

March 7, 1950

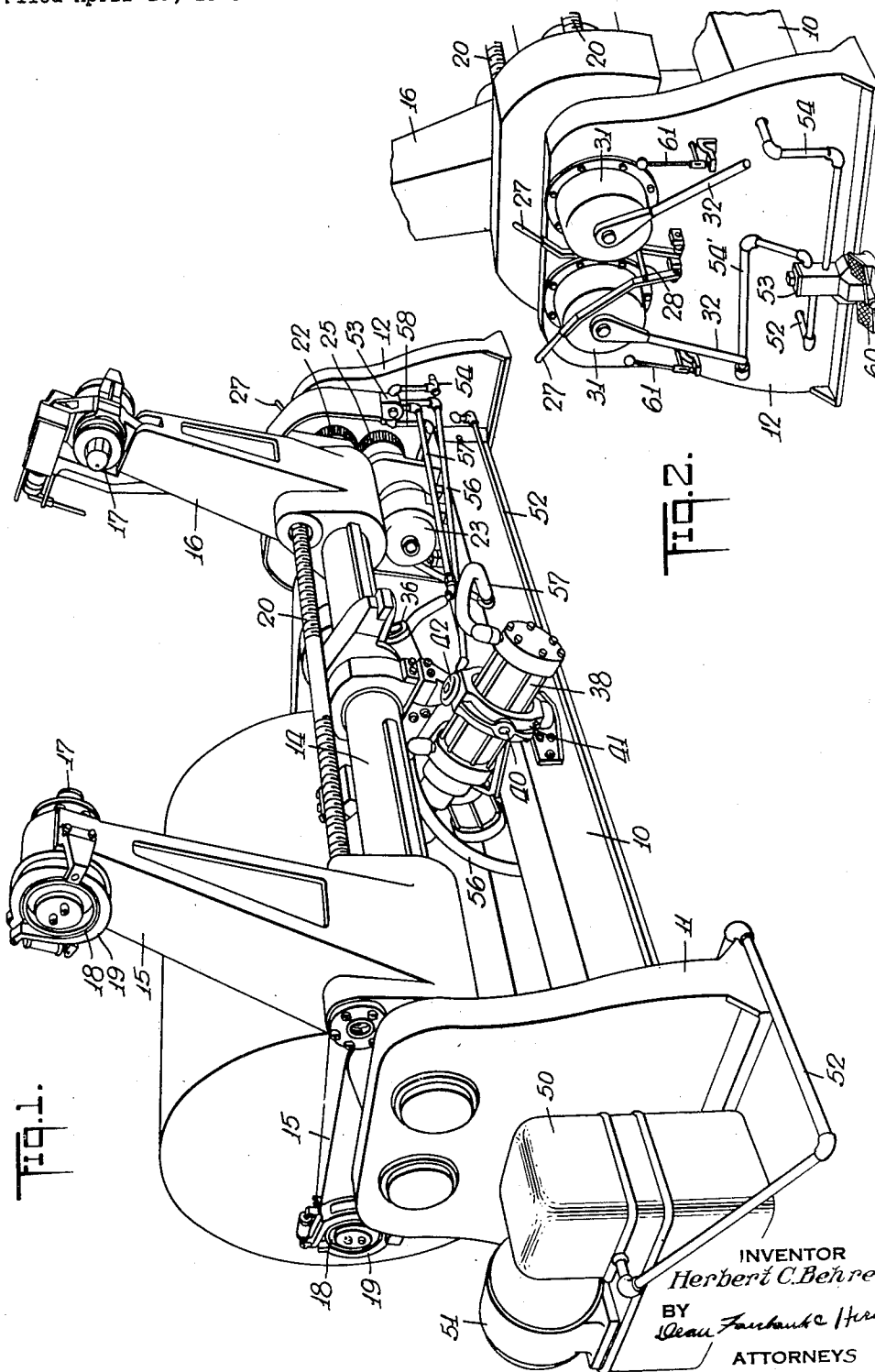
H. C. BEHRENS

2,499,562

MILL ROLL STAND

Filed April 13, 1946

