

# (12) UK Patent Application (19) GB (11) 2 372 798 (13) A

(43) Date of A Publication 04.09.2002

(21) Application No 0100863.0

(22) Date of Filing 11.01.2001

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(51) INT CL<sup>7</sup>

**B60C 29/06 23/00**

(52) UK CL (Edition T )

**F2V VS41**

(56) Documents Cited

**GB 2304844 A**

**US 4103549 A**

**US 3283584 A**

**EP 0575165 B**

**US 3419040 A**

(58) Field of Search

UK CL (Edition T ) **B7C CSF , F2V VS41**

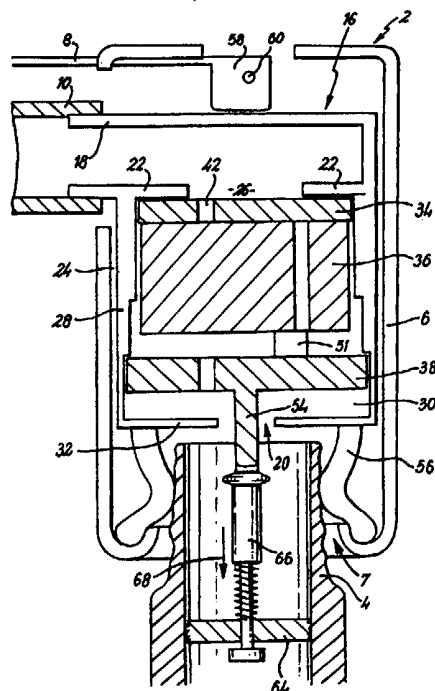
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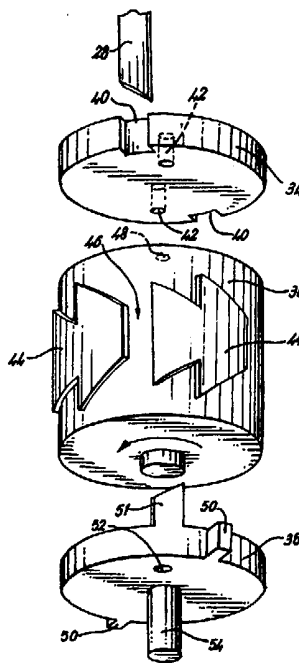
(54) Abstract Title

**Apparatus for checking and or adjusting fluid pressure of a tyre**

(57) An apparatus comprises a nozzle 2 placed over a filler neck 62 of a vehicles spare tyre, a lever 8 rotated over a block 58 which urges a cartridge 16 towards an opening 7 to seal the nozzle 2 on the filler neck 62, and a pin 66 of a tyre valve 64 contacts an actuator rod 54 and urges it into the cartridge 16 which moves a locking member 36 and a piston 34 into contact with a wall 22. Pressurised air is fed through a pipe 10 into cartridge 16 and onto piston 34 which contacts locking member 36 and closes ports 42. The pressure increases until the piston 34 abutting locking member 36 which has arrow like projections 44 contacting projections 51 urges an actuator 38 towards wall 32 to a point where locking member 36 rotates and moves an actuator 38 and actuating rod 54 to open the valve 64 by moving pin 66. Rotation of locking member 36 aligns ports 42, 48 and 50 so that air can flow into the tyre.



