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(54) IMPROVEMENTS IN OR RELATING TO ROTARY COCKS

(71) We, LEGRIS FRANCE S.A., a French Body Corporate of 77330 OZOIR-la-FERRIERE, France, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to cocks. Cocks generally comprise a body wherein there is rotatably mounted a shut-off member which is connected by a rotating spindle to a manipulation member exteriorly of the body.

In previously proposed cocks, the spindle which turns in the body is fixed against axial movement in the latter by means of various devices such as bolts, screws, washers, sprung keepers, radial or tangential pins, encasings, or means bearing on a portion of the spindle and acting as turning stops.

It has also been proposed to utilise flat or round clips in the shape of a fork or yoke which pass through the body of the cock so as to be engaged with a neck or a shoulder of the spindle in order to hold the spindle. These means which are economical under certain precise manufacturing conditions are employed to an ever increasing degree; but they have disadvantages. These disadvantages reside in the fact that the clearance in the body into which the clips are introduced in order to lock the spindle against axial movement are difficult to produce and necessitate an additional, costly, machining operation of drilling or milling when bodies made of conventional metals are involved. Such machining is only avoided in bodies made of moulded plastics materials, but cocks of this kind represent only a small percentage of those used in valves and fittings.

A further drawback resides in the fact that this machining operation at the intersection with the bore intended for the

spindle causes the formation of sharp cutting edges and of barbs which have to be removed, and desirably rounded-off to enable the sealing joint to engage. Removal of these edges or barbs requires an additional operation resulting in increased costs, but it is quite impossible to obtain a radius at the intersections, at a reasonable cost. Recourse is then had to expedients which consist in providing a number of different diameters for the spindle housing with the smallest diameter receiving the seal. This solution greatly complicates the shapes of the housing and of the spindle but, above all, since the actual guidance of the spindle is reduced and less satisfactory, one is obliged to extend the length of the spindle in the body in order to obtain adequate guidance.

The other devices mentioned above do not possess the disadvantages of the clips which pass through the body, but they have the drawback of being fairly expensive to machine and clearly more expensive to instal.

According to the present invention, there is provided a cock comprising a body, a shut-off member rotatably mounted in the body and connected via a spindle to a manipulation member, the spindle being mounted in a bore of the body, the body having a planar support surface onto which the bore opens and which is at opposite sides of the bore by two parallel edge formations, and the spindle having a shoulder level with the support surface, and a locking member co-operating with the spindle and with the support surface for securing the spindle in the body, the locking member having opposed edge portions engaged with said edge formations such that the locking member is held on the body by such engagement, and the locking member having an aperture through which the spindle extends.

Embodiments of the invention will now

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be described, by way of example only, with reference to the accompanying diagrammatic drawings, in which:

5 *Figure 1* is a view in longitudinal section of a cock according to the invention;

Figure 2 is a side view of the cock shown in *Figure 1*;

10 *Figure 3* is a fragmentary section showing the mounting of a spindle equipped with a rotating O-ring seal;

Figure 4 is a section similar to *Figure 3* but with a seal installed in the cock body;

15 *Figure 5* is a view in fragmentary section of a variant of *Figure 3* and comprising an anti-friction washer;

Figure 6 is a view in perspective of one mode of mounting a locking member on a head of the cock body;

20 *Figure 7* is an elevation of a further mode of mounting a locking member on the head of the cock body;

Figure 8 is a view in perspective of an anti-friction washer having two slits;

25 *Figure 9* is a view in perspective of an anti-friction washer having one slit;

Figure 10 is an exploded view in perspective of a modified embodiment of a locking member and its mounting on the head of the cock body;

30 *Figure 11* is a view in transverse section showing the components of *Figure 10* when assembled;

35 *Figure 12* is an exploded view in perspective of a modified embodiment of a locking member and its mounting on the head of the cock body;

Figure 13 is a view in transverse section showing the components of *Figure 12* when assembled;

40 *Figure 14* is a view in perspective of a locking member provided with an added stop;

45 *Figure 15* is a sectional view of a manipulation member comprising two flexible tabs which cooperate with a stop;

Figure 16 is a view in longitudinal section of a manipulation member and of its mounting on the spindle;

