

United States Patent

Uliczky

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[54] **CLOSURE DEVICE FOR STREAMING MEDIA, IN PARTICULAR HIGH PRESSURE LIQUIDS**

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[58] Field of Search ..251/343, 282, 344; 137/625.68

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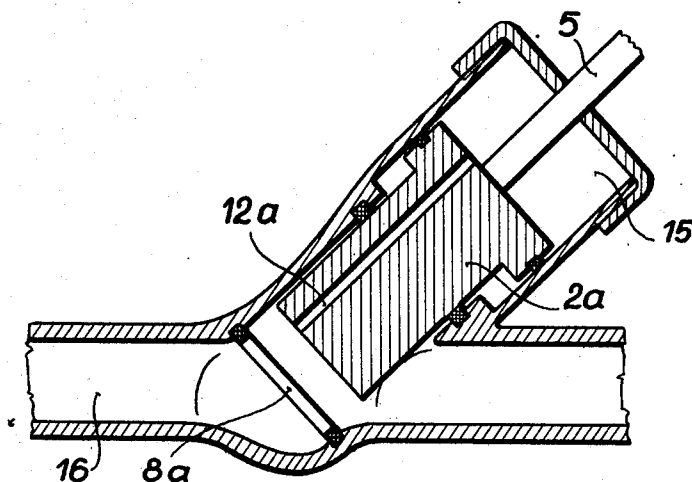
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[57] **ABSTRACT**

It is known to construct a closure means for high pressure fluids in such a way that the forces acting on it compensate each other. According to the invention such a closure means is improved in such a way that it can be removed from the path of the closure means, in order to allow a free streaming of the fluid. For this purpose the closure means is either moved in the interior of the casing, or it surrounds the casing like a sleeve.