**Fig. 2**



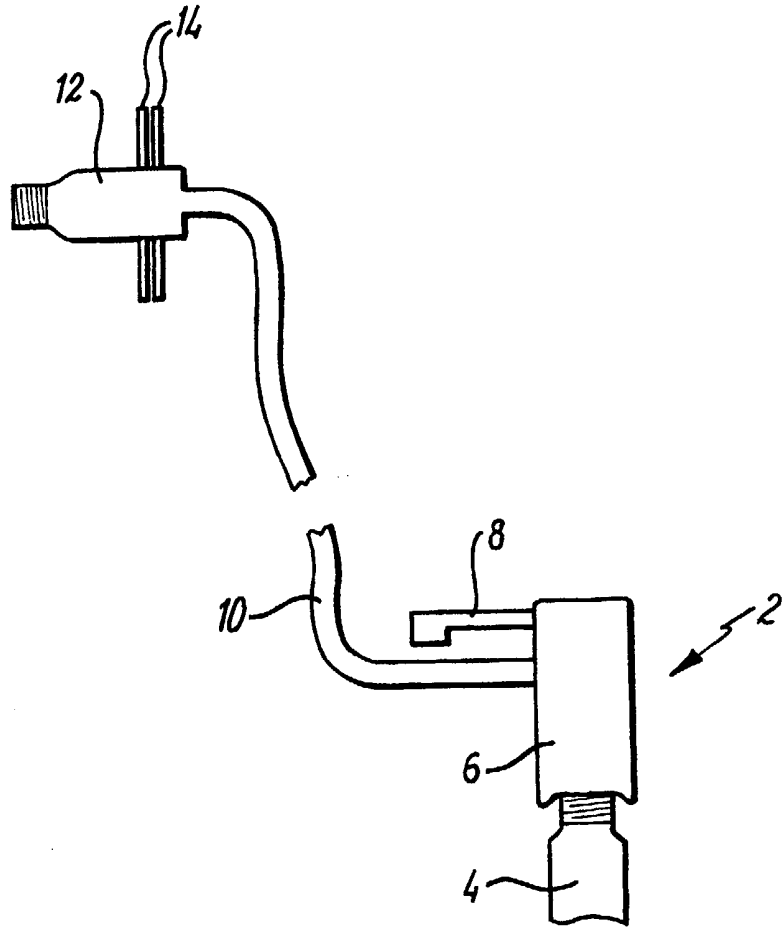
**Fig. 3**

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

**GB 2 372 798 A**

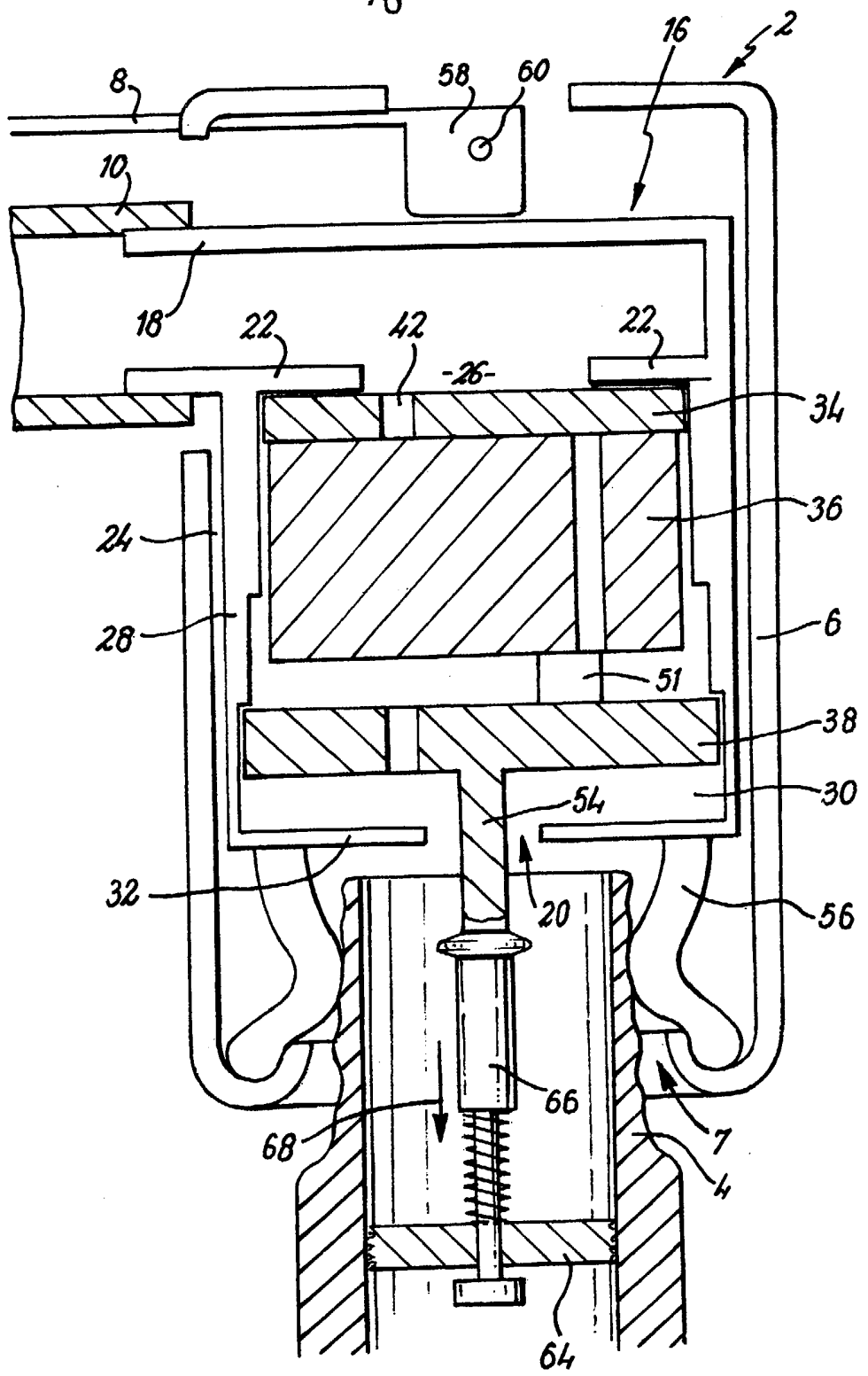
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**FIG. 1**



