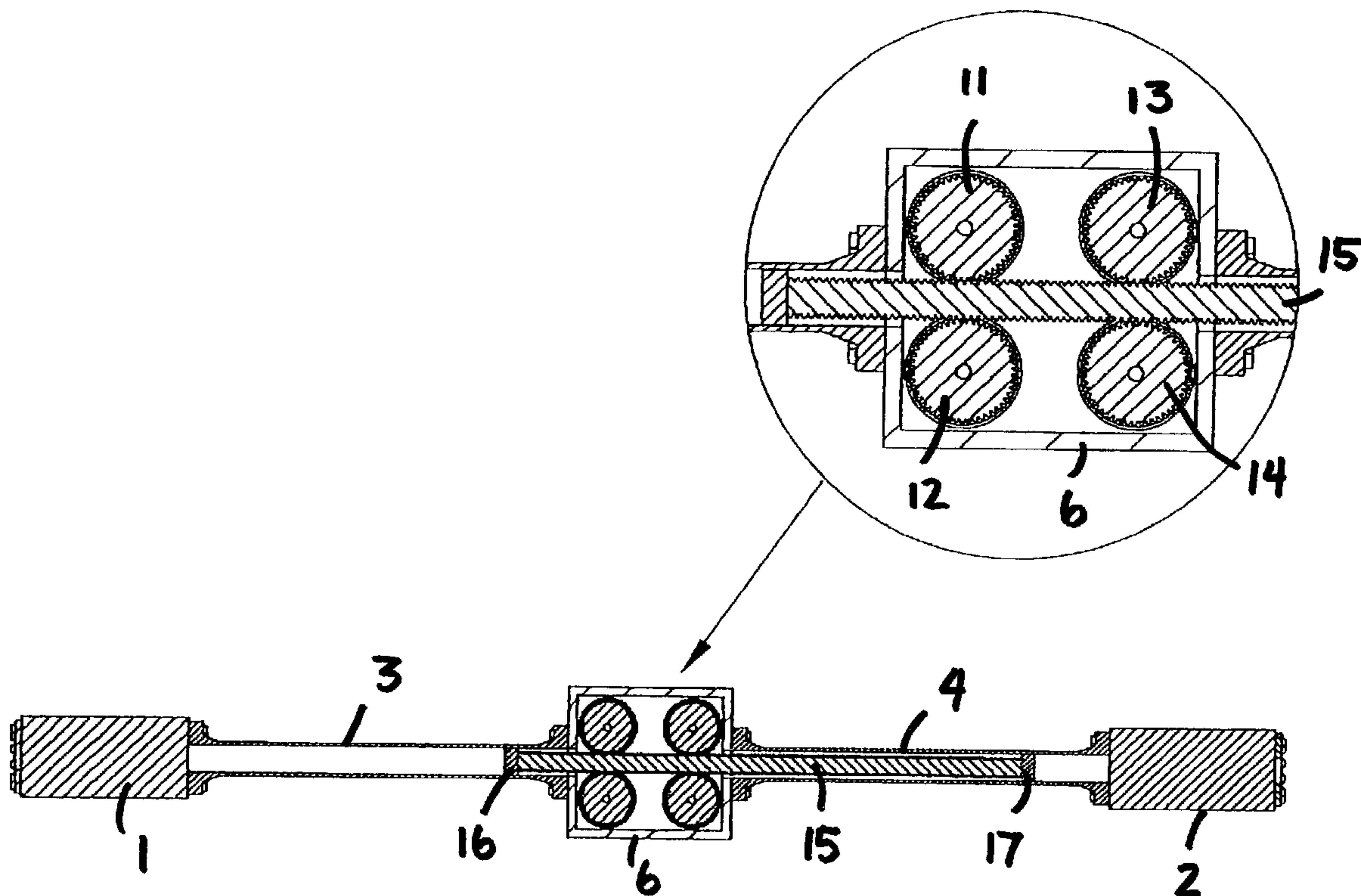




(86) Date de dépôt PCT/PCT Filing Date: 2000/10/17
(87) Date publication PCT/PCT Publication Date: 2001/04/26
(45) Date de délivrance/Issue Date: 2006/03/28
(85) Entrée phase nationale/National Entry: 2002/04/16
(86) N° demande PCT/PCT Application No.: NO 2000/000341
(87) N° publication PCT/PCT Publication No.: 2001/029415
(30) Priorité/Priority: 1999/10/18 (19995084) NO

