Sept. 24, 1946. R. J. PARSONS 2,408,338

HYDRAULIC DEVICE

Filed June 13, 1944

Fig. 1.

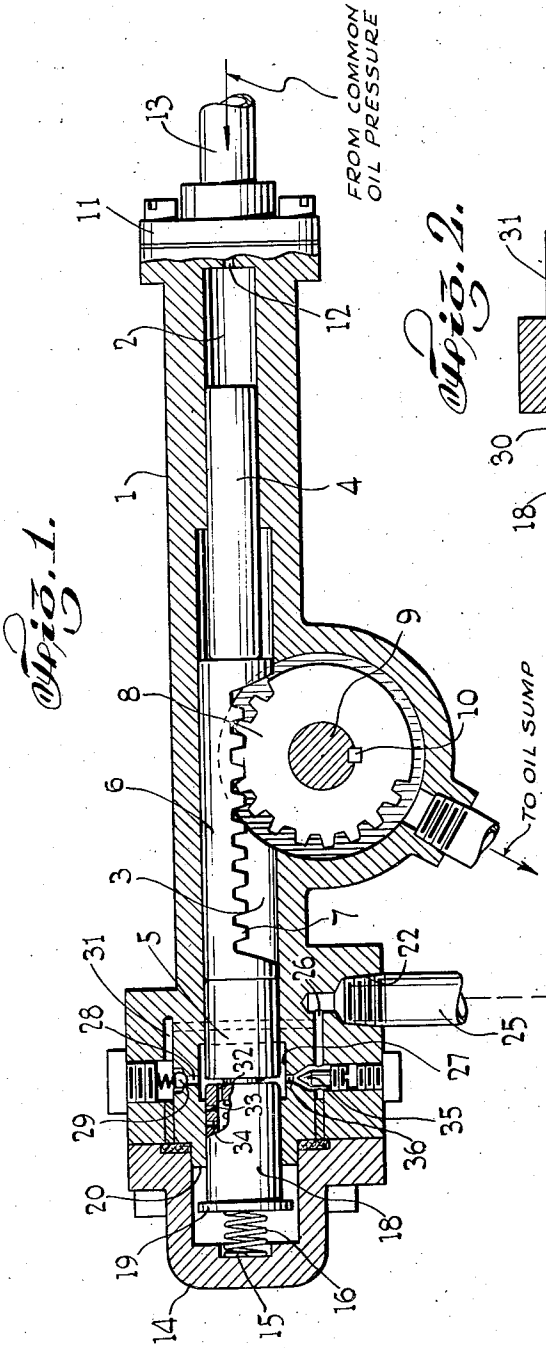
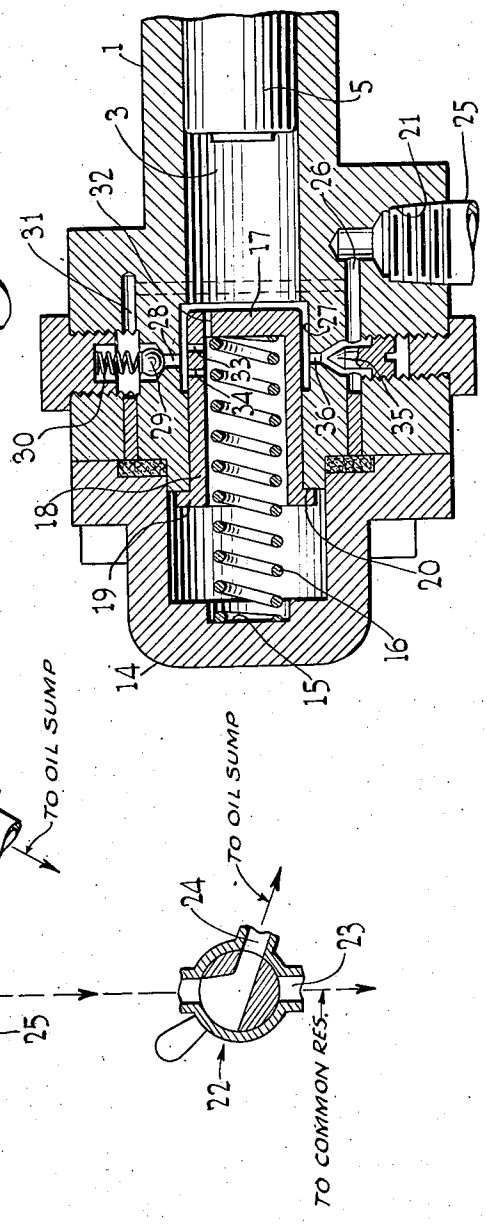


