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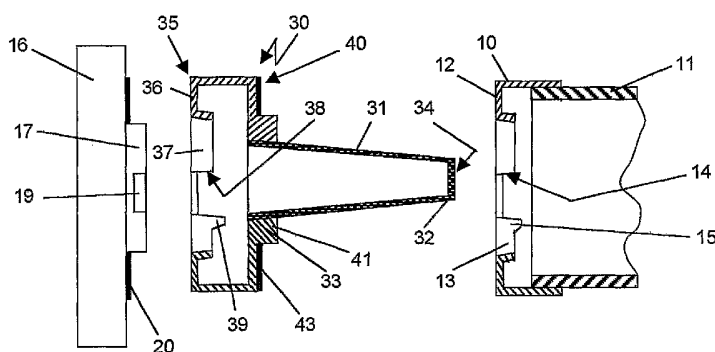
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(54) Title: ANTI-THEFT DEVICE



(57) Abstract: An anti-theft device (30, 67) is provided for the prevention of the theft of fuel from a motor vehicle or other motor driven apparatus. The anti-theft device (30, 67) has a tubular member (31, 68) and a liquid permeable gauze barrier (34, 71). One end (33, 70) of the tubular member (31, 68) has an outer part (35, 72) adapted to receive a filler cap (16, 63) and an inner part (40, 74) adapted to engage a filler pipe (11, 60) with the tubular member (31, 68) extending along the pipe (11, 60). The tubular member (31, 68) also has engagement means (42, 76) operable on insertion of the device (30, 67) into a filler pipe (11, 60) to engage the filler pipe (11, 60) and resist disengagement therefrom. When the device (30, 67) is fitted to the filler pipe (11, 60), the tubular member (31, 68) extends along the pipe (11, 60) and is such a length that the barrier (34, 71) is far enough into the pipe (11, 60) to allow the insertion of the nozzle of a fuel dispensing pump but prevent the insertion of a siphon tube.

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## ANTI-THEFT DEVICE

This invention relates to anti-theft devices, and in particular to devices for the prevention of the theft of fuel from a motor vehicle or other motor driven apparatus.

Conventionally, most motor vehicles and many other types of motor driven apparatus are fitted with a tank in which fuel for the motor is stored. Fuel is delivered to the tank through a filler pipe, which has a neck-end brazed or otherwise secured to the end of the pipe remote from the tank. The neck-end is situated in an accessible place at the outer surface of the vehicle or other apparatus. A removable fuel cap is fitted to the neck-end to prevent spillage and reduce evaporation of fuel from the tank.

To prevent theft of fuel from the tank, it is known to provide lockable fuel caps. These resist removal of the cap from the neck-end without the use of a key. However, in many industrial situations it is inconvenient for the driver of the vehicle or operator of the apparatus to carry a key for this purpose. Also, in such situations the keys readily become lost or damaged. New vehicles or apparatus may be fitted during manufacture with internal theft prevention devices such as a mesh screen located in the filler pipe. However, there are many vehicles and items of apparatus already in existence that are not fitted with such a device. In consequence, many such vehicles and items of apparatus are vulnerable to theft of fuel from their tanks. This is becoming a serious problem, especially for operators of fleets of motor vehicles.

To overcome this problem, it has been proposed in US Patent No. 5476185 to provide an anti-siphon fillneck screen within the filler pipe. This device is entrapped in the pipe between two circlips fitted to grooves in the filler pipe or neck-end. However, this requires that the filler pipe or neck-end be machined to have the two grooves therein. This is satisfactory during manufacture, but is not suitable for existing vehicles and apparatus. In addition, removal of the screen may be accomplished with circlip pliers, and although a casual potential thief may not have such an item with them, a "professional" thief may well have. In consequence, such a device as proposed is not secure against a person so equipped.

It is an object of the present invention to provide a device for the prevention of theft of fuel from a tank that avoids as far as possible the disadvantages of the known systems described above. It is a further object of the invention to provide such a device that may be fitted to an existing vehicle or apparatus without the use of a special tool.

The invention provides an anti-theft device for the prevention of the theft of fuel from a motor vehicle or other motor driven apparatus, comprising a tubular member having a proximal end and a distal end and a liquid permeable barrier, the distal end having an outer part adapted to receive a filler cap and an inner part adapted to engage a filler pipe with the tubular member extending along the pipe, the tubular member comprising engagement means operable on insertion of the device into a filler pipe to engage the filler pipe and resist disengagement therefrom.