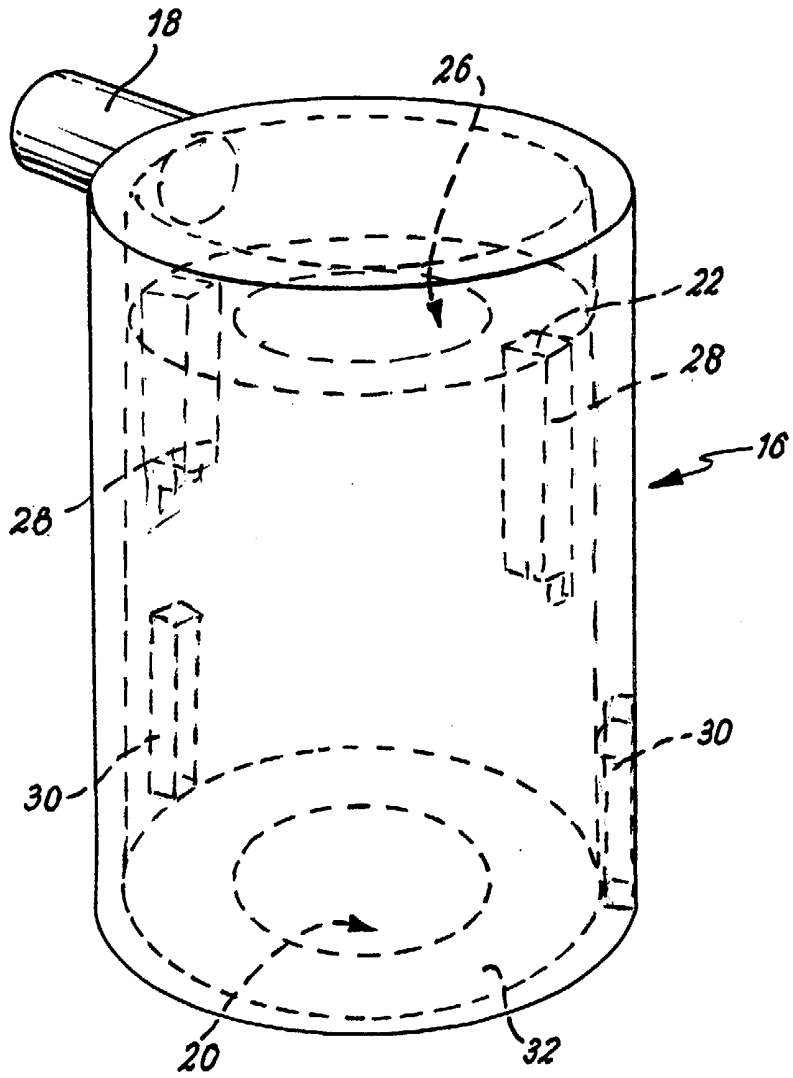
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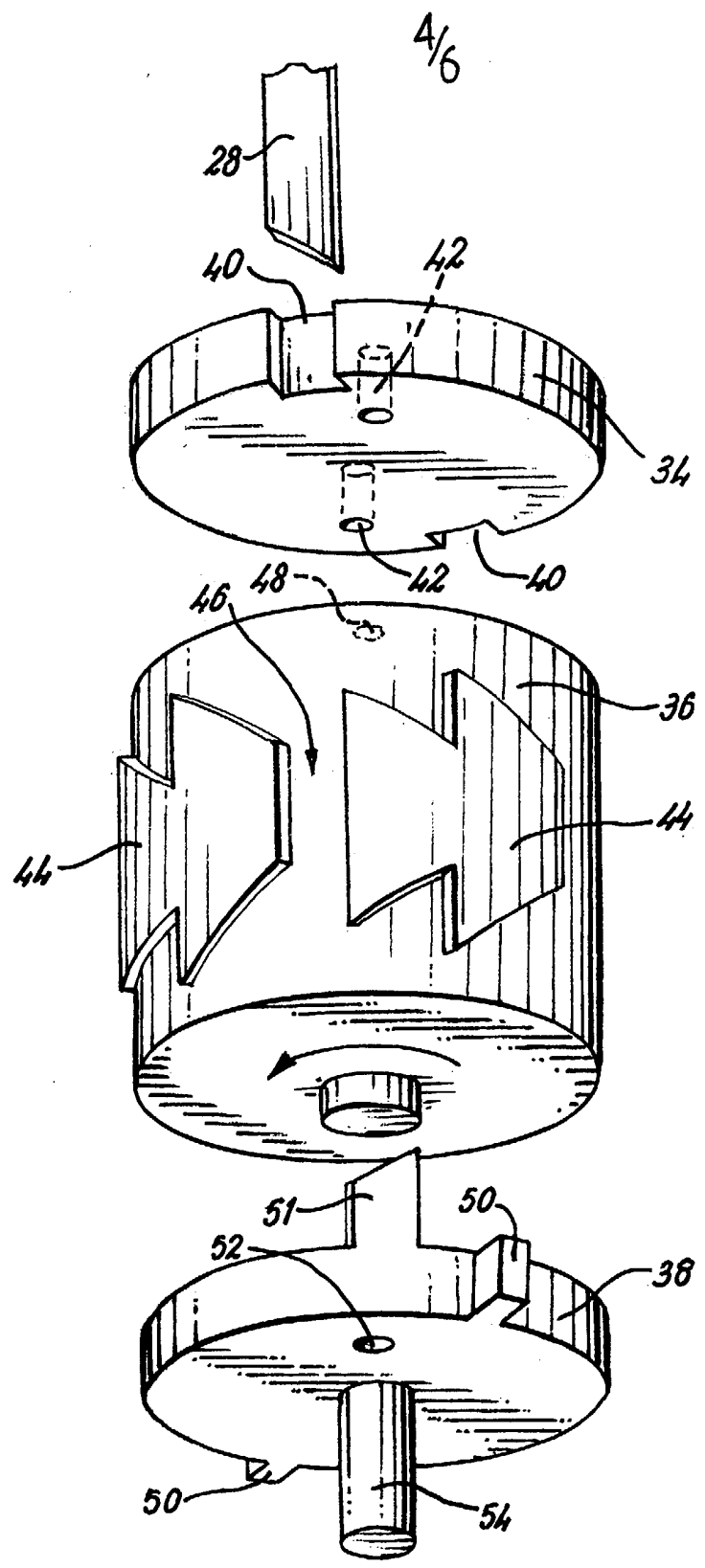
**FIG. 2**