50 *Figure 17* is a sectional view of the head of the cock body, perpendicular to the spindle, and showing the crimping of the locking member to the head;

55 *Figure 18* is a view in perspective of the locking member and showing its fixing by a bent lug or a wedge-shaped crimped portion;

Figure 19 is a view in perspective of a locking member through which passes a pin or a fastening screw which acts as a stop;

60 *Figure 20* is a view in perspective of a locking member comprising a pin or a fastening screw mounted in an aperture of the member;

65 *Figure 21* is a view in perspective of a locking member comprising a fastening

screw provided with a collar; and

Figures 22 to 24 are plan views of the locking member showing various forms of aperture;

70 In *Figures 1 and 2* there is shown a cock comprising a body 1 wherein there is rotatably mounted a spherical shut-off member 2 bearing against sealing gaskets 3, 3a and connected by a spindle 4 to an external manipulation member in the form of a handle 5, the spindle 4 being connected to the shut-off member by a square drive means 6.

75 The spindle 4 is engaged in a first bore 7 of the body and in a second bore 8 of larger diameter which opens at the outside of the body and is intended to receive a boss 4a of the spindle 4 having a neck 9 wherein a sealing gasket 10 is engaged.

80 At its upper portion the spindle 4 is connected with the handle 5 by means of the square drive means 6 or any other equivalent means.

85 The body 1 of the cock is extended by a head 1a pierced by the bore 8 and having a planar support surface 12 extending around the opening of the bore 8 and against which bears a planar surface 13a of a locking member 13 having an aperture in the form of a slot 13b open at one end (*Figures 1 and 6*) by which it is engaged on a neck 4b of the spindle 4. A shoulder 4c defined beneath the neck 4b is level with the surface 12 and bears against the surface 13a of the locking member 13, thereby preventing any axial displacement of the spindle 4 while permitting its rotation by means of the handle 5.

90 The locking member 13, which is formed from a plate, has two turned-in parallel edge portions 14, 14a which form two channels in which engage edge formations in the form of parallel flanges 15, 15a of corresponding shape, which are provided at opposite sides of the head 1a and which define the surface 12 of the cock body. On one of its edges, the locking member has a folded-over lug 16 which forms a stop against which a surface of the handle 5 can abut so as to limit the rotation of the shut-off member 2 between predetermined positions.

115 In *Figure 6* there is shown a method of mounting the locking member 13 on the head 1a of the body, wherein the locking member 13 is slid onto the head 1a in the direction of arrow F, in a plane which is perpendicular to the axis of manipulation, so that the flanges 15, 15a are engaged in the channels defined by the inturned edge portions 14, 14a of the locking member 13, the locking member 13 being a tight fit on the head 1a of the body.

120 Mounting of the locking member is effected when the spindle 4 is situated in the bores 7 and 8 of the body with its shoulder 4c level with the surface 12.

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The sliding movement is stopped when the bottom portion of the slot 13b of the locking member 13 abuts the spindle 4.

It can be seen that this method of assembly is simple and very economical, since it is to all intents and purposes instantaneous, requires no finishing machining and simultaneously provides means for holding the spindle and a precise stop for the handle. The edges of the body 1 and the portions of the locking member engaged therewith cooperate to prevent rotary entrainment of the member 13 about the manipulation axis, the member 13 thus being forcibly held against torque resulting from pressure applied by the manipulation handle against the stop.

A different method of fitting the locking member 13 is illustrated in Figure 7. In this method the edge portions 14, 14a are prepared in a spread apart manner so as to be engaged on the flanges 15, 15a of the head 1a of the body, as is shown in broken lines in Figure 7, the locking member 13 being in contact with the support surface 12 of the body and the spindle 4 being engaged in the slot 13b. The edge portions 14, 14a are then turned down over the flanges 15, 15a of the body by deformation by means of pliers or a suitable tool.

This manner of assembly is performed simultaneously and is very fast and efficient. Furthermore, it has the same advantages and characteristics as those described in conjunction with the preceding method.

