Nov. 26, 1940. J. A. MULLER 2,223,223

PRESS WITH OVERSTROKE PREVENTING MEANS

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FIG. 1.

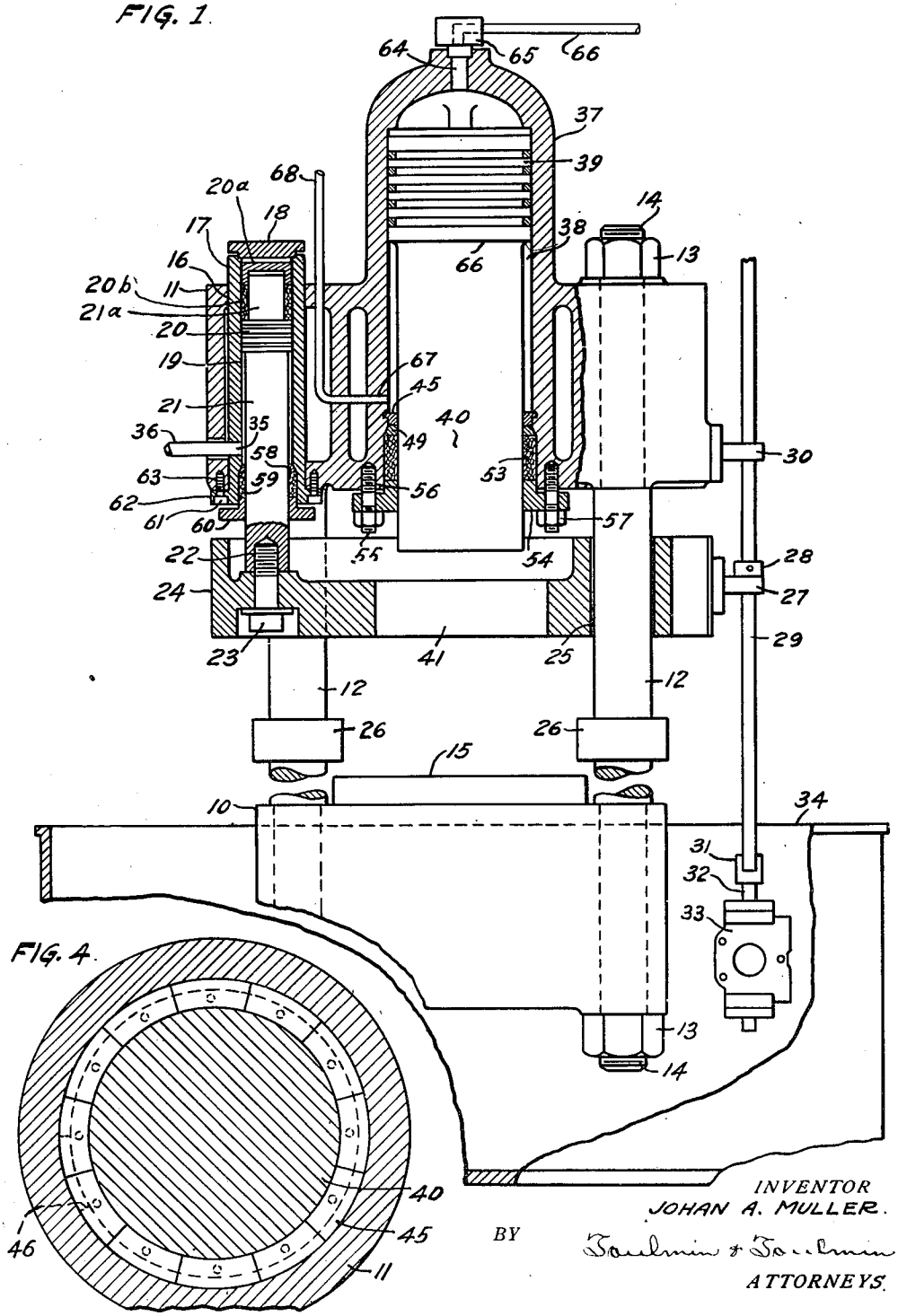


FIG. 4.

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FIG. 2.

