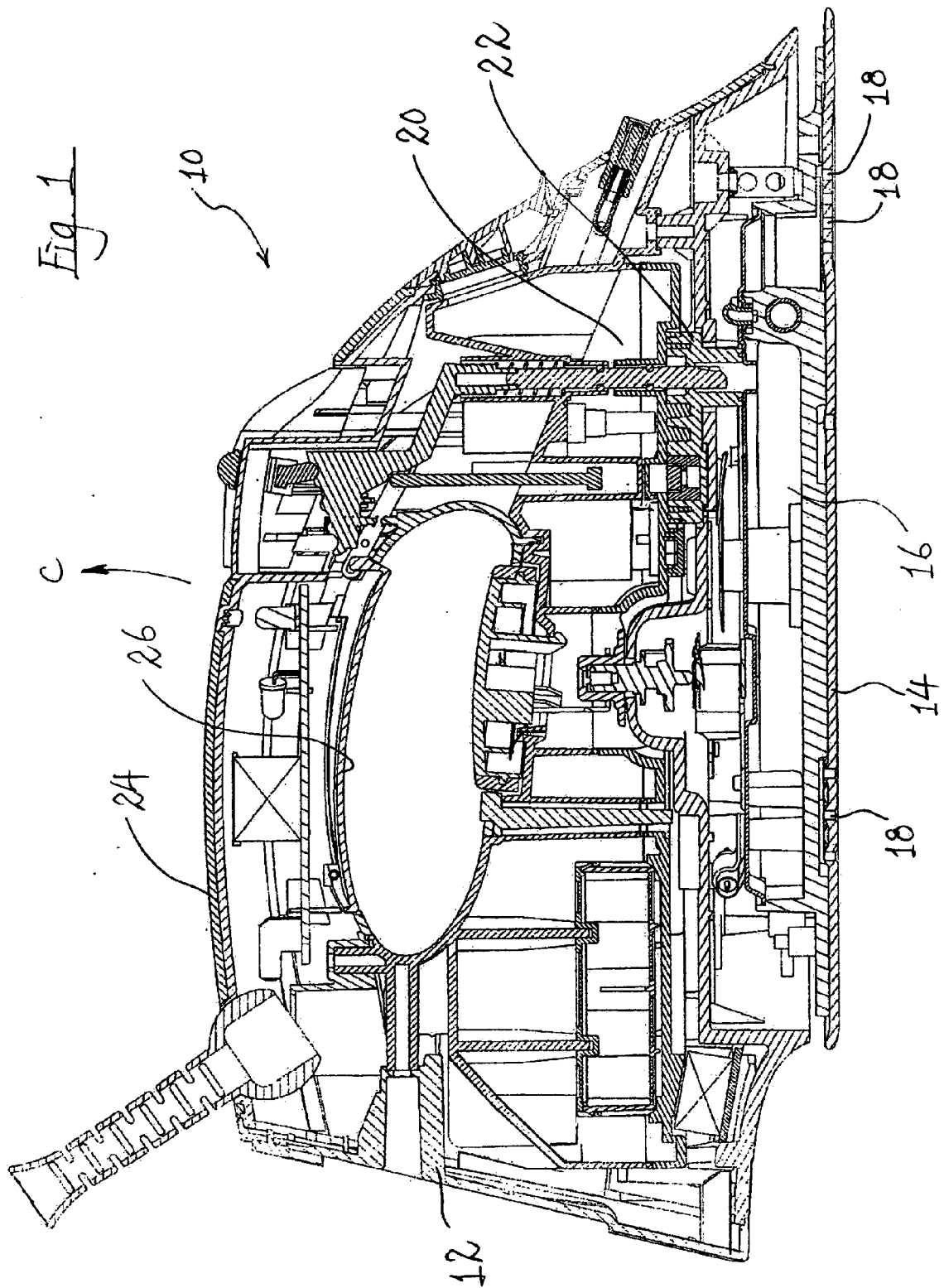


Fig. 2

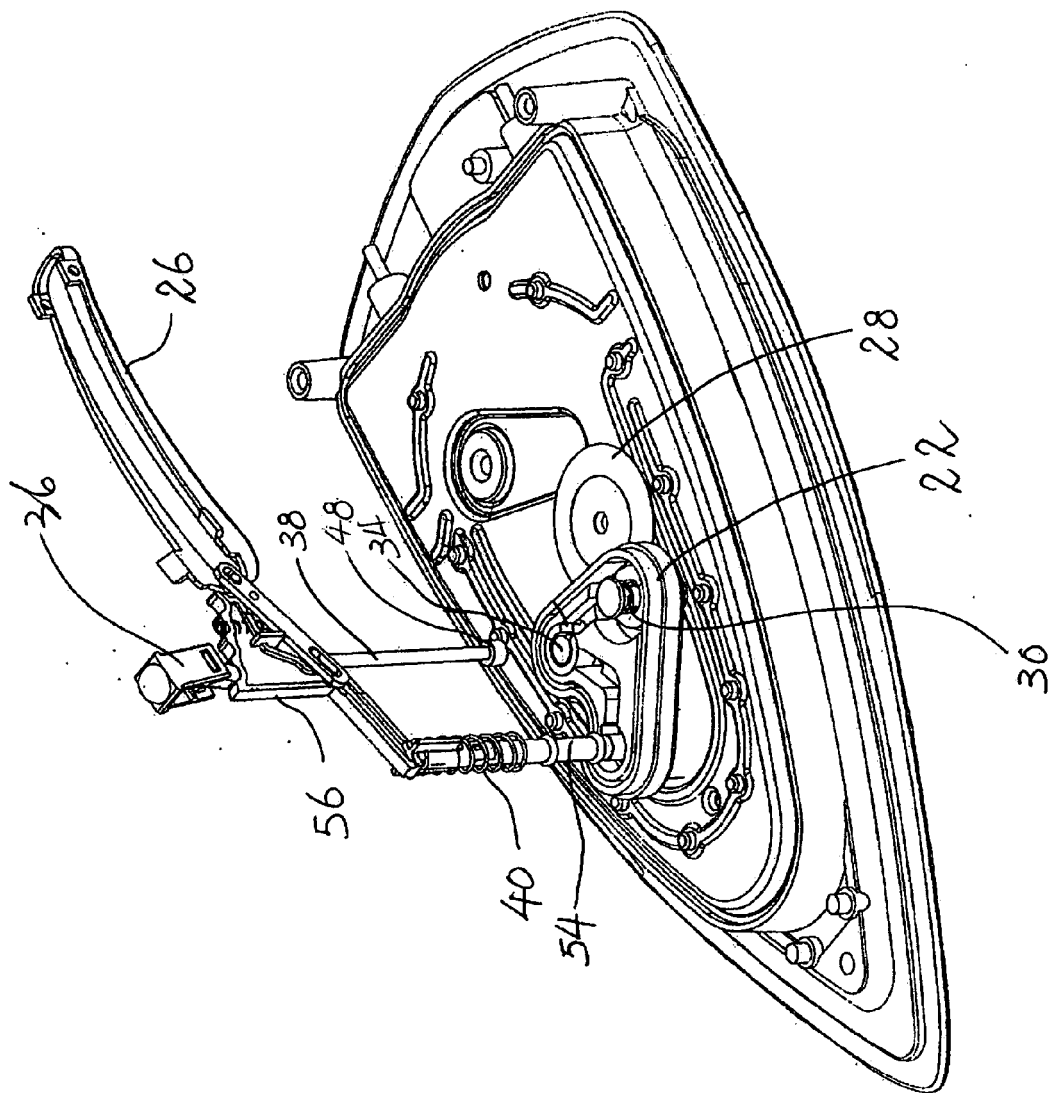


Fig. 5

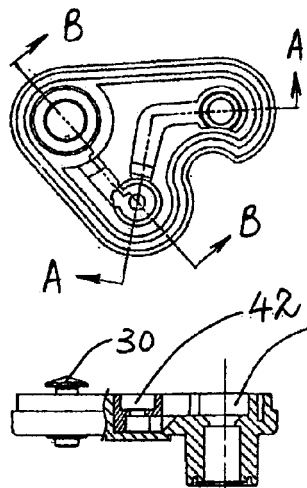


