

April 30, 1940.

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2,199,340

ROLLER MILL

Filed June 9, 1938

2 Sheets-Sheet 1

Fig. 1.

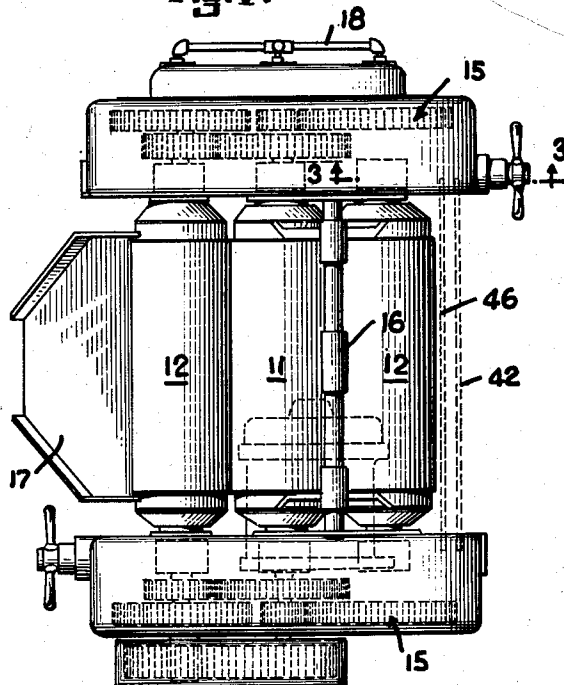
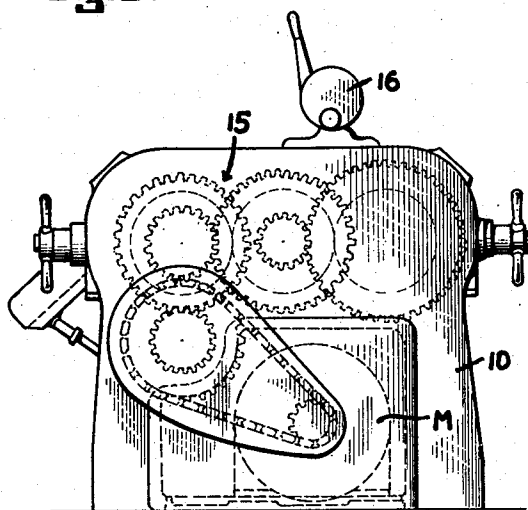


Fig. 2.



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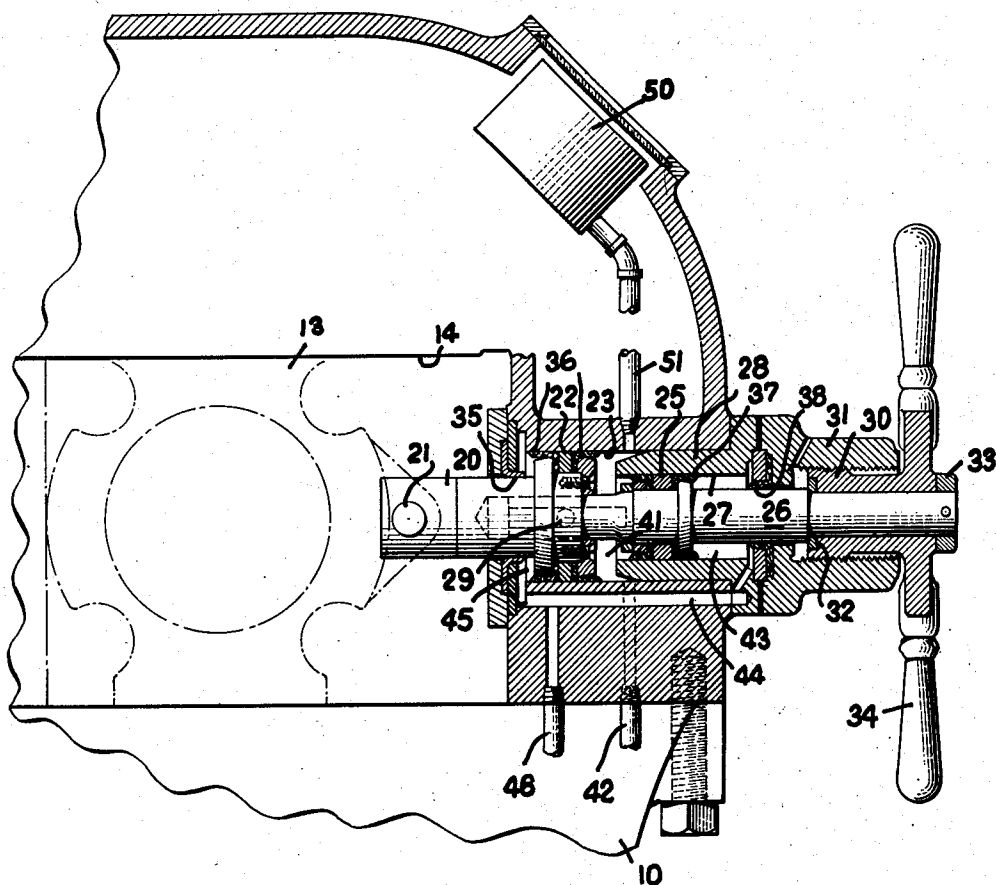
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Fig. 3.



