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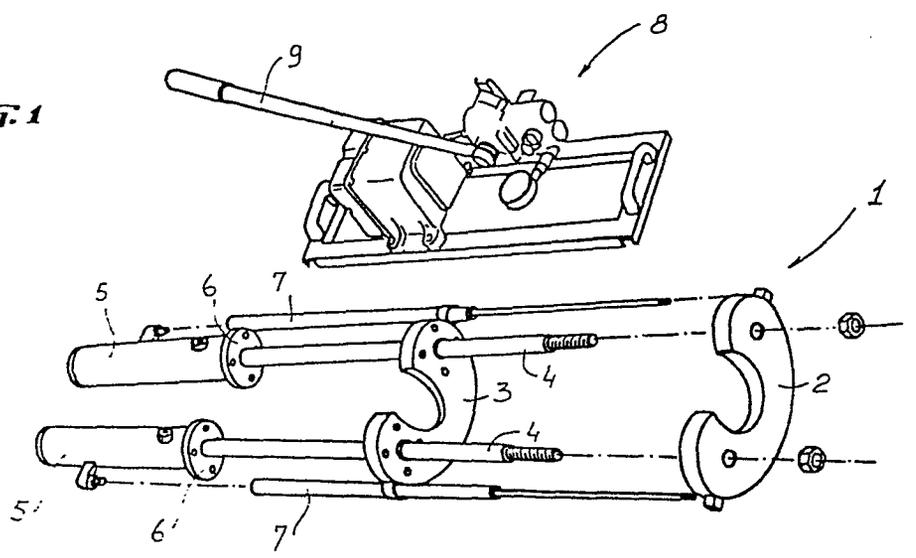
(54) Hydraulic device for removing and inserting marine bushings.

(57) A hydraulic device (1) for extracting and inserting marine bushings (22) mounted in the supports (16) for driving shafts (15) of boats provided with a screw propeller (14), comprises two parallel hydraulic cylinders (5) delivering the axial thrust for said operations and two parallel air cylinders (7) to return the device (1) to the inoperative position.

Fig. 1



EP 0 100 792 A2

"Hydraulic device for removing and inserting marine bushings"

The present invention relates to a hydraulic device by which it is possible to remove and insert marine bushings without need of demounting other components of the transmission on screw propelled boats.

It is indeed well known that removal of marine bushings mounted on supports of shafts for propeller motion, presently faces great difficulties.

These are due to the presence of supports mounted at non easily accessible positions, the different size related to the shaft, the difficulty of removing the bushings axially without damages to the shaft or the support.

Sometimes it is also necessary to replace them in spots which are not close to shipyards or dry docks, that can however carry out the entire operation of bushing replacement in a far lower time, so as to attain a considerable economic advantage either for them or for the user.

The device being the subject matter of the present invention may also be used for underwater bushing replacement, thus without being compelled to raise the boat in the dry dock. Simply by operating on the deck with a hydraulic pump, the device may be employed by the divers without the aid of other components and obtaining the very same operative and technical advantage.

The hydraulic device for removing and inserting marine bushings is characterized by the fact of comprising two lateral and parallel hydraulic cylinders, carrying out an axial thrust extracting said bushings from their seat in the support or inserting said bushings into said seat, as well as two lateral air cylinders parallel to the hydraulic cylinders, carrying out the back thrust to return the device to the inoperative position.

The device also comprises two self-centering forks provided with inserts for matching the diameter of the shaft and the support. One of the forks moves together with the hydraulic pistons and the other with the rods of said pistons.

Through the pressure forwarded by a hydraulic pump, the pistons cause return of the rods, by exerting an axial force that extracts the bushing from its supportor inserts said bushing thereinto.

It is also to be pointed out that only one operator is required to carry out replacement of the bushings, as the use of the device of the present invention is very simple and practical.

The objects, features and advantages of the present invention will be better understood from the following detailed description of a preferred embodiment, given as a non limiting example only, and taken together with illustrative the figures of the accompanying drawings, in which:

Fig. 1 is an exploded view of the device of the invention;

Fig. 2 a view of a guide sleeve divided in two halves, for inserting the bushings;

Fig. 3 is a view of two examples of gauge blocks for removing the bushings;

Figs. 4, 5, 6, 7, 8 and 9 show the logical sequence of operations for removing a bushing; and

Figs. 10, 11, 12 and 13 show the logical sequence of operations for inserting a bushing.

