Feb. 26, 1952 R. J. STEHLING 2,586,879

HIDE AND LEATHER WORKING MACHINE

Filed May 29, 1950 3 Sheets-Sheet 1

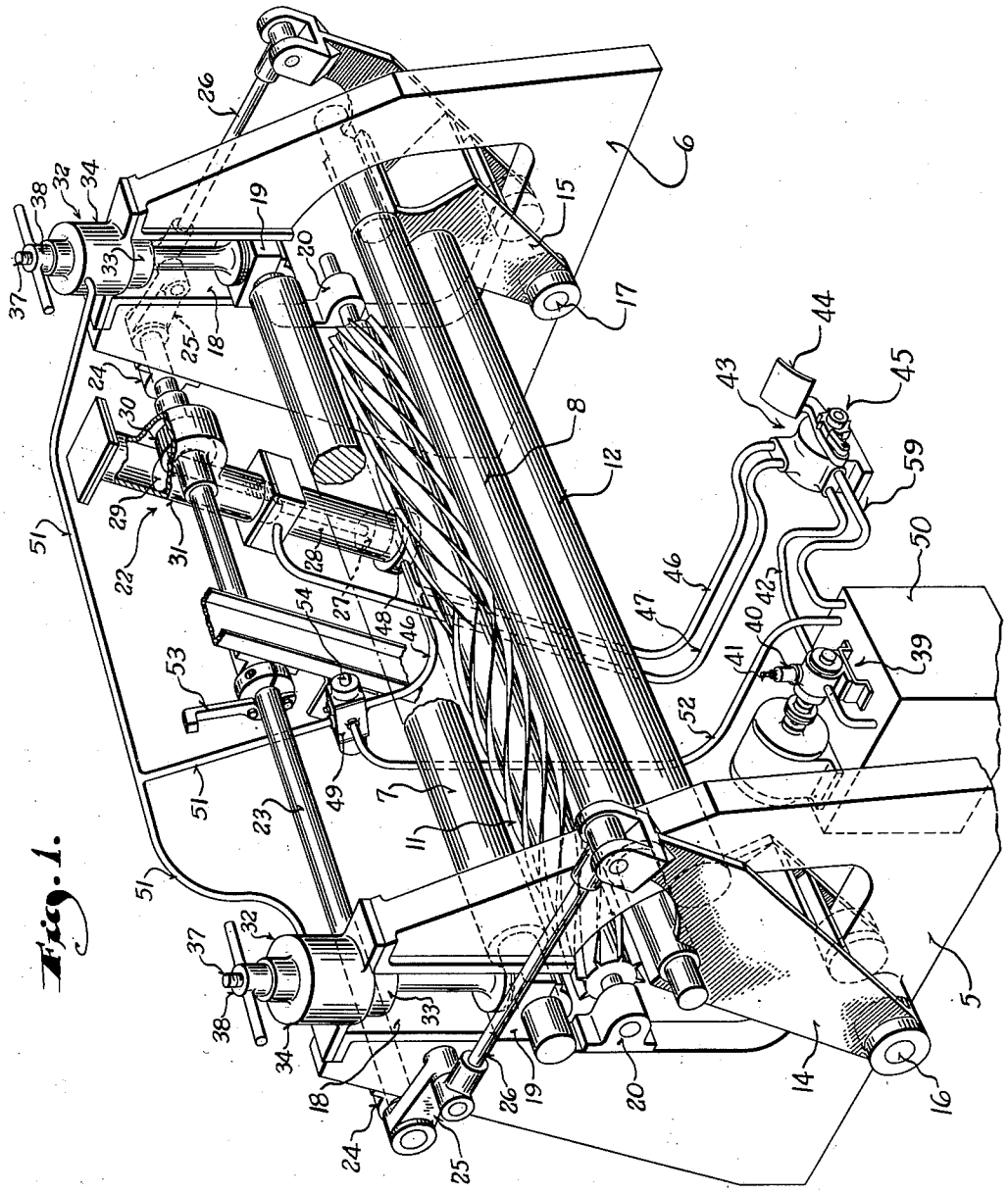


Fig. 1.

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Fig. 3.