In Figure 3 there is shown a spindle 4 a boss 4a of which is disposed in the bore 8 with its lower surface 4d supported by a shoulder 8a of the body. The upper surface 4c of the boss 4a bears against the surface 13a of the locking member 13, the surface 4c being level with the support surface 12 of the body. This arrangement enables the boss 4a to be held captive between the body and the locking member so as to prevent any axial displacement of the spindle 4.

A neck 9 in which a sealing gasket 10 is engaged is provided on the boss 4a. An entry radius r for the engagement of the gasket 10 is provided at the end of the bore 8.

A further embodiment of the spindle 4 is illustrated in Figure 4 wherein a neck 4b is provided in which the locking member 13 is engaged, and a shoulder 4c defined beneath the neck supports the locking member. A sealing gasket 10 is disposed in a groove 17 formed in the body 1 around the spindle 4.

In accordance with Figures 3 and 4, to provide adequate guidance for the spindle and sufficient tightness the diameter of the bore 8 is approximately equal to the depth of the bore.

Although an O-ring seal has been shown, any other kind of gasket may be employed.

In Figure 5 there is shown a modification of the embodiment of Figure 3 in which an anti-friction washer or disc 18 is disposed in a seat 19 formed in the head 1a of the body. The washer is made of a suitable material and is sandwiched between the shoulder 4c of the boss 4a of the spindle 4 and the lower surface of the locking member 13.

This arrangement makes it possible to reduce the rotary friction imposed on the shoulder 4c of the spindle and to withstand large pressures during rotation.

Figure 8 shows an anti-friction washer 18 which is cut into two half-washers 18a, 18b whereby the washer can be fitted onto a spindle 4 which has a neck 4b. This arrangement of two half-washers 18a, 18b permits assembly to be effected much more easily than with a washer consisting of a single piece.

Figure 9 shows an anti-friction washer 18 having a slit 18c which imparts greater flexibility thereto. Also in this case the washer 18 can be fitted on a spindle comprising a simple neck 4b.

Figures 10 and 11 illustrates a modified embodiment of the locking member 13 which is formed by a plate having a slot 13b for engagement with a neck 4b. The locking member has two inclined parallel edges 20, 20a which are engaged in the head 1a of the body in a dove-tail shaped slot, the base of which is formed by the support surface 12 and the edges by grooves 21, 21a having inclined sides. Assembly of the locking member 12 on the head is effected by sliding the locking member as indicated by the arrow F.

Figures 12 and 13 show an embodiment in which the locking member 13 is formed by a plate having a slot 13b in which the neck 4b of the spindle is engaged. The edges of the plate are engaged in parallel undercut grooves 22, 22a provided in the head 1a of the body adjacent the bearing surface 12.

The edges of the notch 13b are provided with reinforcing ribs 23, 23a which are engaged in the neck 4b. The locking member bears against the shoulder 4c of the spindle to prevent axial movement thereof. To mount the locking member, its edges 24, 24a are slid into the grooves 22, 22a thus causing the lower surface of the locking member 13 to coincide with the support face 12, until the bottom of the notch 13b abuts against the spindle 4.

In Figure 14 there is shown a locking member 13 of the kind illustrated in Figures 1 and 2 but having a lug 16, which forms a stop, attached to the locking member 13 by welding. The lug 16 may have a variety of shapes and in particular it may be employed to strengthen the member 13 in its central portion, by doubling its thickness.

Figure 15 shows a sectional view of the

lower portion of the handle 5 at the level of the lug 16 which serves as a stop to limit the rotation of the handle 5. The lug 16 is shown in full lines in a first relation position of the handle and lug, whereby the lug abuts a surface 5a of the handle, and in this position a resilient tab or tongue 26 provided on the handle engages the lug with a ratchet action so as to prevent any inadvertent rotation of the handle as a result of vibrations.

In a second relative position of the handle and lug, the lug 16 is shown in broken lines and abuts a surface 5b of the handle, the handle having a second resilient tab or tongue 26a which engages with the lug in this position to prevent inadvertent rotation of the handle.

Figure 16 shows a method of mounting the handle 5 on the spindle 4 without the need for additional fastening means such as a screw, a pin or the like. With this mounting the handle cannot be removed from the assembled cock and be subsequently lost.