By *liquid permeable barrier* is intended to mean a barrier that allows the passage of fuel into the tank but prevents the passage of a siphon tube therethrough.

The engagement means may comprise at least one engagement member movable between retracted and protruding dispositions, and the engagement member may be resiliently biased towards the protruding disposition. The engagement member may be wedge-shaped. The tubular member may comprise two engagement members, and the engagement members may be on diametrically opposed sides of the tubular member.

The liquid permeable barrier may comprise a perforated member extending across the tubular member adjacent the proximal end. The perforated member may comprise a mesh. The cylindrical wall of the tubular member may taper towards the proximal end, and the cylindrical wall may be a mesh.

The inner part and the outer part may have corresponding male and female configurations, whereby the outer part of the device may be engaged by a filler cap configured to engage a filler tube to which the inner part is adapted to engage. The male and female configurations may be spigots and apertured end face, or may be screw threads.

The invention will now be described with reference to the accompanying drawings in which:

Fig. 1 is front view of a neck-end to which a fuel theft prevention device is to be fitted,

Fig. 2 is a sectional side view of a filler pipe and the neck-end to which a filler cap is to be fitted,

Fig. 3 is a sectional side view of a fuel theft prevention device to be fitted to the neck-end of a filler pipe, and a filler cap to be fitted to the device.

Fig. 4 is a rear view of the device of Fig. 3,

Fig. 5 is an enlarged view of an engagement means of the device of Fig. 3.

Fig. 6 is front view of an alternative filler pipe to which a fuel theft prevention device is to be fitted,

Fig. 7 is a sectional side view of the filler pipe of Fig. 6 to which a filler cap is to be fitted, and

Fig. 8 is a sectional side view of a fuel theft prevention device to be fitted to the filler pipe of Figs. 6 and 7

Referring now to Figs. 1 and 2, there is shown an annular neck-end 10 that is brazed or otherwise secured to the end of a cylindrical filler pipe 11. The neck-end 10 has an end face 12 that is provided with a concentric lip 13. Two cut-outs 14 are provided on diametrically opposed sides of the end face 12 and lip 13. A stop 15 is provided on one end of each lip 13. A filler cap 16 has a central boss 17 that can enter the aperture 18 in the end face 12 formed by the lip 13. Protruding from diametrically opposed sides of the boss 17 are two spigots 19 which, in order that the filler cap 16 can engage with the neck-end 10, are passed through the cut-outs 14. The filler cap 16 is then turned clockwise so that the spigots 19 pass behind the end face 12 until they contact the stops 15. Conventionally, the lips 13 increase in width towards the stops 15. This provides that the filler cap 16 is drawn into tighter engagement with the neck-end 10 with the end face 12 against a resilient washer 20, thereby ensuring a seal against leakage of fuel from the filler pipe 11. Thus far, all that has been described is conventional.

Referring now to Fig. 3, there is shown a neck-end 10, filler pipe 11 and filler cap 16 as described above. In this case, between the neck-end 10 and filler cap 16 there is shown an anti-theft device 30. The anti-theft device 30 has a tubular member 31 with a proximal end 32 and a distal end 33. The tubular member 31 is tapered towards the proximal end 32, which provides a liquid permeable barrier in the form of a gauze end 34. The liquid permeable barrier 34 allows the passage of fuel into the filler pipe 11 but prevents the passage of a siphon tube therethrough. The tubular member 31 may be formed of a solid sheet of metal, or may be perforated or of gauze, as preferred.

The distal end 33 has an outer part 35 adapted to receive the filler cap 16. For this purpose, the outer part 35 has an end face 36 that is provided with a concentric lip 37. Two cut-outs 38 are provided on diametrically opposed sides of the end face 36 and lip 37. A stop 39 is provided on one end of each lip 37. This construction is identical with that of the neck-end 10 such that the front view of the anti-theft device is identical with Fig. 1. This ensures that the filler cap 16 may be fitted to the anti-theft device 30 in the manner of fitting it to the neck-end 10 as described above. The distal end 33 also has an inner part 40 adapted to engage the neck-end 11. When the device 30 is fitted to the neck-end 10, the tubular member 31

extends along the pipe 11 and is such a length that the gauze end 34 is far enough into the pipe 11 to allow the insertion of the nozzle of a fuel dispensing pump.