(51) Cl.Int./Int.Cl. *F04B 9/02* (2006.01),
F16H 55/26 (2006.01), *F16H 19/04* (2006.01)
(72) Inventeur/Inventor:
EILERTSEN, BJORN, NO
(73) Propriétaire/Owner:
ENGINEERING & DRILLING MACHINERY AS, NO
(74) Agent: RIDOUT & MAYBEE LLP

(54) Titre : POMPE A PISTON
(54) Title: PISTON PUMP



(57) Abrégé/Abstract:

A piston pump assembly having a single drive gear assembly associated with two adjacent pump cylinders. Each pump cylinder has a separate valve unit associated therewith. The two pump cylinders have a common piston rod having a pump piston arranged at each end. The piston rod is formed as a toothed rack and the drive gear assembly includes motor-driven gear wheels engaged with the toothed rack.

ABSTRACT

A piston pump assembly having a single drive gear assembly associated with two adjacent pump cylinders. Each pump cylinder has a separate valve unit associated therewith. The two pump cylinders have a common piston rod having a pump piston arranged at each end. The piston rod is formed as a toothed rack and the drive gear assembly includes motor-driven gear wheels engaged with the toothed rack.

PISTON PUMP

The present invention relates to a pump unit which comprises at least two pump cylinders.

The invention has been especially developed as a drilling fluid pump. The standard drilling fluid pumps are connecting rod operated piston pumps. These are relatively heavy structures, and their service life is also comparatively short.

Therefore there is a need for a new type of drilling fluid pump that is lighter in weight and has a longer service life.

10 In accordance with the invention, there is provided a pump unit comprising a central housing; at least two separate elongated pump cylinders attached to the central housing so as to extend in opposite directions from the central housing; respective pump pistons positioned within the respective pump cylinders and outside of the central housing; a piston rod in the form of a toothed rack having one of the pump pistons attached to each end of the toothed rack; a central drive unit comprising electric motors driving respective gear wheels in engaging interaction with the toothed rack for moving the pump pistons back and forth in the pump cylinders, respectively; and a valve unit at each end of the elongated pump cylinders remote from the central housing, each of the valve units containing inlet and outlet valves for the pump cylinders.

20 In the pump unit according to the invention, the central housing and the valve units may be mounted on a common frame which can be a transport frame or a support frame.

The electric motors may be reversible so as to drive the respective gear wheels in opposite directions to move the pump pistons back and forth in the pump cylinder.

According to an aspect of the pump unit of the invention, at least a first electric motor may be arranged to drive respective first gear wheels in a first direction and at least a second electric motor may be arranged to drive respective second gear wheels in an opposite direction so as to move the pump pistons back and forth in the pump cylinders.

Additional features and advantages of the invention will be explained in detail in the following description of an exemplary embodiment with reference to the drawings, wherein

30 Figure 1 is a perspective view of a drilling fluid pump according to the invention;
Figure 2 is a side view of the pump in Figure 1;
Figure 3 is a sectional view taken along the line A-A in Figure 2;
Figure 4 is a sectional view taken along the line B-B in Figure 2; and

1a

Figure 5 is a perspective view of an embodiment in which two pumps are placed on a frame.

The drilling fluid pump shown in Figure 1 comprises two valve units 1 and 2, two pump cylinders 3 and 4, and a central drive unit 5. The valve units 1 and 2 are as known from the conventional pumps, and the pump cylinders 3 and 4 are also conventional. Therefore these components are not described in any more detail here.

The central drive unit comprises a housing 6 and two electric drive motors 7 and 8 mounted thereon. The two drive motors 7 and 8 are via gearboxes 9, 10 and gear wheels 11-14 drive-connected to a toothed rack 15 which moves in the two pump cylinders 3, 4. At
10 each end, the toothed rack 15 has a piston 16 and 17 respectively which act as

2

pump pistons in their respective cylinder 3, 4. The toothed rack 15 has an H-shaped cross-section, see Figure 4.

The pump shown in Figure 1 is symmetric, i.e., the two valve units 1, 2 and the pump
5 cylinders 3, 4 are identical to one another.