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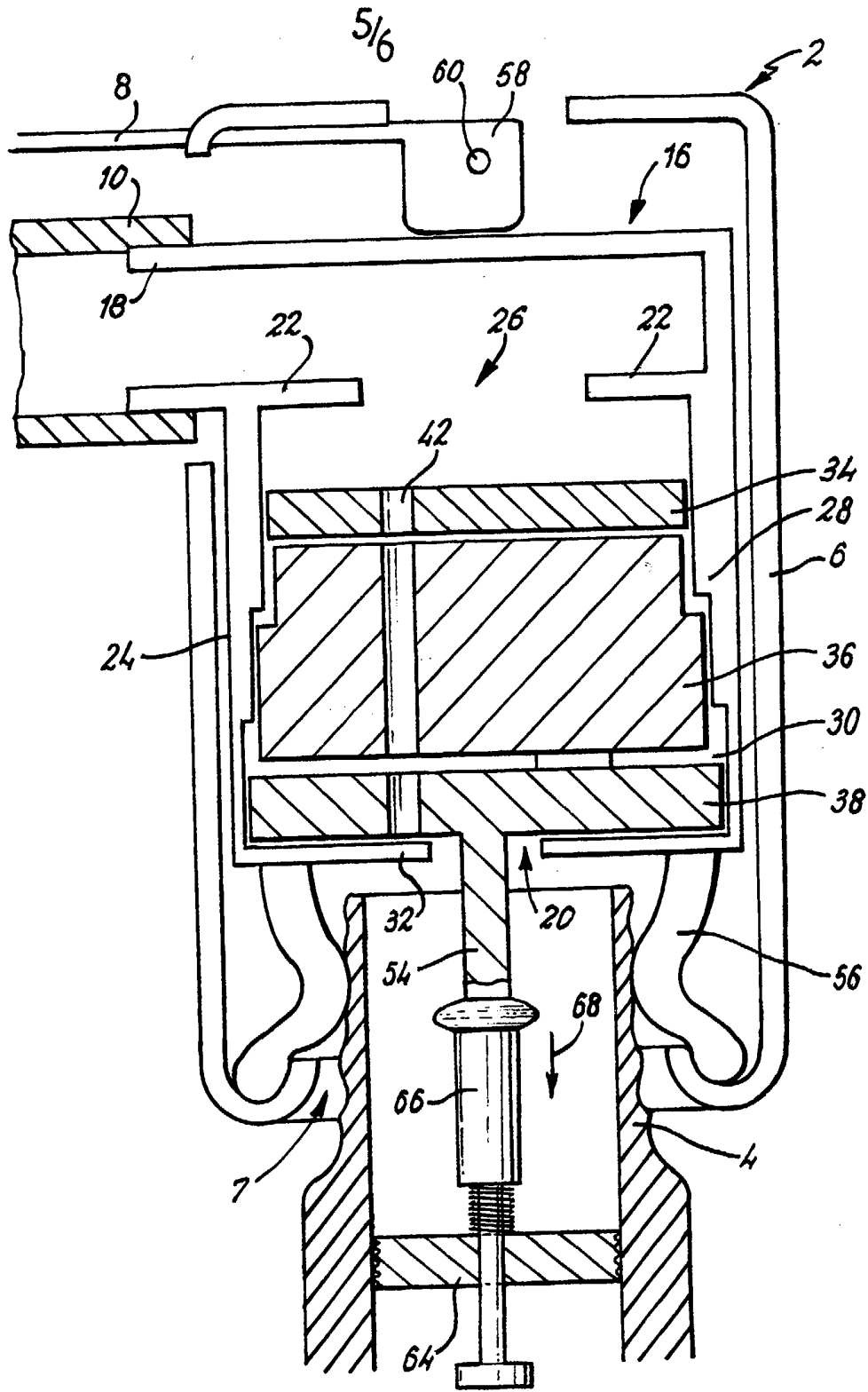
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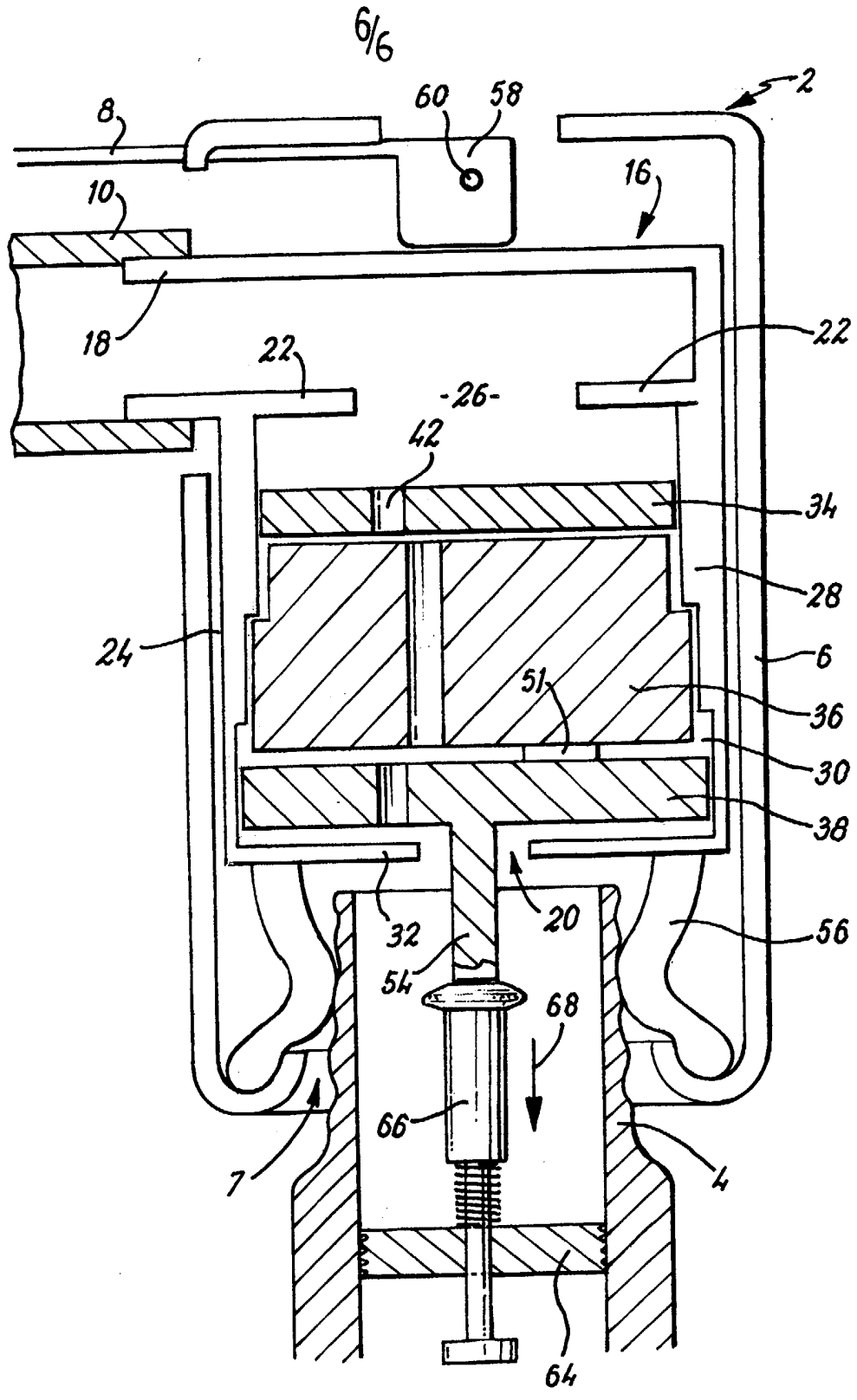
**FIG. 3**



