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1,925,109

HYDRAULIC CHUCK

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2 Sheets-Sheet 2

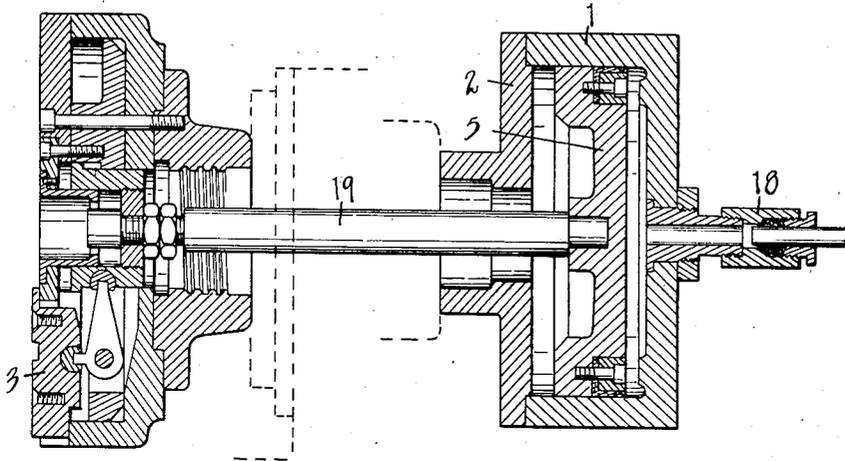


Fig. 5

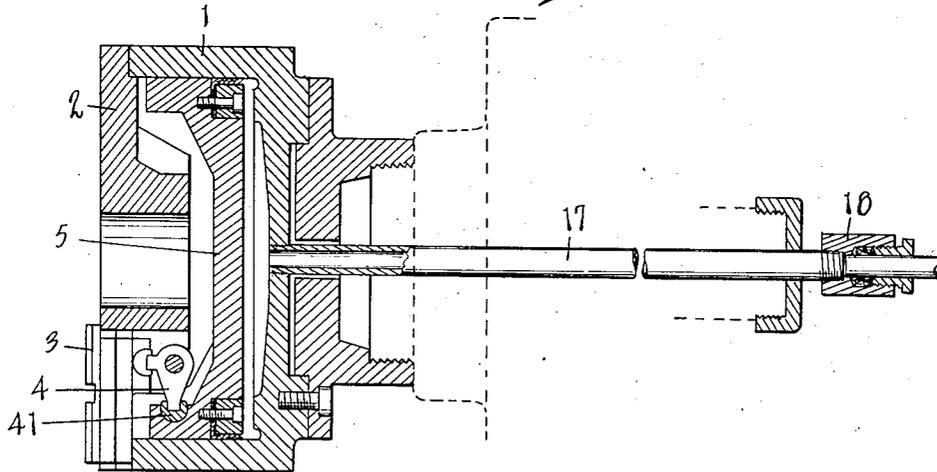


Fig. 4

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HYDRAULIC CHUCK

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4 Claims. (Cl. 279-4)

The objects of the invention are:

First, to provide a very simple and very compact construction of hydraulic chuck.

Second, to provide means for controlling such a chuck by pumping the fluid into and out of the cylinder depending on the pressure of the atmosphere to return the piston.

Third, to provide improved means which I call an "accumulator" for maintaining the hydraulic pressure while the machine is in operation.

Fourth, to provide an improved pump and valve means for delivering fluid to and from the hydraulic cylinder.

Objects pertaining to details and economies of construction and operation will appear from the description to follow.

Preferred embodiments of my invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a detail assembly view partly diagrammatic of the chuck and accumulator shown in vertical central section.

Fig. 2 is a detail vertical longitudinal sectional view through the improved valve structure showing the relation of its ports and the connection of the parts when closing the chuck.

Fig. 3 is a similar sectional view with the piston valve shown in full lines, the valve being shifted to the eduction position for drawing fluid or oil from the hydraulic cylinder to open the chuck.

Fig. 4 is a modification of my invention in which the fluid is delivered to and from the cylinder through an axially disposed pipe with a stuffing box connection therein.

Fig. 5 is a modification in which the chuck and the actuating cylinder are provided as separate units.

The parts will be identified by their numerals of reference which are the same in all the views.

1 is a chuck body of cylindrical form. It is provided with a face plate 2 which carries the reciprocating chuck jaws 3, preferably three in number, one only being shown. The jaws are each actuated by a bell crank lever 4 having connections appearing in the patent to Hopkins, #1,711,787, of May 7, 1929.