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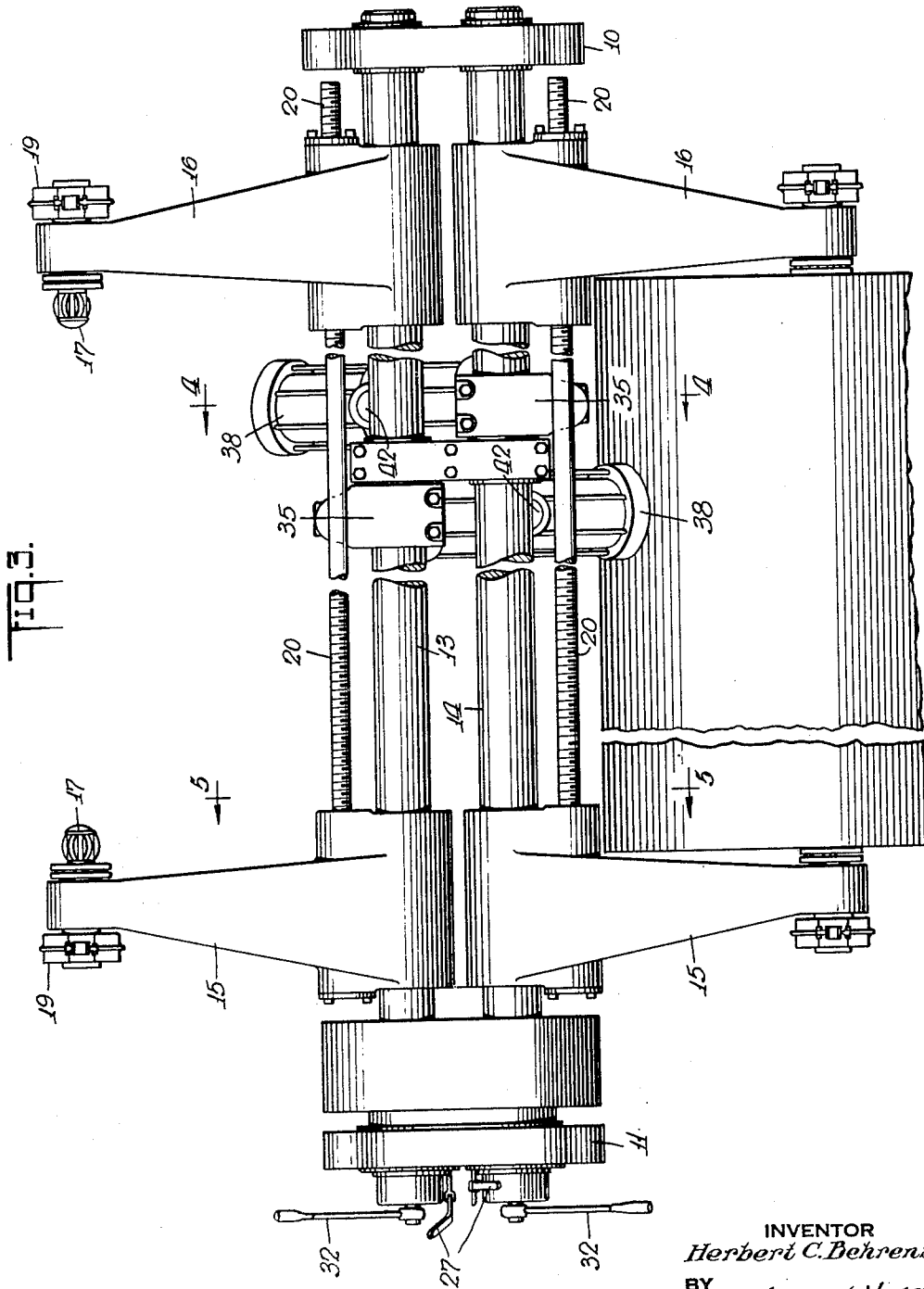