With reference now to Fig. 1, the device 1 of the present invention comprises two self-centering forks 2 and 3 for positioning the device on the propeller shaft of the boat; fork 2 is fixed to the rods 4 of two cylinders 5 while fork 3 is fixedly secured to flanges 6 of said cylinders 5.

In order to obtain back thrust for returning the device to the inoperative position, two air cylinders 7 are arranged on either side and are fixed to cylinders 5 and to the sliding fork 2.

The force required for extraction and insertion of the bushings is obtained through a manual hydraulic pump 8 actuating said device by the pressure obtained by acting on the control lever 9.

With reference now to Figs. 2 and 3, in order to extract the bushing from a support, the two half sleeves 10 and 11 are leant on the shaft 15.

As the outer diameter of said sleevel is slightly less than the support diameter, it is clear that a particularly precise axial thrust may be effected on the metal part of the bushing to be replaced.

It is also necessary to use the gauge blocks 12 and 13 to carry out the operative matching between the forks of the device and the diameter of the propeller shaft of the boat on which the bushings are to be replaced.

Referring now to Figs. 4 through 9, the various operative stages of the bushing extraction are now illustrated.

After having removed the screw propeller 14 from the shaft 15, the device of the present invention is positioned astride the support 16 with the sliding fork 2 on the side of the screw connection.

Then the two sleeve halves 10 and 11 and a gauge block 12 or 13 according to the shaft diameter are mounted.

After having connected the hose 20 of the manual hydraulic pump 8 to the fitting 21 of the cylinders, when pressure is delivered, the sliding fork 2 through the gauge block 12 or 13 abuts on support 16 and consequently through the sleeve halves 10 and 11 the bushing 22 to be replaced is axially pushed until the extraction is complete.

Referring now to Figs. 10 through 13, the various operative stages of the bushing insertion are illustrated.

After having slipped a fresh bushing 22 on the shaft 15, the device of the present invention is so positioned that the sliding fork 2 is between said bushing 22 and the support 16.

On the fixed fork 2 the gauge block is positioned, then pressure is delivered to the cylinders 5, the device abuts on the support 16 and the sliding fork 3 pushes axially the bushing 22 until it is completely inserted into its seat.

It is therefore apparent that the device of the present invention attains the above mentioned objects and solves in an optimal and practical way the problems relating to the replacement of bushings for driving shafts of screw propellers for boats, and it has to be pointed out that the foregoing detailed description of a preferred embodiment does not limit the scope of the invention, but on the contrary it has to be understood that many modifications, variations, additions or substitutions of elements may be resorted to the parts and structures of the device, without altering however the spirit and the object of the invention or departing from its scope of protection, as it is defined in the appended claims.

CLAIMS

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1) Hydraulic device for removing and inserting marine bushings, characterized by the fact of comprising two lateral and parallel hydraulic cylinders (5), carrying out an axial thrust extracting said bushings (22) from their seat in the support (16) or inserting said bushings (22) into said seat, as well as two lateral air cylinders (7) parallel to the hydraulic cylinders (5), carrying out the back thrust to return the device (1) to the inoperative position.

2) Hydraulic device according to Claim 1, characterized by the fact of comprising two self-centering forks (2,3), the one (3) being fixed and integral with the two thrust cylinders (5), the other (2) being slidable together with the moving piston rods (4) of the cylinders (5), for a simplified positioning of the device (1) on the driving shaft (15) of the boat.

3) Hydraulic device according to Claim 2, characterized by the fact of comprising a set of gauge blocks (12,13) to match the forks (2,3) to the diameter of the propeller shaft (15) and of the bushings (22) to be extracted or inserted.

4) Hydraulic device according to Claim 2, characterized by the fact of comprising a set of pushing half sleeves (10,11) to be positioned on the shaft (15), having a size calibrated to the diameter of the bushings (22) and of their seat in the support (16).