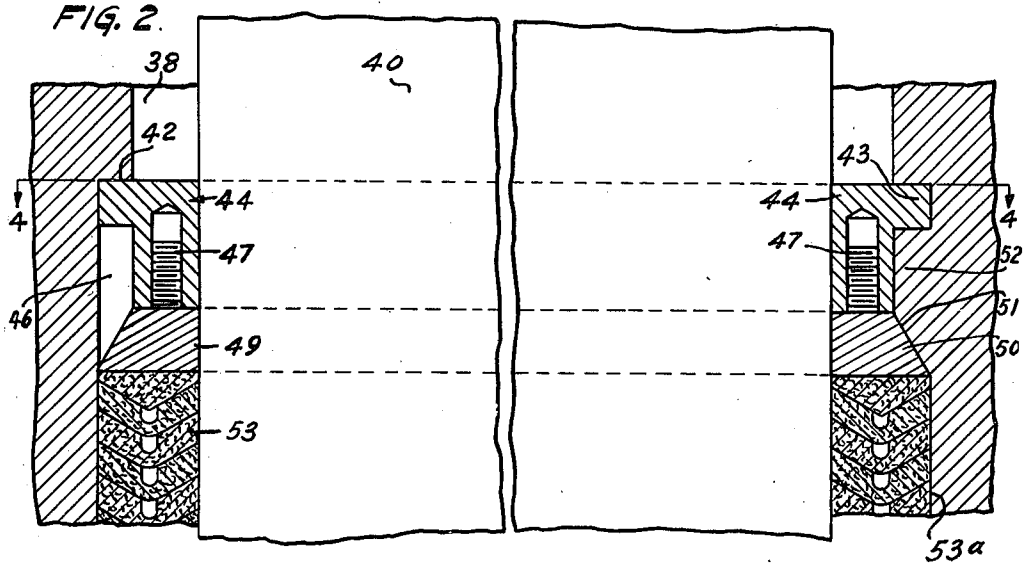
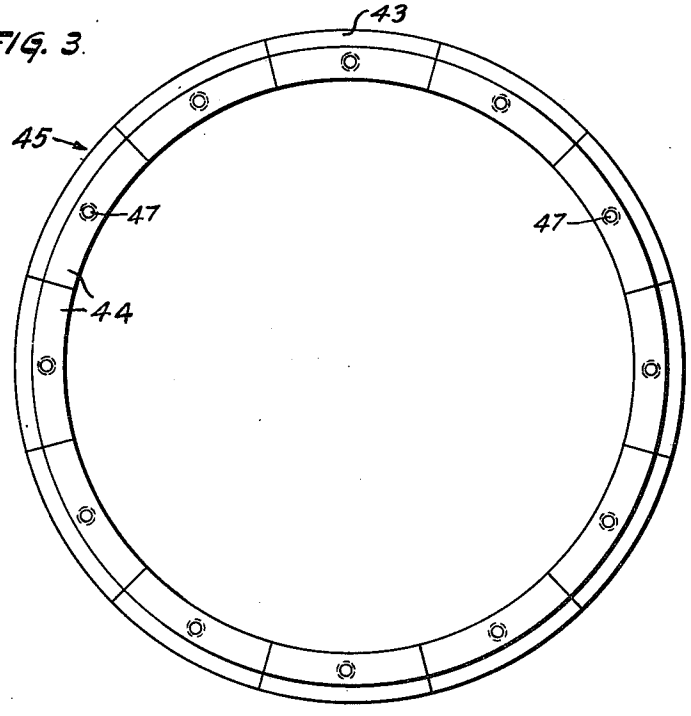


FIG. 3.



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2,223,223

PRESS WITH OVERSTROKE PREVENTING MEANS

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Application March 12, 1938, Serial No. 195,524

4 Claims. (Cl. 121—38)

This invention relates to presses, and in particular, to means for preventing the overstroking of rams in hydraulic presses.

One object of this invention is to provide means within the cylinder of the press for preventing overstroking of the ram, thereby eliminating the necessity for stops attached to the ram of the press, or other external connections, and also eliminating the interference caused by such external stop mechanisms with working conditions.

Another object is to provide a stop ring secured to the press cylinder, near the mouth thereof, and adapted to engage the ram when the latter reaches the extreme limit of its stroke, thereby preventing overstroking of the ram.

Another object is to provide an overstroke preventing device for hydraulic presses, as mentioned above, wherein the ring consists of split segments inserted in a groove in the cylinder wall, near one end of the cylinder.

Another object is to provide such an overstroke preventing means for hydraulic presses, wherein a packing is arranged adjacent the overstroke preventing ring so that the latter additionally serves as an abutment for the packing.