To enable the device 30 to be fitted to the neck-end 10, the inner part 40 has a central boss 41 that can enter the aperture 18 in the end face 12 formed by the lip 13. As seen more clearly in Fig. 4, protruding from diametrically opposed sides of the boss 41 are two spigots 42 which, in order that the device 30 can engage with the neck-end 10, are passed through the cut-outs 14. The device 30 is then turned clockwise so that the spigots 42 pass behind the end face 12 until they contact the stops 15. The device 30 is drawn into tighter engagement with the neck-end 10 with the end face 12 against a resilient washer 43, thereby ensuring a seal against leakage of fuel from the filler pipe 11. Thus far, the fitting of the device 30 to the neck-end 10 is the same as fitting the fuel cap 16 to the neck-end 10. However, in order to prevent the removal of the device 30 from the neck-end 10, there is also provided engagement means 44 on the spigots 42. As seen in Fig. 5, the engagement means 44 comprise wedge-shaped plungers that are biased by springs 45 to their protruding position. When the device 30 is turned clockwise, the stops 15 are first engaged by the plungers 44, which are caused to retract against the force of the springs 45. When the step 46 of each spigot 42 engages the respective stop 15, thereby preventing further rotation of the device 30, the plungers 44 are disengaged from the stops 15 and return to their protruding position. Re-engagement of the protruding plungers 44 with the stops 15 prevents rotation of the device 30 in an anti-clockwise direction, thus the device 30 is prevented from being removed from the neck-end 10.

Referring now to Figs. 6 and 7, there is shown a cylindrical filler pipe 60 having a female thread 61 at its outermost end. An internal buttress 62 is provided at the base of the thread 61. A filler cap 63 has a central boss 64 on which there is a male thread 65. When the filler cap 63 is to be applied directly to the filler pipe 60, the male thread 65 co-operates with the female thread 61 until a sealing washer 66 abuts the end of the filler pipe 60. In the present case however, between the filler pipe 60 and filler cap 63 there is an anti-theft device 67 as shown in Fig. 8. The anti-theft device 67 has a tubular member 68 with a proximal end 69 and a distal end 70. At the proximal end 69 is a tapered liquid permeable barrier in the form of a gauze 71. The liquid permeable barrier 71 allows the passage of fuel into the filler pipe 60 but prevents the passage of a siphon tube therethrough. The tubular member 68 may be formed of a solid sheet of metal, or may be perforated or of gauze, as preferred. The distal end 70 has an outer part 72 adapted to receive the filler cap 63. For this purpose, the outer part 72 has a female thread 73 into which the male thread 65 of the filler cap 63 may be inserted. In addition, the distal end 70 has an inner part 74 with a male thread 75 adapted to engage the

filler pipe 60. When the device 67 is fitted to the filler pipe 60, the tubular member 68 extends along the pipe 60 and is such a length that the gauze end 71 is far enough into the pipe 60 to allow the insertion of the nozzle of a fuel dispensing pump. In this situation, a pair of resilient leaves 76 engage the rear face of the buttress 62, thereby resisting removal of the anti-theft device 67. Further to prevent the removal of the anti-theft device 67 from the filler pipe 60, a collar 77 is provided. The collar 77 has a smooth outer surface and a stepped inner surface 78 that is a rotating fit on the stepped outer surface 79 of the distal end 70 of the device 67. This collar 77, freely rotating on the distal end 70, prevents the use of pliers, stilson wrenches or the like to grip the device 67 in an attempt to unscrew it from the filler pipe 60.

Other embodiments of device in accordance with the invention will be readily apparent to persons skilled in the art. For example, the retractable plungers 44 may be fitted to move radially from the central boss 41 to engage behind the end face 12. In this case, more than two plungers 44 may be provided. The plungers 44 themselves may be of a resilient material instead of being biased by separate springs. A corresponding arrangement to that shown in Fig. 8 may be provided for male threaded filler pipes.

