(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 366 409 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89310942.1**

(51) Int. Cl.5: **A62B 18/08**

(22) Date of filing: **24.10.89**

(30) Priority: **25.10.88 GB 8824986**

(43) Date of publication of application:
02.05.90 Bulletin 90/18

(84) Designated Contracting States:
BE FR GB NL SE

(71) Applicant: **AVON INDUSTRIAL POLYMERS LIMITED**
Bath Road
Melksham Wiltshire SN12 8AA(GB)

(72) Inventor: **Angell, Cyril Nelson Edward**
128 Silver Street Lane
Trowbridge Wiltshire(GB)

(74) Representative: **Harrison, David Christopher et al**
MEWBURN ELLIS 2 Cursitor Street
London EC4A 1BQ(GB)

(54) Sight corrective lens mounting system for respirators.

(57) A means for attachment of a sight corrective lens (19) adjacent the eyepiece (4) of a respirator includes a lens mount (10) and a lens surround (2), the surround (2) having blind recesses (6b,7b) therein into which engage tabs (9,18) on the mount (10), the tabs (9,18) and recesses (6b,7b) being of different dimensions at different positions around the frames so as to assure a unique orientation of the lens mount (10) in relation to the surround (2) when they are engaged. At least one tab (9,18) may have spaced-apart protrusions (15) for interfitting with a lug (7a) projecting radially from its associated blind recess (7b).

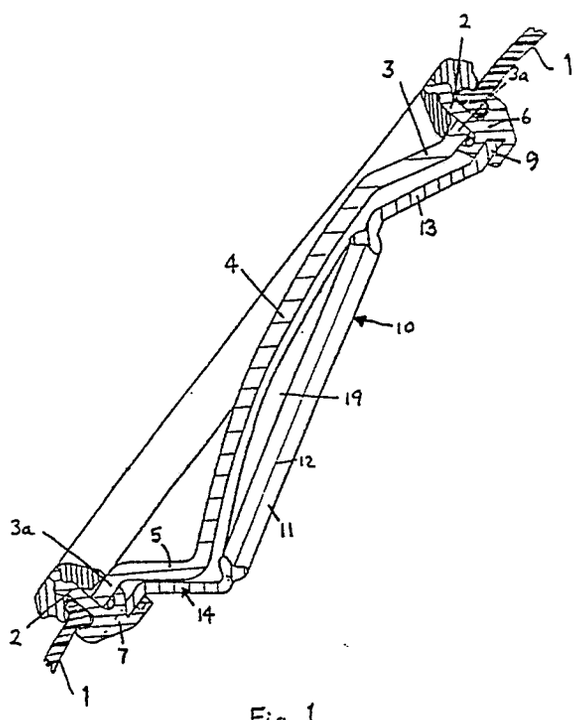


Fig. 1

EP 0 366 409 A2

SIGHT CORRECTIVE LENS MOUNTING SYSTEM FOR RESPIRATORS

This invention relates to improvements in means for attachments of sight corrective lenses to a respirator.

There have been various attempts at solving the problem of correcting for sight defects of the wearer of a respirator. Examples of systems whereby sight corrective lenses may be mounted onto a respirator eyepiece are to be found in, for instance, US-A-2737659, US Design Patent 237757, DE-A-1171750, EP-A-0106447 and US-A-4449255 (EP-A-035849).

In our granted European Patent EP-B-0184929, the disclosure of which is hereby incorporated herein by reference, there are described for attachment of a sight corrective lens adjacent to an eyepiece of a respirator, in which tabs of the lens mount are of different widths and engage with apertures in shallow, rectangular, projecting lugs on the respirator eyepiece. The widths of the apertures differ correspondingly so that the lens mount as a whole can only be fixed in one orientation relative to the eyepiece frame.

In the lens mounting system of the present invention the above attachment means are modified so that the lens mount, instead of being retained by apertured lugs, is retained by solid shoulders which project inwardly from an eyepiece surround, by virtue of there being immediately adjacent each shoulder, between it and the eyepiece surround, a blind recess into which one end of each tab of the lens mount may be inserted.

At least one of the tabs may have two tangentially spaced projections on its surface, the spacing of which corresponds to the tangential width of a lug projecting radially inwardly from the shoulder, so that when each tab is retained in its respective recess the pins engage with the sides of the lug, thereby substantially preventing tangential movement of the lens mount relative to the eyepiece frame. The other tab is retained by the walls of the respective recessed lug, thereby substantially preventing tangential movementy of the lens mount relative to the eyepiece frame.