Fig. 2.



INVENTOR.
Robert J. Parsons
BY
Lyman E. Dodge
ATTORNEY

Patented Sept. 24, 1946 2,408,338

UNITED STATES PATENT OFFICE

2,408,338

HYDRAULIC DEVICE

Robert J. Parsons, Schenectady, N. Y., assignor to Consolidated Car Heating Company, Inc., Albany, N. Y., a corporation of New York

Application June 13, 1944, Serial No. 540,081

1 Claim. (Cl. 121—44)

1

This invention relates to reciprocating hydraulic motors.

A further object of this invention is the production of a device of the type specified which will be so constructed that an end of its movement will be retarded.

A principal object of the invention is the production of a device of the type specified which shall be so designed that it may be manufactured without the necessity for great precision in alignment of opposing pistons and cylinders.

Other objects and advantages will appear as the description of the particular physical embodiment selected to illustrate the invention progresses, and the novel features will be particularly pointed out in the appended claim.

In describing the invention in detail, and the particular physical embodiment selected to illustrate the invention reference will be had to the accompanying drawing and the several views thereon in which like characters of reference designate like parts throughout the several views, and in which:

Figure 1 is a longitudinal cross sectional view of a hydraulic motor including my invention; Fig. 2 is an enlarged fragmentary cross sectional view of one end of a hydraulic motor including my invention, particularly illustrating the construction of retarding means.

1 designates a casing. This casing is, in effect, two integrally joined cylinders 2 and 3. In cylinder 2 there is a piston 4. In cylinder 3 there is a piston 5. Between pistons 4 and 5 there is a distance piece 6. This distance piece abuts the end of piston 4 and the end of piston 5 and is formed with rack teeth 7 to engage with the teeth of pinion 8 which is mounted on a shaft 9 secured by a key 10.

As piston 4 is a piece separate from piston 5 and as both are separate from distance piece 6, the bores in which they may reciprocate need not be made precisely in line, and if wear occurs in any bore causing misalignment, friction does not occur. This method of construction enables the cylinders and pistons to be made at much less cost than would be necessary if the several parts 4, 5 and 6 were one integral piece and the bores of the cylinders 2 and 3, for close fit on the pistons 4 and 5, had to be formed precisely in line.

On one end of the piston 2 there is a head 11 through which a duct 12 extends from the pipe 13 connected to a common source of oil pressure, permanently, preferably.

At the left hand end of the cylinder 3, as viewed

2

in Fig. 1, manually operable means are provided for operating the pistons. The controlling means are illustrated more clearly in Fig. 2.

The end of the cylinder 3 is closed conveniently by means of a cap 14. The cap 14 is preferably provided with a slight cavity 15 in which rests one end of a spring 16. The other end of this spring 16 rests against the inner side of an end wall 17 of a slide valve 18. The spring causes the valve 18 to be biased to the position as shown in Fig. 2.

The slide valve 18 is made in the form of a hollow cylinder with one end wall 17 present and a flange 19 at the other end engageable with the end 20 of the cylinder 3 to limit the movement of the slide valve 18.