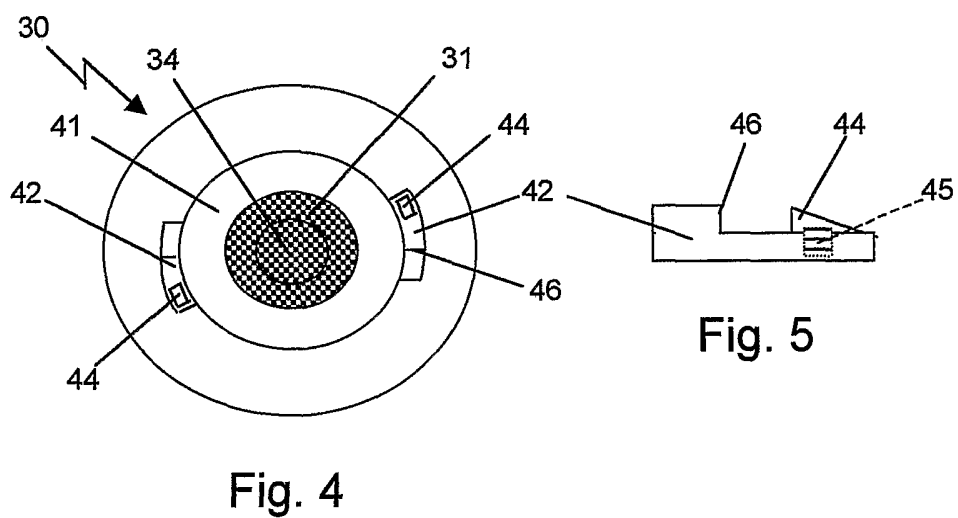
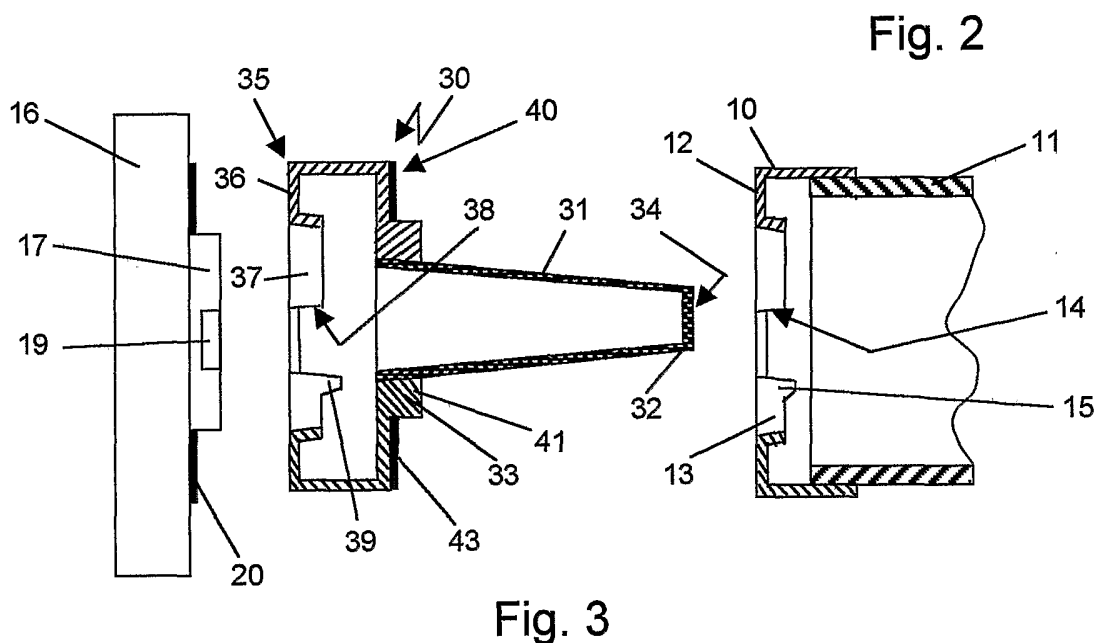
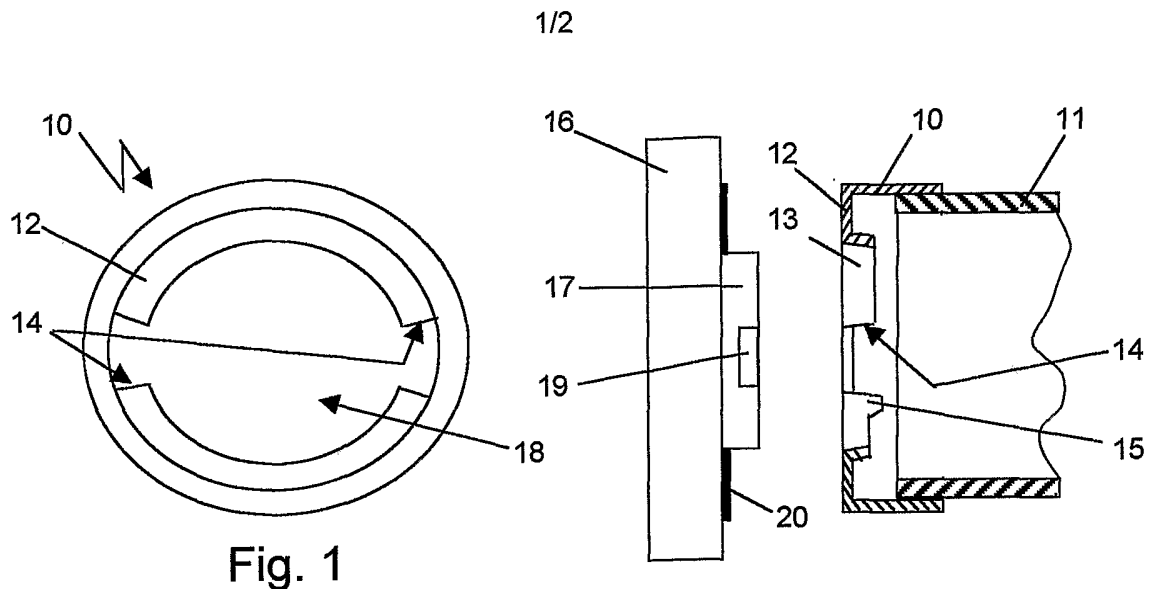
By means of the invention, a device that prevents the theft of fuel from a motor vehicle or other motor driven apparatus is provided that may be fitted simply and without the use of any tools. Once fitted, it may not be removed. A conventional fuel cap is fitted to the device, thereby avoiding the need for keys.