**FIG. 4**



**FIG. 5**



**FIG. 6**

**APPARATUS FOR CHECKING AND/OR ADJUSTING FLUID****PRESSURE IN A RECEPTACLE FITTED WITH A VALVE**

The present invention relates to apparatus for checking and/or adjusting fluid pressure in a receptacle fitted with a valve, particularly, but  
5 not exclusively, air pressure in the spare tyre of a vehicle where the spare tyre is fitted with a non-return valve.

It is important that the spare tyre of a vehicle, such as a motor car, is correctly inflated so that it can be deployed when required. To ensure this it is advisable that the air pressure in the spare tyre is regularly checked and  
10 if necessary adjusted.

Often, the spare tyre of a vehicle is stored in a difficult to access position, for example under the floor of a luggage compartment or underneath the vehicle itself. This makes checking and adjusting air pressure in the spare tyre inconvenient. A consequence is that the spare  
15 tyre pressure is not checked regularly, or at all. This increases the risk of the tyre becoming under inflated and thus unsuitable for use.

In consideration of this problem the inventor has proposed using a tube extending between the spare tyre of a vehicle and a more accessible location than the tyre to enable the tyre pressure to be checked and  
20 adjusted remotely from the more accessible position. There is, however, a problem with this.

Pneumatic vehicle tyres include a filler neck fitted with a non-return



valve operative to prevent escape of air from the tyre. The non-return valve may be opened by depressing a pin extending in the filler neck of the tyre. Conventional nozzles for filling tyres with air include a mechanical means for depressing the non-return valve pin to open the valve to allow air to pass into and out of the tyre.

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A tube used for remote checking and adjusting of tyre pressure could be fitted to a tyre using a conventional tyre filling nozzle arranged to hold the tyre's non-return valve open. A problem with this is that the integrity of the nozzle, tube and any fitting on the opposite end of the tube to the tyre is then relied upon to maintain the pressure of air in the tyre. This increases the risk that the tyre may become deflated, possibly defeating the object of providing the tube in the first place.

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Alternatively the tube could simply be fitted over the filler neck of the tyre and air pressure in the tube relied upon to force open the tyre's non-return valve to fill the tyre. This is also unsatisfactory. To open the non-return valve it is necessary to raise the pressure in the tube considerably above normal tyre pressure. When the non-return valve opens the tyre fills very rapidly making it difficult to control the amount of inflation of the tyre. Also, it is not possible to determine the tyre pressure using the tube as the tyre's non-return valve is only open when the pressure in the tube considerably exceeds that in the tyre.

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The present invention has been made in consideration of these

problems, which it aims to overcome, or at least reduce.

According to the present invention there is provided apparatus for use in adjusting and/or checking the fluid pressure in a receptacle fitted with a valve, the apparatus comprising a fluid operable actuator for operating the  
5 valve.

The apparatus enables a valve, such as the non-return valve of a spare tyre, to be remotely opened by means of fluid conducted in a tube, particularly by a tube for connecting a supply of air for inflating the tyre. Providing means to open the non-return valve of a spare tyre means that the  
10 valve need only be opened when it is desired to check and/or adjust the air pressure within the tyre, and allows the pressure in the tyre to be accurately determined.