When the pump is in operation, the toothed rack 15 is moved back and forth by the electric motors 7, 8 via the gearboxes 9, 10 and the gearwheels 13 - 14. The pistons will then draw in and force out drilling fluid through the associated valve unit 1, 2.

10

The new drilling fluid pump can be made having a weight that is about four times lighter than the conventional drilling fluid pumps which have heavy drive gears. The reduction in weight will depend on the length of the cylinders. An expedient pump cylinder length is 3 metres, which is about six times longer than in a conventional
15 pump.

The piston velocity can then be the same as in a conventional pump, and the pump cylinder diameter can be as in the known pumps, for example as much as 6" in cylinder diameter. A service life is thus obtained for the inventive pump that is six times longer
20 than that of the conventional pumps.

Figure 5 shows a drilling fluid pump which differs from that in Figure 1 only in that it has been "doubled", and where the pumps are placed on a transport or support frame 18.

25

CLAIMS:

1. A pump unit comprising:
a central housing;
at least two separate elongated pump cylinders attached to the central housing so as to extend
in opposite directions from the central housing;
respective pump pistons positioned within the respective pump cylinders and outside of the
central housing;
a piston rod in the form of a toothed rack having one of the pump pistons attached to each
end of the toothed rack;
a central drive unit comprising electric motors driving respective gear wheels in engaging
interaction with the toothed rack for moving the pump pistons back and forth in the
pump cylinders, respectively; and
a valve unit at each end of the elongated pump cylinders remote from the central housing,
each of the valve units containing inlet and outlet valves for the pump cylinders.
2. The pump unit of claim 1, wherein the central housing and the valve units are
mounted on a common frame.
3. The pump unit of claim 1 or 2, wherein the frame is a transport or support frame.
4. The pump unit of any one of claims 1 to 3, wherein the electric motors are reversible
so as to drive the respective gear wheels in opposite directions to move the pump pistons
back and forth in the pump cylinders.
5. The pump unit of any one of claims 1 to 4, wherein at least a first electric motor is
arranged to drive respective first gear wheels in a first direction and at least a second electric
motor is arranged to drive respective second gear wheels in an opposite direction so as to
move the pump pistons back and forth in the pump cylinders.