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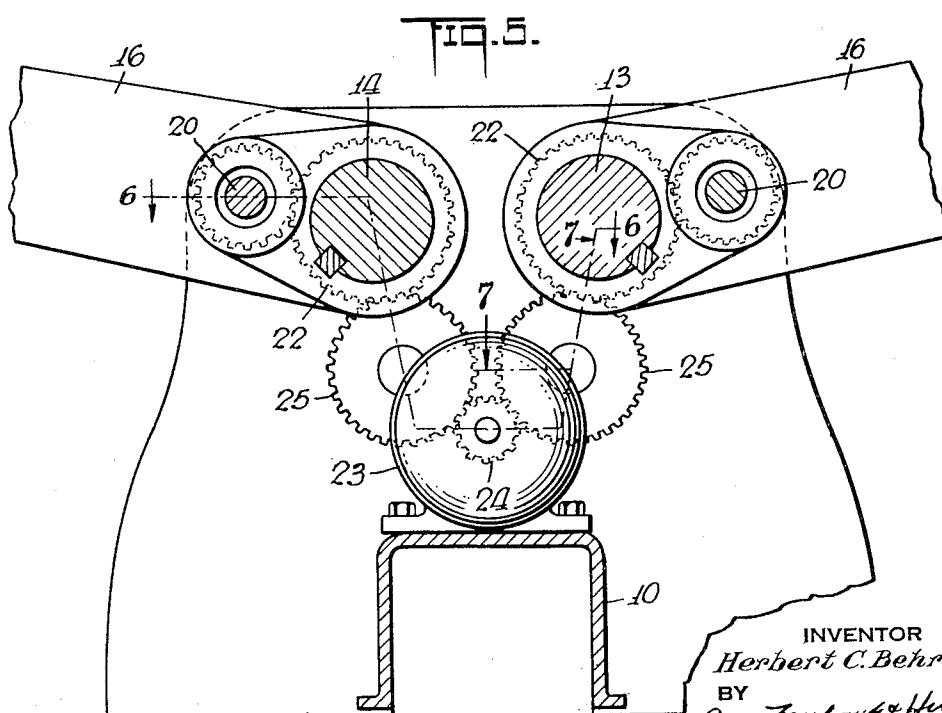
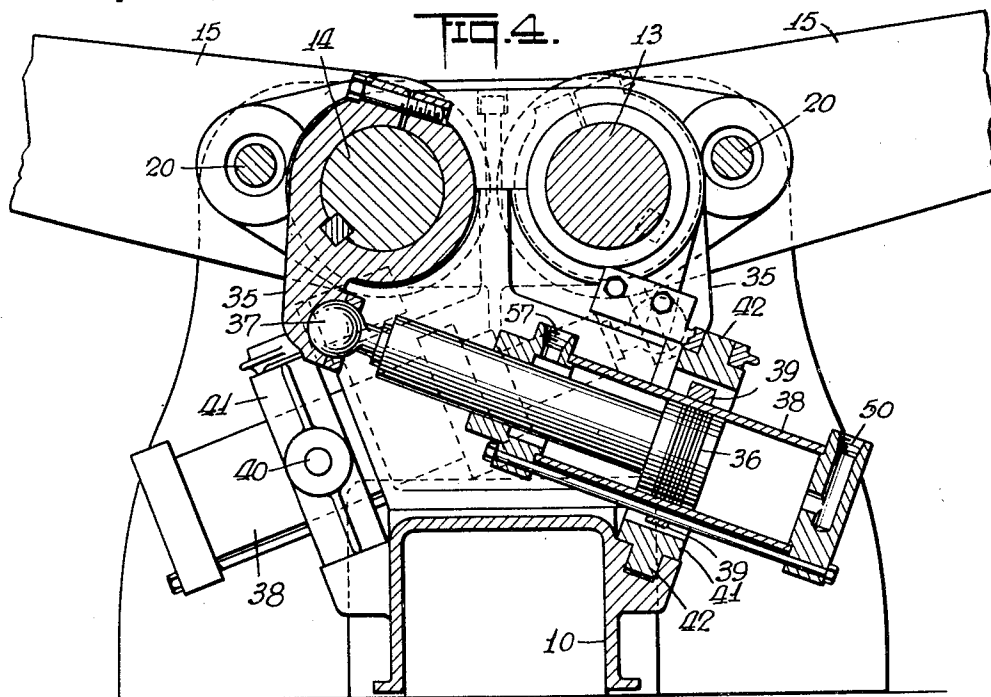