Another object is to provide an overstroke preventing construction for hydraulic presses, wherein the cylinder wall, near one end thereof, is provided with an interrupted groove adapted to receive a plurality of annular segments forming a ring in assembly, the final segment being placed in position at the point where the groove is interrupted or cut away.

In the drawings:

Figure 1 is a diagrammatic view, partly in central vertical section, through a hydraulic press, showing the overstroke preventing means of this invention installed in the main cylinder.

Figure 2 is an enlarged cross sectional view of the ram overstroke preventing ring shown in Figure 1, showing the interrupted or cutaway portion of the cylinder groove at the left-hand side thereof.

Figure 3 is a bottom plan view of the assembly of segments forming the overstroke preventing ring.

Figure 4 is a section taken on the line 4—4 of Figure 2.

In general, the overstroke preventing means for hydraulic presses, according to the present invention, consists of an annular stop member which is secured within a groove in the cylinder wall, near one end thereof, so that this ring is engaged by the piston head as the ram reaches its extreme position on the downward stroke. The ring consists of a plurality of segments, and the cylinder groove is interrupted or cut away for the extent of one segment in order to facilitate the assembly of the ring in the cylinder wall by permitting the insertion of the final segment of the ring through the cutaway or interrupted portion of the groove. Preferably there is secured to the annular stop member an abutment ring for forming an abutment for the annular packing surrounding the main plunger and preventing the escape of fluid from the main cylinder.

Referring to the drawings in detail, Figure 1 shows a hydraulic press equipped with the overstroke preventing means of this invention. This press consists of a bed 10 and a head 11, interconnected by strain rods 12 having nuts 13 on the threaded portions 14 for holding the same in assembly. The bed 10 is provided with a bolster plate 15 for the reception of a die or other support for the workpiece. The press head 11 is provided with bores 16 containing auxiliary cylinders 17, with heads 18 closing the upper ends thereof. Reciprocable in the auxiliary cylinder bore 19 is a piston head 20 having a piston rod 21, with a recess 22 for receiving a bolt 23, securing it to the auxiliary platen 24. The latter may serve as a blank holder or for clamping workpieces during an assembly operation. Secured to the piston rod extension 21^a and movable therewith is a gland-like cap 20^a arranged to compress an auxiliary packing 20^b against the piston head 20 so as to reduce slippage therepast during comparatively long clamping periods. The press shown in Figure 1 has a pair of auxiliary cylinders, such as shown on the left-hand side thereof, the right-hand side of Figure 1 not being broken in order to disclose the connection of the strain rods 12 to the press head 11. The auxiliary platen 24, however, is broken away on its right-hand side in Figure 1 to disclose a bore 25, which is one of four such bores surrounding the strain rods 12, and serving to guide the auxiliary platen 24 upon its vertical reciprocation.

Stop rings 26 upon the strain rods 25 serve to limit the descent of the auxiliary platen 24. A platen arm 27 on the auxiliary platen 24 serves to engage an adjustable stop 28 upon the control rod 29, the latter being supported and guided by the arm 30 secured to the press head 11. The control rod 29 is connected, as at 31, to the valve rod 32 of a valve 33, mounted upon the tank 34, and arranged to control the distribution of fluid to the hydraulic circuit from a pump (not shown). The auxiliary cylinders 17 are provided with ports 35 communicating with pipes 36 for the admission and discharge of fluid from the auxiliary cylinder bores 19.

The press head 11 is likewise provided with a main cylinder 37 having a cylinder bore 38, within which a main piston head 39 is reciprocable. The piston head 39 is connected to a piston rod or main plunger 40, which passes downwardly through the cylinder bore 38 and outwardly into

the space beneath the press head 11. In order to permit the passage of the main plunger 40 the auxiliary platen 24 is provided with an aperture 41. Near the lower end of the cylinder bore 38 the main cylinder 37 is provided with an annular groove 42 (Figure 2), which is adapted to receive the corresponding flanged portions 43 of segments 44 forming in assembly a stop ring, generally designated 45 (Figure 3). In order to facilitate the insertion of the stop ring 45 in its groove 42, the latter is interrupted or cut away, as at 46, for the circumferential extent of one segment 44. For twelve segments, therefore, the cutaway portion 46 would subtend an angle of thirty degrees at the axis of the main plunger 40. The segments 44 are provided with threaded holes 47, which serve for the reception of a threaded rod to facilitate removal of the segments, if required. The abutment ring 49 is provided with an outer conical wall 50 which engages a correspondingly flared wall 51 of the portion 52, beneath the groove 42. It is this portion 52 which is interrupted or cutaway at 46 to provide for the insertion of the segments 44.