The apparatus preferably comprises a nozzle. The apparatus preferably includes a piston disposed in a cylinder for providing a force in  
15 response to fluid pressure. The piston may be comprised in or arranged to operate the actuator. The apparatus preferably includes a locking means operative to lock the actuator in a predetermined operative state. The locking means may comprise a cylindrical member having outward radial projections disposed in a cylindrical cartridge having inward radial  
20 projections arranged to cooperate with the projections on the cylindrical member. The cartridge may also house a piston and an actuator member. The actuator member may include formations operative to cooperate with

formations on the locking member. The piston may include one or more ports by means of which fluid may pass through the piston. The locking member may be arranged to close the port or ports in certain operational states. Preferably the apparatus can be operated with a single fluid supply for operating the actuator and for filling the receptacle with fluid.

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Preferably the apparatus is for use in checking and/or adjusting the air pressure in a pneumatic tyre fitted with a standard spring loaded normally closed non-return valve. In this case the actuator is preferably operable between at least two operational states, one where a tyre valve may be held open and another where a tyre valve is allowed to remain closed. A locking means is preferably provided to retain the actuator in the operative state in which it may hold a valve open. The apparatus may be arranged so that when mounted on a tyre and supplied with a first blast of air it opens the tyre valve and then holds the valve open until supplied with a second blast of air. By blast of air is to be understood supplying air to the apparatus for a short time and then removing the supply. The apparatus may include means for sealingly engaging it with the filler neck of a tyre.

The apparatus may further comprise a length of pipe for supplying fluid to the nozzle. The free end of the length of pipe may comprise a filler which may include a non return valve. The apparatus may include a filter, especially a particle filter. This may be fitted to the apparatus, in particular it may be fitted to the pipe or nozzle. The apparatus is particularly suited

for fitment to vehicles, with the nozzle fitted to the spare tyre and the filler mounted in an accessible place on the vehicle to enable the spare tyre pressure to be conveniently checked and adjusted.

In order that the invention may be more clearly understood an embodiment thereof will now be described, by way of example, with reference to the accompanying drawings of which:

Figure 1 is a schematic view of apparatus according to the invention;

Figure 2 is a cross-sectional view of a nozzle according to the invention mounted on a filler neck of a tyre with the nozzle in a first operational state;

Figure 3 is a perspective view of the cartridge of the nozzle of Figure 2 in which hidden detail is shown by broken lines;

Figure 4 is a an exploded perspective view of components of the nozzle of Figure 2;

Figure 5 is a view similar to Figure 2 with the nozzle in a second operational state; and

Figure 6 is a view similar to Figure 2 with the nozzle in a third operational state.

Referring to Figure 1, a nozzle, generally 2, is shown fitted onto the filler neck 4 of a vehicle spare tyre (not shown). The nozzle comprises a body 6 on which a lever 8 is pivotally mounted. One end of a flexible pipe 10 is connected to the nozzle 2. The opposite end is connected to a filler

12, similar to a tyre filler neck. The filler 12 includes two mounting nuts 14 to enable it to be mounted onto the body or chassis of a vehicle. Typically the filler 12 would be mounted near to the fuel filler of a vehicle to prompt checking of the vehicle's spare tyre pressure when refuelling. The filler 12 may, optionally, include a non-return valve (not shown) of the type normally fitted to a tyre filler neck and operative to allow air to flow through the filler 12 into the pipe 10, but not out unless the valve is held open.

The nozzle 2 is illustrated in more detail in Figures 2 to 6. Referring to these Figures the body 6 is generally cylindrical in shape and defines an aperture 7 in one end. The body 6 houses a generally cylindrical cartridge 16. Extending radially outwards from towards one end of the cartridge is a short tube formation 18 to which the flexible pipe 10 is connected. An aperture 20 is defined in the face of the opposite end of the cartridge 16. About a quarter of the distance along the length of the cartridge 16 from the end from which the tube 18 extends a wall 22 extends radially inwardly from around the circumference of the inside of the side wall 24 of the cartridge. The wall 22 defines an aperture 26 therethrough.

Two projections 28 extend longitudinally along opposite sides of the side wall 24 of the cartridge 16 from the wall 22 about half way to the end of the cartridge 16 where aperture 20 is formed. The projections 28 are substantially rectangular in cross-section. The ends of the projections 28 remote from the wall 22 are angled relative to the wall 22. Spaced from the

end of each projection are two opposed longitudinally extending slots 30. The slots extend in the side wall 24 of the cartridge 16 to the end wall 32 of the cartridge 16.

5 The cross-sectional views shown in Figures 2,5 and 6 are taken along a plane extending through both the projections 28 and both the slots 30.

Disposed within the cartridge between walls 22 and 32 are, starting from the wall 22, a piston 34, a locking member 36 and an actuator 38.

10 The piston 34 comprises a substantially circular disc with two opposed slots 40 formed in its circumference and two ports 42 formed by apertures extending between its opposed faces. The piston 34 is slidably fitted into the cartridge with the projections 28 received into the slots 40 to prevent relative rotation of the piston 34 and cartridge 16. The peripheral edge of the piston 34 forms a substantially air-tight seal with the inside of the cartridge 16.

15 The locking member 36 is generally cylindrical and disposed between the piston 34 and actuator 36. The diameter of the locking member 36 is less than that of the piston. This enables the locking member to accommodate a number of spaced apart arrow-like projections 44 on its curved surface. Slots 46 into which the projections 28 may be received are defined between each arrow-like projection. The locking member 36 also includes ports 48 extending between its opposed faces. The locking member 36, as with the piston 34, may move longitudinally within the

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cartridge 16. When the locking member 36 is positioned so that the projections 28 extend between the arrow-like formations 44 this prevents relative rotation of the locking member 36 and the cartridge 16. However, the locking member 36 can move longitudinally along the cartridge 16 sufficiently towards the end wall 32 so that the projections 28 no longer extend between the arrow-like formations 44. In this position the locking member 36 may rotate relative to the cartridge 16. The periphery of the locking member 36 does not form an air-tight seal with the inside of the cartridge 16.