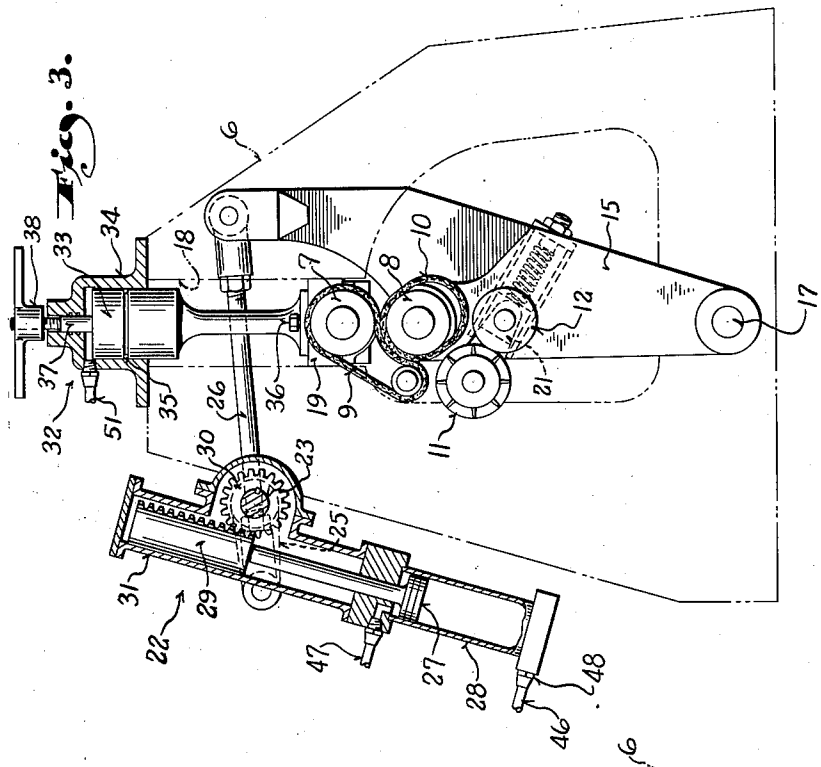
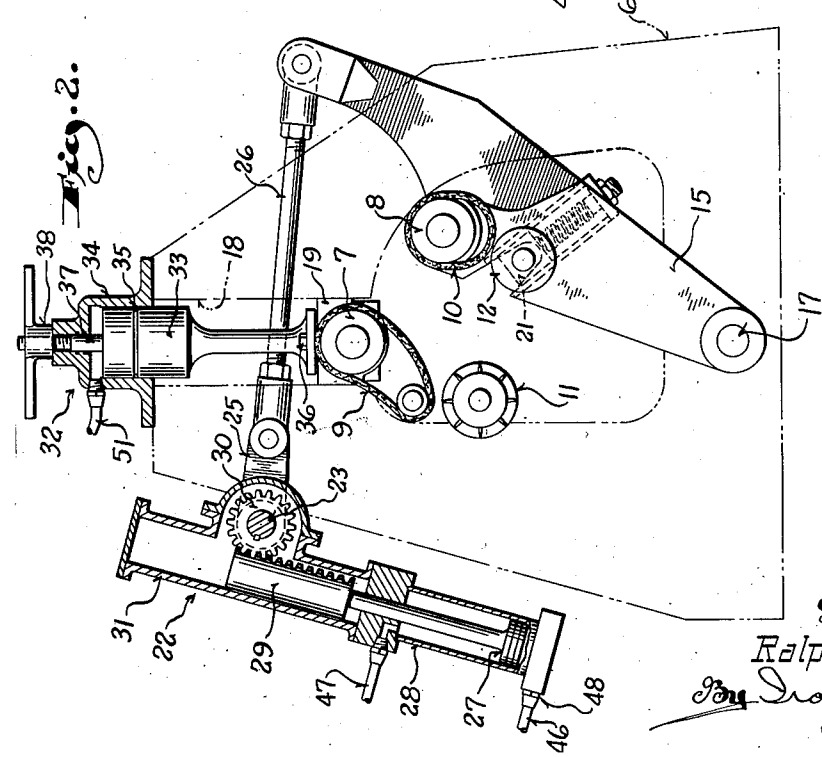


Fig. 2.



