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ADJUSTABLE BOOSTER RAM ASSEMBLY FOR HYDRAULIC MOTORS

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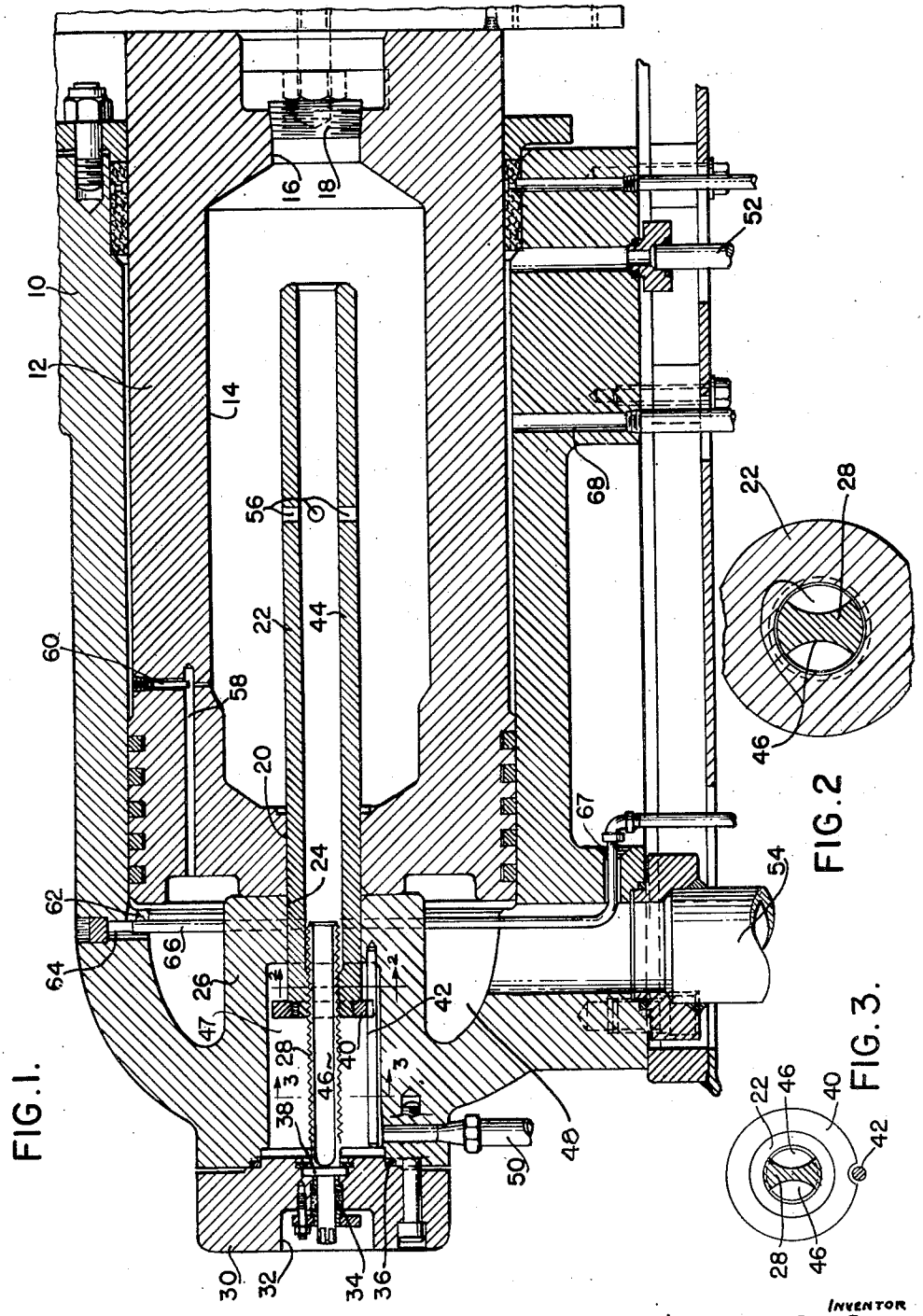


FIG. 1.

FIG. 2

FIG. 3.

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ADJUSTABLE BOOSTER RAM ASSEMBLY FOR HYDRAULIC MOTORS

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1 Claim. (Cl. 60—97)

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This invention relates to fluid operable apparatus and is particularly concerned with an improved construction for a reciprocating ram having a booster ram.

Rams having booster rams are customarily formed from solid metal and a bore for the booster ram thereafter machined axially within the said ram. The ram is then mounted in a cylinder and the booster ram is secured in the head end of the cylinder and extends into the aforementioned bore of the main ram.

The booster ram is adjustable in the cylinder by being threadedly engaged therewith or threadedly engaging a rotatable member carried in the cylinder head. In order to effect fluid communication between the working area of the booster ram and the working area of the main ram, it is customary to provide passages in the main ram communicating with the booster ram bore at the proper point.

The manner of constructing a ram having a booster ram according to the foregoing is expensive because it involves considerable machine work.

