

June 25, 1946.

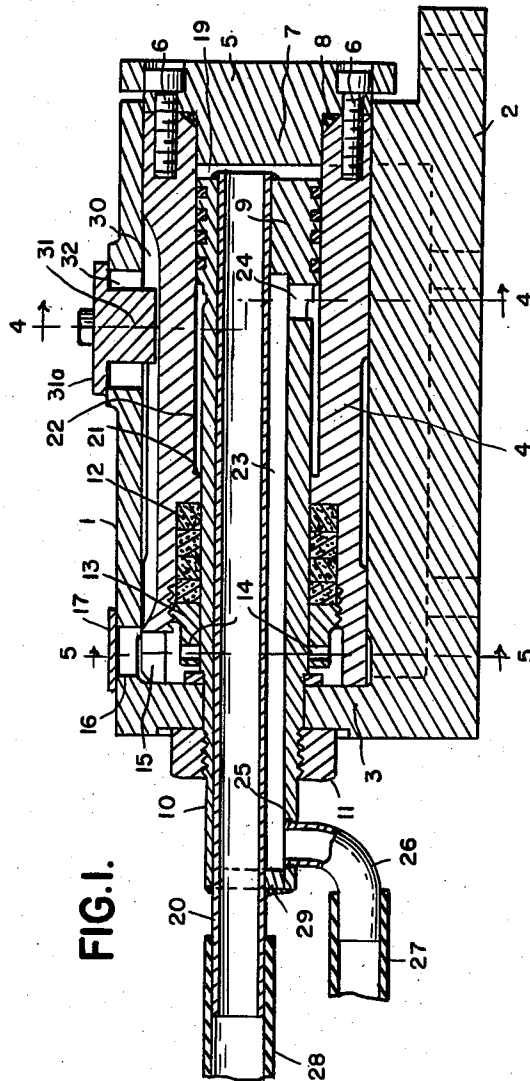
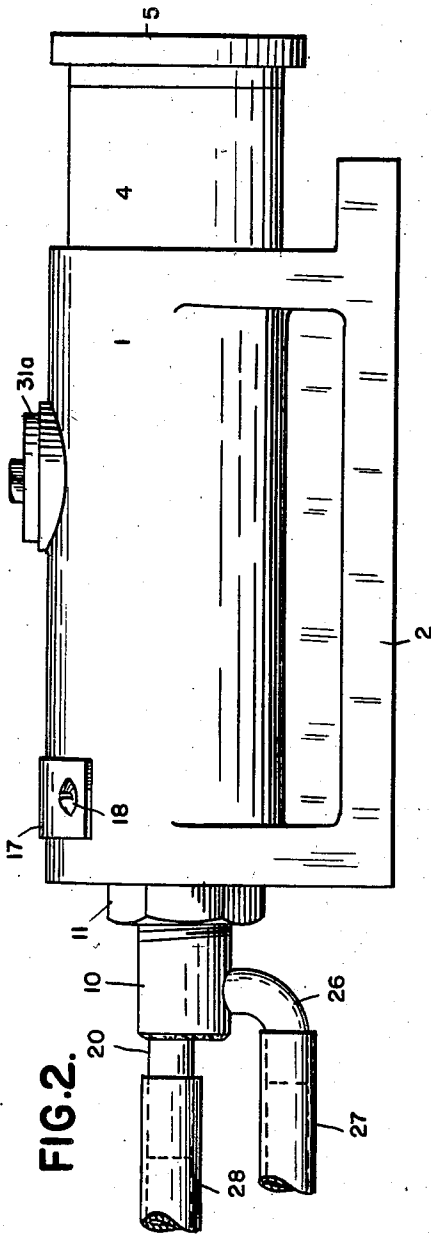
C. SENN

2,402,848

FLUID MOTOR

Filed May 25, 1945

2 Sheets-Sheet 1



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FIG.3.

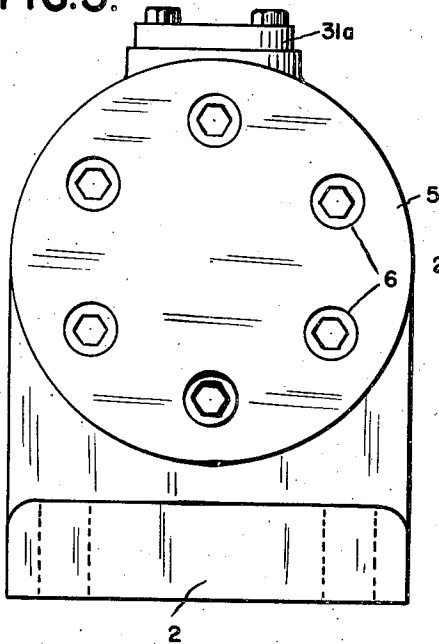


FIG.4.

