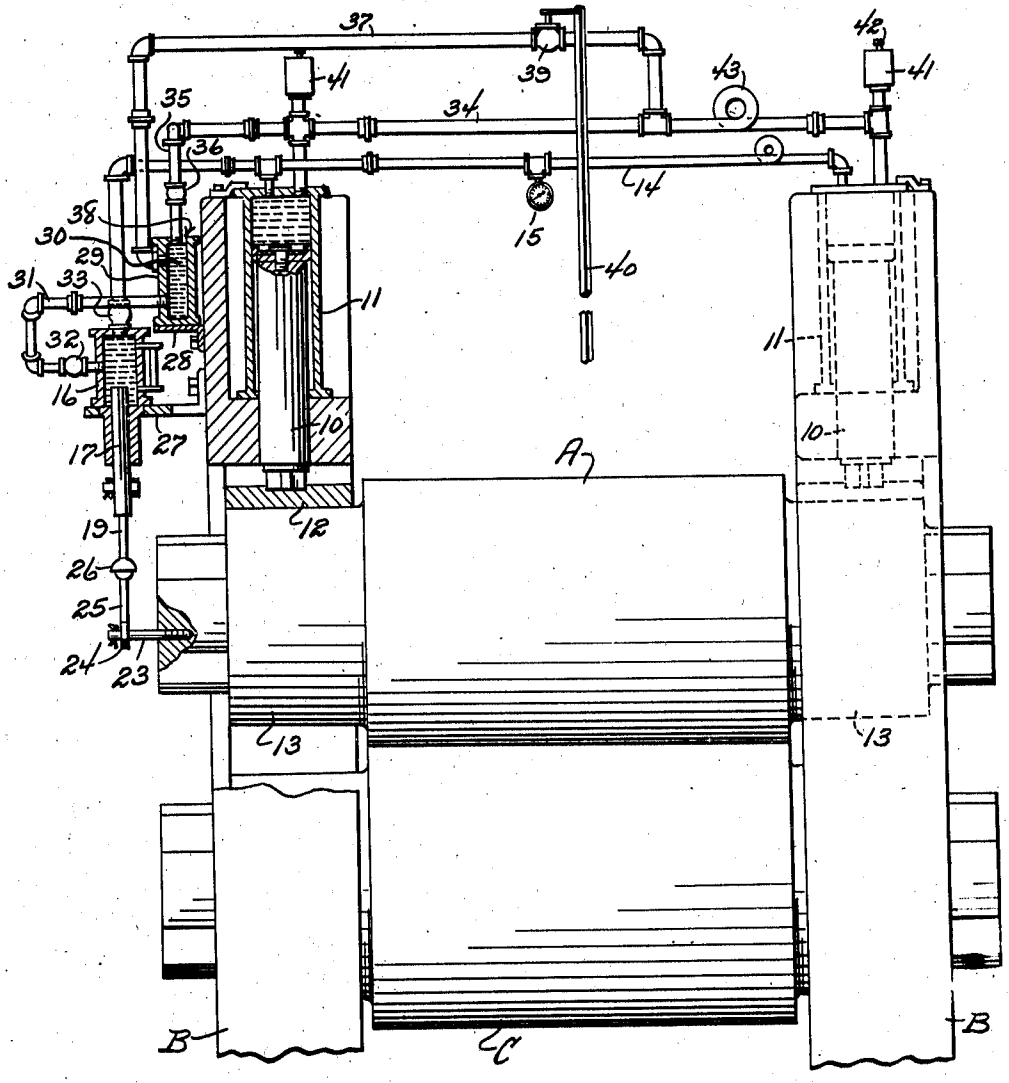
Jan. 7, 1936. W. G. McFADDEN 2,027,283

HYDRAULIC ROLL ADJUSTER MECHANISM

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Fig. 1.



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Fig. 2.