The actuator 38 comprises a substantially circular disk having two lugs 50 extending from opposite points on its circumference. The lugs 50 are configured to be received into the slots 30 of the cartridge 16. The actuator 38 may move longitudinally within the cartridge 16, but relative rotation is prevented by the lugs 50 and slots 30. The periphery of the actuator 38 does not form an air tight seal with the cartridge 16. The actuator 16 includes ports 52 formed by apertures extending between its opposed faces. An actuator rod 54 extends from the face of the actuator disk facing, and through, the aperture 20. Two projections 51 extend axially from opposed points on the periphery of the actuator 38, towards the locking member 36. The projections are arranged to extend around the outside of the locking member 36, between the locking member 36 and the inside surface of the cartridge 16. The ends of the projections 51 are angled

relative to the faces of the actuator and are configured to cooperate with the arrow-like formations 44 of the locking member 36.

5 The cartridge 16 is disposed in the body 6 of the nozzle 2 between a resilient collar (for example a rubber collar) 56 and an over centre block 58 . The over centre block 58 is mounted on the body 6 by means of a pivot 60, and may be pivoted by means of the lever 8 to urge and lock the cartridge 16 towards the opening 7 at the end of the body 6. This causes the collar 56 to deflect or expand radially inwardly and form an airtight seal between the nozzle and a tyre filler neck 4 received into the nozzle.

10 The filler neck 4 includes a non-return valve 64 comprising a spring loaded pin 66 which when moved against its spring loading, in the direction of arrow 68, opens the valve.

15 In use the nozzle 2 is placed over the filler neck 62 of a spare tyre and the lever 8 moved to rotate the over centre block 58 to urge the cartridge 16 towards the opening 7 to form a seal between the nozzle 2 and filler neck 4.

20 When initially fitted to a filler neck the nozzle 2 adopts the operative position shown in Figure 2. The pin 66 of the tyre non-return valve 64 contacts the actuator rod 54 and urges it into the cartridge 16. This moves the locking member 36 and piston 34 towards the wall 22, until the piston 34 contacts the wall 22. The tyre valve 64 remains closed. This is the normal state of the nozzle 2. As the tyre valve 64 remains closed the nozzle



2 and pipe 10 are not pressurised so air from the tyre cannot leak out through the apparatus.

When it is desired to check and/or adjust the air pressure in the tyre a user connects a normal tyre inflation nozzle to the filler 12. Air is then fed  
5 into the filler 12 and along the pipe 10. The air pressure in the cartridge 16 is increased above the piston 34. The ports 42 in the piston are closed by the top of the locking member 36 which is urged against the piston 34 by the pin 66. The build up of air pressure above the piston urges the piston down the cartridge 16 towards the end wall 32. The piston 34 abuts the  
10 locking member which is also urged towards the end wall 32. This causes the arrow like projections 44 of the locking member 36 to contact the projections 51 of the actuator 38 and the locking member 36 to urge the actuator towards the end wall 32 and the actuator rod 54 to urge the valve pin 66 into the filler neck 4, opening the valve 64.

15 As the locking member 36 moves down the cartridge 16 a point is reached at which the arrow like projections 44 move beyond the projections 28 in the cartridge 16, permitting the locking member 36 to rotate. The configuration of the projections 51 and arrow like projections 44 then causes the locking member 36 to rotate allowing the actuator 38 and  
20 locking member 36 to move towards each other. As the locking member 36 rotates the ports 42 and 48, in the piston 34 and locking member 36 respectively, align and the arrow like formations 44 pass under the ends of

projections 28. This state is illustrated in Figure 5.

As the tyre valve 64 is now open, and the ports 42,48,52 in the piston 34, locking member 36 and actuator 38 are all aligned air can flow from the pipe 10 into the tyre. If it is desired to fill the tyre, therefore, the user continues to supply air into the pipe 10.

When a desired amount of air has been fed into the tyre, or as soon as the state illustrated in Figure 5 is adopted, the flow of air into the pipe 10 is ceased by the user. As the flow ceases the actuator 30 will be urged into the cartridge 16 by the valve pin 66. However, as the locking member 36 has now been rotated relative to the cartridge 16 it will not return to the position illustrated in Figure 2. Rather, it adopts the position shown in Figure 6 where the arrow like formations 44 abut the lower end of the projections 28. This holds the tyre valve 64 open. Now the piston 34 is floating freely above the locking member 36 which allows air to pass either through the locking member port 48, or around the locking member 36, between the locking member 36 and piston 34 and through the ports 42 in the piston 34. The space above the piston 34 and hence the pipe 10 will now be maintained at the pressure of the tyre, enabling the tyre pressure to be measured from the filler 12.

To close the tyre valve 64 the user briefly supplies air to the filler 2 again. As air suddenly flows into the cartridge 16 this increases pressure above the piston 34 and urges the piston 34 towards the locking member

36 closing ports 42. The piston 34 then urges the locking member 36 towards the end wall 32, as shown in Figure 5. As this happens then, as before, the projections 51 on the actuator 38 cause the locking member 36 to rotate, this time until the slots 46 between the arrow like members 44 on the locking member 36 are aligned with the projections 28. When air is no longer supplied to the filler 12 the valve pin 66 will urge the components in the cartridge 6 back to the position shown in Figure 2, allowing the tyre valve 64 to close. This process may be repeated as necessary until the desired tyre pressure is obtained. Air may be allowed to flow out of the tyre when the nozzle is in the state shown in Figure 6. Sufficient ports are provided in the piston 34, locking member 36 and actuator 38 to allow repeated operation.