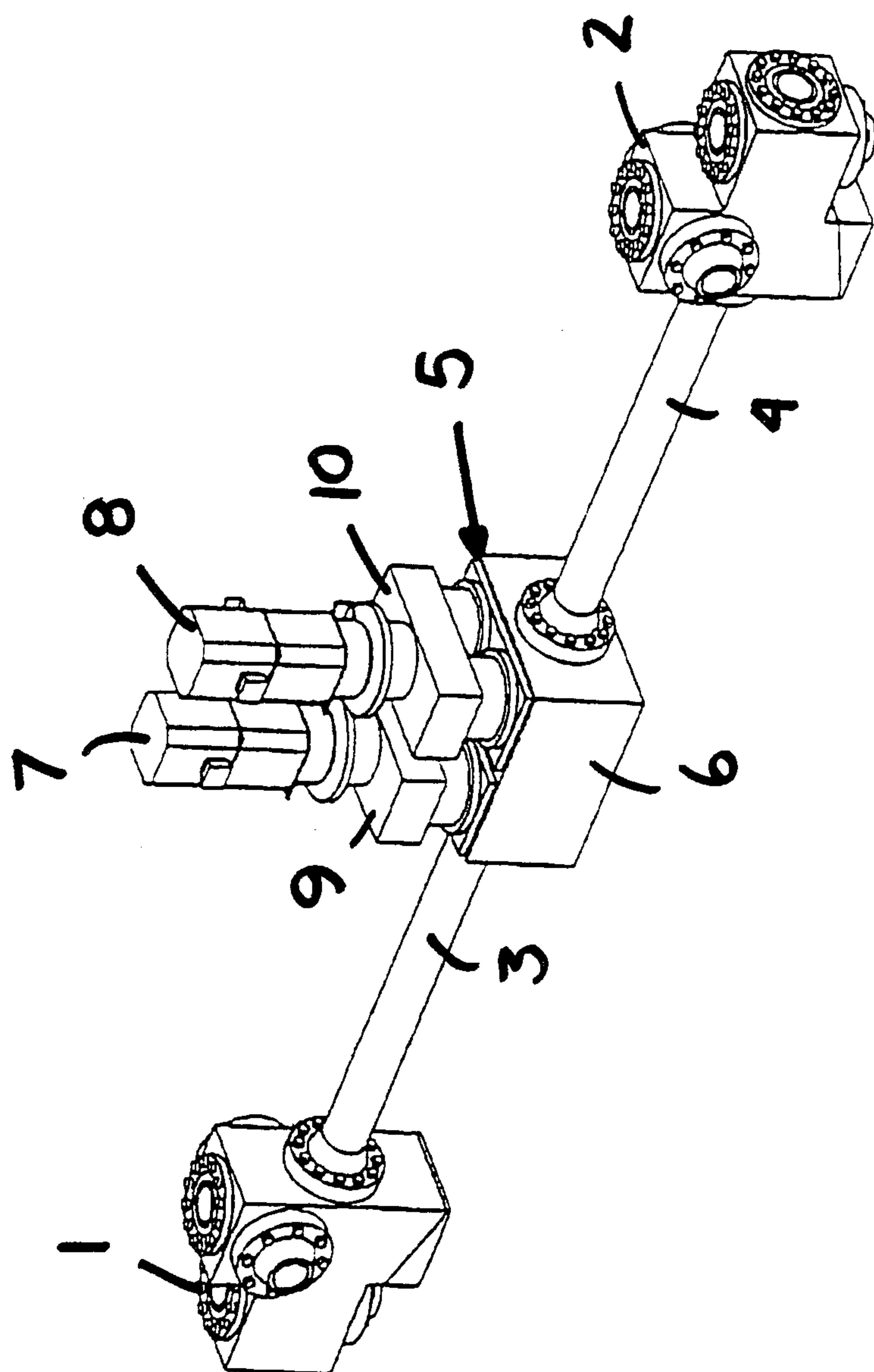


Fig.1

2/5