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Fig. 4.

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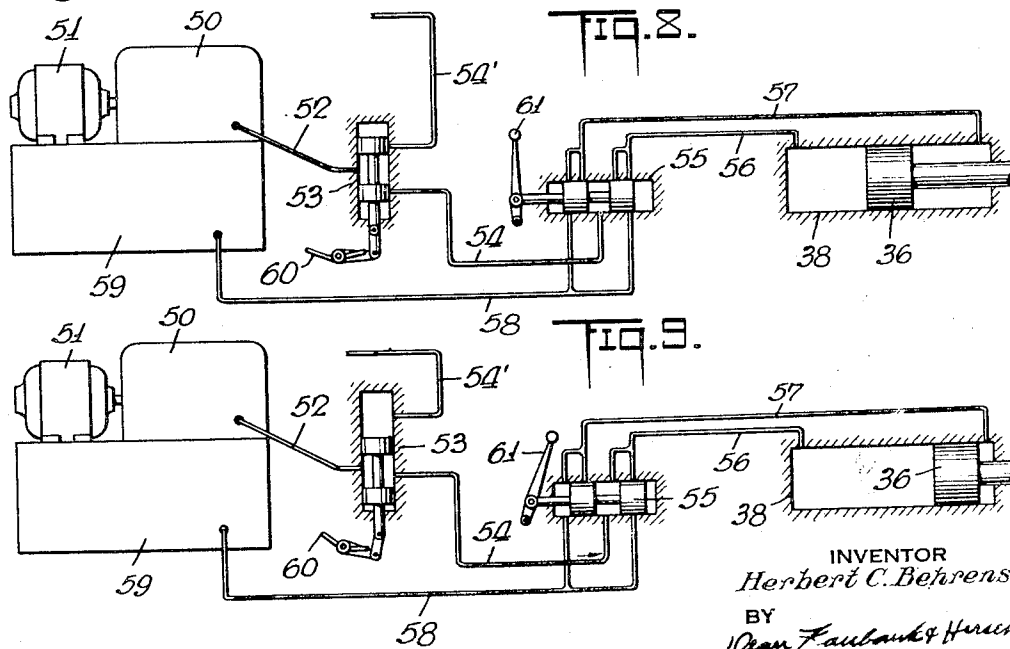
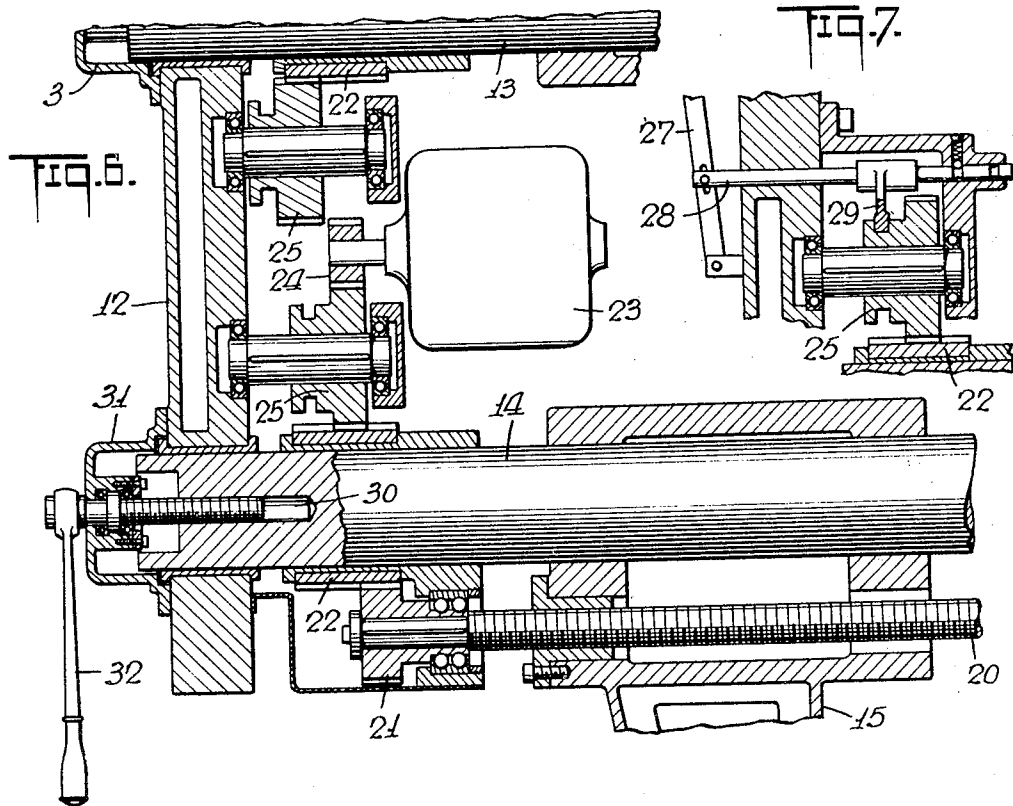
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4 Sheets-Sheet 4



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2,499,562

MILL ROLL STAND

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Application April 13, 1946, Serial No. 661,951

7 Claims. (Cl. 242—58)

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This invention is an improvement in mill roll stands of the general type adapted to engage with and lift heavy rolls of sheet material such as paper, and to support the roll in such position that the sheet or web may be unwound and delivered to some other machine or mechanism in which the sheet is used or acted upon.