## CLAIMS

1. An anti-theft device (30, 67) for the prevention of the theft of fuel from a motor vehicle or other motor driven apparatus, comprising a tubular member (31, 68) having a proximal end (32, 69) and a distal end (33, 70) and a liquid permeable barrier (34, 71), characterised by the distal end (33, 70) having an outer part (35, 72) adapted to receive a filler cap (16, 63) and an inner part (40, 74) adapted to engage a filler pipe (11, 60) with the tubular member (31, 68) extending along the pipe (11, 60), the tubular member (31, 68) comprising engagement means (42, 76) operable on insertion of the device (30, 67) into a filler pipe (11, 60) to engage the filler pipe (11, 60) and resist disengagement therefrom.
2. An anti-theft device according to claim 1, characterised in that the tubular member (31, 68) comprises at least one engagement member (42, 76) movable between retracted and protruding dispositions.
3. An anti-theft device according to claim 1, characterised in that the engagement member (42, 76) is resiliently biased towards the protruding disposition.
4. An anti-theft device according to claim 2 or claim 3, characterised in that the engagement member (42) is wedge-shaped.
5. An anti-theft device according to any one of claims 2 to 4, characterised in that the tubular member (31, 68) comprises two engagement members (42, 76).
6. An anti-theft device according to claim 5, characterised in that the engagement members (42, 76) are on diametrically opposed sides of the tubular member (31, 68).
7. An anti-theft device according to any one of claims 1 to 6, characterised in that the liquid permeable barrier (34, 71) comprises a perforated member extending across the tubular member (31, 68) adjacent the proximal end (32, 69).
8. An anti-theft device according to claim 7, characterised in that the perforated member (34, 71) comprises a mesh.
9. An anti-theft device according to any one of claims 1 to 8, characterised in that the cylindrical wall of the tubular member (31, 68) tapers towards the proximal end (32, 69).

10. An anti-theft device according to any one of claims 1 to 9, characterised in that the cylindrical wall is a mesh.
11. An anti-theft device according to any one of claims 1 to 10, characterised in that the inner part (40, 74) and the outer part (35, 72) have corresponding male and female configurations (75, 73), whereby the outer part (35, 72) of the device (30, 67) may be engaged by a filler cap (16, 63) configured to engage a filler pipe (11, 60) to which the inner part (40, 74) is adapted to engage.
12. An anti-theft device according to claim 11, characterised in that the male and female configurations comprise spigots (42) and apertured end face (36).
13. An anti-theft device according to claim 12, characterised in that the anti-theft device (30) is adapted to engage a neck-end (10) of a filler pipe (11).
14. An anti-theft device according to claim 11, characterised in that the male and female configurations comprise screw threads (75, 73).
15. An anti-theft device for the prevention of the theft of fuel from a motor vehicle or other motor driven apparatus substantially as hereinbefore described with reference to and as illustrated in Figs. 3 to 5 or Fig. 8 of the accompanying drawings.





