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(54) **Fluid pressure operable unit.**

(57) A fluid pressure operable unit comprising a piston 21 and cylinders 9, 10 having respective lugs 16, 22 for connection to a mechanism to be controlled, the cylinder having an intergral pumping means 12 for generation of fluid pressure in the cylinder to control movement of the piston 21.

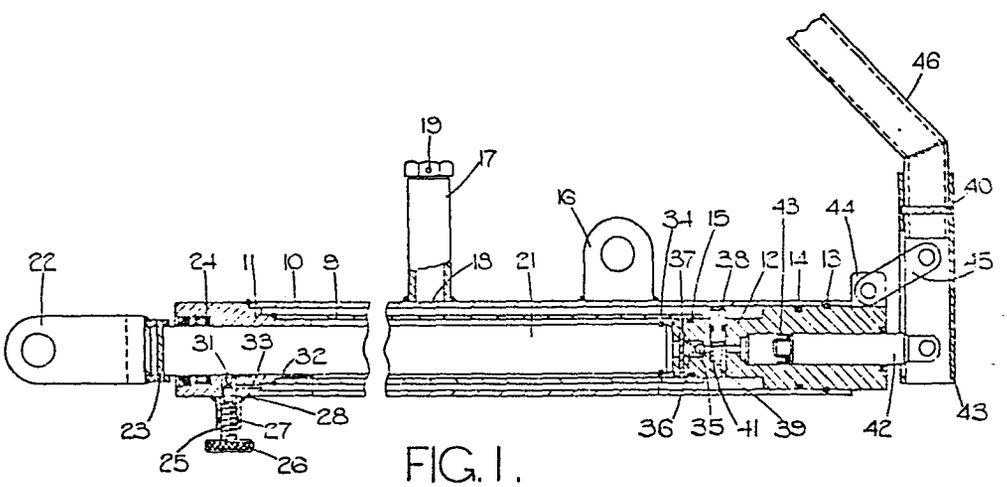


FIG. 1.

EP 0 185 436 A2

"Fluid pressure operable unit"

This invention relates to a fluid pressure operable unit which is capable of being used, without any external source of fluid under pressure, for a variety of purposes.

Mechanical components which are conventionally moved by means of mechanical mechanisms, such as lead screws, can be conveniently actuated by means of such a unit.

It is the object of the invention to provide a fluid pressure operable unit which is convenient for use in association with a number of different types of mechanism.

In accordance with the present invention, there is provided a fluid pressure operable unit comprising a piston and cylinder unit, one of which has a connecting lug to a part of a mechanism and the other of which has a further lug for connection to a further part of the

mechanism, between which parts relative movement is to be controlled, the cylinder having integral pumping means at one end thereof for generating fluid pressure in the cylinder to control movement of the piston relatively thereto.

Conveniently, one end of the piston externally of the cylinder has a lug fixed thereto and the cylinder has a lug fixed to its external surface. The pumping means is preferably at the end of the cylinder remote from that from which the piston extends. The pumping means may have a plunger operable in the same direction as the direction of movement of the piston. The pumping means may include a linkage arranged to actuate the plunger and providing a mechanical advantage between a manual control member and the plunger.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a cross sectional side elevation view of a fluid pressure operable unit constructed in accordance with the invention, and

Figure 2 is a plan view of the unit.

The unit shown is capable of use in several different mechanisms but has been designed specifically for raising and lowering the chute on the back of a ready-mixed concrete vehicle. Conventionally, the chute is controlled by a screw and nut mechanism. No external source of fluid under pressure is required for operation

of the unit shown since it is entirely self-contained.

The unit, as shown in Figures 1 and 2, comprises a cylinder containing a slideable piston. The cylinder is fabricated from inner and outer concentric tubular sleeves 9, 10 secured at one end to a hollow plug 11. Securement is by welding to form a liquid-tight joint. The plug 11 is stepped to provide shoulders on which the sleeves 9 and 10 engage respectively.