The handle 5 has a squared housing 27 in which there is mounted a head 11 of the spindle 4 of corresponding shape, the handle being held captive between the square head 11 and the upper surface 28 of the locking member 13. During assembly, the handle 5 is engaged by its housing 27 on the head 11 of the spindle, and the spindle is engaged in the bore 8 of the body. Subsequently, the locking member 13 is slid onto the head 1a of the body to engage the spindle 4.

Figure 17 shows the head 1a of the body of the cock in a section perpendicular to the axis of the spindle 4. In this figure the locking member 13 is secured to the body by crimped portions 29, 29a provided at one end of the member 13 so as to prevent any unintentional detachment of the locking member.

This and another method of fixedly securing the locking member 13 is shown in Figure 18 wherein the crimped portion 29 is shown at one side of the locking member and at the other side there is shown a tab 30 which is bent down onto the head 1a.

Any other method of fixedly securing the locking member may alternatively be employed.

In Figure 19, the locking member has an aperture through which passes a screw or a pin 31 engaged in an aperture of the body by screwing or with a forced fit (in the case of a pin). This screw or pin 31 is simultaneously utilised as a member for fixedly securing the member 13 to the body 1 and also as a stop for the handle.

In Figure 20, the screw or pin 31 lies within the slot 13b of the locking member and simply acts as a stop for the handle.

Figure 21 shows an arrangement similar

to that of Figure 20 wherein a screw 32 is disposed in a tapped hole of the head 1a of the body, in the space occupied by the slot 13b. The screw 32 comprises a collar 32a which bears on the locking member 13 and is intended to prevent its inadvertent detachment to provide increased resistance to the thrust of the spindle and to act as a stop for the handle.

In Figure 22 the locking member 13 is formed with a slot 13b having sides 33, 33a which extend along converging lines to an entry passage 34 which is slightly smaller than a circular portion 35 intended to receive the spindle 4, so as to permit a weak snap-fit on the latter during assembly.

A further form of the slot 13b is shown in Figure 23 and has two parallel edges providing a passage 35 of constant width greater than the diameter of the spindle 4.

In Figure 24 there is shown a further embodiment of the locking member which may be employed in the assembly shown in Figure 7 and wherein the spindle 4 is engaged in a simple, circular aperture 36 instead of an open-ended slot. This member is fixedly attached to the body as shown in Figure 7 to thereby secure the spindle 4.

The arrangements particularly described provide at least some of the following advantages:

- An assembly which comprises a small number of components: handle, spindle, locking member, seal body which simplifies the provision of spare parts and maintenance;

- A reduction of the costs of machining and casting by virtue of maximum simplification of shapes and total elimination of finishing operations;

- A reduction in assembly costs;

- Rapid dismantling when desired;

- Safety from inadvertent disassembling;

- Simple and precise rotation abutments;

- The possibility of releasably holding the handle in its limits of rotation to prevent accidental rotation caused by vibrations;

- The handle cannot be accidentally detached and lost.

The cocks described may be used for liquids or for gases under negative pressure, at conventional pressures and temperatures. With modifications the cocks can be used for any fluid at elevated pressures and temperatures.

WHAT WE CLAIM IS:-

1. A cock comprising a body, a shut-off member rotatably mounted in the body and connected via a spindle to a manipulation member, the spindle being mounted in a bore of the body, the body having a planar support surface onto which the bore opens and which is delimited at opposite sides of the bore by two parallel edge formations, and the spindle having a shoulder level with

the support surface, and a locking member co-operating with the spindle and with the support surface for securing the spindle in the body, the locking member having opposed edge portions engaged with said edge formations such that the locking member is held on the body by such engagement, and the locking member having an aperture through which the spindle extends.

2. A cock according to claim 1, wherein the locking member is formed by a planar plate having two inturned parallel edge portions which form two grooves into which engage corresponding edge flanges provided on the body of the cock on opposite sides of the planar support surface and constituting said edge formations.

3. A cock according to claim 1 or claim 2, wherein the spindle comprises a circular neck engaged with the edges of the aperture of the locking member.

4. A cock according to claim 1, wherein an anti-friction washer is disposed between the locking member and the shoulder provided on the spindle.