The apparatus allows the pressure of a tyre, particularly a spare tyre, to be checked and/or adjusted remotely and accurately and for the tyre to remain isolated from the apparatus when testing is not being carried out.

In an alternative embodiment the end wall 32 is deleted, to facilitate moulding. Stops may be incorporated to prevent escape of the piston and other sliding components. In this embodiment the side wall 24 is thickened so that its lower edge can compress the collar 56.

The above embodiments are described by way of example only. Many variations are possible without departing from the invention.

CLAIMS

1. Apparatus for use in adjusting and/or checking the fluid pressure in a receptacle fitted with a valve, the apparatus comprising a fluid operable actuator for operating the valve.
2. Apparatus as claimed in claim 1 comprising a nozzle.
3. Apparatus as claimed in either claim 1 or 2 comprising a piston disposed in a cylinder for providing a force in response to fluid pressure.
4. Apparatus as claimed in any preceding claim comprising a locking means operative to lock the actuator in a predetermined operative state.
5. Apparatus as claimed in claim 4, wherein the locking means comprises a cylindrical member having outward radial projections disposed in a cylindrical cartridge having inward radial projections arranged to cooperate with the projections on the cylindrical member.
6. Apparatus as claimed in claim 5, wherein the cartridge houses a piston and an actuator member.
7. Apparatus as claimed in claim 6, wherein the actuator member includes formations operative to cooperate with formations on the locking member.
8. Apparatus as claimed in either claim 6 or 7, wherein the piston includes one or more ports by means of which fluid may pass through

the piston.

9. Apparatus as claimed in claim 8, wherein the locking member is arranged to close the port or ports in certain operational states.
10. Apparatus as claimed in any preceding claim operable with a single fluid supply for operating the actuator and for filling the receptacle with fluid.
11. Apparatus as claimed in any preceding claim for use in checking and/or adjusting the air pressure in a pneumatic tyre fitted with a standard spring loaded normally closed non-return valve wherein the actuator is operable between at least two operational states, one where a tyre valve may be held open and another where a tyre valve is allowed to remain closed and a locking means is provided to retain the actuator in the operative state in which it may hold a valve open.
12. Apparatus as claimed in claim 11 arranged so that when mounted on a tyre and supplied with a first blast of air it opens the tyre valve and then holds the valve open until supplied with a second blast of air.
13. Apparatus as claimed in either claim 11 or 12 including means for sealingly engaging it with the filler neck of a tyre.
14. Apparatus as claimed in claim 2 or any of claims 3 to 13 when dependent, directly or indirectly, upon claim 2 including a length of pipe for supplying fluid to the nozzle.
15. Apparatus as claimed in claim 14 wherein a free end of the length of

pipe includes a filler.

16. Apparatus as claimed in claim 15, wherein the filler includes a non-return valve.
17. Apparatus as claimed in any preceding claim including a particle filter.
18. Apparatus for use in adjusting and/or checking fluid pressure in a receptacle fitted with a valve substantially as herein described with reference to the accompanying drawings.



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Application No: GB 0100863.0  
Claims searched: 1 - 18

Examiner: Stephen Hart  
Date of search: 25 June 2002

### Patents Act 1977 Search Report under Section 17

#### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.T): B7C CSF; F2V VS41  
Int Cl (Ed.7): B60C 23/00, 29/06; F16K  
Other: Online: WPI, EPODOC, PAJ

#### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2304844 A  (NVB) Figs 1, 3, 4 & 7, page 3 line 32 - page 4 line 2 and page 5 line 26 - page 7 line 21, noting actuator 12, piston 8, bore holes 9 & 10 through piston and lever arm 19 which locks the actuator in a predetermined state.	1 - 4, 10, 14 & 15
X	EP 0575165 B1  (STREET & SAWYER) figs 1 - 3 and col 2 line 46 - col 3 line 46, noting plug 50 with passages 52, extension 38 with pin 42, sleeve 2 with helical slot 18 spring seat 24 and rubber boot 44 to preclude ingress of foreign material.	1 - 6, 8 & 17
X	US 4103549  (SCHMIDT) figs 1 & 3, col 1 line 64 - col 2 line 2, col 2 line 59 - col 3 line 5 and col 3 lines 26 - 33, noting helical cam arrangement between cylindrical extension of a reduced diameter of piston 7 and shaft 8.	1 - 5
X	US 3419040  (THIBODEAUX) figs 1 - 3, col 2 lines 54 - 59, col 3 lines 32 - 40 and col 3 line 68 - col 4 line 2, noting sealing element 31 engaging bore 32, projection 45 on stem 29 engaging slot 36b in sleeve 36.	1 - 4

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



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**Application No:** GB 0100863.0  
**Claims searched:** 1 - 18

**Examiner:** Stephen Hart  
**Date of search:** 25 June 2002

Category	Identity of document and relevant passage	Relevant to claims
X	US 3283584 (COFFING) figs 3 & 10, col 3 lines 62 - 74 and col 5 lines 60 - 63, noting piston 1 actuating rod 19, drive pin 16 & 46 engaging helical slot 17 & 45 respectively	1 - 4

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.