At the other end of the two sleeves 9, 10 there is a pump body 12 also having surfaces on which the ends of the sleeves 9, 10 engage. To secure the outer sleeve 10 onto the pump body 12, a circumferential wire ring 13 is used. The pump body carries external circumferential seals 14, 15 engaging with the sleeves 9, 10 respectively to form liquid-tight seals at the ends of the sleeves. There is no positive securement between the end of the unit sleeve 9 and the pump body 12 other than through the seal.

On the outside surface of the outer sleeve 10 there is fixed a pair of apertured lugs 16 which can be connected to an external mechanism by means of a bolt or pin. Also situated on the external surface of the outer sleeve 10 is a filler tube 17 enclosing an entry hole 18 through the outer sleeve 10 and having at its outer end a filler plug 19 which may have a retention pin passing through it. This allows air to bleed in and out of the reservoir tube.

Extending into the interior of the cylinder there is a piston in the form of a cylindrical piston rod 21 having one end extending through the plug 11. That end of

the piston rod carries a yoke 22 defining a pair of spaced aperture lugs. A pin 23 retains the yoke on the end of the piston rod 21. A fluid-tight seal assembly 24 is housed within the end of the hollow plug 11 and this engages with the piston rod 21 to provide a seal as the piston moves relatively to the cylinder.

The space between the inner and outer sleeves 9, 10 forms a reservoir for hydraulic fluid which can be introduced through the filler tube 17. Fluid also fills the space between the inner sleeve 9 and the piston rod 21 and there is a closeable by-pass valve controlling flow of fluid from the inner to the outer space when required. This defice comprises a screwed valve member 25 having a knurled control knob 26 at its outer end. The valve member 25 occupies a short tube 27 fixed on the exterior of the hollow plug 11. This is internally screw threaded to engage with the valve member 25. The valve member can bear on a ball 28 which can close a port 31, connecting a passage 32 with a drilling 33 both in the plug 11. The passage 32 is formed longitudinally on the interior surface of the plug 11 and communicates with the end of the plug directed towards the pump body 12. The drilling 33 is between the space within the plug 11 occupied by the ball 31 and the end of the valve member 25 and the space between inner and outer sleeves 9, 10. By screwing the valve member 25 outwardly away from tight contact with the ball 28, this is allowed to lift off the seating in the port 31 thus allowing communication between the passage 32

and the drilling 33. If the pressure in the passage 32 exceeds the pressure in the drilling 33, fluid will flow in that direction. However, tightening the valve member 25 against the ball, 28 will prevent such flow.

At the end of the piston rod 21 nearest to the pump body 12 there is a circumferential spring clip 34 which serves to limit travel of the piston rod through the plug 11.

The pump body 12 has a stepped coaxial bore which at the end nearest to the piston rod 21 is occupied by a spring loaded ball 35. The spring 36 for this is retained in place by means of a transverse pin. The ball 35 is engaged against a seating formed by a step in the bore of the pump body.

There is also a transverse bore in the pump body which contains a plug 38 serving as an abutment for a spring loaded ball 39. The spring 41 for this abuts against an end surface of the plug 38. The plug has an external circumferential seal engaging in the transverse bore which the plug occupies. The ball 39 engages on a seating formed by a step in the transverse bore. The two ends of that transverse bore open into the space between inner and outer sleeves 9 and 10.

The other end of the coaxial bore in the pump body 12 is occupied by a sliding pump piston 42 carrying a seal 43, providing a liquid-tight seal between the pump piston 42 and the cylinder formed by the appropriate portion of the bore of the pump body 12. The outer end of

the pump piston 42 is pivotally connected to a member 43 which is a hollow sleeve with a slot in one side. The end of the pump piston 42 extends through such slot. A further lug 44 is secured to the end of the pump body 12 and to this is pivotally connected one end of a toggle 45. The other end of the toggle is pivotally connected to the member 43 at a position spaced at its pivotal connection with the pump piston 42.

A pin 40 is provided in the member 43 near its upper end as shown and into this can be fitted a removable handle 46 which is of cranked shape as shown. The end of the handle which is made of tube is slotted to engage the pin 40.

In operation, the device may be connected into a mechanism having parts which are to be relatively movable. One of the parts is secured to the lugs 16 and the other to the yoke 22.