Engaging the abutment ring 49 is a packing assembly 53, of any suitable type, this packing assembly, in turn, being engaged by a gland 54, held in place by studs 55 secured in threaded holes 56 in the press head 11, and serving to receive nuts 57 by which the gland 54 may be tightened or loosened in order to adjust the packing assembly 53 against the abutment ring 49.

In the assembly of the press shown in Figure 1, the various segments 44 of the stop ring 45 with their flanges 43 within the groove 42 are slid together, end-to-end, circumferentially. The final segment 44 is then inserted through the cutaway or interrupted portion 46 into the gap thus provided, whereupon the segments 43 may be moved circumferentially by the distance of a half segment so that the ends of a pair of adjacent segments 43 will meet in the center of the cutaway portion 46, and thus span the latter. The abutment ring 49 may then be placed in position, and the packing assembly 53 and the gland 54 inserted and adjusted to their proper degrees of compression. The cylinder bore 38 is enlarged, as at 53a, to provide a packing throat for receiving the packing assembly 53. The auxiliary plungers 21 are fitted with abutment rings 58 for packings 59, compressed by glands 60. The auxiliary cylinders 17 are held in position within the bores 16 by means of bolts 61 passing through the flanged ends 62 of the cylinders 17, into the threaded holes 63. The top of the main cylinder 37 is provided with a passageway 64, to which a pipe 66 is connected by means of the bolted-on flange 65, whereas the bottom thereof has a passageway 67 to which a pipe 68 is connected.

The form of hydraulic circuit, or indeed of the press itself, is immaterial to the purposes of the present invention. It will be evident that the overstroke preventing ring 45 may be used in connection with a variety of press constructions.

In the operation of the press, so far as it affects the action of the main plunger 40, pressure fluid is admitted to the upper portion of the main cylinder 37, above the piston head 39, so that the latter descends. If now the operator is careless, or the control mechanism fails to work properly, the main piston head 39 continues to descend beyond the desired point. The main plunger 40 continues to descend under these circumstances until the annular ridge 66, between the piston rod 40 and the piston head 39, engages the stop ring 45. By this means the piston head 39 is brought to an abrupt halt by the positive action of the stop ring 45. No damage can, therefore, result to other portions of the press and the necessity for having external stops for preventing overstroking of the ram is eliminated. This elimination of external stops is especially important when the work of the press is accomplished by tools attached directly to the ram rather than by a platen attached to the ram. Such a press, for example, is the type used for inserting bushings in bushing apertures, commonly known as a bushing forcing press.

It will be understood that I desire to comprehend within my invention such modifications as come within the scope of the claims and the invention.

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

1. In a hydraulic press, a cylinder having a cylinder bore, a plunger reciprocable in said bore, said cylinder bore having a recess, a piston head on said plunger, and a plurality of twelve segmental members arranged end-to-end in a continuous annular assembly in said recess to form an annular stop, said annular stop being arranged to engage said piston head at a predetermined limiting position in the stroke thereof, said recess being cut away along one-twelfth of its extent to facilitate the insertion of said segmental members.

2. In a hydraulic press, a cylinder having a cylinder bore, a plunger reciprocable in said bore, said cylinder bore having a recess, a piston head on said plunger, and a plurality of at least three segmental members arranged end-to-end in a continuous annular assembly in said cylinder to form an annular stop, said annular stop being arranged to engage said piston head at a predetermined limiting position in the stroke thereof, said segmental members having outwardly extending portions engaging said recess and forming a substantially unbroken ring in assembly.

3. In a hydraulic press, a cylinder having a cylinder bore, a plunger reciprocable in said bore, said cylinder bore having a recess, a piston head on said plunger, and a multiplicity of segmental members comprising three or more arranged in an annular assembly and having peripheral flanges in end-to-end abutment in said recess to form an annular stop, said annular stop being arranged to engage said piston head at a predetermined limiting position in the stroke thereof.

4. In a hydraulic press, a cylinder having a cylinder bore, a plunger reciprocable in said bore, said cylinder bore having a recess, a piston head on said plunger, a multiplicity of three or more segmental members arranged in an annular assembly in said recess to form an annular stop, said annular stop being arranged to engage said piston head at a predetermined limiting position in the stroke thereof, said recess having a single cut away portion along a part of its extent substantially the peripheral length of one of said segmental members whereby to facilitate the insertion of said segmental members.

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