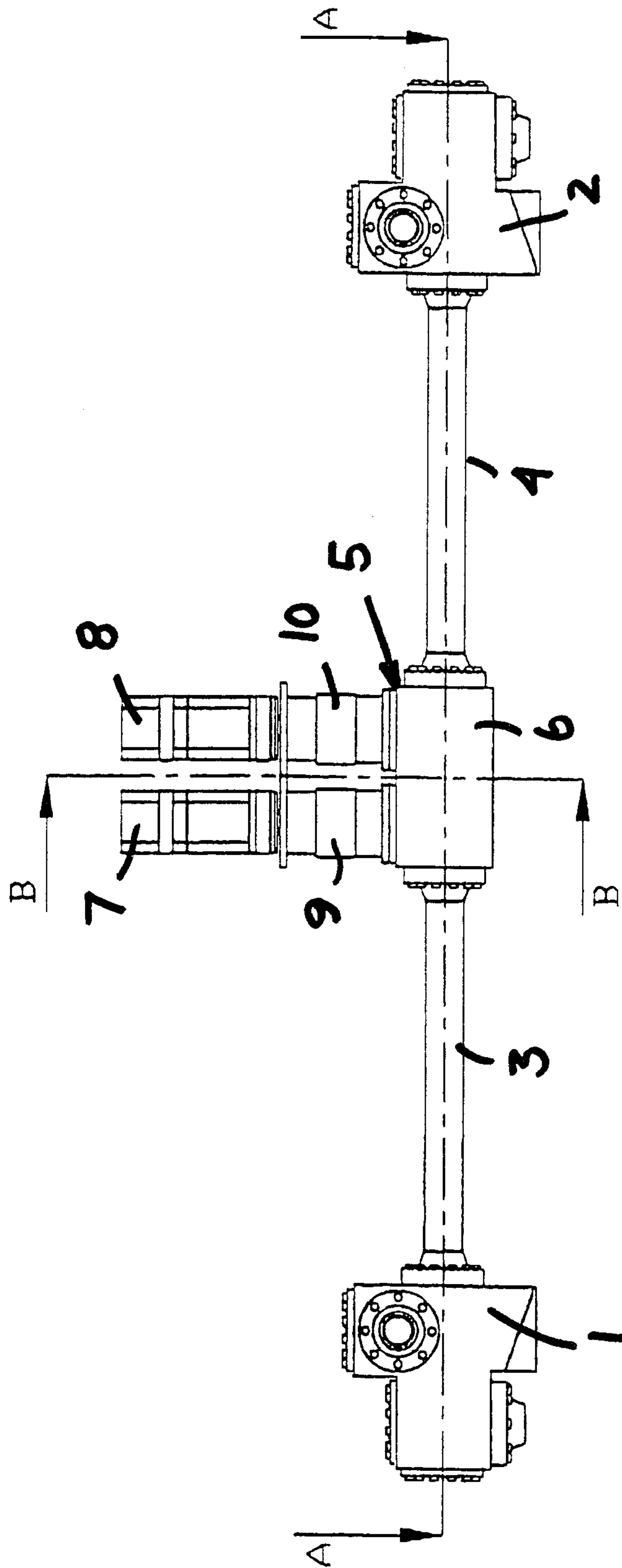
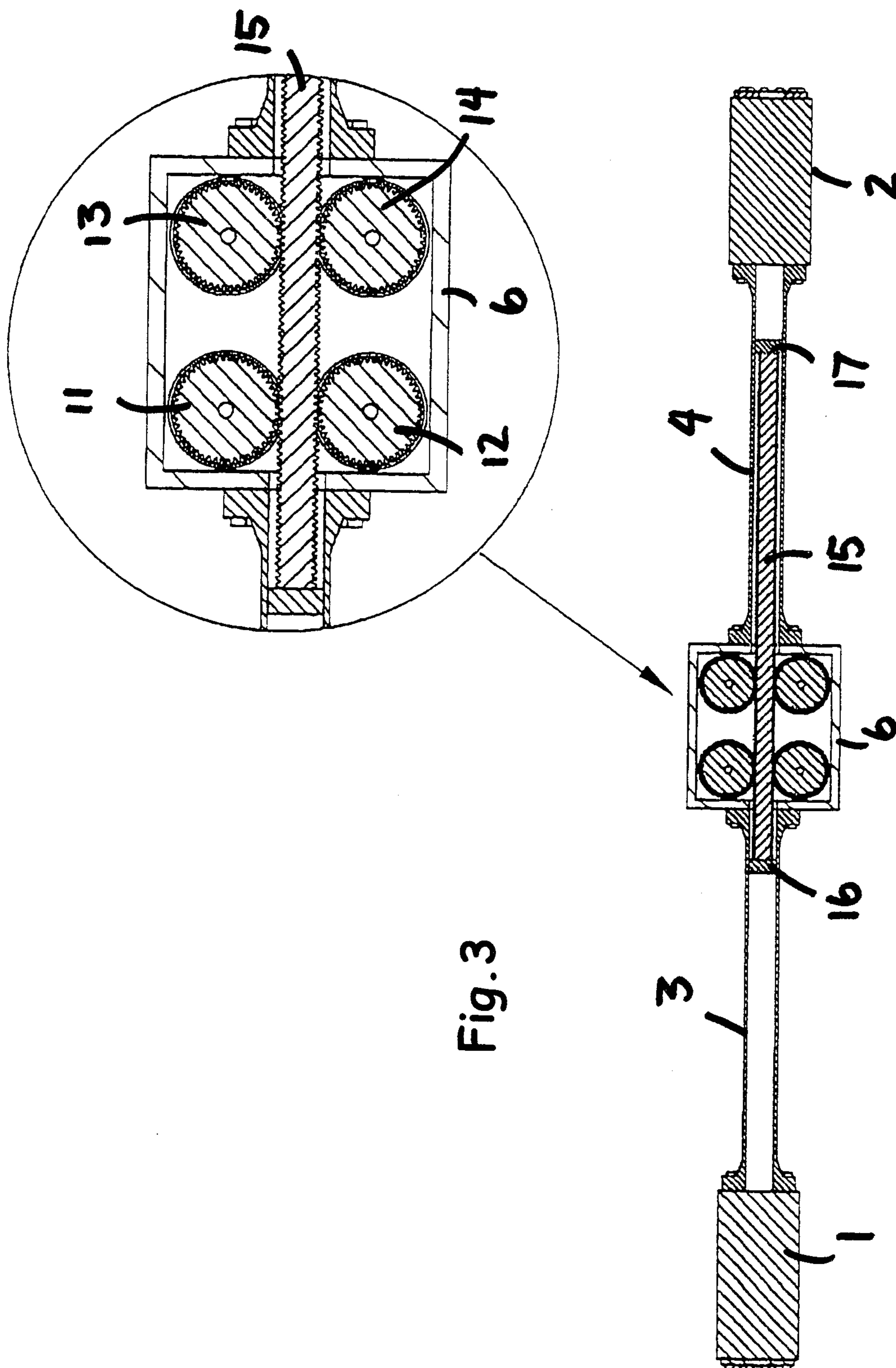