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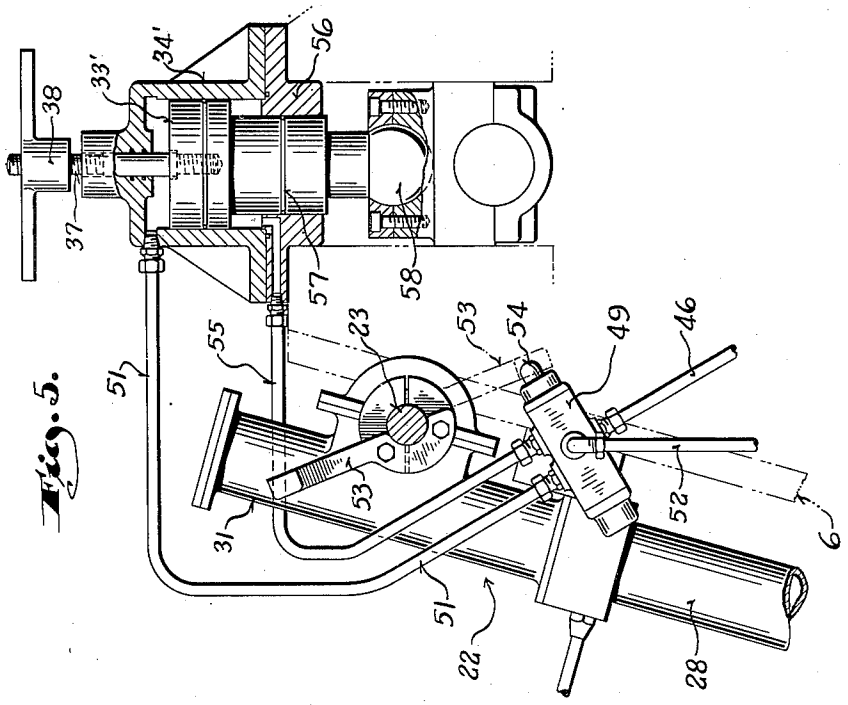


Fig. 5.

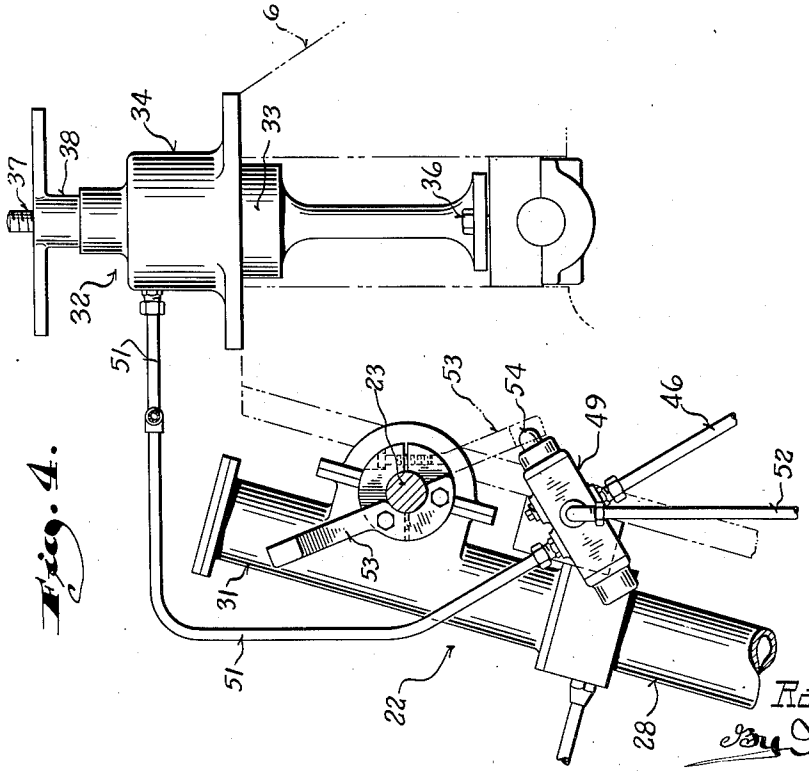


Fig. 4.

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UNITED STATES PATENT OFFICE

2,586,879

HIDE AND LEATHER WORKING MACHINE

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Application May 29, 1950, Serial No. 164,945

10 Claims. (Cl. 69—41)

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This invention relates to hide and leather working machines such as fleshing machines and wringers in which the lower one of a pair of superimposed pressure rolls is swung between a loading position and an operative position directly under the upper roll. When the lower roll is swung to its loading position the machine is said to be "open" allowing a wet hide or skin to be draped over the lower roll, and as the lower roll is swung to its operative position to "close" the machine the hide or skin draped thereover is gripped and squeezed between it and the upper roll which is yieldingly pressed downward.

Heretofore the means for pressing the upper roll downward consisted of heavy coil springs confined between the bearings in which the upper roll is journalled and adjustable pressure nuts. This construction is illustrated in Patent No. 2,094,761, issued to J. J. Stehling, October 5, 1937.

The mechanism by which the lower roll is swung to and from its operative position originally was mechanically driven as in the aforesaid patent. Subsequently hydraulic means were substituted for the mechanical drive mechanism as shown in Patent No. 2,471,984, issued to R. J. Stehling, May 31, 1949. While the substitution of the hydraulic means of the latter patent for the mechanical drive employed in the former was a definite improvement, the retention of the heavy compression springs to provide the yielding pressure upon the work still left the machine with a serious fault.