The device contains hydraulic fluid. Reciprocation of the pump piston 42 by actuation of the handle 46 results in fluid being drawn from the reservoir, formed by the space between inner and outer sleeves 9, 10 and delivered to the space between the piston rod 21 and the inner sleeve 9. When the pump piston 42 is moved outwardly, that is to the right as shown in the drawing, fluid is drawn past the ball 39 and into the space vacated by the pump piston 42. Upon reversal of the movement of the pump piston 42, the build up of pressure closes the ball 39 against its seating and instead opens the ball 35 thus

allowing entry of the fluid into the space between the piston rod 21 and the inner tube 9. From the closed position as shown the pressure initially acts against the end of the piston rod 21 and it is against this surface that the force is applied to move the piston rod 21 to the left so as to increase the distance between the lugs 16 and the yoke 22.

When the fluid pressure is to be released, the valve member 25 is unscrewed by means of its knurled knob 26 thus allowing the fluid to escape back into the outer space between the sleeves 9 and 10, thus allowing the piston rod 21 to move inwardly. Mechanical force is necessary to cause such movement. During such inward movement of the piston rod 21, the ball 35 is against its seating thus preventing fluid flowing through that portion of the bore of the pump body 12.

It is to be understood that the lugs 16 and the yoke 22 can be replaced by other attachment means whereby the device can be secured to parts of a mechanism to be controlled.

The pump handle 46 may be detached when pumping action is not required and its shape and form may vary according to the operating position of the device in a mechanism. The pumping action provides a mechanical advantage between the manual operation of the handle 46 and the sliding movement of the pump piston 42.

The pump body 12 may be fitted in various alternative positions, in order to allow operation of the

handle 46 in certain alternative directions. In a position of use the handle operating plane may be above or below or to either side of the remainder of the unit, as convenient.

CLAIMS

1. A fluid pressure operable unit comprising a piston and cylinder, one of which has a connecting lug to a part of a mechanism and the other of which has a further lug for connection to a further part of the mechanism, between which parts relative movement is to be controlled, the cyliner having intergral pumping means at one end thereof for generating fluid pressure in the cylinder to control movement of the piston relatively thereto.

2. A fluid pressure operable unit as claimed in claim 1 in which one end of the piston externally of the cylinder has a lug fixed thereto and the cylinder has a lug fixed to its external surface.

3. A fluid pressure operable unit as claimed in claim 1 or claim 2 in which the pumping means is at the end of the cyliner remote from that from which the piston extends.

4. A fluid pressure operable unit as claimed in any one of the preceding claims wherein the pumping means has a plunger operable in the same direction as the direction of movement of the piston.

5. A fluid pressure operable unit as claimed in any one of the preceding claims wherein the pumping means has

a linkage arranged to actuate the plunger and providing a mechanical advantage between a manual control member and the plunger.

6. A fluid pressure operable unit as claimed in any one of the preceding claims in which the cylinder is fabricated with inner and outer walls, the space between these serving as a reservoir for fluid.

7. A fluid pressure operable unit as claimed in anyone of the preceding claims in which the pumping means includes valve means whereby fluid can flow only from a reservoir to the cylinder, as the pumping means is operated.

8. A fluid pressure operable unit as claimed in any one of the preceding claims wherein fluid can be released from the cylinder to allow the piston to move in a direction opposite to that produced by operation of the pumping means, by means of a manually controlled valve.