Fig. 2



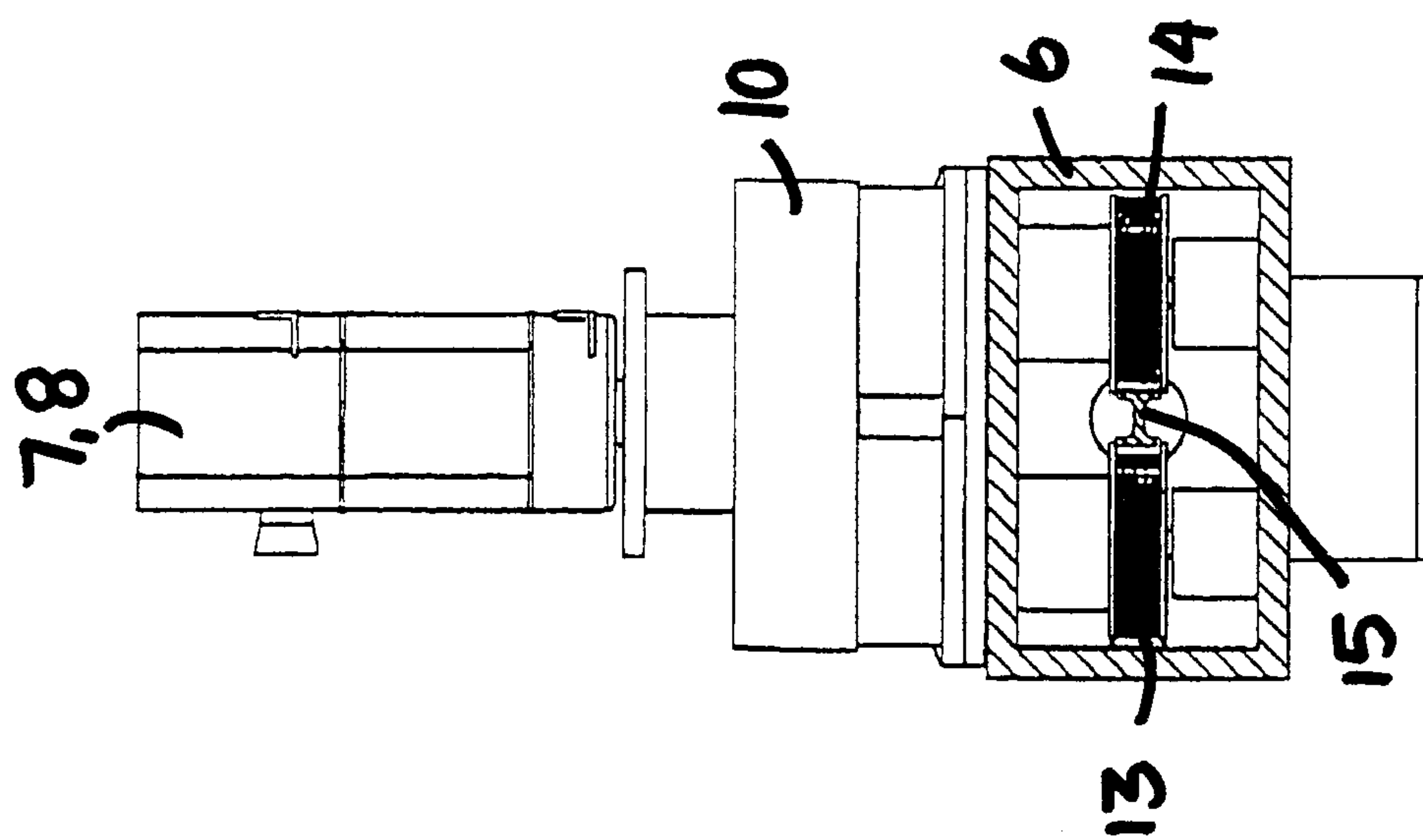


Fig. 4