One of many uses for such stands is for supporting a roll of paper being delivered to a machine for making single faced or double faced corrugated paper. Such rolls are very heavy so that a powerful lifting mechanism is required. In order to minimize delays in changing to a fresh roll when another roll is used up, it is common practice to so design the stand that it may lift and support two rolls so that while one roll is being unwound, another may be lifted and be ready for use immediately thereafter.

A wide variety of mechanisms have been designed for this general purpose, some using mechanical gearing driven by an electric motor, and others using hydraulic means for lifting the roll.

The present invention relates particularly to a type of stand in which the roll is supported and lifted by a pair of parallel arms connected to an oscillating shaft, with the power means acting on said shaft. It is also of the type in which a hydraulic cylinder and piston is employed to effect the raising and supporting of the roll.

The present application is a continuation-in-part of my prior copending application Serial No. 490,001, filed June 7, 1943 (now Patent 2,405,637).

The main object of the present invention is to provide a mechanism of compact and rugged design. This I accomplish by mounting the power means beneath the oscillating shaft and between the arms which support said shaft, and on the same base which supports said arms. Separate independent power cylinders for the two pairs of oscillating shafts are employed, and compactness is obtained by mounting the shafts close together and with the power cylinders therebeneath.

As an important feature of the invention each oscillating shaft has arms for supporting the roll, and an arm to which the power means is connected so that the arms and shaft constitute a bell crank type of mechanism, and the power means is conveniently positioned therebeneath.

As a further feature the power means is pivoted so that it may oscillate about the pivot point as the power is being applied to the lifting arms.

As a further feature compactness is effected not only by having the two shafts close together, but by having the power means for each shaft

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disposed beneath the other shaft, and both act across the center line of the machine.

As a further feature the roll supporting arms are slidable toward and from each other on their supporting shaft to engage and disengage the roll, and a simple and improved means is provided for effecting such movement of the arms on both shafts at will and from a single electric motor.

It is often necessary to move the shaft together with its arms and the supported roll axially to properly align the sheet with the mechanism which is to act thereon, and as an important feature of the present invention the power cylinder has a gimbal ring type of mounting so that it may tilt in one direction during oscillating of the shaft, and may tilt in another direction during axial movement of the shaft.

In the accompanying drawing there is illustrated an embodiment of my invention, but it will be understood that various changes may be made in the construction and arrangement of the parts without departing from the spirit or scope of my invention.

In the drawing

Fig. 1 is a perspective view of a machine embodying my invention;

Fig. 2 is a perspective view of a portion of the end of the machine opposite to that shown in Fig. 1;

Fig. 3 is a top plan view, the piping being omitted;

Figs. 4 and 5 are sections on the lines 4—4 and 5—5, respectively, of Fig. 3;

Figs. 6 and 7 are sections on the lines 6—6 and 7—7, respectively, of Fig. 5;

Fig. 8 is a diagrammatic showing of the fluid control means and with the parts in position for locking a power piston against endwise movement; and

Fig. 9 is a view similar to Fig. 8 but showing the parts in a position for forcing the piston in one direction.

In the specific form illustrated the machine is provided with a base 10 having a pair of end frames 11 and 12 which support a pair of oscillating shafts 13 and 14 which are mounted comparatively close together. Each shaft has a pair of roll supporting arms 15 and 16 keyed thereto and adjustable therealong. No roll shaft is employed as the outer ends of the arms have roll supporting members 17 which may be extended a short distance into the core of the roll to grip the latter and permit its rotation. Each member 17 preferably has a brake drum 18 and brake shoes or brake band 19 whereby the desired resistance to free

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rotation of the roll may be applied to control the tension on the delivered sheet; but these parts may be of any desired type well known in the art and the details are unimportant.