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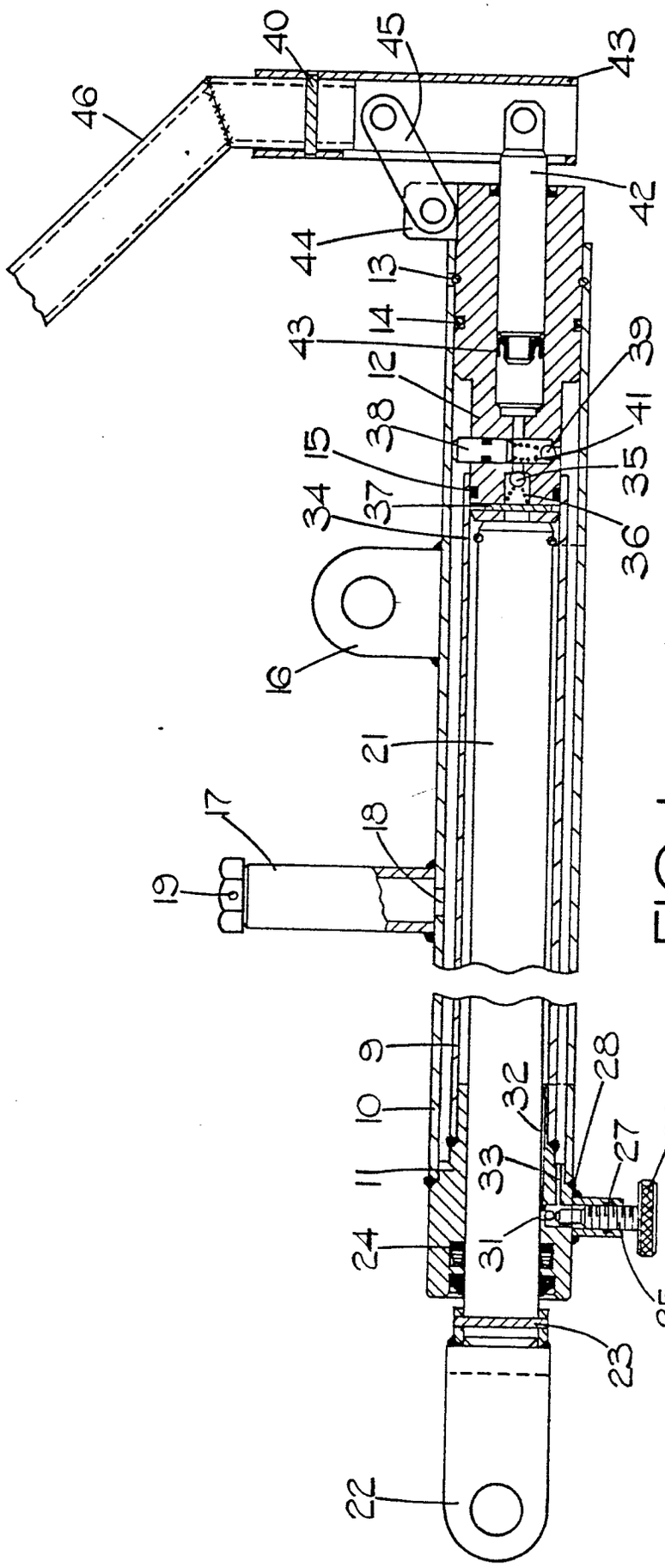


FIG. 1.

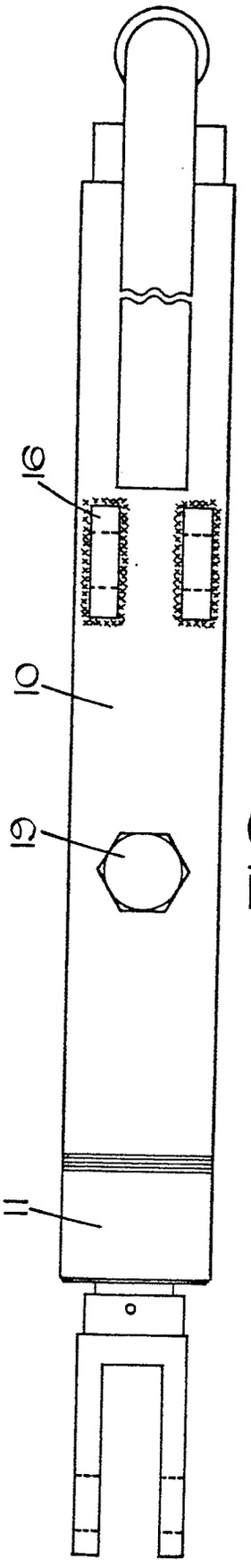


FIG. 2.