The primary object of the present invention is to provide a construction for a ram having a booster ram which is more economical in both material and labor and produces equivalent or better operation of the motor.

It is another object to provide in combination with a reciprocating ram, a booster ram therefor and means for axially adjusting the booster ram which is more readily manufactured and assembled than previous types.

Still another object is to provide in combination with a main ram and a booster ram therefor, means for bleeding off air pockets for improving the operation of the apparatus.

These and other objects and advantages will become more apparent upon reference to the accompanying drawing in which:

Figure 1 is a longitudinal section through a booster ram constructed according to this invention;

Figure 2 is a transverse section on the line 2—2 of Figure 1 showing the fluid passages in the booster ram adjusting screw; and

Figure 3 is a similar view on the line 3—3 of Fig. 1.

Referring to the drawing, 10 indicates the cylinder within which is reciprocably mounted a double acting ram 12 which is hollow as at 14 and has an aperture 16 at the right end thereof which is closed by a plug 18 that may be welded or brazed in the said aperture as desired.

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The ram 12 is also apertured at the left end as at 20 for receiving a booster ram 22 that comprises a substantially tubular member. The booster ram 22 extends leftwardly from the main ram and passes through a bore 24 in the inwardly projecting boss 26 of the head of the cylinder 10. The extreme left end of the booster ram 22 is internally threaded for receiving a screw 28 that extends through the end cap 30 which is secured to the left end of the cylinder. The end cap 30 is recessed as at 32 so that the end of the screw 28 does not project beyond the limits thereof for protecting the said screw from injury.

Suitable packing means as at 34 seal the end cap against leakage around the screw, and other packing as at 36 seals against leakage from between the cylinder and end cap. The screw 28 is shouldered as at 38 to carry the thrust of the booster when the motor is in operation.

In order to prevent rotation of the booster 22 when the screw 28 is rotating to adjust the position of the said booster, there is provided the plate 40 which threads on the left end of said ram and which has a notch therein engaged by a dowel pin 42 that is stationarily mounted in the boss 26.

As a convenient means of supplying fluid to the central passage 44 of the booster ram, the screw 28 comprises the axial grooves 46 down either side thereof which communicate the said central bore with a chamber 47 formed in the left end of the cylinder 10 between the cap 30 and the boss 26.

Fluid is supplied to the chamber 47 and therethrough to the bore 44 by a pipe 50 connected with the cylinder 10. During the time that the ram 12 is moving rightwardly due to pressure supplied to the booster, the right side thereof is exhausted through a conduit 52 while the left side thereof is freely supplied fluid through a conduit 54. When the main ram has moved rightwardly until the transverse bores 56 in the booster communicates with the left-hand side thereof, the conduit 54 is closed by a check valve (not shown) and the ram 12 thereafter continues movement at reduced speed and increased thrust.

To eliminate air pockets which may accumulate within the cylinder 10 or within the hollow ram 12 there is provided a passage 58 which connects the left side of the ram 12 with the bore 14. This passage is restricted by an adjustable needle valve at 60 to prevent the loss of fluid from the chamber 14 during booster operation of the ram. Further to confine the air, the cylinder 10 includes a depending flange or skirt at 62

which has a bore therethrough that directs the air into a pocket 64. To bleed off air pockets from the chamber 64 there is provided a pipe 66 that extends into the chamber and leads to the outside of the cylinder 10 through a packing gland, indicated at 67. The pipe 66 may also be used as a gauge line for indicating the pressure acting within the cylinder 10.

According to well known practices the plunger 12 may include piston rings sealing it against the cylinder wall, the open end of the cylinder may be closed by suitable packing means, and the bypass port 68 may be provided for halting the advancing travel of the ram at a predetermined point by bypassing the fluid supply thereto.

It will be apparent that a ram and booster ram constructed in this manner has the advantage of being more cheaply built, is more readily adjusted as to the length of the rapid advancing stroke, and has improved means for bleeding off air pockets.

It will be understood that this invention is susceptible to modification in order to adopt it to different usages and conditions and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claim.

I claim:

In a hydraulic motor; a cylinder provided with a main ram-receiving chamber and a separate auxiliary chamber; a hollow ram reciprocable in the main chamber of said cylinder and formed with a first pressure-responsive area and an internal chamber providing a second pressure-responsive area, the internal chamber of said ram being open at one end; a tubular sleeve member formed with an axial bore and having one end communicating with the auxiliary chamber of said cylinder and its opposite end extending within the chamber of said ram, said sleeve member being formed with a screw-threaded opening at one end communicating with the bore of said sleeve and the auxiliary chamber of said cylinder and arranged for sliding movement axially within said cylinder; a screw-threaded member extending through the auxiliary chamber of said cylinder and in threaded engagement with the screw-threaded opening in said sleeve member, said screw-threaded member being formed along its side portions with a longitudinally extending channel providing communication between the auxiliary chamber of said cylinder and the bore of said sleeve member and being rotatable within said cylinder to move said sleeve member axially thereof; and inlet means communicating with the auxiliary chamber of said cylinder for introducing pressure fluid therein.

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