3 Claims, 4 Drawing Figures



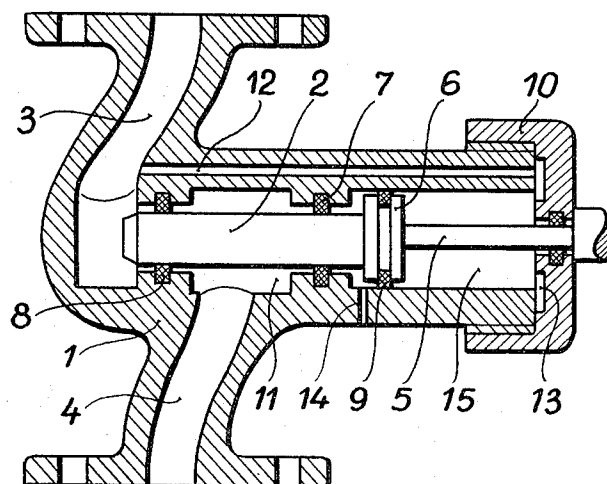


Fig. 1

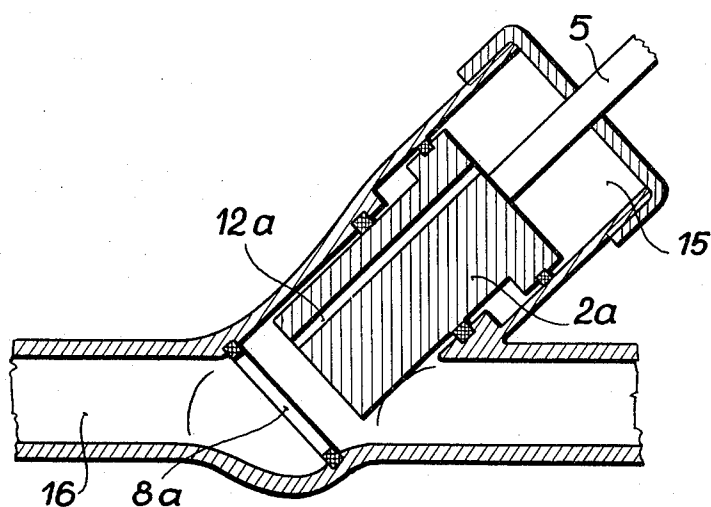


Fig. 2

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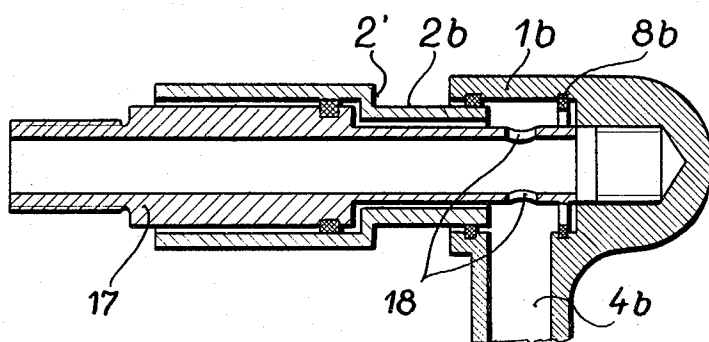


Fig. 3

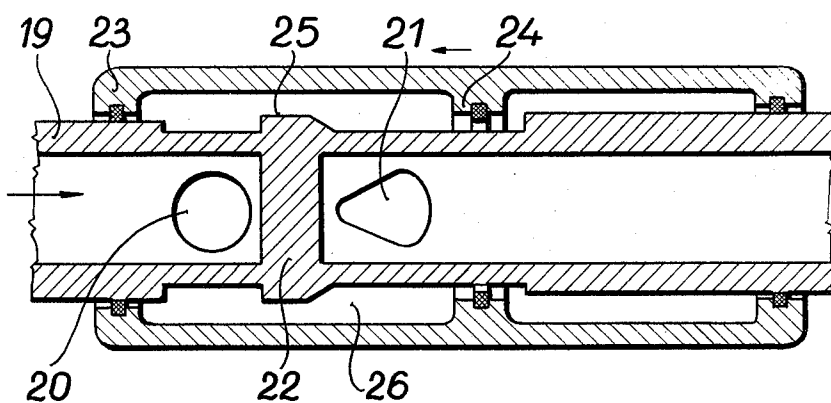


Fig. 4

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CLOSURE DEVICE FOR STREAMING MEDIA, IN PARTICULAR HIGH PRESSURE LIQUIDS

The invention relates to a closure device for streaming media, in particular for liquids under high pressure.

In order to close the flow of streaming media, i.e. liquids and gases, it is usual to employ valves, slides or other closing means. When these closing means are pressed against their seat by the pressure of the medium, very substantial forces are required for opening. In order to eliminate this, closure means are known in which the pressure of the medium acts on the cylindrical closure device radially and in all directions, so that the forces compensate each other. It is moreover known to relieve the closure means in such a manner that essentially equal forces act on the closure means in axially opposed directions, so that pressure is relieved, and accordingly closure and opening can be effected without any difficulty.

In these conventional devices, however, the closure means checks the flow of the streaming medium a fact, which is disadvantageous, because streaming of the medium is impeded and eddies are produced.

It is the object of the invention to eliminate this shortcoming. The invention therefore provides a closure member which is so designed as to be removable from the way of the streaming medium in a relieved state. This can be realized in two different manners. In one embodiment the closure member is disposed in the interior of the casing of the closure device, and is removed from the path of the streaming medium by being shifted within the casing. In the other embodiment the closure member surrounds the tube carrying the medium in tubular form, the medium streams 387/80 ált./Kné through the clearance or space between the two tubes, and the removal of the closure member from the path of the medium takes place — upon opening — in this clearance or interspace.

Three exemplified embodiments of the first described solution are shown in schematical section in FIGS. 1 to 3, whereas FIG. 4 represents an embodiment of the last mentioned variant of the device according to the invention, also in schematical section.

In FIG. 1 the medium, e.g. high pressure liquid streams into channel 3 in casing 1, and is discharged from said casing through channel 4. In the closed position as represented in the drawing, said streaming is impossible, since the space between the two channels is closed by the piston 2 by means of the sealing rings 7 and 8. Piston 2 is joined to a piston 6 of larger diameter, which is also shifted in a sealed state in the appropriate bore of the casing, by means of the sealing ring 9. A piston rod 5 joins the pistons, and protrudes from the casing at one of its ends. The casing is closed by a lid 10.