5/5

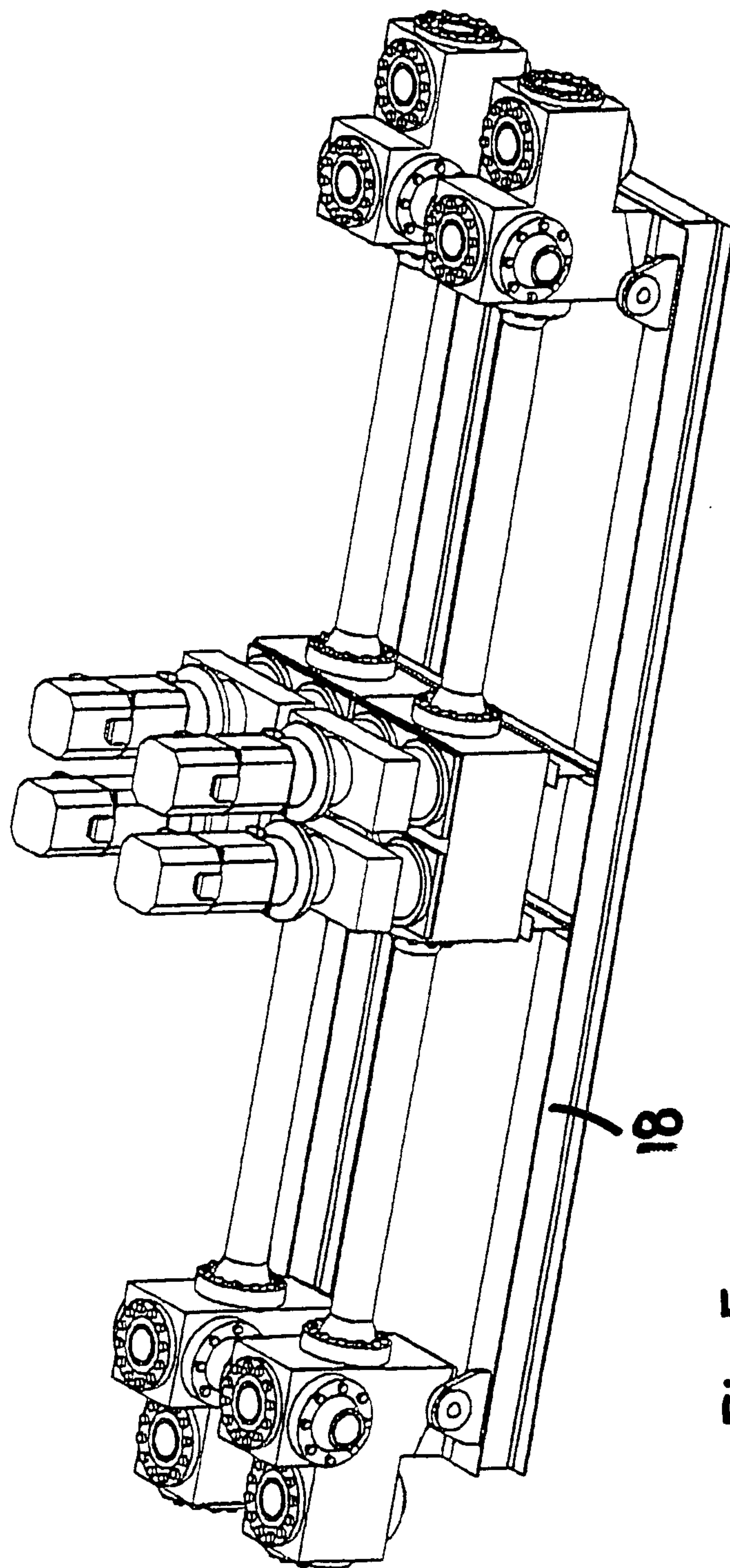


Fig. 5