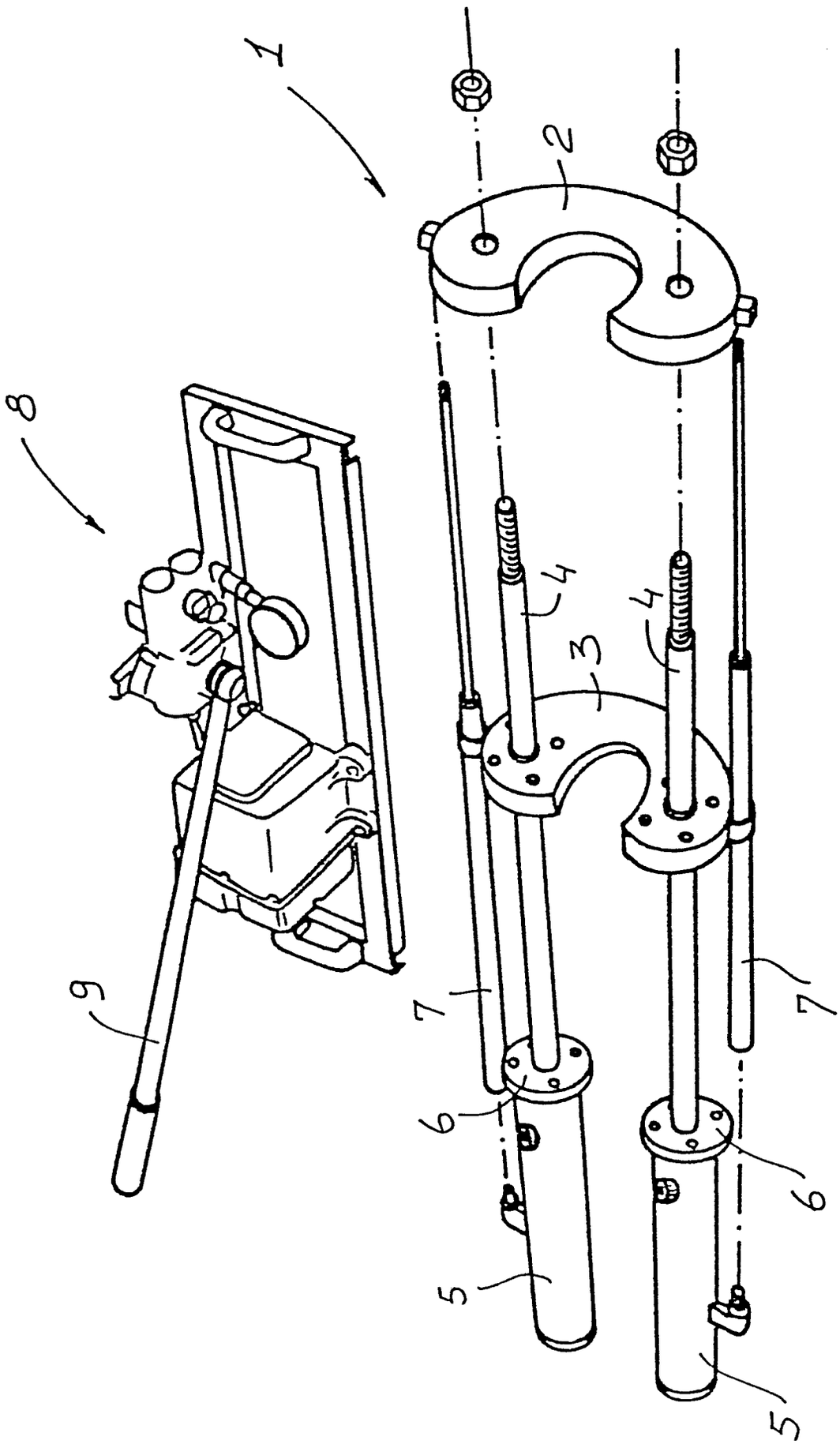


Fig. 1

Fig. 2

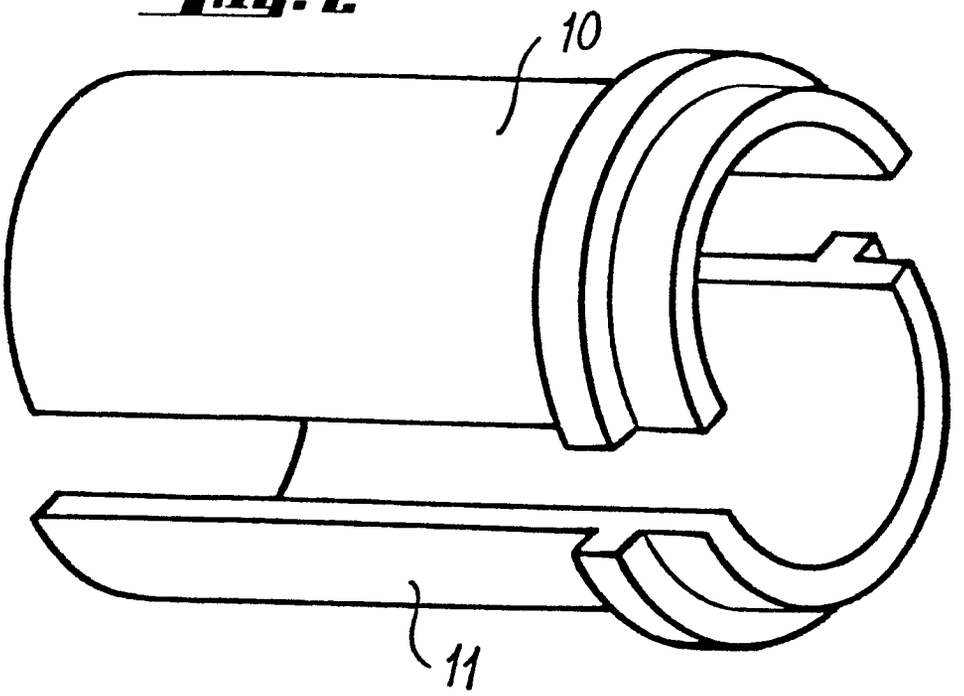