The cylinder 3 is provided with a screw-threaded cavity 21 for the reception of a pipe connected to a manually operable valve 22 which has one port 23 connecting to a common source of oil pressure and another, 24, connecting to an oil sump.

When valve 22 is positioned, manually, so as to make connection between port 23 and pipe 25, oil under pressure flows to duct 26 and thence to channel 27 and so into the cylinder 3 to force piston 5 to the right, as viewed in Fig. 1, causing distance piece 6 and piston 4 to move to the right and oscillate shaft 8. The oil, under pressure, so admitted, is able to do this because the bore of cylinder 3 is larger than the bore of cylinder 2. The oscillation of shaft 8 may be used for any useful purpose but applicant has particularly in mind the movement of a door.

After piston 5 has been moved to the right and it begins to move to the left, as viewed in Fig. 1, the oil between it and the end of cylinder 3 is forced through channel 27 and duct 26 into pipe 25 and through valve 22 to port 24 and to the oil sump. The oil also is forced out through duct 28, lifting oil valve 29 against the pressure of spring 30, into duct 31 and so to duct 26. The flow of oil or hydraulic fluid to the oil sump caused by the movement of piston 5 to the left, as viewed in Fig. 1, up to the time piston 5 contacts slide valve 18, is quite free and the motion of piston 5 may be relatively rapid, compared to the later movement, but when piston 5 contacts slide valve 18 it forces it to the left, as viewed in Fig. 1, and the oil between it and the cap 14 must flow out through bores 32, 33 and 34. This slows up the motion of the piston 5 and as the piston 5 and slide valve 18 move farther to the left, port 34 moves out of registry with channel 27 and then port 32 also moves out of registry with

channel 27 so that then the oil must flow through 32, solely, to get into channel 27, which causes a further deceleration of the motion of piston 5.

The rate of motion of piston 5 in moving to the right, as viewed in Fig. 1, is regulated by the opening adjuster 35 which may be screwed in or out to properly position its inner conical end in relation to the opening 36 into the channel 27.

Although I have shown duct 28 as without adjustment for size, nevertheless, I desire to have it understood that I do not exclude any well known means for regulating the size of this duct, in accordance with the requirements of speed of movement of piston 5 to the left.

By the above described construction it will be seen that there has been provided a hydraulic motor of the differential piston type by which quick motion may be produced in one direction and as equally quick motion in the other direction except for the latter part of the stroke of the pistons. During this latter part of the stroke of the piston, the motion is gradually decelerated and so brought to a stop without shock to the operated part.

Although I have specified and illustrated a manually operable valve for operating the piston, it is to be understood that I do not intend to exclude other types of valves, even if not manually operable.

Although I have particularly described one particular physical embodiment of invention and explained the construction and principle thereof, nevertheless, I desire to have it understood that the form selected is merely illustrative, but does not exhaust the possible physical embodiments of the idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

A hydraulic motor, including, in combination: a body formed with a cylinder, a piston in the cylinder, a shaft, means for causing an oscillation of the shaft by a reciprocation of the piston, a slide valve in the form of a hollow cylinder having an end wall in the cylinder between the end of the piston and the end of the cylinder, said slide valve having resilient means between it and the end of the cylinder whereby it is always pressed toward the piston, means on the slide valve for limiting its extent of movement, said cylinder formed with a circumferential channel opening in the inside surface, two ducts opening therein, a connecting duct and a cavity adapted for the reception of a fluid supply line connected with said ducts, a spring held valve closing one of the ducts opening into the channel, said slide valve having two spaced through bores in the side wall and a bore in the end wall, a source of fluid pressure, an oil sump, a valve adapted to alternatively connect said cavity with the source of fluid pressure or the oil sump, and means to move the piston toward the slide valve, whereby when the cavity is connected to the source of fluid the piston moves away from the slide valve and when the cavity is connected to the oil sump the piston moves rapidly at first toward the slide valve and then with a gradually decelerating motion together with the slide valve.

ROBERT J. PARSONS.