F. W. WARREN.

HYDRAULIC LIFT FOR BEATER ROLLS.

APPLICATION FILED MAR. 2, 1916.

1,236,794.

Patented Aug. 14, 1917.

2 SHEETS—SHEET 1.

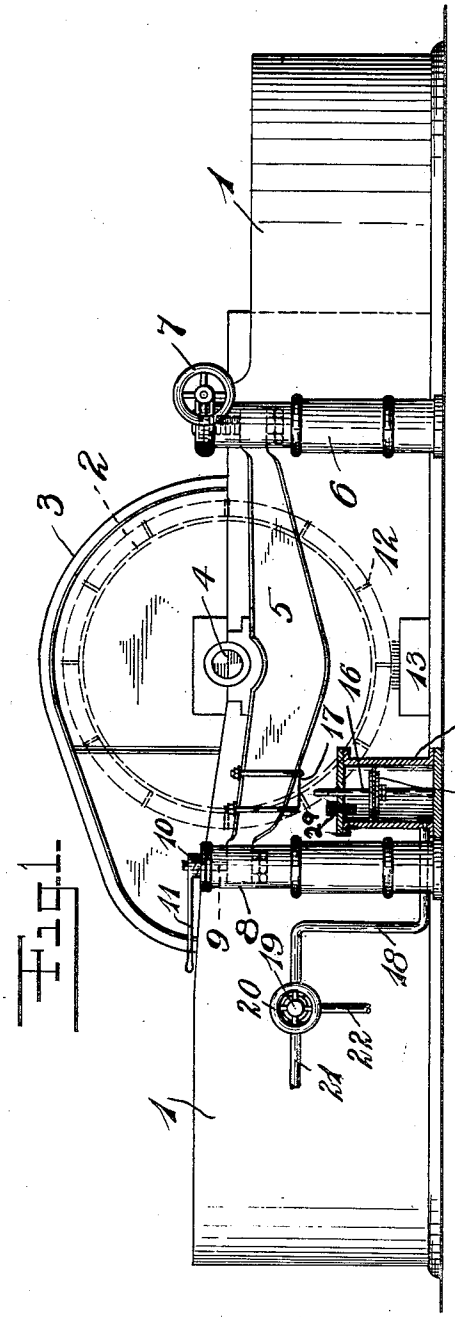


Fig. 1.

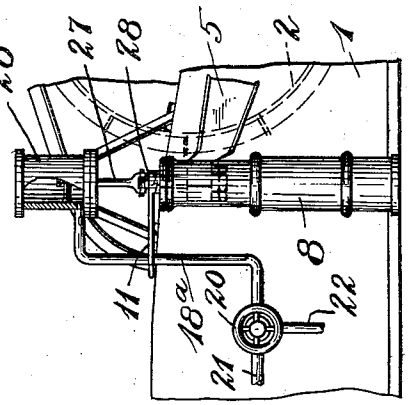


Fig. 3.

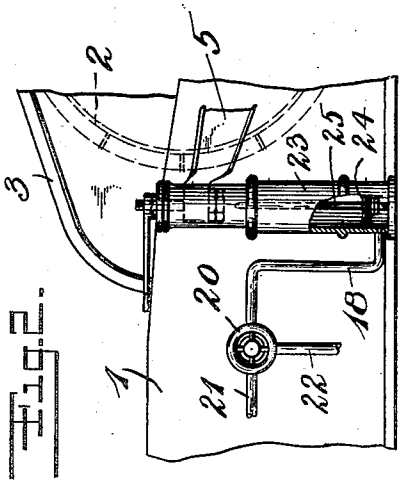


Fig. 2.

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Fig. 4.

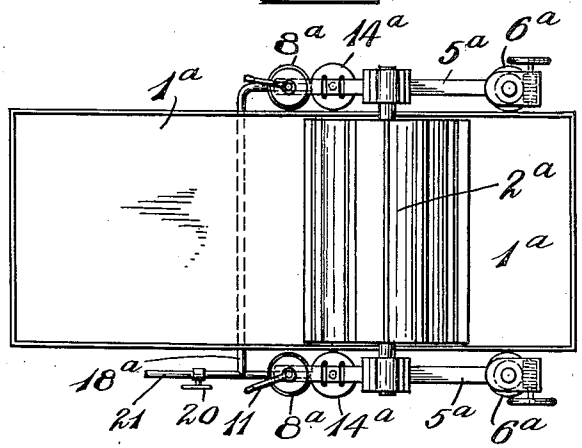


Fig. 5.