Fig. 3

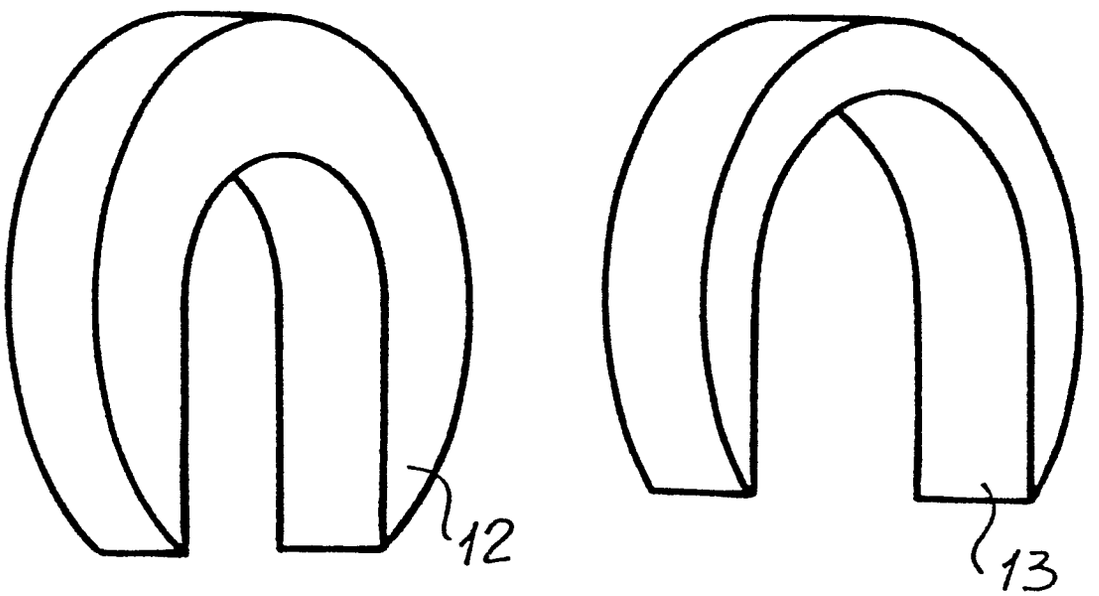


Fig. 4