Thus, once in position in the eyepiece frame, radial movement of the lens mount and tangential movement of the narrower tab may be limited by the blind recesses in the eyepiece frame into which the free ends of the respective tabs of the lens mount are inserted; tangential movement of the lens mount is also prevented in the preferred embodiment by the engagement of opposite sides of its respective lug with the two projections on that tab.

In the system of this invention no part of the lens mount need project radially outwardly of the eyepiece surround. This allows the two eyepiece frames of a two-lens system to be closer together in the region of the nose of the wearer, thereby affording improved field of vision.

Also, the resilience of the lens mount material allows the mount to be sprung into and out of its position in retentive engagement with the lugs of the eyepiece surround, but at the same time impart sufficient interference to retain the lens mount in position at all times.

In a modification, the lens mount may be provided with seal means to engage the eyepiece of the respirator, and the attachment means be arranged to bias the seal means into contact with the eyepiece.

An embodiment of the invention will now be described in further detail with reference to the accompanying drawings, wherein:-

Figure 1 is a sectional view of an eyepiece of a respirator incorporating the lens mounting system of the invention;

Figure 2 is a face view of the eyepiece frame of the eyepiece of Figure 1;

Figure 3 is a sectional view on the plane C-C of Figure 2;

Figure 4 is a sectional view on the plane A-A of Figure 2;

Figure 5 is a view on arrow D of Figure 4, rotated through 90°;

Figure 6 is a sectional view on the plane B-B of Figure 2;

Figure 7 is a view along arrow F of Figure 6, rotated through 90°;

Figure 8 is a face view of one lens mount for securing a lens inside the eyepiece of the respirator;

Figure 9 is a sectional view along the plane A-A of Figure 8;

Figures 10(a) and (b) are enlarged views of the tabs 14, 13 shown in Figure 9;

Figure 11 is a sectional view on the plane D-D of Figure 8;

Figure 12(a) is a view along arrow F of Figure 8;

Figure 12(b) is a view along arrow G of Figure 12(a);

Figure 13(a) is a view along arrow E of Figure 8;

Figure 13(b) is a view along arrow H of Figure 13(a);

Figure 14 is a sectional view, corresponding to Figure 10(a), of a modified lens mount for securing a lens inside the eyepiece of the respirator.

In this embodiment the lens may be an individual monocle, so that in a two-lens system two such

lens mounts are provided for the respective eyes of the wearer. The mounts may be identical (except for their handedness if provided) so that any one of a plurality of standard prescription lenses may be fitted into them exactly as if they were the standard frame of a pair of spectacles. When the lenses are separate monocles secured individually to the eyepiece frames of the respirator, the need for any link going across the bridge of the nose of the wearer or for any arms going back to his ears, as in a conventional spectacle frame, is avoided.

Figure 1 shows, in section, the face piece 1 of a respirator, having a circular surround 2 formed in the rubber material of the face piece into which is fitted an eyepiece 3. The surround and eyepiece preferably have a configuration wherein a concave-convex portion 4, of which the radii of curvature on both sides are equal and which therefore has no optical corrective effect, is presented at an advantageous angle to the eye by the provision of an angled wall 5 linking it to a planar rim 3a of the eyepiece 3 which is held in the surround 2.

The surround 2 is provided with attachment means 6,7, whereby a mount 10 containing a monocular sight corrective lens 19 may be attached inside the eyepiece 3, between it and the eye of the wearer.

In Figure 2 the eyepiece frame is shown, comprising the surround 2 and attachment means 6,7. It may be made of any suitable thermoplastic or thermosetting material, for example an acetal resin such as Delrin (Trade Mark). The attachment means 6,7 are mounted diametrically opposite each other across the circular surround 2, but are asymmetric. The surround 2 and attachment means 6,7 are preferably integrally moulded and a cross-section of the surround 2 is shown in Figure 3. In Figure 2 the dashed lines indicate the blind recesses which will be later described.

It can be seen, in Figure 4, that the attachment means 6 has substantially the same cross-section as the surround 2, except that a lug 6a projects radially from a raised shoulder 6d, thereby forming a blind recess 6b between the lug and a part 6c of the surround. In an analogous manner, attachment means 7 has a lug 7a projecting radially inwardly from a raised shoulder 7d, to within the inner radius of the surround 2, with a blind recess 7b between it and a part 7c of the surround. As is clear from Figure 2, the lug 7a and recess 7b of the attachment means 7 are of greater width than the lug 6a and recess 6b of the attachment means 6. A comparison of Figures 5 and 7 illustrates this difference; the tangential extent of the blind recesses 6b,7b and shoulders 6d,7d is shown by the dashed lines. The lug 7a is narrower than the respective recess 7b, but the lug 6a is of substantially the same width as the respective recess 6b (as shown in Figure 2).