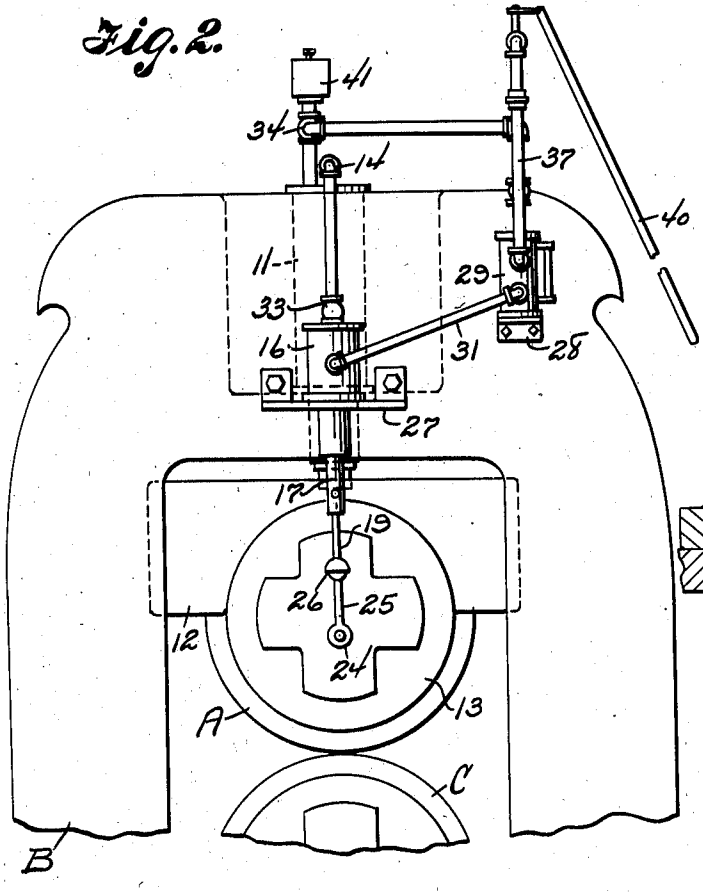


Fig. 3.

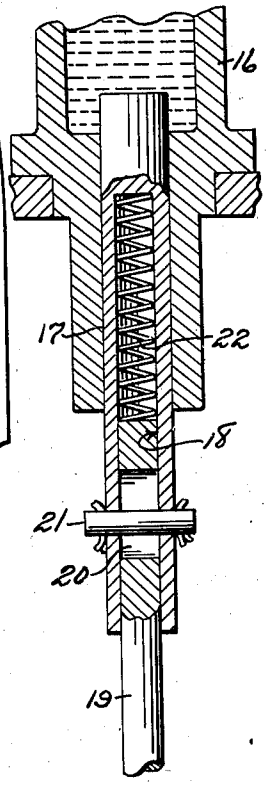
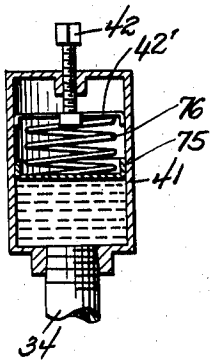


Fig. 4.



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HYDRAULIC ROLL ADJUSTER MECHANISM

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Application May 21, 1934, Serial No. 726,829

5 Claims. (Cl. 80—56)

The invention relates to a mill roll adjuster and more especially to hydraulic roll adjuster mechanism.

The primary object of the invention is the provision of mechanism of this character, wherein the floating roll of a mill will be sustained under automatic pressure so as to avoid any possibility of the roll rising more at one end than the other, and thus maintaining the said roll true to the work and with a uniformity of pressure thereon.

Another object of the invention is the provision of mechanism of this character, wherein the hand adjustment of the floating roll of a rolling mill or the like is entirely eliminated as the said floating roll will be hydraulically adjusted and a uniformity of pressure had during the working period of such roll, the mechanism being of novel construction and readily adaptable for service with mills for bar or sheet rolling or the like.

A further object of the invention is the provision of mechanism of this character which is comparatively simple in its construction, thoroughly reliable and efficacious in its purposes, automatic in action, assured of maximum life, and inexpensive to manufacture and install.

With these and other objects in view, the invention consists in the features of construction, combination and arrangement of parts as will be hereinafter more fully described in detail, illustrated in the accompanying drawings, which disclose the preferred embodiment of the invention, and pointed out in the claims hereunto appended.