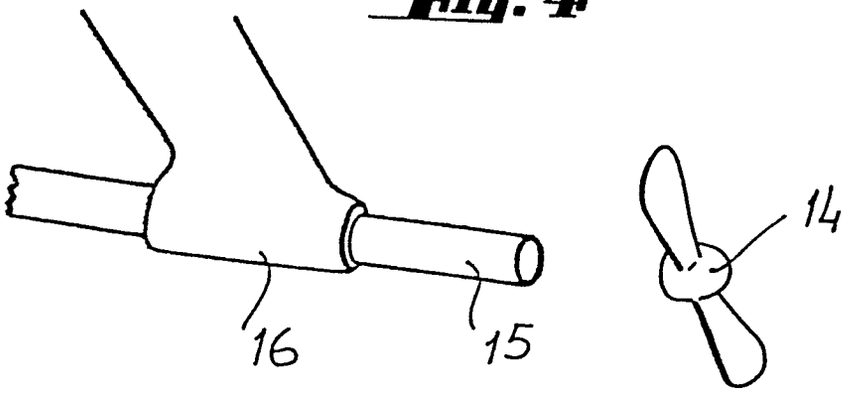
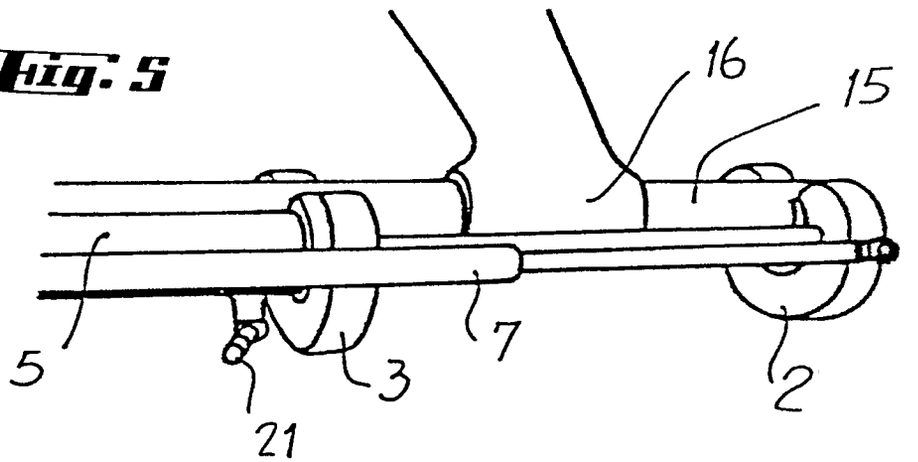