A lens mount by which an optical sight corrective lens may be secured inside the eyepiece of the respirator is seen in Figure 8. The lens mount 10 is a, preferably one-piece, moulding of any suitable thermoplastic or thermosetting material, for example polycarbonate, EPDM or EPT. Polycarbonate is particularly preferred. The mount 10 comprises a frame part 11, which is shown here as being circular in shape. It is to be understood, of course, that the frame part 11 may be of any other desired shape; in particular, it is desirable that it is of a standard shape for receiving a standard prescription sight corrective lens. Around the radially inner surface of the frame part 11 is a continuous groove 12, into which may be fitted the edge of a lens 19, in a similar manner to a normal spectacle frame. A cross-section of the frame part 11 and the groove 12 are shown more clearly in Figure 11.

Opposed across the frame part 11 are legs 13,14 of which end portions 9,18 form tabs. These are shown more clearly in cross-section in Figures 9 and 10. The end portion of the tab 9 is laterally dimensioned so that it fits snugly within the tangential extent of the blind recess 6b of the attachment means 6. Figures 12(a) and (b) show more clearly the form of the tab 9.

The leg 14 includes a portion 17 which is at an angle to the general plane of the frame part 11 of the mount, so as to accommodate the shape of the respirator eyepiece used, such as eyepiece 3 (Figure 1). In this embodiment the portion 17 fits along the angled wall part 5 of the eyepiece 3. At the end of the portion 17 is a tab end portion 18 generally coplanar with the tab 9 end portion of the leg 13. The tab 18 of leg 14 is provided with two tangentially spaced pins 15, which are shown more clearly in Figure 13.

The pins 15 are tangentially spaced on one surface. Referring to Figure 13, the pins 15 are substantially cylindrical and are inclined at an angle to the general plane of the end portion 18 (Figure 13(b)). The reason for this is in order to facilitate and maintain snug engagement of the pins 15 with the sides of the lug 7a of the attachment means 7.

The width of tab 14 is substantially greater than that of tab 9. As with that tab, the tab 18 of the leg 14 is laterally dimensioned so that it fits snugly within the tangential extent of the recess 7b of the attachment means 7. The spacing of the pins 15 of tab 18 is such as to provide snug engagement between the pins and the sides of the lug 7a of the attachment means 7.

Because of the different tangential extents of the lugs 6a and 7a and the recesses 6b and 7b of the attachment means 6 and 7 and because of the different widths of the tabs 9 and 18, the lens mount 10 can only be assembled within the

eyepiece in one orientation.

To fit the lens mount 10, the tab 18 is inserted under the lug 7a from a direction generally parallel to the portion 5 of the eyepiece, as seen in Figure 1. The mount is then rotated so that the end of the tab 18 rides up the sloped front of the portion 7c and the tab 9 approaches the shoulder 6d. As it reaches the lug 6a the user presses it radially inwardly thereby flexing the legs 13,14 particularly in the region 17. The tab 9 is then pressed towards the eyepiece 3, its tapered end assisting it in sliding past the end of the lug 6a until it snaps radially into the recess 6b, where it is held by relaxation of some of the flexion imposed on the mount to fit it.

In a further embodiment of the invention the lens mount 10, which is otherwise identical to that described above, is provided with a seal ring 20 continuously around the frame part 11, on the face which will be nearer to the respirator eyepiece. This is illustrated in Figure 14. The seal ring 20 is of tapered section so that its extremity 21 is comparatively deformable. This extremity 21 is, in use, pressed against the inner surface of the respirator eyepiece portion 4. This pressing is due to the dimensioning of the seal ring 20 and of the attachment means 6, 7, so that when the latter are engaged there is tensioning of the tabs 13,14 to stress the seal ring and press it against the eyepiece portion 4. This prevents access of particles or moisture to the mutually adjacent faces of the lens in the mount and of the eyepiece.

In our granted European Patent EP-B-0184929 Figure 6 shows how the lens mount may have two angled portions 17′, one on each tab, to accommodate a type of eyepiece 3′ where the concave-convex (or planar) portion 4′ is not set to one side of but intercepts the plane 22 of its rim, with angled walls 5′ on both sides of the section, the plane 23 of the tabs of the mount being, of course, parallel to plane 22. It is to be understood that the lens mounting system of the present invention may also be used in conjunction with a lens mount modified in this manner. Furthermore, more than one blind recess may have a radially inwardly projecting lug (such as 7a) associated with it, with projections (such as 15) on the tab which is to engage with it, the spacing of the projections on different tabs being different.