Between the two sealing rings 7 and 8 there is in the casing a cylindrical space 11. The space between sealing rings 7 and 9 communicates with the atmosphere by means of a bore 14, i.e. an opening serving for ventilation and lubrication.

The inlet channel 3 is connected by a bore 12 with the cylindrical space 15 on the side of piston 6 which is opposite piston 2 in such a manner that said bore 12 opens out into a recess 13 in the lid 10. In this manner the high pressure will act on that front surface of the piston 2 which is represented on the left hand side of

the drawing, as well as on the right hand side annular surface of the piston 6 which is of like area as the aforementioned surface. The pistons are accordingly relieved.

If the system of pistons is drawn to the right, the piston 2 leaves the sealing ring 8. Accordingly, streaming can begin and there is no obstacle in the way of shifting the moving parts rightward, to such an extent, that piston 6 shall come quite close to lid 10. The piston 2 will thus be removed from the path of streaming by means of being displaced in the interior of the casing.

The embodiment shown in FIG. 2 differs from the above described solution mainly in that as a result of the slantwise arrangement of the closure device there is no need for the medium to flow in an S-shaped path, as in the first described device. In this embodiment the piston 2a can be pressed into a sealing ring 8a, disposed in tube 16, by means of piston 5, whereas in the open position the piston departs from the sealing ring and from the path of the streaming medium. In this embodiment the bore 12a serving for relief is not arranged in the casing but in the piston.

According to FIG. 3 the closing member consists of a hollow piston 2b, which is tubular and consists of two parts of smaller and larger diameters, respectively, with a shoulder 2' arranged between the two parts for relief. A tube 17, carrying the medium, ends in the casing 1b, with openings 18 disposed near the extremity of said tube, so that in the represented open position the medium passes through the openings into the channel 4b and is discharged through said channel from the casing.

When closing is intended, the piston 2b is shifted in the interior of the casing to the right until it reaches the sealing ring 8b. As soon as the piston is locked in said sealing ring, the streaming of the medium is checked. The shifting of the tubular piston 2b in both directions obviously occurs in a state relieved by the forces acting axially opposed to one another; in the open position there is no closing member to impede the path of the streaming medium.

In the embodiment shown in FIG. 4 the medium streams in the tubing 19 which is divided in two by a partition 22. The medium will stream across the opening 20 disposed before the partition into a cylindrical envelope 23 surrounding the tubing, i.e. into a space 26, whence it streams back into the tubing 19 through an opening 21. For closure the envelope 23 is shifted to the left, and meanwhile the envelope is displaced with sealing on the outer surface of the tubing. As a result of the displacement to the left, the sealing ring in the narrow part of the envelope 24 slides onto the collar or flange 25 of the tube 19, thus checking the flow of the medium in this part. The same effect is achieved, if the sealing ring is disposed on the external part of the collar 25, instead of the interior of the narrow part 24.

In order to permit closure, the sealing must naturally be effected by all means between the two openings 20 and 21, thus essentially in the place where the tube is closed up by the partition 22. In both cases the tapering part 24 acts as closing member, which moves away from the path of the flowing medium upon opening.

The opening 21 has a non-circular shape, widening in the direction of the flow. This shape has the effect that when the envelope 23 is shifted but slightly after closure from its closed position, streaming starts with sub-

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stantial throttling and is gradually increased with further shifting of the envelope.

What we claim is:

1. A closure device, in particular for high pressure streaming media, comprising a casing, a piston mounted for sliding movement in the casing between open and closed positions in which the piston respectively opens and closes the casing to the flow of a said medium therethrough, the piston having a relatively small diameter cylindrical forward portion and a relatively large diameter rear portion, a pair of packing rings in the casing into which the relatively small diameter portion of the piston is slidable and one of which seals with the piston only in said closed position and the other of which seals with the piston in both of

said positions of the piston, a third packing ring with which the relatively large diameter portion of the piston seals in both of said positions of the piston, and means to equalize the pressure on opposite sides of the piston.

2. A device as claimed in claim 1, said piston having a rod that extends through the casing and that is connected to said relatively large diameter rear portion of the piston.

3. A device as claimed in claim 1, and a tube through which said medium flows into the casing, said piston surrounding said tube, said third packing ring sealing between the piston and the tube.

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