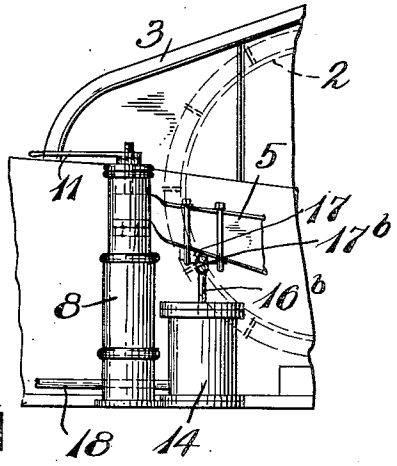
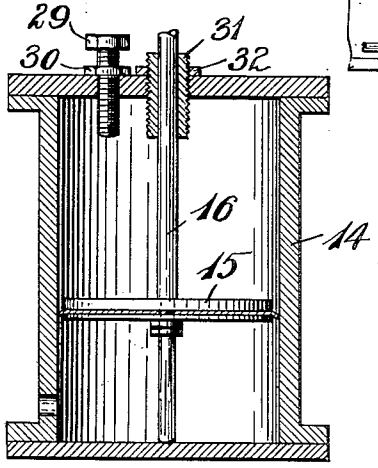


Fig. 6.



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UNITED STATES PATENT OFFICE.

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HYDRAULIC LIFT FOR BEATER-ROLLS.

1,236,794. Specification of Letters Patent. Patented Aug. 14, 1917.

Application filed March 2, 1916. Serial No. 81,627.

To all whom it may concern:

Be it known that I, FRANCIS W. WARREN, a citizen of the United States, residing at Watertown, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Hydraulic Lifts for Beater-Rolls; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to beating engines for use in paper mills and to novel mechanism in conjunction therewith for lifting the roll from its position of adjustment with respect to the bed plate quickly and easily without undue exertion on the part of the operator to a sufficient height, so that in refilling a beater, laps of pulp, or slabs of broken paper of the usual thickness, will not cause the roll to jump from its usual position in its bearings.

The invention has for an object the saving of the time and labor now wasted in adjusting the beater roll to the bed plate each time that the beater is refilled, and the avoiding of the present danger of breaking beater roll shafts with the attendant expense for repairs or replacements of shafts or bearings. The invention has for a further object the provision of novel hydraulic mechanism for lifting the roll from its position of adjustment with respect to the bed plate, which will overcome the disadvantages above indicated, and which will, in addition, have material advantages in its construction and operation.

The methods commonly used for raising and lowering the roll by means of a hand-wheel and screw or by means of the so-called quick-lifting devices consisting of a ratchet lever, require considerable time and energy and waste of power, while the so-called quick-lifting devices allow freeing the roll only a part of the required distance from the bed plate. The difficulty in raising the beater according to the common methods has resulted, in many cases, in the abandonment of the raising and lowering operation, whereas it is a proven fact that papers which are not properly beaten are not of as good strength, texture or finish as those which are properly beaten. According to the present invention, the saving of a very considerable amount of beating time is accomplished, since the roll can, by the present invention, be raised or lowered in about one or two minutes by the simple operation of turning a valve, thereby saving practically all of the time and energy now wasted by methods in common use.

By eliminating the hard labor and the loss in time incident to the raising and lowering of beating rolls by hand, the present invention admits of using the roll to the best advantage so that more work can be done with the same amount of power, while the roll can nevertheless be raised high enough so that clogging and jumping are eliminated, thereby avoiding the danger of breaking shafts. Furthermore, according to the present invention, the roll can, in most cases, be adjusted for the work it should do, and can then be raised and lowered without readjustment of the roll with respect to the bed plate, the roll coming back to its own adjustment at each lowering. This permits the operator to produce a uniform grade of paper throughout the operating day, the only adjustments required being such as are necessitated by the wear of the knives in the roll or in the bed plate, which wear, as is a matter of common knowledge among paper makers, is almost negligible in a day's operation.

According to the present invention, there is provided, in connection with the beating roll and bed plate of the beating engine, and the adjustable supports or bearings for supporting the roll and adjusting the same with respect to the bed plate, one or more hydraulic cylinders arranged to raise the roll from its position of adjustment and to return it thereto, whereby the roll can be raised and lowered by the hydraulic cylinder or cylinders without readjustment. Where the beater roll is supported directly in supporting posts or pillars, the hydraulic cylinder or cylinders are combined with the pillars to secure the desired raising and lowering operation. Where the beater roll is supported at one or both ends by lighter bars, which bars are in turn supported adjustably at their ends in lighter posts, the cylinder or cylinders can be arranged below the bars intermediate the posts, or combined with the posts themselves.

