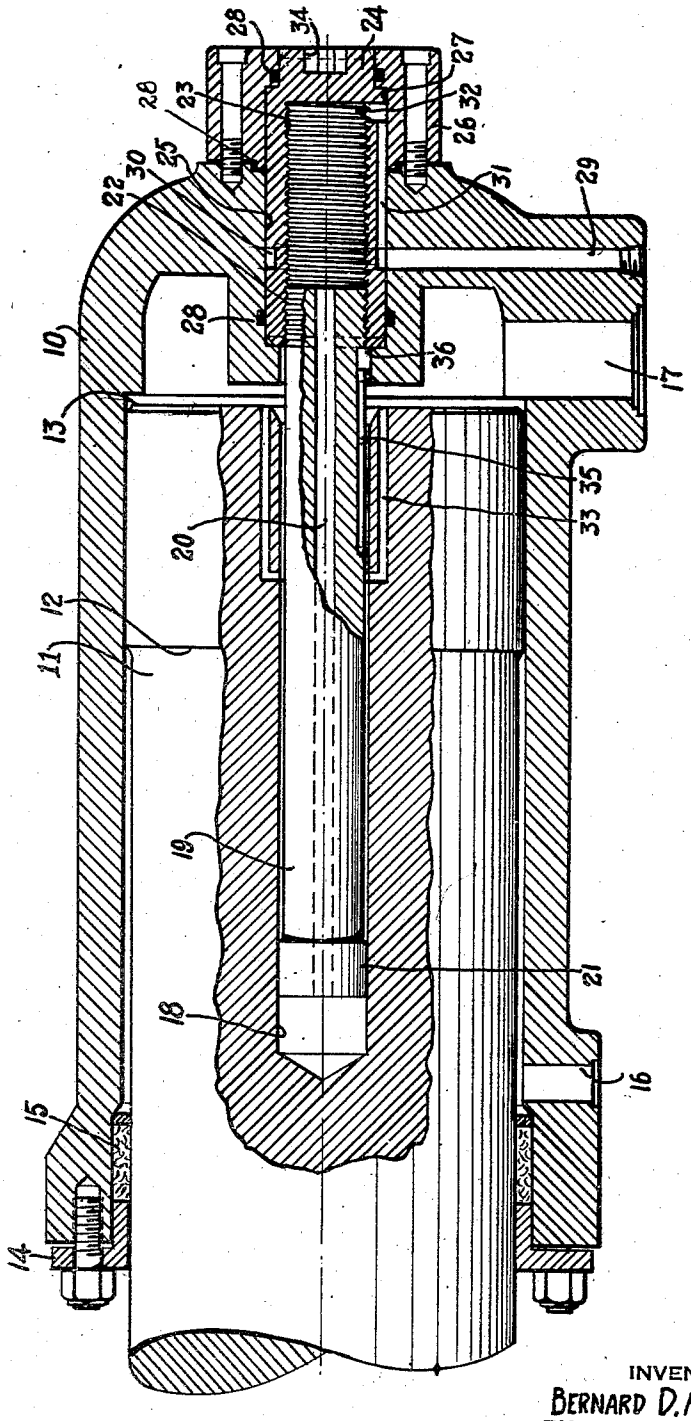
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BOOSTER RAM CONSTRUCTION

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INVENTOR
BERNARD D. ASHBAUGH,
BY
Toulmin & Toulmin
ATTORNEYS

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BOOSTER RAM CONSTRUCTION

Bernard D. Ashbaugh, Mount Gilead, Ohio, assignor to H-P-M Development Corporation, Wilmington, Del., a corporation of Delaware

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1 Claim. (Cl. 60—97)

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This invention relates to hydraulic apparatus and, particularly, to hydraulic motors having reciprocating plungers.

In a hydraulic motor having a reciprocable main ram it is often necessary that the ram be advanced rapidly through at least a portion of its working stroke. One method of accomplishing this result is to provide an auxiliary or booster ram which may be stationarily mounted relative to the main press ram and the effective area of which is such that the desired ram speeds are obtained.

It is the primary object of this invention to provide an improved booster ram construction for reciprocating fluid operable motors.

It is another object of this invention to provide an adjustable booster ram construction which is entirely contained within the main cylinder of the hydraulic motor.

These and other objects will become more apparent upon reference to the following specification and the accompanying drawing.