5. A cock according to claim 4, wherein the washer has at least one slit facilitating its installation.

6. A cock according to claim 1, wherein the aperture is in the form of a slot open at one end.

7. A method of mounting a locking member in a cock according to claim 6, wherein the locking member is mounted on the body by sliding in a direction perpendicular to the axis of the spindle with the edge portions of the locking member in engagement with the corresponding edge formations of the body, the manipulation spindle having been previously mounted on the body with its shoulder level with the support surface of the body so that the spindle is received in the slot of the locking member when the locking member is slid onto the body.

8. A method of mounting a locking member in a cock according to claim 1, wherein the spindle is mounted in the body with its shoulder level with the support surface of the body, and the locking member is mounted on the manipulation spindle and its edge portions are folded into engagement with the corresponding edge formations of the body.

9. A cock according to any one of claims 1 to 6, wherein the locking member includes a stop arranged to cooperate with the manipulation member to limit rotation of the manipulation member.

10. A cock according to any one of claims 1 to 6, or claim 9, wherein the manipulation member is held captive between a shoulder of an entrainment boss provided at the end of the spindle and the adjacent surface of the locking member.

11. A cock according to claim 9, wherein the stop of the locking member is arranged to cooperate with resilient members provided on the manipulation member so as to releasably retain same in its stop positions.

12. A cock according to any one of claims 1 to 6, wherein the locking member is fixedly held on the body by crimped portions at an end of the locking member.

13. A cock according to any one of claims 1 to 6, wherein the locking member is fixedly held on the body by a lug provided on the member and bent down against the body of the cock.

14. A cock according to any one of claims 1 to 6, wherein the locking member is fixedly held on the body by pin means which is forced or screwed into an aperture provided in the planar support surface of the body.

15. A cock according to claim 14, wherein the pin means forms a stop for the manipulation member.

16. A cock according to claim 15, wherein the pin means is located within the said aperture of the locking member.

17. A cock according to claim 16, wherein the pin means has a collar which is pressed against the locking member, the outer end portion of the pin means forming a stop for the manipulation member.

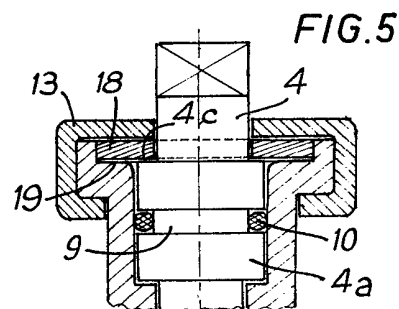
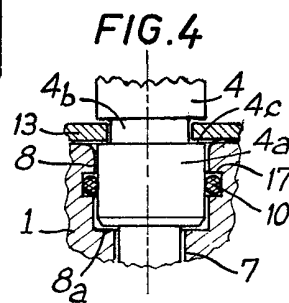
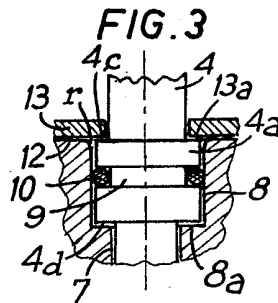
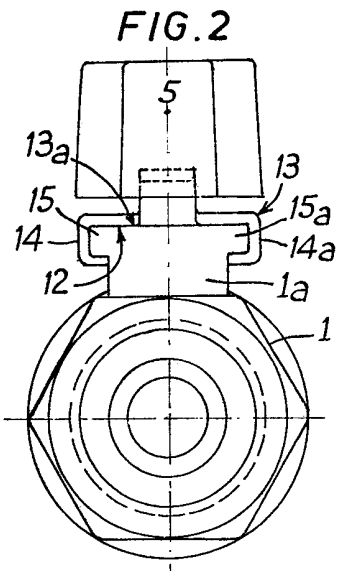
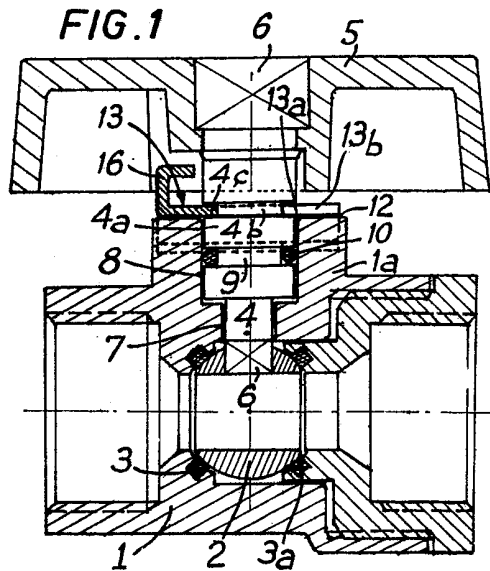
18. A cock according to any one of claims 1 to 6, wherein the locking member is a plate having opposed inclined edges and which is engaged in the body in a dove-tail shaped slot the base of which is forced by the support surface of the body and the edges by grooves with inclined sides and which constitute said edge formations.