The invention will be further described in connection with the accompanying drawings, in which,

Figure 1 shows in side elevation and with parts in section, a beating engine embodying the invention;

Fig. 2 shows part of a beating engine, in side elevation, with a modification of the invention embodied therein;

Fig. 3 shows a further modification of the invention;

Fig. 4 is a plan view of a beater having both ends of the beater roll arranged to be lifted and lowered;

Fig. 5 shows a further modification of the invention; and

Fig. 6 is a central sectional view of the hydraulic cylinder showing stops combined therewith.

The beating engine of Fig. 1 is made up of the beater tub 1 having therein the beater roll 2 provided with a roll cover or cap 3, and mounted in bearings 4 carried by the lighter bar 5. This bar is adjustably supported at one end in the post 6, adjustment thereof being effected by means of the hand-wheel 7 in a manner which will be readily understood. At its other end the lighter bar 5 is adjustably supported in the lighter post 8 by means of the rod or bolt 9 having at its upper end a nut 10 threaded thereon and operated by a suitable ratchet wrench 11. The nut 10 and its operating wrench may be of any suitable construction, the object of this nut being to hold the end of the lighter bar 5 in adjusted position and to raise or lower the bar when it is desired to change the adjustment of the roll with respect to the bed plate.

The roll 2, shown in dotted lines in Fig. 1, is provided with knives 12 of any suitable or preferred construction, which coact with knives carried by the bed plate 13. The construction and operation of these knives on the beater roll and on the bed plate is well known and needs no further description.

Arranged below the lighter bar 5 of Fig. 1 is the hydraulic or other fluid cylinder 14 having therein a suitable piston 15. The piston rod 16 extends through the head of the cylinder and is suitably guided thereby. It is arranged below the bearing 17 on the bar 5 so that it will strike the bearing 17 when raised. The cylinder 14 is provided with a suitable supply pipe 18 for water or other motive fluid under pressure which is supplied through the supply pipe 21 and controlled by means of a three-way valve 19 operated by the hand-wheel 20, or by any other suitable means. The outlet pipe is indicated at 22. In the operation of the construction of Fig. 1, when water or other motive fluid is admitted from the supply pipe 21 through the pipe 18 to the cylinder below the piston, the raising of the piston and piston rod will cause the rod to abut against the bearing 17 with the result that the lighter bar 5 will be raised by further upward movement of the piston and piston rod. Upon lowering of the piston and piston rod by release of the water from below the piston, the lighter bar and roll will be returned to their lowered position. It will be noted that the adjustment of the bar 5 and of the roll is not changed and that when the roll is lowered, it will be returned to its position of adjustment with respect to the bed plate. It will be further noted that the roll and lighter bar can be raised to the desired extent by continuing the action of the hydraulic cylinder. In order that the roll may not be raised too far, the cylinder may, with advantage, be provided with a stop for limiting the upward movement of the piston. Such a stop is shown in Fig. 1 at 29 and in the enlarged view of Fig. 6 at 29 and 31.

The stop 29 of Fig. 6 is a screw or bolt threaded in the cylinder head and provided with a lock nut 30. The stop 31 is of a tubular nature and forms a sleeve around the piston 5. It is also threaded in the cylinder head and is provided with a lock nut 32. A single stop is sufficient, as indicated in Fig. 1, the stop 31 of Fig. 6 being intended as an alternative construction to that of the stop 29. It may however, in some cases, be desirable to provide two stops in the same cylinder, one of which is more readily adjustable than the other, so that provision may be made for limiting the raising movement to a predetermined maximum amount by one stop and for varying the amount of raising by means of the second stop.

In the construction of Fig. 2, the lighter post 23 itself forms the cylinder and the inlet pipe 18 is connected thereto. The piston 24 and piston rod 25 are of similar construction to those of Fig. 1, the piston rod being guided in any suitable manner (not shown). In this case, the piston rod acts directly against one end of the bar, raising this end to the desired extent.

In the construction of Fig. 3, the hydraulic cylinder is suitably supported above the post 8 and the piston rod 27 is pivoted or otherwise secured at its lower end to the bolt or rod 28, or otherwise to the bar 5 or its support, so that the rising of the piston and piston rod will lift the bar and roll.

In Fig. 1, only one end of the beater roll, and one side of the beater tub, are shown. In common types of beating engines, where the width of the tub is double the length of the roll, the bearing on the far side of the beater is a sufficient distance away so that raising of the roll shaft at the near end may sufficiently raise the roll as a whole. In such cases, the adjusting and raising of the roll can be effected at one end only of the shaft which supports the roll. With other types of beaters, where the width of the tub is approximately equal to the length of the roll, means may be provided at both ends

of the roll for adjusting and raising it. In Fig. 4, a beater of this type is shown conventionally, the other parts of the beater, aside from the roll and its supports, being omitted. The roll 2^a has its bearings in lighter bars 5^a suitably supported in the lighter posts 6^a and 8^a, the construction being similar to that of Fig. 1. Hydraulic cylinders 14^a are, however, provided under each lighter bar, at both ends of the roll, and the supply pipe 18^a is connected with both cylinders. By introducing water under a suitable pressure into the cylinders, both ends of the roll will be raised to the desired extent, and the roll can then be again lowered by release of the water from the cylinders. The cylinders may themselves be constructed and provided with stops in a manner similar to that above described.