Fig. 3

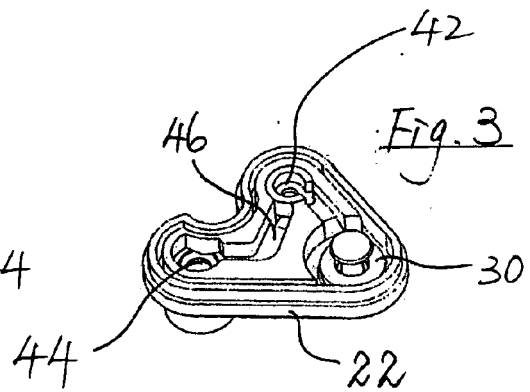


Fig. 9

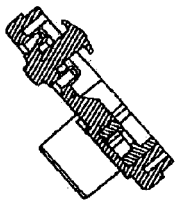


Fig. 8

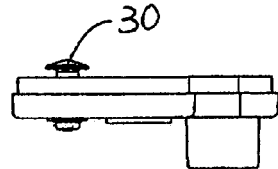


Fig. 6

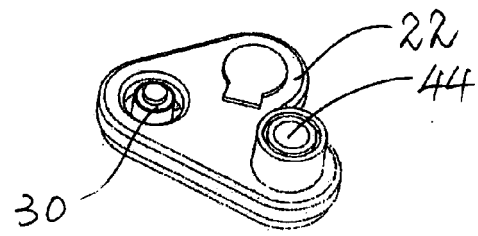


Fig. 4