It can be seen that the design of the lens mount and the lens mounting system of this invention is extremely elegant, especially in the one piece nature which can be achieved in the lens mount and the eyepiece frame. In particular, no special tools or techniques are required for the assembly of the lens mount to the respirator eyepiece. In general, sight corrective lenses may be readily exchanged in a given lens mount. Alternatively, of course, different mounts may be supplied for a given user for use with one respirator, e.g. for different intended activities. Of course the principle enunciated for the ready attachment of sight corrective lenses inside the eyepiece of a respirator is not restricted to use with the eyepiece and surround design which has been described as preferred; the lenses may, using the present system, be equally well mounted behind purely planar eyepieces, for example.

Claims

1. Means for attachment of a sight-corrective lens (19) adjacent the eyepiece (4) of a respirator at the side of the eyepiece nearer to the user of the respirator, the means including a mount (1) for mounting the lens and interengaging means (6,7,9,18) on the lens mount (10) and a surround (2) of the eyepiece (4) which at different positions round these frames are of different dimensions whereby to assure a unique orientation of the lens mount (10) in relation to the eyepiece surround (2) when they are engaged, characterized in that the interengaging means include blind recesses (6b,7b) on the eyepiece surround (2) and tabs (9,18) on the lens mount (10) for fitting in the blind recesses respectively.

2. Attachment means according to claim 1 wherein the radial dimension between the ends of the tabs (9,18) slightly exceeds the radial dimension between end walls of the blind recesses (6b,7b) whereby the tabs (9,18) are maintained under compression when engaged with the recesses (6b,7b).

3. Attachment means according to claim 1 wherein at least one tab (9,18) has spaced-apart protrusions (15) for interfitting with a lug (7a) projecting radially inwardly from its associated blind recess (7b).

4. Attachment means according to claim 3 wherein the tangential extent of the projecting lug (7a) is less than that of the associated blind recess (7b).

5. Attachment means according to any one of claims 1 to 4 wherein legs (13,14) bearing the tabs (9,18) extend radially from the lens surround of the lens mount (10) and at angles to its plane whereby portions of the legs (e.g. 13,17) may be distorted for insertion of at least one of the tabs (9,18) into the recesses (6b,7b) from the radial direction.

6. Attachment means according to any one of the preceding claims wherein the lens mount (10) has a seal ring (20,21) for contacting the eyepiece (4) when the tabs (9,18) and recesses (6b,7b) are interengaged.

7. Attachment means according to any one of

the preceding claims wherein the lens mount (10) is an integral one-piece moulding of a polycarbonate plastics material.

8. A respirator including an eyepiece (4) and a sight-corrective lens (19) mounted adjacent to it by attachment means according to any one of the preceding claims.