In the accompanying drawings:

Figure 1 is a side elevation of a floating roll of a roll mill showing the hydraulic adjuster constructed in accordance with the invention applied to the mill, a portion of the mill and adjuncts of the mechanism being broken away.

Figure 2 is an end elevation.

Figure 3 is a fragmentary enlarged detail sectional view through the pump.

Figure 4 is a vertical sectional view through one of the equalizers of the mechanism.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

Referring to the drawings in detail, A designates a floating roll of a roll mill and B portions of the ends of said mill in which is trunnioned the roll A, as is usual, for vertical displacement with relation to the underlying drawing roll C of said mill.

Suitably fitted within the ends B of the mill and superposed with relation to the roll A are hydraulic rams, each including a piston 10 operating within a fluid cylinder 11, the piston 10 acting against a breaker 12 next thereto and against the adjacent trunnion 13 of the roll A. Common to the cylinders 11 of the rams is a pressure line 14, this having a pressure gauge 15 fitted therewith. The line 14 communicates with a hydraulic pump having the cylinder 16 and the piston 17, the same being provided with a bore 18 opening through its outer end and in which is telescoped loosely a connecting rod 19, the loose connection being had through the medium of the slot 20 in the rod 19 and the cross coupling pin 21 mounted transversely in the piston 17. Within the bore 18 and active against the rod 19 is a compression spring 22 constituting a cushioning medium and thus acting as an equalizer.

Eccentrically connected to the trunnion end 13 of the roll A is a wrist pin 23 having engaged therewith the eye end 24 of a companion connecting rod 25 for the rod 19, these rods being coupled through a universal joint 26. The pump cylinder 16 is supported upon a bracket 27 upon the end B next thereto of the mill. Above the location of the bracket 27 is another bracket 28 on which is a reservoir tank 29 for the hydraulic medium or liquid 30. The tank 29 has the lead 31 to the pump cylinder 16 and in which is located the check valve 32. The valve 32 checks the return of the liquid of feed line on pressure stroke of piston or plunger 17. The pressure line 14 extends to the pump cylinder 16 and has therein the check valve 33 close to said pump cylinder for preventing back pressure to the pump.

Common to the cylinders 11 of the rams is a return line 34, this having a lead 35 from the reservoir tank 29, the lead being fitted with a safety valve 36. This valve, in case of excess pressure opens to return such excess pressure into the reservoir. The return line 34 has the branch 37 opening into the side of the reservoir tank 29 which latter, at its top, has the air vent 38 to allow the escape of air above the fluid in reservoir and thereby prevent the creation of a vacuum therein. The vent is extremely small, its bore being not greater than the cross sectional diameter of an ordinary pin. The outer atmospheric pressure prevents the passage of fluid through the vent, and vents of this character and for this purpose are well known in the arts. The branch 37 has arranged therein the relief valve 39 equipped with a relief valve hand lever 40. By opening the valve 39 all pressure is returned back to the supply tank or reservoir which relieves the pressure of the rams on the roll A.

At the point of communication of the return line 34 with the cylinders 11 of the rams are located equalizers 41 having the adjusting screws 42 accessible from without said equalizers. The screws 42 are movable to adjust the disks 42' in the body of each equalizer 41. In each equalizer 41, there is a disk piston 75 that rests on the fluid therein and between the plungers and disks there are coiled expansion springs 76. Now, in case of heavy bars entering between the rolls the pistons, by virtue of fluid pressure thereagainst will compress the springs 76 and the latter, exerting pressure against the said pistons, will when permitted to expand, force the fluid back into the line, and thus allow such bars to pass between the rolls without extreme pressure being exerted thereagainst and with only a momentary loss of fluid from the lines. The equalizing cylinders are piped to the top of ram cylinders and are coupled to the line 34, as shown.

The pressure line 14 and the return line 34 have formed therein the single coils 43 which serve to absorb vibrations to joints therein.