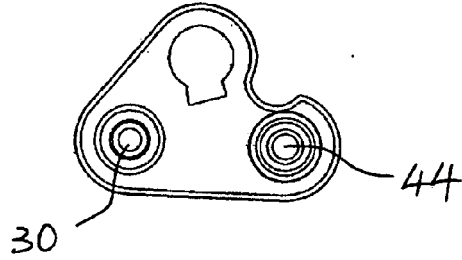


Fig. 7

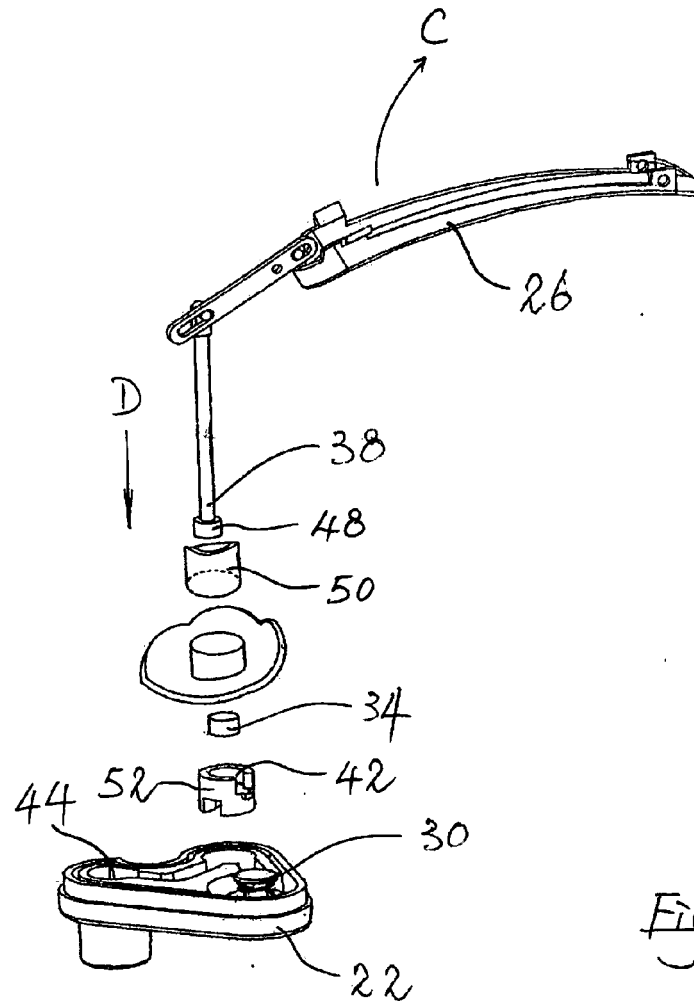
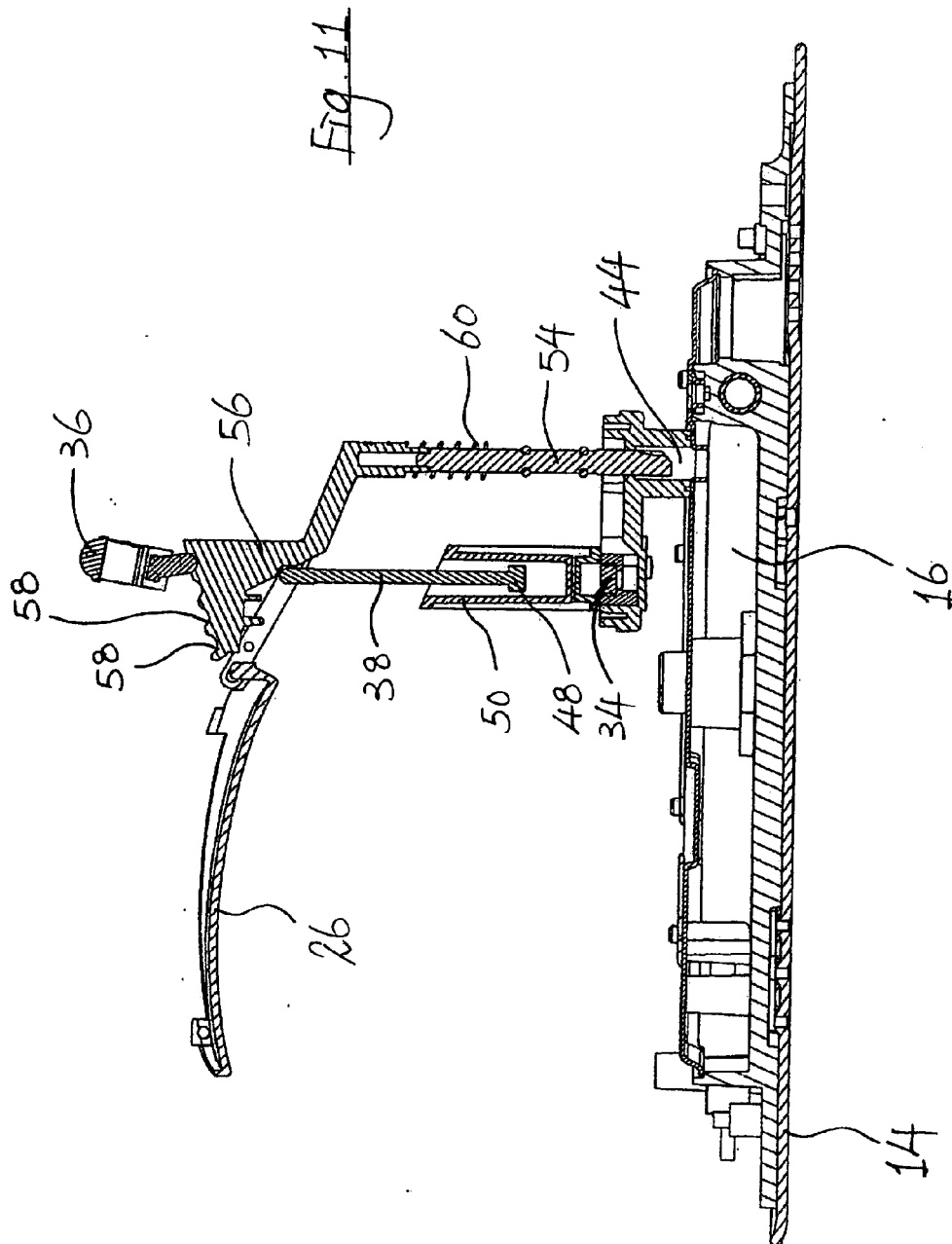