Fig. 5



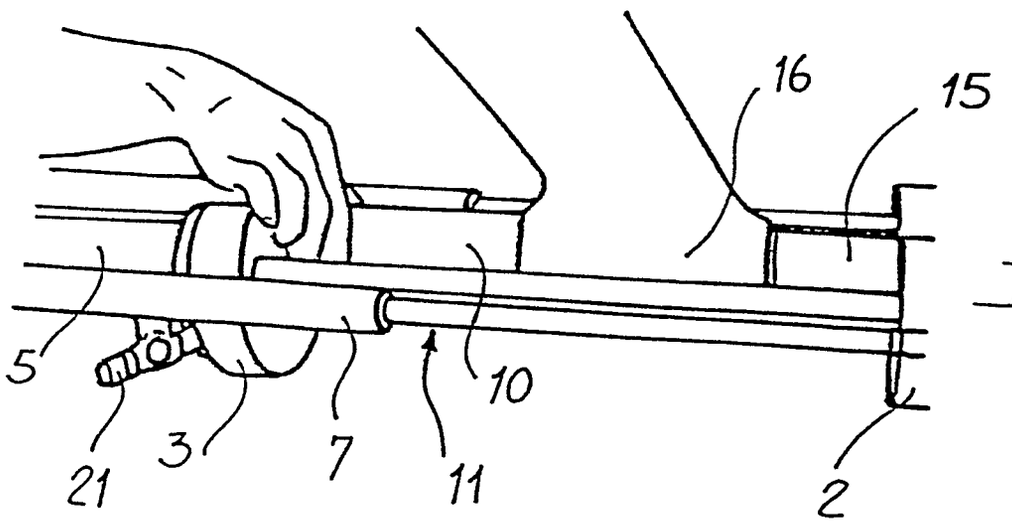


Fig. 6

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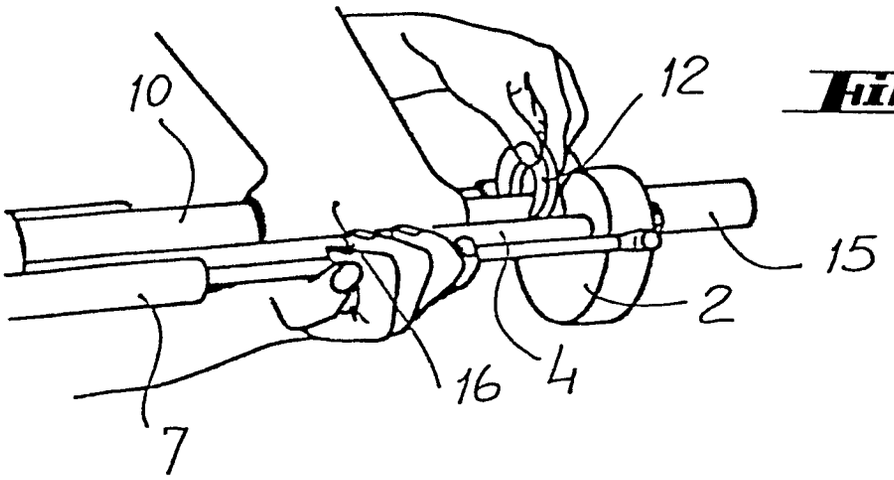