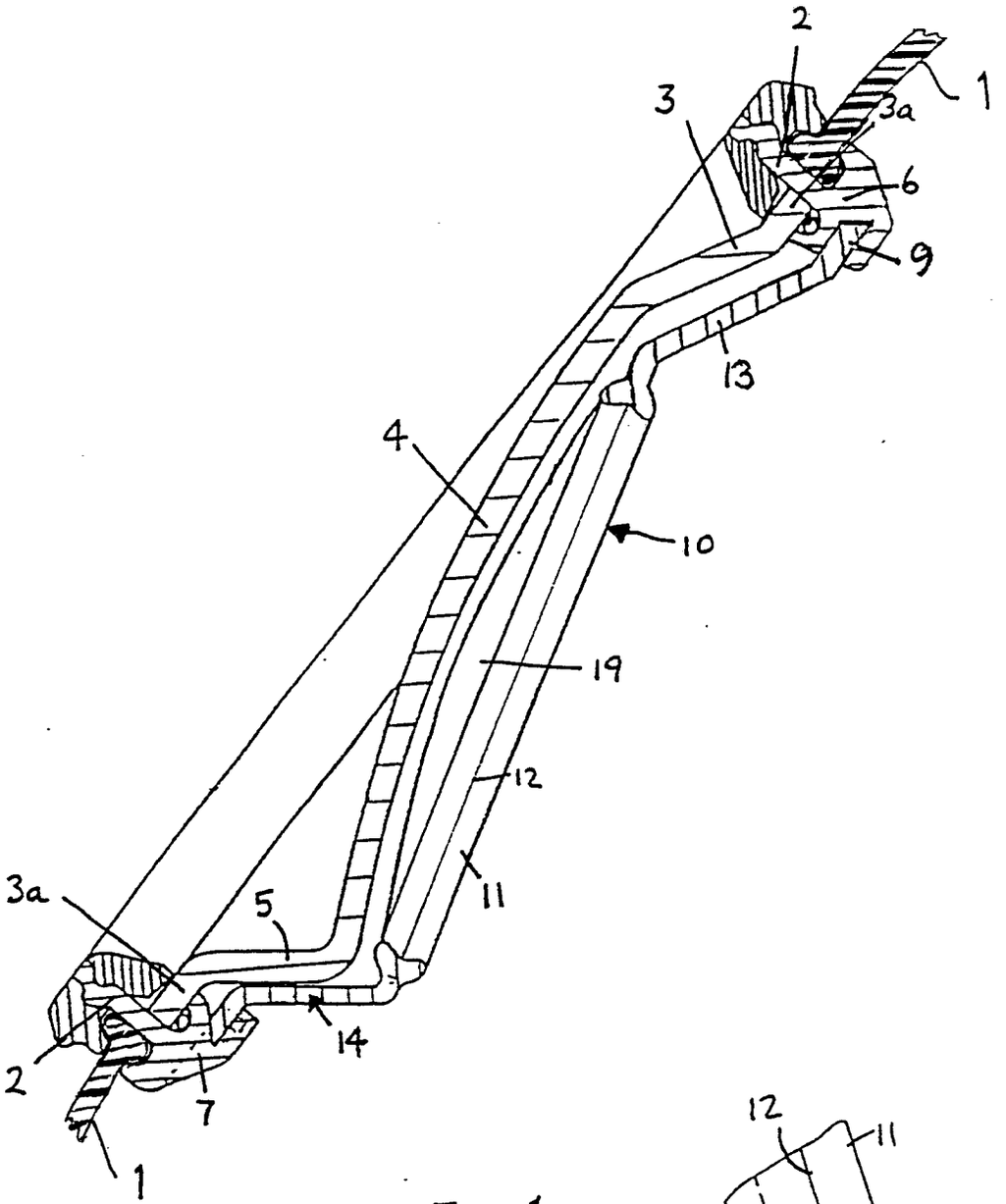


Fig. 1

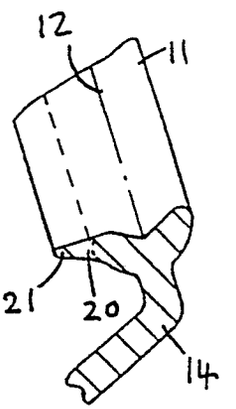


Fig. 14

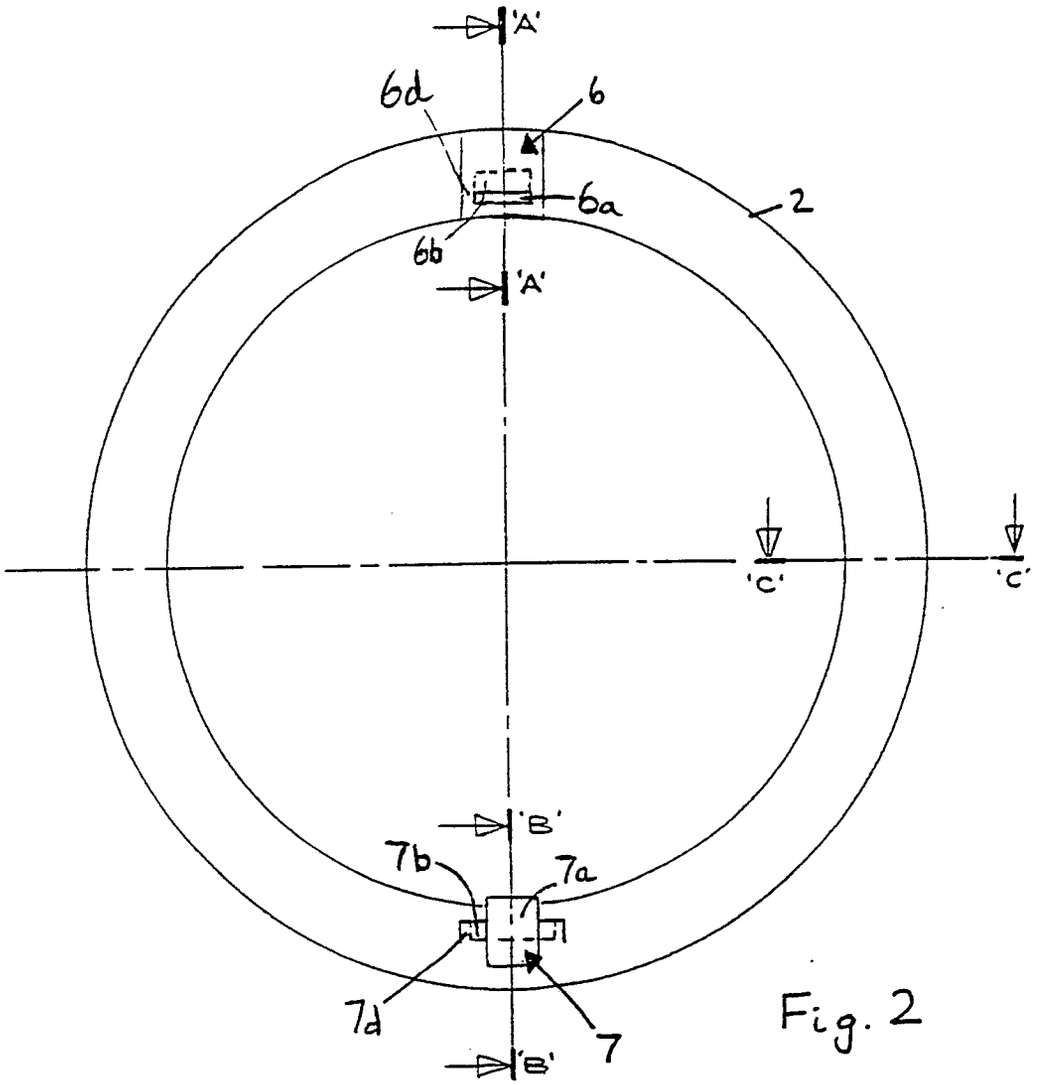
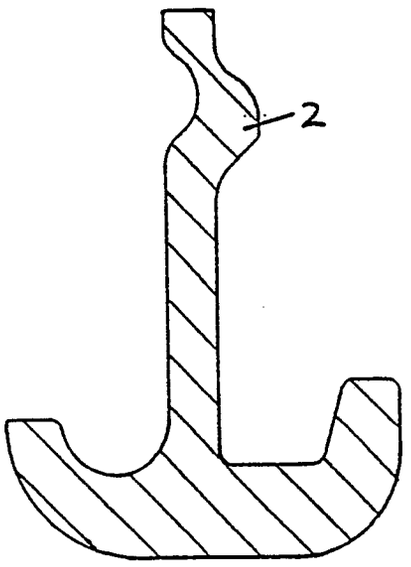