Fig 10



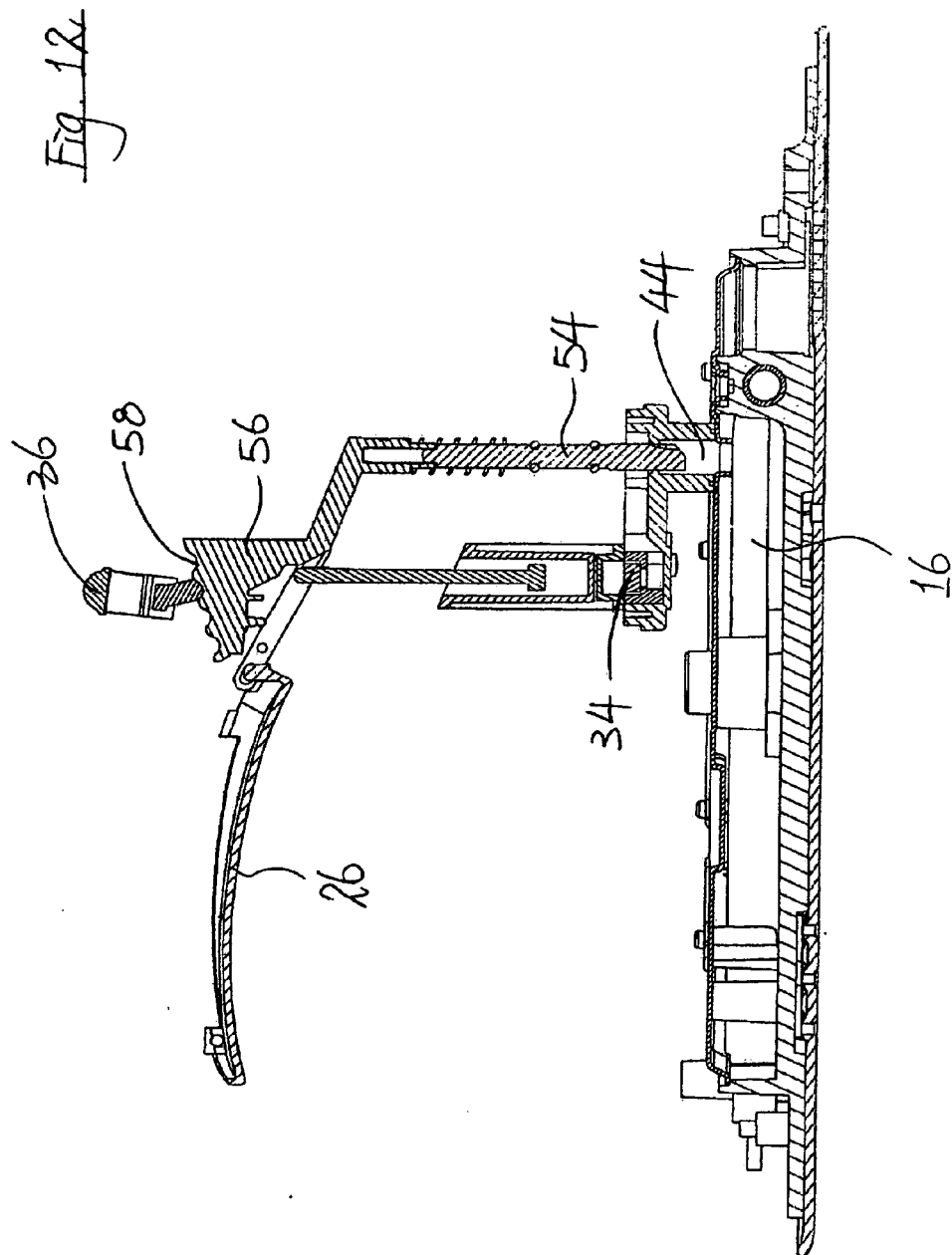


Fig. 13

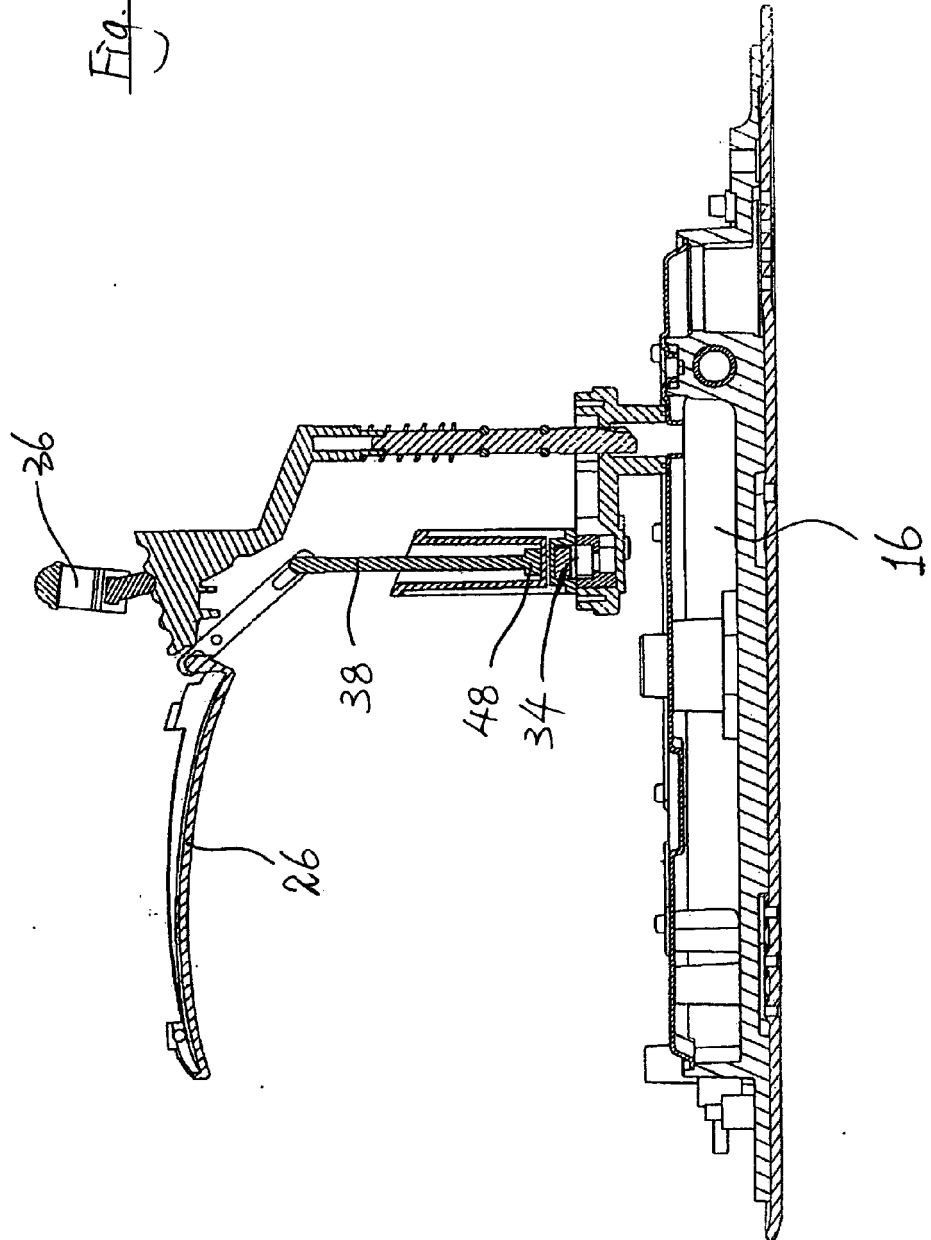


Fig. 14

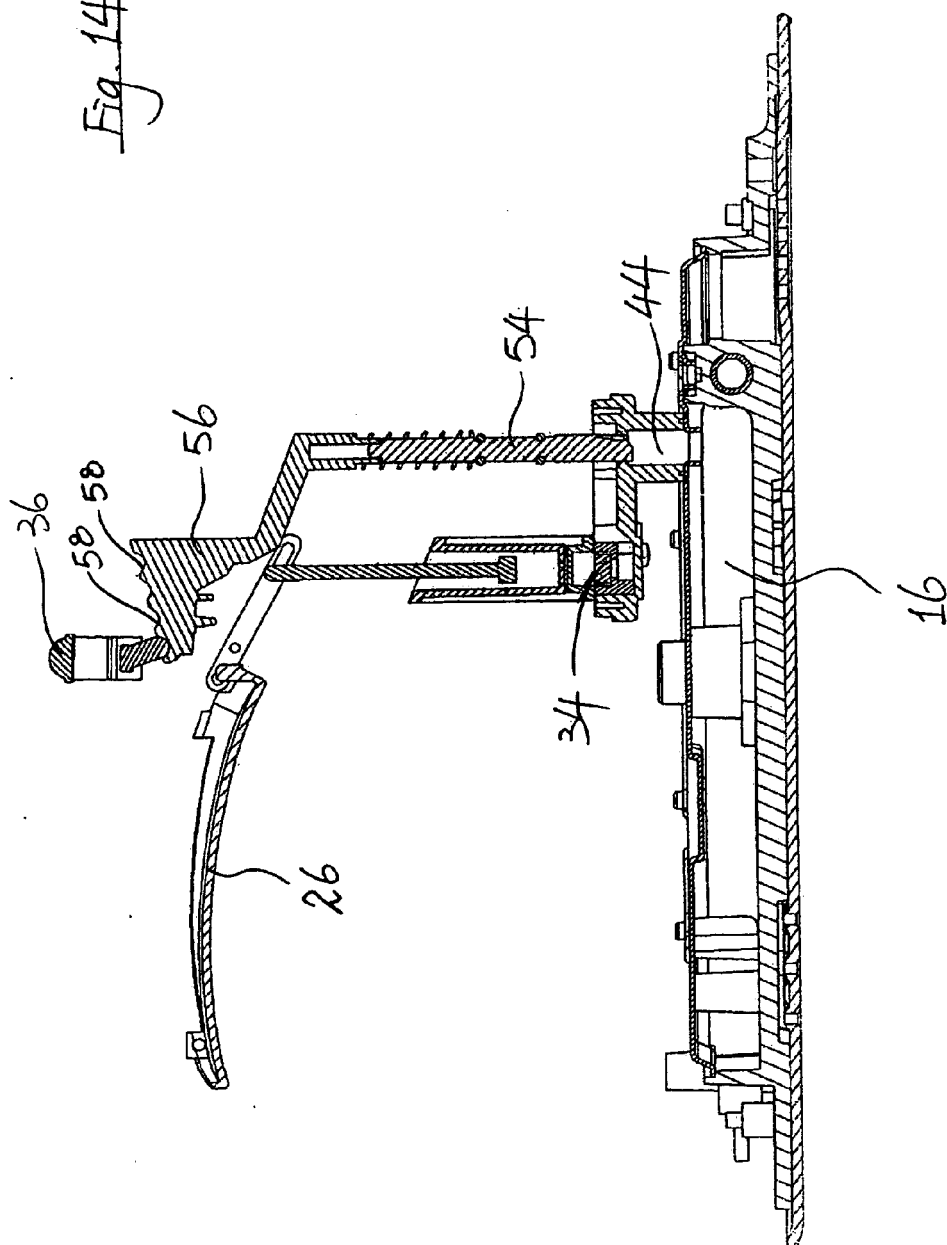
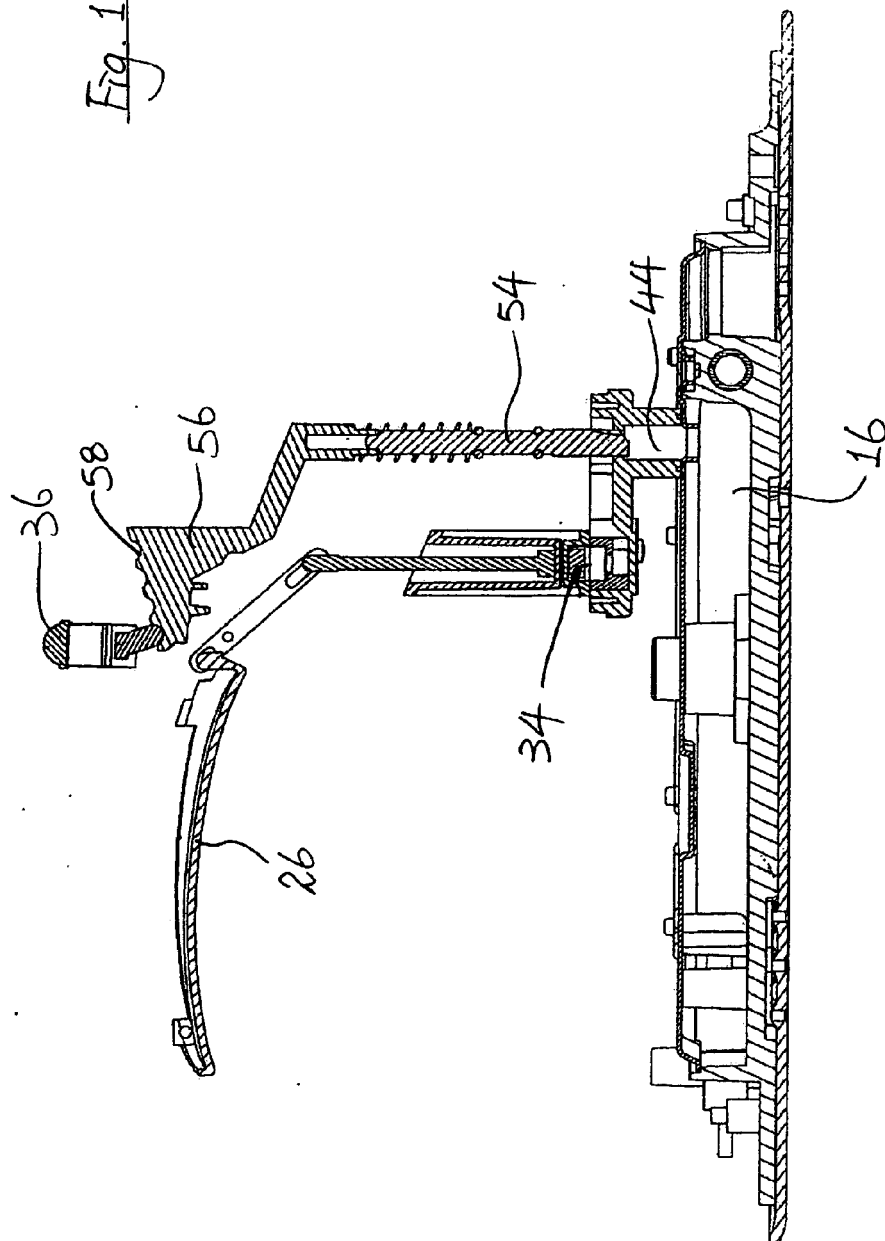
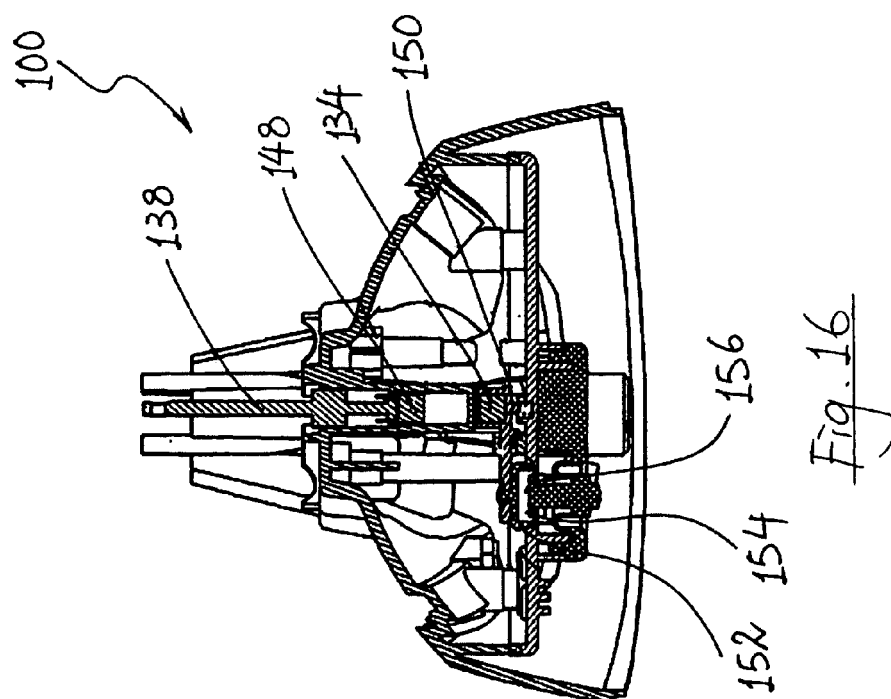