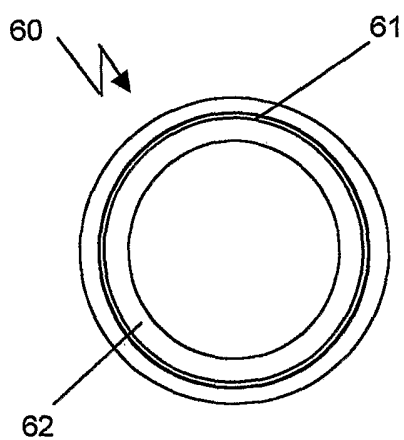


Fig. 6

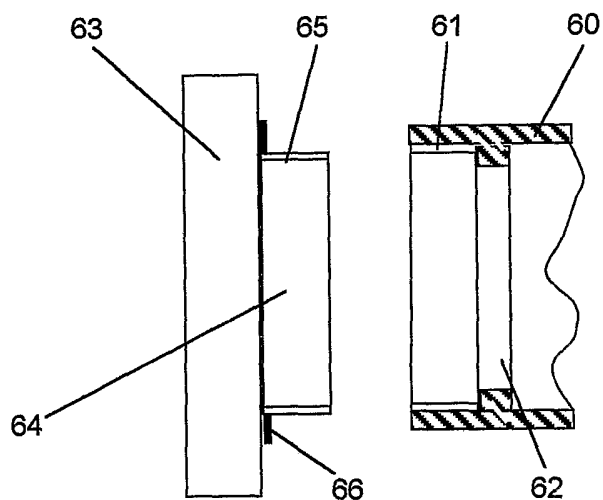


Fig. 7

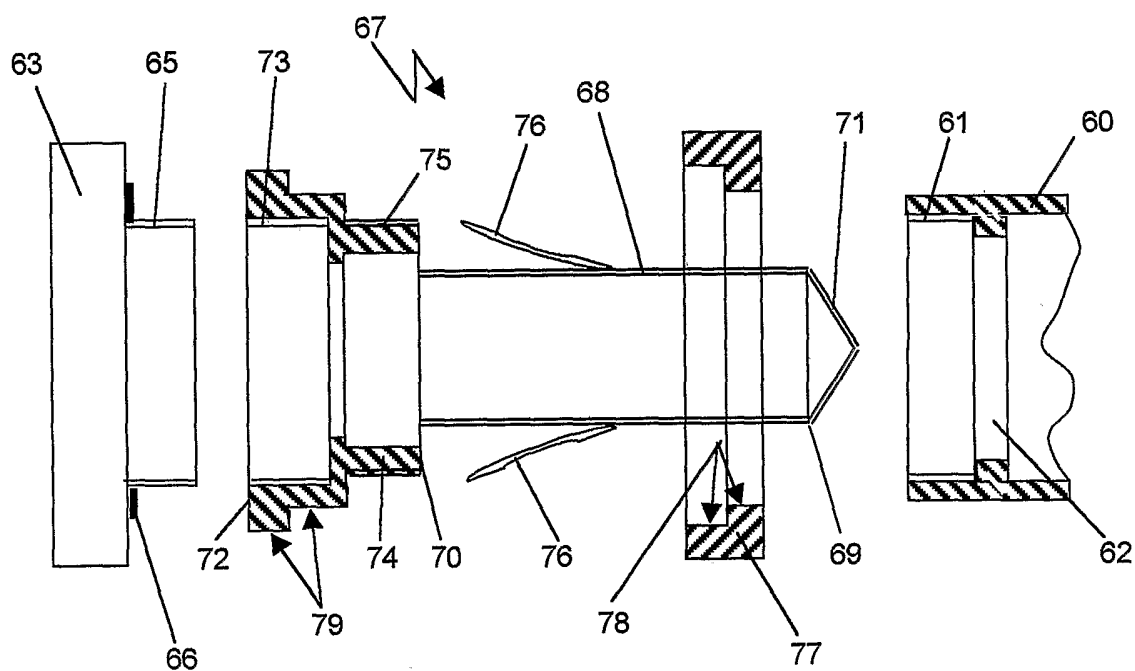


Fig. 8