Fig. 2

Fig. 3



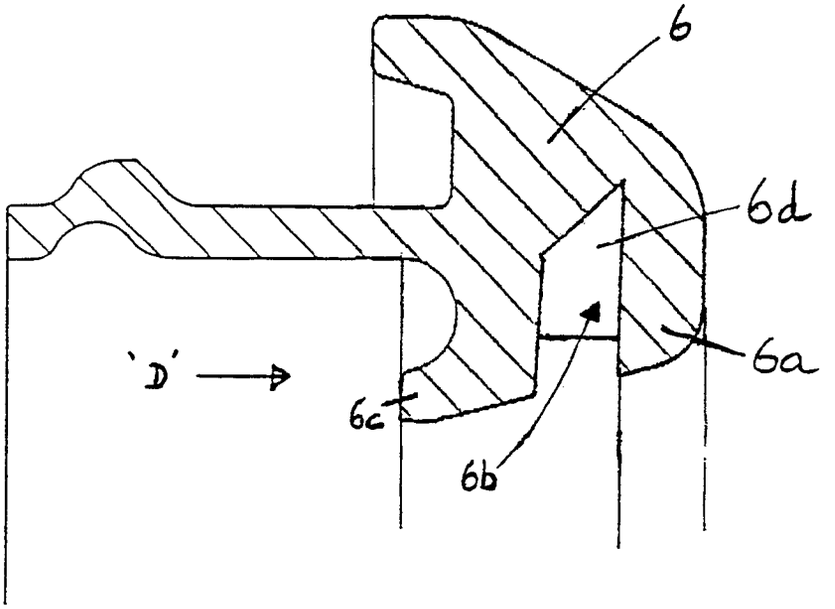
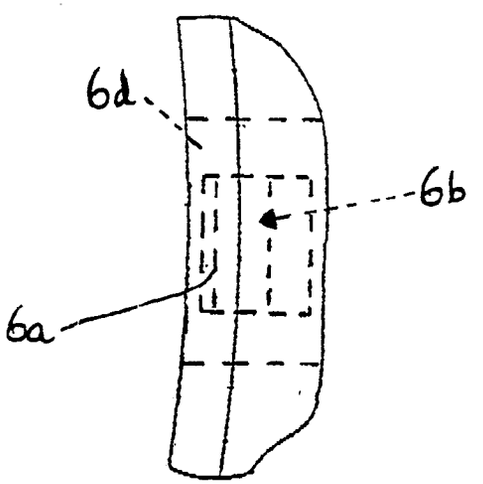