The chuck body is a hydraulic cylinder within which is disposed the cup-shaped piston 5 provided with suitable and usual hydraulic packing. The movable rockers 41 for the bell cranks 4 are carried by a forwardly projecting flange or cup wall of the said piston 5 so that the reciprocation of the piston actuates the chuck jaws as will

be clearly and readily understood from an examination of Fig. 1.

Fluid, preferably oil, is supplied through conduit 6. A pump 7 delivers the same from a suitable supply connected at 8, the supply not being shown. It may be a small tank of oil. The supply 8 delivers to the valve casing 9. An intake pipe 10 leads from the valve casing to the upper end of the pump 7 and the discharge pipe 11 delivers from the lower end of the pump. The passages to and from the pump are controlled by the piston valve 12 in the cylinder 13 within the valve casing 9. Connection 14 is from the center of the valve casing at boss 141 and part 142 to the supply pipe 6, being connected thereto by a T-coupling 61.

The piston valve 12 is spool-shaped and hollow so that the fluid is delivered around and also through the same. The pipe 10 to the pump is connected to boss 101 on valve casing 9 and is supplied through port 102 in the valve cylinder 13. The discharge pipe 11 of the pump is connected to boss 111 and discharges to the cylinder 13 through part 112. The piston valve is controlled by lever 121 connected to the piston rod 122, as seen in Fig. 1.

To maintain the fluid pressure in the structure, I provide what I call an accumulator. This consists of a vertical pipe 62 secured to the T-coupling 61 and extending a considerable distance above the same. A plunger 15 of small diameter is fitted within the vertical pipe 62 and is provided with a weight 16 which extends upwardly into a sleeve 161 which carries the said plunger 15 so that it can be readily reciprocated in the pipe 62. Removable weights 162 are provided so that the weight and pressure on the plunger 15 can be regulated and controlled to the desired or required pressure.

I have thus described the details of my structure and its operation will be clear from an examination of the same.

The pump 7, preferably a rotary pump, operates continuously in one direction. When set as in Fig. 2 it draws fluid supply from the pipe 8 through the end of the valve casing 9, upwardly into supply pipe 10, past the port 102. It delivers this oil downwardly through discharge pipe 11, through port 112 into valve cylinder 13 which delivers downwardly through pipe 14 into the supply pipe 6, driving the piston 5 to the left and closing the jaws 3 of the chuck.

The pressure elevates the plunger 15 which is urged downwardly by the weights thereon and thus maintains the pressure as desired. When

the work is done, by reversing the position of the valve 12 by throwing the lever inwardly, the valve will take the position indicated in Fig. 3. The pump then operating will draw oil up through the port 102 from the central part of the spool of the piston and up through the port 143 in the lower side of the valve cylinder. This will rapidly withdraw the oil from the cylinder and the jaws of the chuck will be opened. The oil drawn in will be delivered downwardly through port 112 and through the center of the valve 12 out to the source of supply, so that by simply manipulating the valve 12 the piston of the chuck is controlled as desired.

In Fig. 4 in place of delivering the oil through a distributor, surrounding the adapter or other revolving parts, I deliver the same centrally through a pipe 17 providing a stuffing box 18 to permit the rotation of the parts.

In Fig. 5 I show the hydraulic cylinder as a separate unit, being in all details the same as that appearing in Fig. 1. The piston is provided with a draw bar or piston rod 19 which operates a chuck exactly comparable to the chuck illustrated in the said patent to Hopkins. It may be any suitable chuck for the purpose.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A hydraulic chuck structure, comprising a hydraulic chuck, a pump to inject and discharge fluid from the said chuck, an engine valve for

reversing the flow of the said pump to inject or discharge the fluid from the said chuck, a vertical pipe connection to the said supply, and a weighted plunger in said pipe.

2. A hydraulic chuck structure, comprising a chuck body with radially movable jaws thereon, a hydraulic cylinder to control the same, a pump to inject and discharge fluid from the said cylinder, an engine valve for reversing the flow of the said pump to inject or discharge the fluid from the said piston, a vertical pipe connection to the said supply, a plunger in the said pipe, and a weight with sleeve surrounding the said pipe to apply pressure to the said plunger to act as an accumulator.

3. A hydraulic chuck structure, comprising a chuck body with movable jaws thereon, a hydraulic cylinder to control the same, a pump to inject and discharge fluid from the pump, a vertical pipe connection to the supply, a plunger in the said pipe, and a weight to apply pressure to the said plunger to act as an accumulator.

4. A hydraulic chuck structure, comprising a chuck body with movable jaws thereon, a hydraulic cylinder to control the same, a pump to inject and discharge fluid from the said cylinder, a valve for reversing the flow of the said pump, a pipe connection to the supply, a plunger in the said pipe, and means to apply yielding pressure to the said plunger to act as an accumulator.

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