Fig. 7

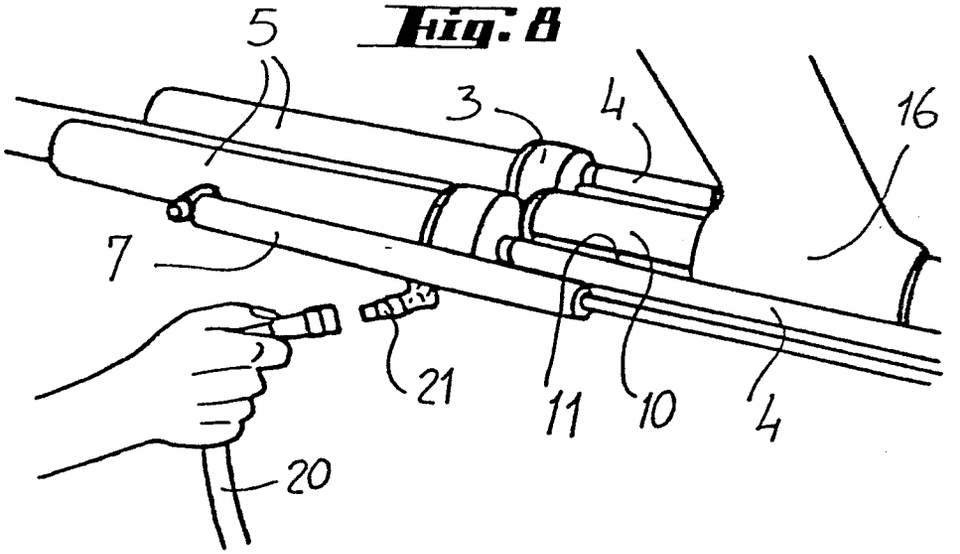


Fig. 8

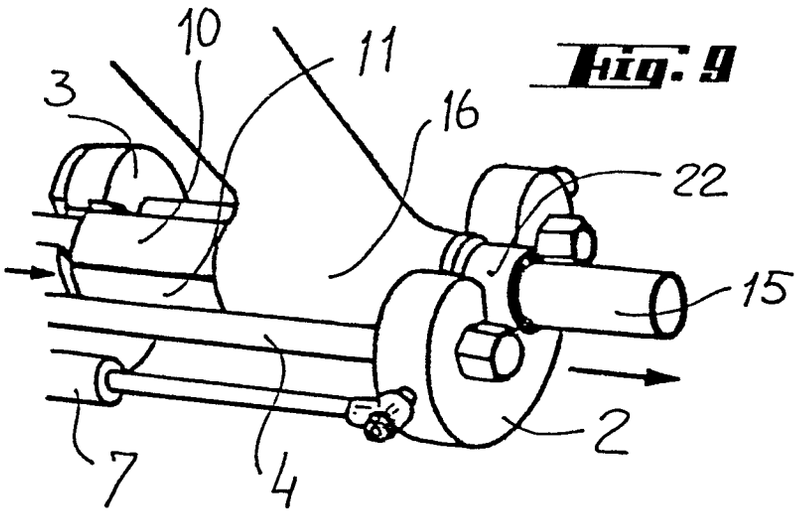


Fig. 9

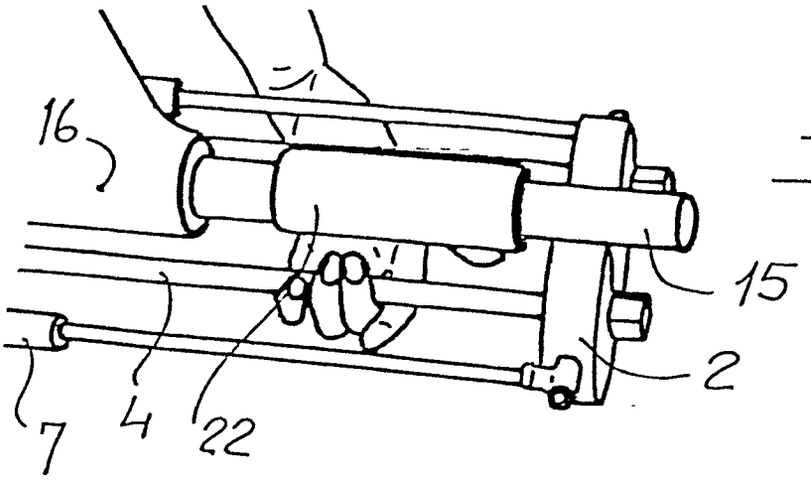
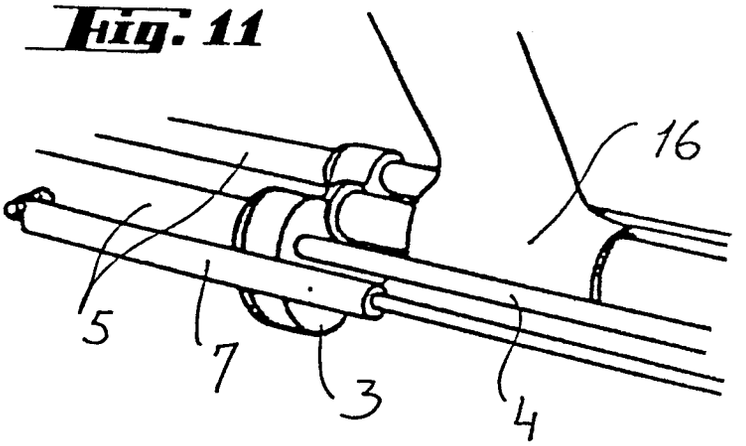


Fig. 10

Fig. 11



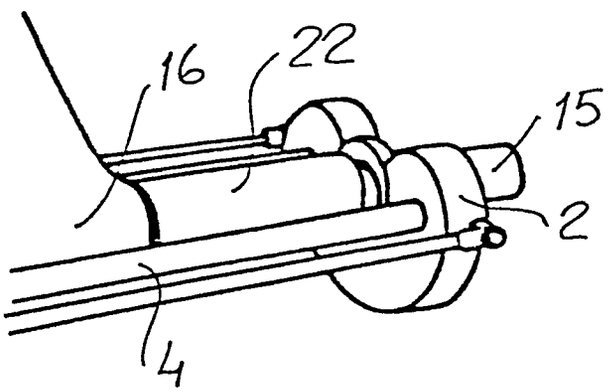


Fig. 12

Fig. 13