Fig. 4

Fig. 5



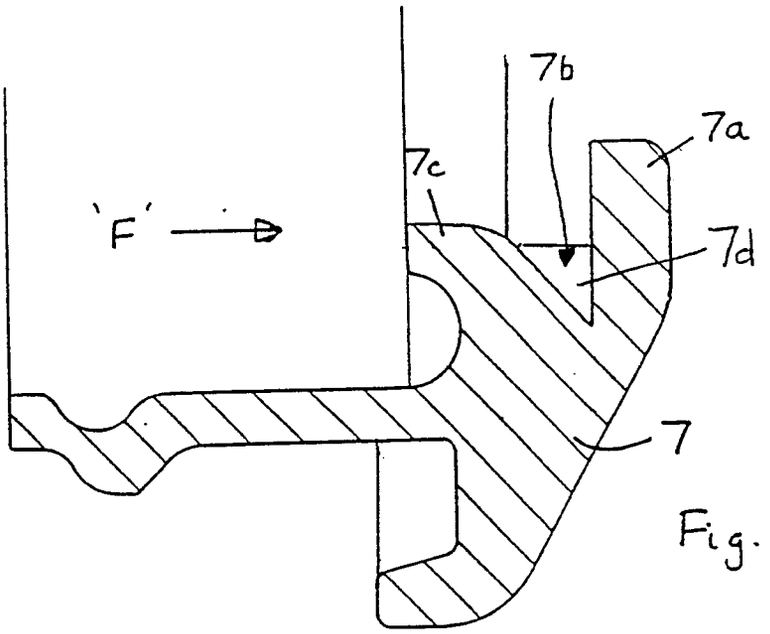
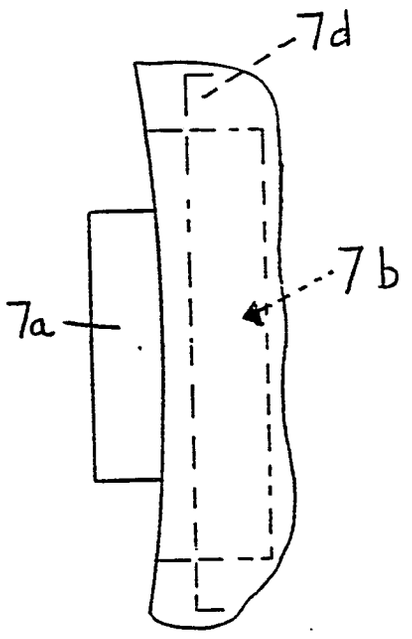