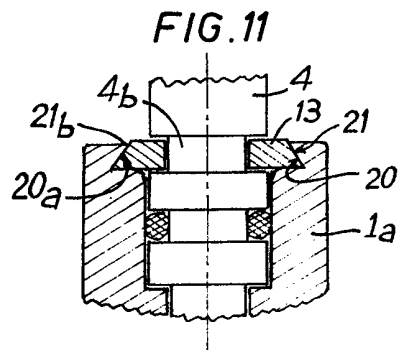
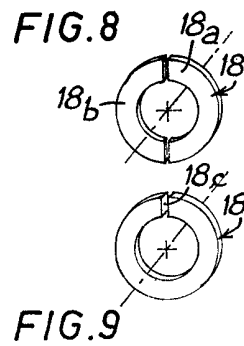
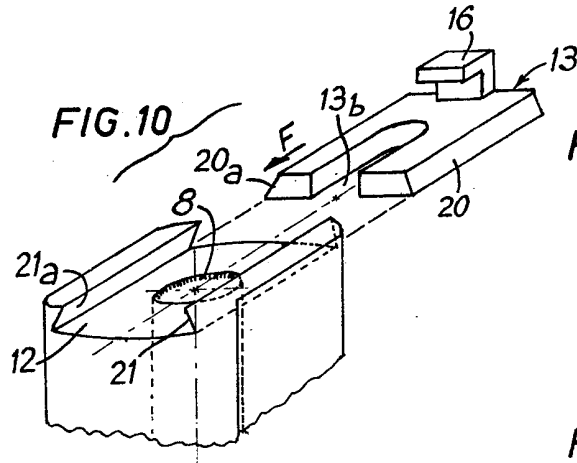
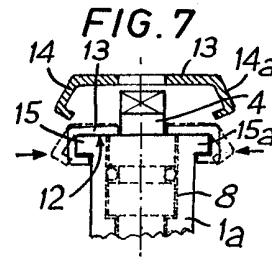
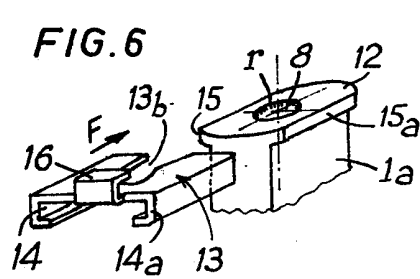
19. A cock according to any one of claims 1 to 6, wherein the locking member is formed by a plate having opposed edge portions engaged in parallel grooves provided on opposite sides of the support surface of the body and constituting said edge formations.