Referring to the drawing, there is illustrated a hydraulic motor comprising a cylinder 10 within which is reciprocably mounted the double acting plunger 11 which has a retracting area as at 12 and an advancing area as at 13. The cylinder 10 is closed at the left end by a packing gland 14 which retains the packing 15 in place so as to prevent leakage from the cylinder 10 during the reciprocation of the plunger 11.

The cylinder 10 is provided with the ports 16 and 17, the former communicating with the retracting area 12 and the latter with the advancing area 13.

The plunger 11 is axially bored as at 18 to receive the booster plunger 19. The booster plunger 19 has an axial bore 20 which communicates with the bore 18. The left hand end of the booster plunger 19 may terminate in an enlarged diameter piston portion as indicated at 21, while the right hand end thereof is provided with the screw threads 22. The threads 22 engage with the threads 23 of the sleeve 24.

The sleeve 24 is received in a shouldered bore 25 in the cylinder 10 and is retained therein by the cap 26 which has a shouldered bore 27. Sealing means such as the resilient rings indicated at 28 are provided for sealing the cap 26 and also the sleeve 24.

A bore 29 in the cylinder 10 adjacent the bore 17 is adapted to be in continuous fluid communication with the annular groove 30 on the sleeve 24. An axial groove 31 communicates between the groove 30 and the radial port 32, the latter

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communicating with the threaded cavity in the sleeve 24 and thence through the bore 20 with the bore 18.

A plurality of passages 33 communicate between the advancing chamber of the cylinder 10 and the bore 18 so that when the plunger 11 has advanced a predetermined amount fluid communication is established between the working area of the booster plunger 19 and the advancing area 13 of the plunger 11.

In operation, fluid pressure from any suitable source is directed thru the bore 29 into the groove 30, through the groove 31 and the port 32 into the interior of the sleeve 24 and thence through the bore 20 into the bore 18. Since the bore 18 is relatively small, the plunger 11 advances relatively rapidly exhausting fluid through the port 16 while freely drawing fluid in through the port 17. When the plunger 11 has advanced to the point where the bores 33 communicate with the working side of the plunger 19, pressure fluid is supplied also to the advancing area 13. Since the combined areas of the advancing area 13 and the working area of the booster plunger 19 are relatively large, the plunger 11 proceeds at a reduced rate to complete the work to be performed. Well known means, not shown, provide for the closing off of the port 17 during the reduced speed working stroke of the plunger 11.

The particular point at which the plunger 11 commences its reduced speed travel may be regulated by rotating the sleeve 24 by means of the recess 34 which is shaped to receive a wrench or similar torque tool. When the sleeve 24 is rotated the threads 23 in cooperation with the threaded portion 22 of the piston 19 are effective axially to shift the booster plunger 19. In order to prevent rotation of the plunger 19 during the axial adjustment thereof, the plunger is provided with the elongated keyway 35 which is adapted to receive a key 36 retained in a suitably shaped keyway in the cylinder 10.

While the preferred construction has been illustrated in the drawing, it will be understood that it is desired to comprehend such modifications as may be considered to come within the scope of the appended claim.

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

In combination, in a fluid operable motor, a cylinder, a main plunger reciprocably mounted therein and having a fluid operable advancing area, a bore in said plunger, an auxiliary plunger extending into said bore, a bore extending

through said auxiliary plunger, an externally threaded end on said plunger, a sleeve rotatably mounted in said cylinder and having its bore threaded for engaging the threaded end of said plunger, means for preventing rotation of said plunger while permitting the axial movement thereof, means for permitting rotation of said sleeve while preventing axial movement thereof, said sleeve being completely within the confines of said cylinder and having its outer end closed, a shaped recess in said outer end, an aperture in the end of said cylinder adjacent said recess through which access may be had to the latter for adjusting said sleeve, a first inlet portion in said cylinder in continuous fluid communication with the advancing area of said main plunger, a second inlet port in said cylinder, channel

means continuously connecting said second inlet port with the chamber defined by said auxiliary plunger and the bore in said main plunger, said channel means including an annular external groove in said sleeve in communication with said second inlet port, a port extending through the peripheral wall of said sleeve and in continuous communication with said bore in said auxiliary plunger, a groove in said sleeve connecting said last mentioned port with said annular external groove, and means operable in response to a predetermined advancing movement of said main plunger relative to said auxiliary plunger for effecting fluid communication between said chamber and said advancing area of said main plunger.

BERNARD D. ASHBAUGH.