Fig. 6

Fig. 7



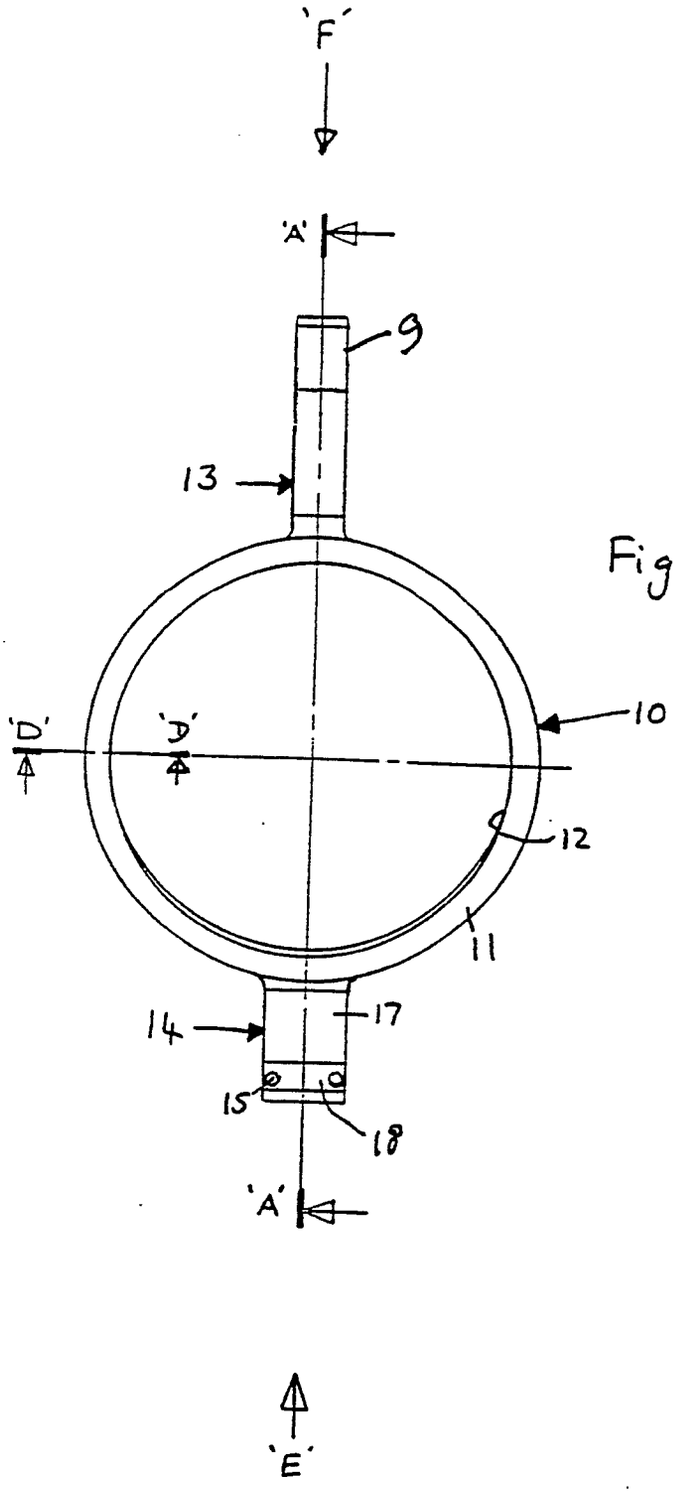


Fig. 8

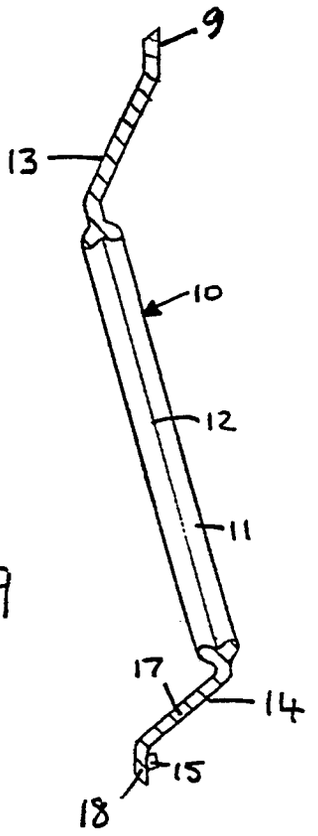


Fig. 9

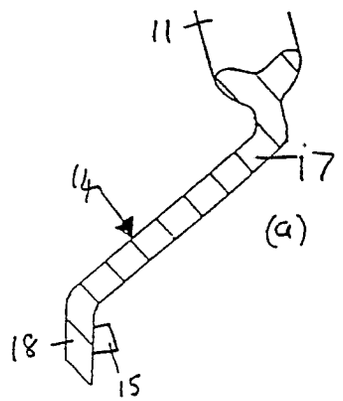
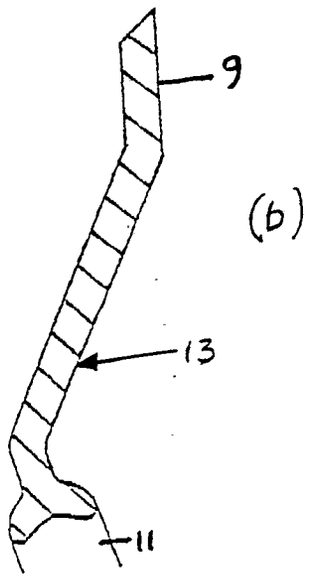


Fig. 10



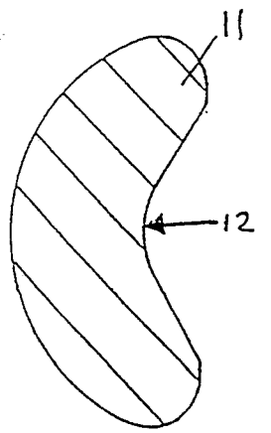


Fig. 11

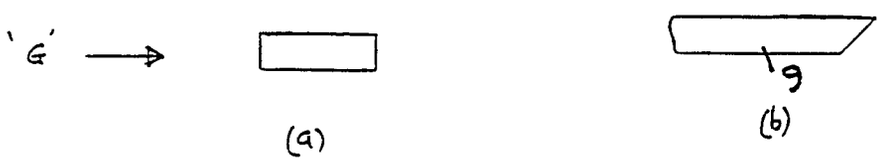


Fig. 12

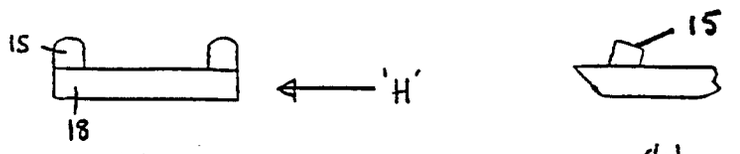


Fig. 13