For moving the arms toward and from each other to effect engagement with a roll there is provided on each pair of arms 15 and 16 a shaft 20 which may be held against endwise movement in respect to one arm and have threaded engagement with the other, or may be held against endwise movement by the frame of the machine and have threaded engagement with both arms. The threaded shaft 20 is parallel to its corresponding main shaft which supports the arms controlled by the threaded shaft, and has pinion 21 meshing with a gear 22 rotatable on and supported by the main shaft.

As shown in Figs. 5 and 6, there is provided an electric motor 23 having a pinion 24, and which may mesh with either of the two gears 25, one of which is in permanent engagement with the gear 22 of the shaft 14, and the other in permanent engagement with the gear 22 of the shaft 13. The gears 25 may be moved axially into and out of mesh with the pinion 24 of the motor to operate either threaded shaft 20. With the parts in position shown in Fig. 6, the power of the motor may be employed to rotate the pinion 22 and the threaded shaft 20 of the main shaft 14, but no power will be transmitted to the pinion 22 of the shaft 13. By reversing the positions of the two gears 25 the power of the motor 23 may be delivered to the threaded shaft 20 of the main shaft 13, and not to that of the other main shaft 14.

Any suitable means may be employed for effecting the shifting of the two gears. As shown in Fig. 2, there are two levers 27 mounted on the end frame 12, and these are connected to push rods 28 which have arms 29 engaging in grooves of the pinions 25. Thus, by pulling out one lever 26 and pushing in the other, the power from the motor 23 may be applied to the roll supporting arms of either of the two shafts 13 and 14.

Various means may be employed for moving the shafts 13 and 14 and their roll supporting arms axially to align the sheet with the sheet receiving machine. As illustrated in Fig. 6, the end of each of the oscillating shafts 13 and 14 has a threaded rod 30 axially disposed therein and held against endwise movement in respect to the frame of the machine by a bracket 31. Each rod 30 at its outer end has an arm or crank 32, whereby the rod may be rotated in either direction and to the extent necessary to effect the alignment of the paper. In such movement of the oscillating shaft it carries with it the arms 15 and 16 and the means for effecting relative movement of said arms toward and from each other.

An important feature of the invention involves the means employed for oscillating the shafts 13 and 14 to raise and lower the rolls carried by the arms keyed to said shafts. For oscillating the shaft the latter has an arm 35 keyed thereto and dependent therefrom. A plunger or piston 36 is connected to the arm preferably by a ball and socket joint 37, and is mounted in a hydraulic cylinder 38 which carries a ring or collar 39 intermediate of its ends. The collar has horizontally extended pivot pins 40 mounted in an outer ring 41, which latter has pivot pins 42 extending at right angles to the pivot pins 40 so that the two rings and the two sets of pivot pins con-

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stitute a gimbal ring mounting and permit the cylinder and plunger to swing horizontally or vertically or in any diagonal plane.

When power is applied to the right hand end of the cylinder 38, as shown in Fig. 4, the shaft 14 is oscillated, and the arms 15 and 16 carried thereby are raised. When the threaded rod 30, shown in Fig. 6, is turned to move the shaft 14 endwise, the plunger and cylinder may swing in a plane at right angles to the plane of the first mentioned movement. The pivot pins 42 are mounted in rigid parts of the base 20 and a bracket carried thereby so that the gimbal ring mounting of the cylinder will resist the strain applied thereto in lifting the heavy roll and supporting it at the desired elevation.

As an important feature of the invention the base 10 of the machine is made comparatively narrow, and the mountings for the cylinders 38 are connected thereto and disposed directly beneath the shafts 13 and 14. The cylinder for operating the shaft 14 is mounted beneath the shaft 13, and the cylinder for operating the shaft 13 is mounted beneath the shaft 14. Thus a very compact arrangement is effected.

For controlling the application of motive fluid to the cylinders there is employed a hydraulic pump 50, driven by an electric motor 51. This pump delivers through a pipe 52 to a control valve 53 at the other end of the machine, thence through a pipe 54 to a reversing valve 55 and then through pipe 56 or 57 to either end of the cylinder 38, as shown in Figs. 8 and 9. From the reversing valve the fluid may return through pipe 58 to the supply tank 59.