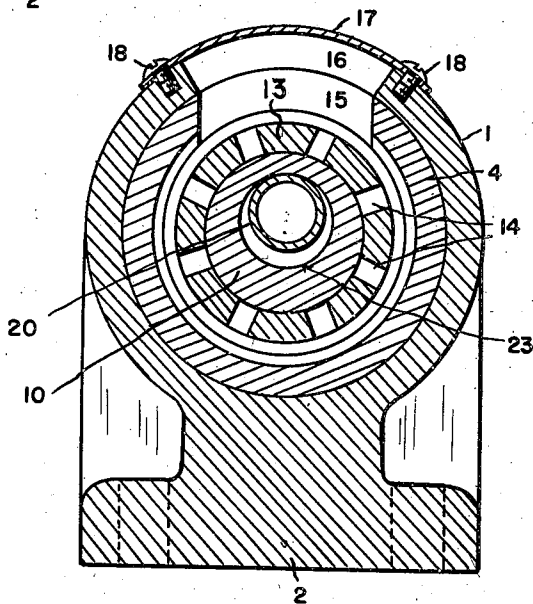
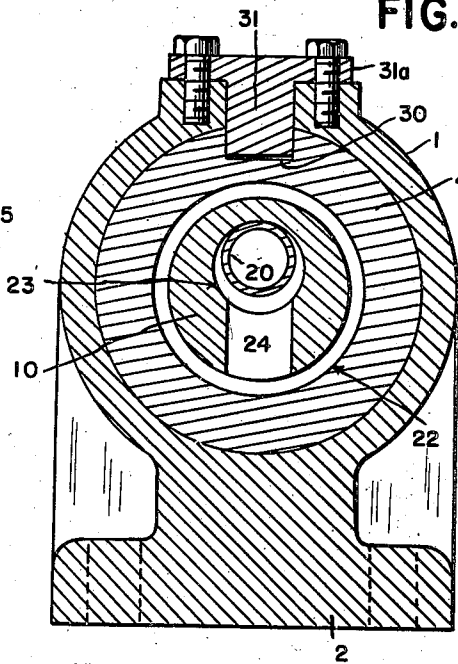


FIG.5.

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UNITED STATES PATENT OFFICE

2,402,848

FLUID MOTOR

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Application May 25, 1945, Serial No. 595,735

1 Claim. (Cl. 121—38)

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This invention relates to fluid motors and particularly motors employing a purely reciprocating motion, and has the nature of an improvement on the subject matter of my pending application, Serial Number 535,319, filed May 12, 1944.

Objects of the invention are to provide improved means for delivering a pressure fluid to and from the pressure chambers of a fluid motor; to provide for adjustment of a packing nut disposed interiorly and at the axis of such a motor without disassembly of the motor; and to provide in a novel manner for air cushioning the retractive stroke of the reciprocating member of the motor.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Fig. 1 is an axial sectional view of the improved motor, showing the initial position of the working stroke.

Fig. 2 is a view in side elevation showing the final position of said stroke.

Fig. 3 is a front end view of the motor.

Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a cross section taken on the line 5—5 of Fig. 1.

In these views, the reference character 1 designates an outer or guide cylinder formed with a suitable base 2, whereby the cylinder may be bolted down on any desired support. Said cylinder is integrally formed at its rear end with a head 3 and its front end is open. Slidably guided in the described cylinder is a cylinder 4 of a length adapting it to substantially fully occupy the bore of the guide cylinder. The cylinder 4 extends through the open front end of the cylinder 1 and has its own front end closed by a head 5 secured to such end by cap screws 6, the arrangement being such that the head 5 is closely adjacent to the open front end of the cylinder 1 when the inner cylinder is fully retracted, as in Fig. 1. Preferably the head 5 has a central boss 7 inserted in and closely fitting the cylinder 4, and a packing ring 8 is compressed between said boss and the forward edge of the cylinder 4.