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ROLLER MILL

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Application June 9, 1938, Serial No. 212,644

3 Claims. (Cl. 83—12)

This invention relates to roller mills, particularly to roll adjusting means for such mills, and has for an object the provision of improvements in this art.

Often when roller mills are used for grinding pigments for paints, inks or the like or substances like cocoa or chocolate, it is desirable to have the rolls pressed together evenly along their length and also to have accurate information as to the pressure between the rolls so the degree of fineness of crushing can be determined and repeated when desired in the future. Roller mills with hydraulic roll adjustment have been developed which, theoretically at least, satisfied these requirements.

The present invention aims to improve these hydraulically adjusted roller mills by providing simpler mechanism which gives greater assurance of obtaining even roll adjustment of definitely predetermined values and also to provide within one and the same mechanism, means for both forcing the rolls together and for separating them. The invention also provides a single control mechanism which acts evenly and simultaneously on both ends of a roll.

The objects and advantages of the invention will be understood from the following description of an illustrative embodiment of the invention shown in the accompanying drawings, wherein:

Fig. 1 is a top plan view;

Fig. 2 is an end elevation; and

Fig. 3 is an enlarged vertical section taken on the line 3—3 of Fig. 1.

In the drawings the numeral 10 designates a roller mill frame rotatably supporting a roll 11 operating in fixed bearings and a pair of rolls 12 operating in adjustable bearings. The specific construction, as shown in Fig. 3 comprises bearing blocks 13 slidable longitudinally in guides 14. The rolls are driven by a motor M through suitable gears at each end generally indicated by the numeral 15. The gears are of the known type which will permit driving of the rolls in all adjusted positions and which are smooth and quiet in operation. The rolls are provided with parts 16 associated with the feeding mechanism and a discharge apron 17. Pipes 18 are shown for supplying cooling fluid to the rolls.

At each end of each adjustable cylinder the bearing block, as shown in Fig. 3, is connected to a piston rod 20 by a pin 21. The piston 22 operates within a cylinder 23 secured to the frame. The piston is of the double-acting type subject to fluid pressure on either side. The piston has a larger area and hence is subject to greater pres-

sure on the side for forcing the rolls together and has smaller area and is subject to lesser pressure on the side for separating the rolls.

Means are provided for actuating the pistons 22, preferably mechanical means acting through a hydraulic medium. Only one mechanical actuating device is required, this being placed at one end of an adjustable roll and acting through fluid conduits upon the bearing adjusting piston at the other end of the roll.

The actuating means herein disclosed comprises a control piston 25 secured to a piston rod 26 and operable in an auxiliary cylinder 27. The piston 25 is also double acting, but both faces, which are approximately the same size, are much smaller than either face of the piston 22 so as to give a working advantage to the piston 25. Conveniently the cylinder 27 is formed in a separate casting 28 which is secured within the cylinder 23.

The piston rod 26 is held against rotation by splining it, as at 29 by a pin and slot arrangement, within a bore in the piston rod 20. The rod 26 is actuated by a rotatable sleeve 30 threaded in a member 31, the sleeve being fixed longitudinally on the rod 26 between collars 32 and 33 and being turned by a hand wheel 34.