It should be obvious as to the operation of the mechanism for the hydraulic roll adjuster of the floating roll A of the mill. In the use of the mechanism to have it maintain the desired pressure on the top roll A, it being possible to adjust the equalizers 41, each spring therein through the screws 42 and such equalizers acting for the maintenance of the pressure and are susceptible under their adjustment to vary the pressure.

Now, when the roll A is subjected to heavy bars the pistons 10 move back into the cylinders 11 of the several rams thus causing the receding of the springs in the said equalizers and the increase of tension on the latters' springs force the fluid back into the line 34.

In the working of the rolls A and C the hydraulic pump which is actuated by the roll A builds up pressure in the rams and thus holding a determined pressure on the roll A and this pressure is readable at the gage 15. Any excess pressure on this roll A will be relieved by either the equalizers 41 or by having the pumping action of the pump become less active through the spring 22 between the piston 17 and the rod 19 of such pump.

To reduce the pressure in the rams and on the roll A the relief valve 39 is turned so that the fluid under pressure will be relieved in said rams by flowing back into the reservoir 29.

What is claimed is:

1. The combination with a floating roll, of hydraulic rams active against the same at opposite ends thereof, a hydraulic pump having a plunger eccentrically connected with said floating roll and operative thereby, a reservoir tank communicating with said pump, a pressure line common to said rams and leading to the pump, a return line common to said rams and leading to the tank, a branch return line between said first-named return line and the tank and having a relief valve, a check valve located between the pump and said tank, a check valve arranged in the pressure line close to said pump, an equalizer in the return line, means for regulating fluid pressure in said equalizers, a safety valve for returning excess fluid pressure to the reservoir arranged in the return line close to said tank, and a pressure gauge included in said pressure line.

2. The combination with a floating roll, of hydraulic rams active against the same at opposite ends thereof, a hydraulic pump having a swingable jointed and telescopic piston which is eccentrically connected with said floating roll and operative thereby and having an equalizer, a reservoir tank communicating with said pump, a pressure line common to said rams and leading to the pump, a return line common to said rams and leading to the tank, a branch return line between said first-named return line and the tank and having a relief valve for returning fluid to the reservoir to relieve excess pressure on the floating roll, a check valve preventing such return of fluid on the pressure stroke of the piston located between the pump and said tank, a valve arranged in the pressure line close to said pump for retaining pressure in the line, an equalizer in the return line, a safety valve for releasing excessive pressure in the tank arranged in the return line close to said tank, a pressure gauge included in said pressure line, and single coils formed in the pressure and return lines.

3. The combination with a floating roll, of hydraulic rams active against the same at opposite ends thereof, a hydraulic pump having a plunger eccentrically connected with the floating roll and operated thereby, a reservoir tank communicating with said pump, a pressure line common to said rams and leading to the pump, a return line common to the rams and leading to the tank, an equalizer above each ram coupled to the return pipe and piped to said rams, a plunger in each equalizer, spring means influencing the plunger against the head of the fluid in each equalizer, tensioning means for said spring means, a branch return line between said first named return line and the tank and having a safety valve for releasing excessive pressure in the tank.

4. The combination with a floating roll, of hydraulic rams active against the same at opposite ends thereof, a hydraulic pump having a plunger eccentrically connected with the floating roll and operated thereby, a reservoir tank communicating with said pump, a pressure line common to said rams and leading to the pump, a return line common to the rams and leading to the tank, an equalizer above each ram coupled to the return pipe and piped to said rams, a plunger in each equalizer, spring means influencing the plunger against the head of the fluid in each equalizer, tensioning means for said spring means, a branch return line between said first named return line and the tank and having a safety valve for releasing excessive pressure in the tank, and equalizers having spring influenced plungers therein, and means for adjusting the plungers, and having a pipe connection with the return line and with the top of each ram cylinder.

5. The combination with a floating roll, of hydraulic rams active against the same at opposite ends thereof, a hydraulic pump having a plunger eccentrically connected with the floating roll and operated thereby, said plunger having a piston provided with a bore working in the pump cylinder, a rod in said piston, spring means influencing the rod away from the piston, means limiting the movement of the rod, a second rod having a universal connection with the first named rod and a wrist pin carried by the second named rod and screwed in the floating roll.

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