Fixed within and slidably engaging the front end portion of the cylinder 4 is a piston 9 rigidly carried by the front end of a rod 10 having its rear portion centrally mounted in the head 3 and clamped to the latter by a nut 11. Said rod projects rearwardly of the head 3 for reasons which will presently appear. The rear portion of the inner cylinder is slidably fitted on the rod

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10 and is chambered to receive annular packing 12 sealed against the rod under compression of a nut 13. This packing will occasionally require tightening and a provision is made for turning the nut 13 for that purpose without disassembly of the motor. Thus the rear portion of the nut 13 has a series of circumferentially spaced, radial openings 14 outwardly of which the cylinder 4 is formed with a slot 15. In the fully retracted position of the cylinder 4, this slot 15 registers with a slot 16 in the cylinder 1 normally covered by an arcuate plate 17. This plate is readily removable by unfastening screws 18 and thereupon a suitable pin (not shown) may be inserted through the slots 15 and 16 to enter any of the openings 14 and thus turn the nut. Circumferential extent of said slots is adequate to afford swinging of the inserted pin through a substantial arc, as is evident from Fig. 5.

Between the head 5 and piston 9 there is formed a high pressure fluid chamber 19 wherein fluid is accumulated to force the cylinder 4 forward on its working or power stroke. A pipe 20 extends within the rod 10 from end to end thereof to deliver fluid to and discharge it from the chamber 19. Between the rear face of the piston and an interior annular shoulder 21 on the cylinder 4 there is formed a low pressure fluid chamber 22 wherein fluid is accumulated to retract said cylinder, the rod having a bore 23 extending from its rear end substantially to the piston to deliver fluid to and discharge it from the chamber 22. A port 24 laterally opens from said bore into the chamber 22 closely adjacent to the piston and a port 25 laterally opens from the projecting rear portion of the rod into a fitting 26 from which a hose 27 leads to a fluid source (not shown). As best appears in Figs. 4 and 5 the pipe 20 is of lesser diameter than the bore 23 and disposed eccentrically in the latter, being preferably tangent to the bore along a line opposed to the ports 24 and 25. Said pipe projects sufficiently rearward of the rod 10 for connection to a hose 28 or the like leading to any fluid source (not shown). An insert 29 fits exteriorly on said pipe and is welded or otherwise fixed in the rear end of the bore to close such end.

To positively restrain the cylinder 4 from any rotation, a key-way 30 is longitudinally extended in the outer face of such cylinder to receive a key 31 exteriorly mounted on the cylinder 1 and projecting through a slot 32 in the latter. Any suitable valve mechanism may control the flow through the hoses 27 and 28 to initiate the pro-

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jection and retraction of the cylinder 4 at the proper times.

The described motor has many uses, particularly in machine shops and factories. Examples of these uses are punching, stamping, spot welding and arbor pressing. Specialized machines for performing different pressure operations are decidedly expensive and in shops where the volume of such operations does not warrant installation of such machines, the described fluid motor can advantageously be employed. The light weight, compactness, low cost, and ready portability of this fluid motor are highly desirable, rendering it feasible to readily shift same to and install it in any location where it may be needed.

It is important to appreciate that this motor is designed for precision work, as distinguished from a considerable variety of fluid motors designed for lifting, impact, and other uses entailing no considerable accuracy of travel. The elimination of need for any outboard bearing is to be noted, the necessary accurate guidance being secured within the confines of the motor itself, by virtue of employing the two cylinders substantially coextensive and one operating within the other.

What I claim is:

A fluid motor comprising a fixed cylinder having a headed rear end and an open front end, a piston rod fixed upon and forwardly extending

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from said headed rear end, a cylinder reciprocably fitted in and guided by the fixed cylinder and extending through said open end and having a headed front end and a rear portion in fluid sealing engagement with said rod, a piston fixed on the forward portion of said rod within the reciprocable cylinder and forming a front and a rear expansible fluid chamber respectively with the front end and rear portion of the reciprocable cylinder, said rod being formed eccentrically with a passage extending from the rear end portion of the rod approximately to the piston and having a fluid delivery connection to said passage rearwardly of the fixed cylinder and a fluid connection to the rear expansible chamber from the front portion of said passage, said fluid connections being in the relatively thick portion of the wall of said passage, and a pipe of lesser diameter than said passage extending in said passage from the rear portion of said rod to and substantially through the piston for fluid delivery to and from the front expansible chamber, said pipe being substantially against the wall of said passage opposed to said fluid connections, whereby the spacing of said pipe from the passage wall is a maximum at said fluid connections.

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