The pistons 22 and 25 and the piston rods 20 and 26 are made as secure against fluid leakage as possible. By using self-tightening packing 35, 36, 37 and 38 on the piston rod 20, piston 22, piston 25, and piston rod 26 respectively and employing a heavy liquid like thick oil, the leakage may be kept at a minimum if not avoided altogether. If there is a slight leakage the liquid may be drained or replenished as desired.

The fluid in the high pressure space 41 between the pistons 22 and 25 may be in connection with the high pressure space behind the piston 22 at the other end of the roll through a conduit 42. The fluid in the low pressure space 43 behind the piston 25 is connected through the by-pass 44 with the space 45 on the opposite or withdrawal side of the piston 22. Both spaces 43 and 45, or rather the by-pass 44 as shown, may be connected with the withdrawal space 45 of the piston 22 at the opposite end of the roll by a conduit 46.

The high pressure space 41 is connected with a pressure gauge 50 by a pipe 51. If desired a time-pressure recording pressure gauge instead of a visual pressure gauge may be used.

The arrangement for both adjustable cylinders may be identical. As shown in Fig. 1 the hand wheels 34 may be arranged at opposite corners of the machine.

Desirably, means are provided for avoiding breakage if some large or hard object should accidentally pass through the rolls. This may be accomplished by placing a relief valve, which is adapted to open when the pressure becomes unduly high, at some point in the high pressure side.

In operation, when the hand wheel 34 is turned in one direction pressure is built up in the space 41 between the pistons 25 and 22 to force both ends of the adjustable roll toward the fixed roll. When the hand wheel 34 is turned in the opposite direction it relieves pressure in the space 41 and creates pressure in the spaces 43 and 45 to withdraw the pistons 22 at opposite ends of the roll. The construction is very simple, avoids the necessity for having separate pistons for advancing and retracting the movable rolls, is reliable in operation and inexpensive to manufacture.

While one embodiment of the invention has been described in detail in order to illustrate the principles of the invention, it will be understood that the invention may be variously embodied within the limits of the prior art and the scope of the subjoined claims.

I claim:

1. A roller mill comprising in combination, a fixed roll, an adjustable roll associated with said fixed roll, adjustable bearings for each end of the adjustable roll, a cylinder, a double acting piston mounted therein adapted to be actuated in opposite directions by liquid in opposite chambers in said cylinder, an extension cylinder connected with said first-mentioned cylinder, a double acting piston in said second cylinder adapted to compress liquid in the cylinder chambers on opposite sides thereof, one of the chambers of the first cylinder opening directly into one of the chambers of the second cylinder, and the other chambers of the two cylinders being connected by a by-pass conduit, power means for actuating said second piston and through the liquid to actuate the first piston, and means including push-pull connections with said adjust-

able bearings for operating said bearings by said liquid actuating devices.

2. A roller mill comprising in combination, a fixed roll, an adjustable roll associated with said fixed roll, adjustable bearings for each end of the adjustable roll, a cylinder, a double acting piston mounted therein adapted to be actuated in opposite directions by liquid in opposite chambers in said cylinder, an extension cylinder connected with said first-mentioned cylinder, a double acting piston in said second cylinder adapted to compress liquid in the cylinder chambers on opposite sides thereof, one of the chambers of the first cylinder opening directly into one of the chambers of the second cylinder, and the other chambers of the two cylinders being connected by a by-pass conduit, power means for actuating said second piston and through the liquid to actuate the first piston, and means including push-pull connections with said adjustable bearings for operating said bearings by said liquid actuating devices, said power means comprising a manually operated hand wheel and a screw connection between said hand wheel and a rod connected to said second piston.

3. A roller mill comprising in combination, a fixed roll, an adjustable roll associated with said fixed roll, adjustable bearings for each end of the adjustable roll, a cylinder, a double acting piston in said cylinder, a push-pull connection between said piston and one of said adjustable bearings, said connection holding said piston against rotation in the cylinder, a second cylinder connected with the first, a double acting piston in the second cylinder, a splined rod between said pistons which also prevents rotation of the second piston but which permits longitudinal movement relative to the first piston, and manual means including a hand wheel and screw device for actuating the second piston and through a liquid operating the first piston.

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