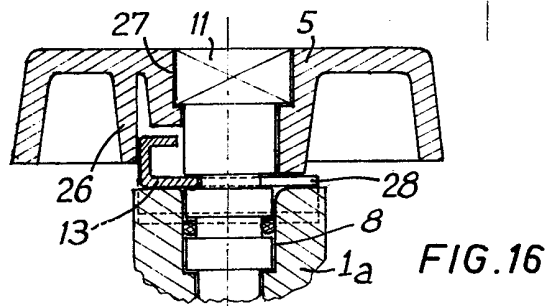
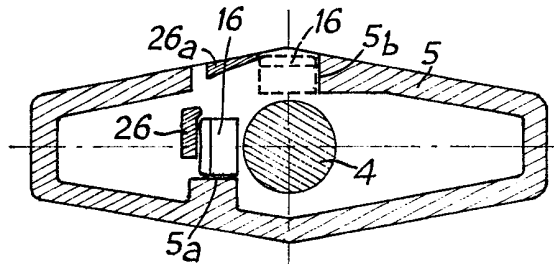
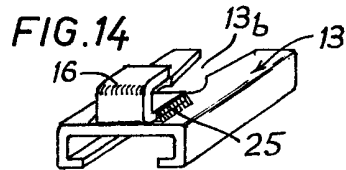
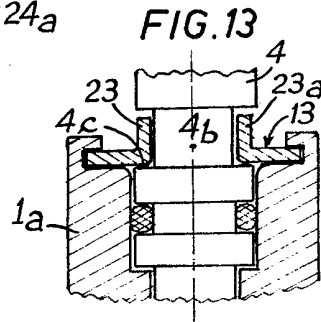
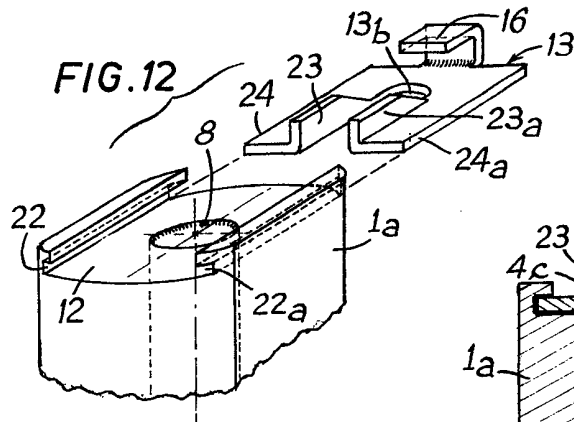
20. A cock substantially as hereinbefore described with reference to the accompanying drawings.

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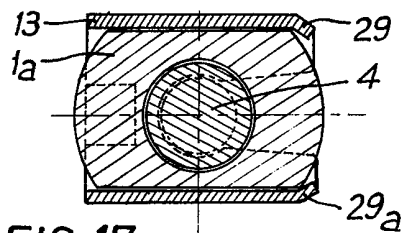


FIG. 17

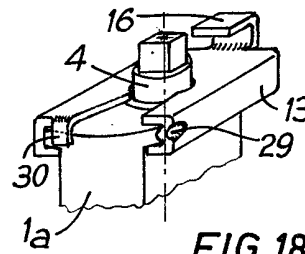


FIG. 18

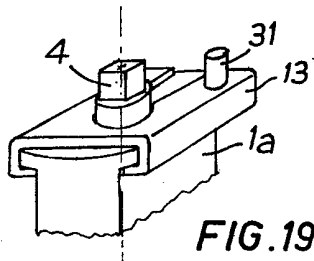


FIG. 19

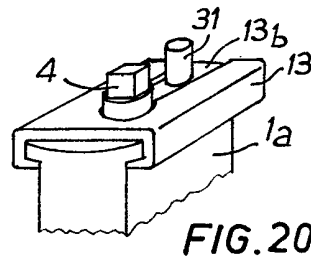


FIG. 20

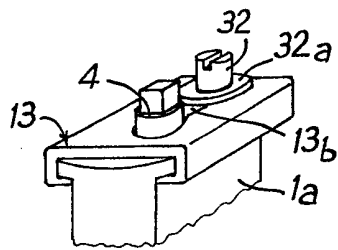


FIG. 21

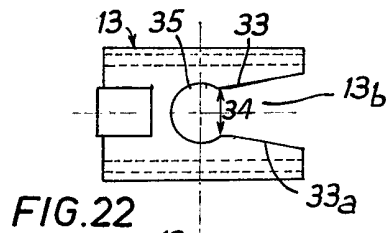


FIG. 22

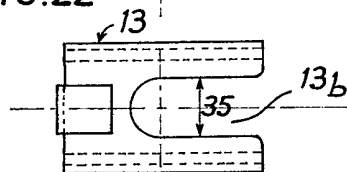


FIG. 23

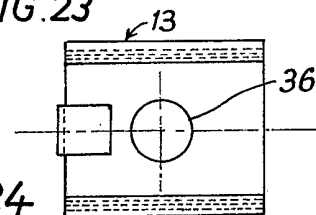


FIG. 24