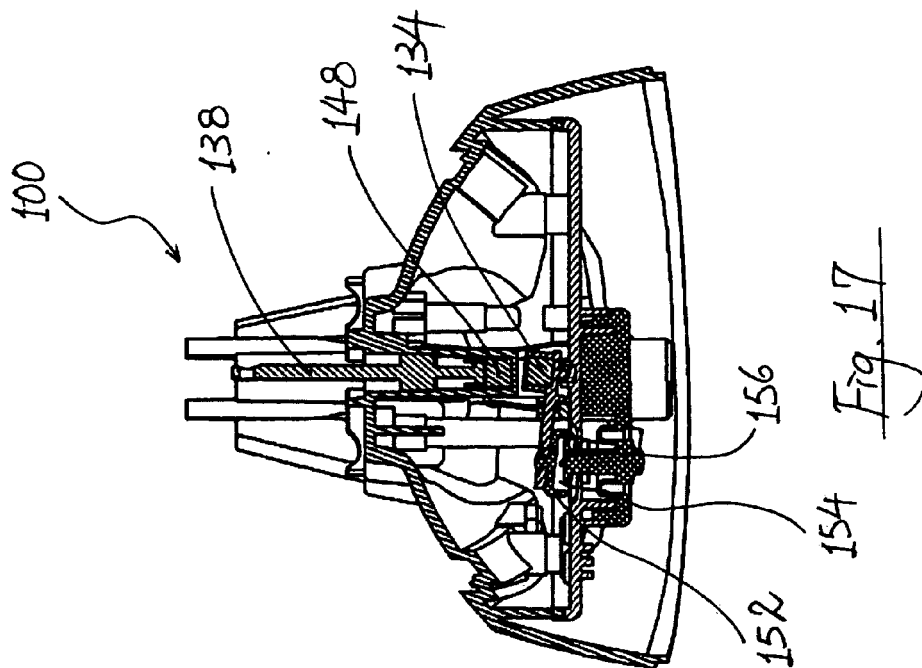


Fig. 15







EUROPEAN SEARCH REPORT

Application Number
EP 11 25 0911

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2009/027257 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]; DUSCHEK HORST JUERGEN [ES]) 5 March 2009 (2009-03-05) * figure 6 *	1-14	INV. D06F75/10 D06F75/14
A	DE 10 2009 028763 A1 (BSH BOSCH SIEMENS HAUSGERAETE [DE]) 25 February 2010 (2010-02-25) * the whole document *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC)
			D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 12 March 2012	Examiner Diaz y Diaz-Caneja
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 25 0911

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12-03-2012

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