In the construction of Fig. 5, the piston rod 16^b is pivoted at its upper end to a link 17^b which is in turn pivoted to the bearing 17. In this construction, the piston is connected directly to the bar 5 so that this bar cannot be raised without raising the piston. So also, the piston cannot be lowered below the position corresponding to the lowered position of the bar 5.

In the construction shown in Fig. 1, the piston rod is free from the lighter bar and when the beater roll is lowered to its normal position, the piston does not touch the lighter bar. In other words, there is no connection between the hydraulic lift and the roll when the latter is in the working position. But when the roll is raised and the beater is being refilled, then should something pass under the roll of sufficient thickness to cause the roll to jump, the shock caused by the return of the roll to its raised position would be received and cushioned by the water within the cylinder. In the construction shown in Fig. 5, however, where the piston rod is directly connected to the bar 5, the bar cannot be raised without raising the piston. The piston in this case, therefore, acts somewhat in the nature of a dash-pot opposing sudden rising of the roll caused by an obstruction, whether the roll is in its raised or lowered position.

The hydraulic cylinder will, in practice, be of sufficient diameter so that, with water at a sufficient pressure, a beater roll of any known weight can be raised by the introduction of the water beneath the piston. The size of the cylinder can accordingly be varied and will in practice be varied in accordance with the water pressure available. The construction of the cylinder can also be varied without departing from its mode of operation, and various arrangements of the cylinder can also be used, certain of these arrangements being illustrated and described above. It will be evident to those skilled in the art that various other arrangements for accomplishing substantially the same result can be constructed and made without departing from the invention.

I claim:

1. A beating engine having a beating roll and bed plate therein, adjustable supports or bearings for supporting said roll and adjusting the same with respect to the bed plate, and a hydraulic cylinder arranged to raise said roll from its position of adjustment and to return the roll thereto, whereby the roll can be raised and lowered without readjustment thereof with respect to the bed plate; substantially as described.

2. A beating engine having a beating roll and bed plate therein, an adjustably supported lighter bar for supporting said roll and adjusting the same with respect to the bed plate, and a hydraulic cylinder arranged to raise said lighter bar and roll from its position of adjustment and to return the lighter bar and roll thereto, whereby the roll can be raised and lowered without readjustment thereof with respect to the bed plate; substantially as described.

3. A beating engine having a beating roll and bed plate therein, a lighter bar for supporting said roll, lighter posts for supporting said lighter bar, means for adjusting said lighter bar in said posts and thereby adjusting the roll with respect to the bed plate, and a hydraulic cylinder mounted below said lighter bar and arranged to raise the same and the roll, whereby the roll can be raised and lowered without readjustment thereof with respect to the bed plate; substantially as described.

4. A beating engine having a beating roll and bed plate therein, a lighter bar for supporting said roll, lighter posts for supporting said lighter bar, means for adjusting said lighter bar in said posts and thereby adjusting the roll with respect to the bed plate, and a hydraulic cylinder arranged below said lighter bar and provided with a piston rod arranged when raised to raise the lighter bar and the roll, whereby the roll can be raised and lowered without readjustment thereof with respect to the bed plate; substantially as described.

5. A beating engine having a beating roll and bed plate therein, a lighter post arranged to support one end of the roll adjustably, and a hydraulic cylinder associated with said post and arranged to raise said roll from its position of adjustment and to return the roll thereto, whereby the roll can be raised and lowered without readjustment thereof with respect to the bed plate; substantially as described.

6. A beating engine having a beating roll and bed plate therein, a lighter post for supporting said roll adjustably, said lighter post forming a hydraulic cylinder and having a

suitable piston and piston rod therein arranged to raise the roll from its position of adjustment and to return the roll thereto, whereby the roll can be raised and lowered without readjustment thereof with respect to the bed plate; substantially as described.

7. A beating engine having a beating roll and bed plate therein, adjustable supports or bearings for supporting said roll and adjusting the same with respect to the bed plate, a hydraulic cylinder arranged to raise said roll from its position of adjustment and to return the roll thereto, and an adjustable stop arranged to limit the upward movement of the piston of said cylinder, whereby the roll can be raised to the adjusted position and lowered without adjustment thereof with respect to the bed plate; substantially as described.

In testimony whereof I affix my signature.

FRANCIS W. WARREN.