The control valve 53 is preferably mounted on the end frame 12, as shown in Fig. 2, and may be moved in either direction by a foot pedal 60. With the parts in the positions shown in Fig. 9, the non-elastic fluid under pressure will be forced by the pump 50 through the pipe 52, valve 53, pipe 54, valve 55, and pipe 56 to the left hand end of the cylinder 38 and force the plunger in one direction. By moving the valve 55 toward the left hand end position, the liquid will flow through the valve 55 and pipe 56 to the right hand end of the cylinder 38 and force the plunger in the opposite direction. As shown, the liquid at the right hand end of the cylinder 38 may flow through pipe 57, valve 55, and a return pipe 58 to the supply tank. With the parts reversed, the liquid may flow from the left hand end of the cylinder 38 through the pipe 56 and valve 55 to said pipe 58. The valve 55 may be operated in any suitable manner, as for instance by lever 61 (see Fig. 2). After the roll supporting arms have been moved to the desired position, the valve 55 is shifted from the position shown in Fig. 9 to the position shown in Fig. 8 so as to block off both pipes 56 and 57, the pump is stopped, and the piston or plunger 36 will be held in the desired position.

In Figs. 8 and 9 only the control mechanism for one of the pair of load lifting arms is shown, but from the reversing valve 53 there is a second pipe 54' through which the liquid under pressure may be delivered from the pipe 52 when the valve 53 is raised to a higher point than is shown in Fig. 8. Thus pipe 54' serves the same purpose as pipe 54, but leads to the operating mechanism of the other pair of load carrying arms. By pushing the foot pedal 60 to one extreme position, as is shown in Fig. 9, the fluid is directed to the operating mechanism for one set of arms, and by pushing it to the other extreme position, the fluid

is directed through the pipe 54' to the operating mechanism of the other pair of arms.

I have illustrated only one embodiment of my invention, but it will be obvious that various changes in the design, construction and mounting of the various parts may be made within the scope of my invention.

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

1. A mill roll stand including an oscillating and endwise movable shaft having a pair of arms for supporting and permitting rotation of a roll, a third arm rigid with said shaft, a piston and cylinder, one connected to said last mentioned arm, and the other having a pivot mounting permitting swing in directions at right angles to each other, and means for controlling the flow of fluid to said cylinder, for oscillating said shaft and raising and lowering said pair of arms.

2. A mill roll stand including an oscillating and endwise movable shaft having a pair of arms for supporting and permitting rotation of a roll, a third arm rigid with said shaft, a piston connected to said last mentioned arm, and a cylinder for said piston, a support for said cylinder permitting swinging in two directions at right angles to each other, and means for controlling the flow of fluid to said cylinder, for oscillating said shaft and raising and lowering said pair of arms.

3. A mill roll stand including an oscillating shaft having a pair of arms for supporting and permitting rotation of a roll, means for moving said shaft endwise, a hydraulic piston and cylinder, means for connecting one of them to said shaft for oscillating the latter, and a gimbal support for the other permitting the piston and cylinder to swing in one plane during oscillation of said shaft, and swing in a different plane during endwise movement of said shaft.

4. A mill roll stand including an oscillating shaft having a pair of arms for supporting and permitting rotation of a roll, means for moving said shaft endwise, a hydraulic piston and cylinder, means for connecting said piston to said shaft for oscillating the latter, and a gimbal support for the said cylinder permitting the piston and cylinder to swing in one plane during oscilla-

tion of said shaft, and swing in a different plane during endwise movement of said shaft.

5. A mill roll stand having a pair of horizontal closely spaced shafts, each having a pair of arms for supporting and permitting rotation of a roll, and a power applying arm for rotating the shaft, a pair of hydraulic cylinders, one having its piston connected to the power applying arm of one shaft, and the other having its piston connected to the power applying arm of the other shaft, the cylinder and piston for each shaft being supported beneath the other shaft, and gimbal mountings for said cylinders.

6. A mill roll stand having a pair of parallel longitudinally movable shafts each having a pair of roll supporting arms, hydraulic means connected to each shaft and including a cylinder and piston for oscillating the shaft, a gimbal mounting for each cylinder, a pump, piping connecting said pump to both cylinders, a valve for directing fluid to either cylinder, and a separate control valve for directing fluid to either end of the cylinder.

7. A mill roll stand having a pair of parallel longitudinally movable shafts each having a pair of roll supporting arms, hydraulic means connected to each shaft and including a cylinder and piston for oscillating the shaft, a gimbal mounting for each cylinder, a pump, piping connecting said pump to both cylinders, a valve for directing fluid to either cylinder, and a separate control valve for directing fluid to either end of the cylinder, said last mentioned valve in one position serving to prevent escape of fluid from either end of the cylinder.

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