It is, of course, desirable that uniform pressure be exerted upon all portions of the hide or skin passing through the machine, but since a hide or skin seldom has the same thickness throughout its entire area it follows that as it passes between the rolls the upper roll rides up and down with increasing and decreasing thicknesses. Where the pressure is derived from springs such up and down movement of the upper roll correspondingly increased and decreased the compression and consequently the force exerted by the springs. Also the springs were difficult and tedious to adjust.

The purpose and object of this invention is therefore, to eliminate the pressure springs which characterized machines of this type heretofore in use and to substitute hydraulic means for applying the pressure upon the upper roll so that regardless of variation in the thickness of the skins or hides the same pressure will be exerted upon all portions thereof.

Another object of this invention is to provide a simple control for the hydraulic pressure applying means which functions to automatically

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cause the rolls to be forced together as the machine is closed and to relieve such pressure as the machine is opened.

Another object of this invention is to provide hydraulic means for suspending the upper roll during the time the machine is open and directly upon closure to press the rolls together so that the upper roll in nowise resists or opposes closure of the machine.

As in the aforesaid patent to R. J. Stehling No. 2,471,984, the fluid pressure for operating the opening and closing mechanism is derived from a variable volume constant pressure pump, and since the mounting for the lower roll and the means for swinging it to and from operative position are so designed that retention of the lower roll in its operative position imposes no load upon the pump, the full output of the pump is available to provide the pressure upon the upper roll. Accordingly, this invention utilizes the same variable volume constant pressure pump which provides the fluid pressure needed to swing the lower roll to and from its operative position to also energize the hydraulic means for supplying the downward pressure upon the upper roll. In this manner both functions are performed without increasing the power requirements of the machine. More important, however, is the fact that adjustment of the pressure applied upon the work is greatly simplified and improved as will appear hereinafter.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate two complete examples of the physical embodiments of the invention constructed according to the best modes so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view, more or less diagrammatic, illustrating the main elements of a leather wringing machine embodying this invention, parts of said view being broken away to better illustrate details;

Figure 2 is a more or less diagrammatic cross sectional view through the machine showing the same open, that is, with its lower roll swung out;

Figure 3 is a view similar to Figure 2 but showing the machine closed and the lower roll in operative position coacting with the upper roll;

Figure 4 is a fragmentary detail cross sectional view taken from the same direction as Figures 2 and 3 and illustrating particularly the automatic control for the hydraulic pressure applying means by which the upper roll is forced downwardly against the lower roll as the machine is closed; and

Figure 5 is a view similar to Figure 4 but illustrating an added feature of the invention, namely, the hydraulic lifting of the upper roll as the machine is opened.

Referring now more particularly to the accompanying drawings in which like numerals indicate like parts throughout the several views, the numerals 5 and 6 designate left and right hand end frames, respectively. These frames are rigidly mounted in fixed relation to one another by structure not shown for the sake of clarity. Extending longitudinally across the space between the end frames are upper and lower pressure rolls 7 and 8, respectively.

Where the machine is designed to operate essentially as a wringer, that is, to wring out and straighten wet hides and skins, the two companion rolls have sleeves 9 and 10, respectively, of felt or other bibulous material loosely encircling the same. Hence, as the skins or hides are passed between the pressure rolls these sleeves 9 and 10 soak up the water squeezed therefrom. For the sake of clarity the sleeves are omitted in Figure 1.

Also disposed in the space between the end frames 5 and 6 and extending longitudinally of the machine is a so-called "putting-out" roll 11 and a rubber covered pressure roll 12 which serves to press the hide or skin against the "putting-out" roll and enables its oppositely pitched helical ribs to work the hide or skin simultaneously in opposite directions and thereby straighten the same.

The mounting for the lower pressure roll and also the rubber covered roll 12 comprises a pair of left hand and right hand swinging arms 14 and 15 pivoted as at 16 and 17 to the lower portion of the end frames 5 and 6, respectively. Attention is directed to the fact that the common axis of the two pivotal connections 16 and 17 is vertically in line with the center of a vertical slot-like opening 18 in the upper portion of each end frame and in which the bearings 19 for the upper roll are slidably mounted.

Though the manner in which the putting out roll 11 and the rubber covered pressure roll 12 are mounted forms no part of this invention, it may be noted that the former is journalled in fixed bearings 20 and that the latter is journalled in spring pressed bearings 21 carried by the swingingly mounted arms 14 and 15, so that as the machine is closed these two rolls come together under spring compression.

Swinging movement is imparted to the arms 14 and 15 to close and open the machine by fluid pressure responsive mechanism indicated generally by the numeral 22. This mechanism 22 incorporates the essentials of the hydraulic drive forming the subject matter of the aforesaid Patent No. 2,471,984 and thus includes a rock shaft 23 journalled in bearings 24 fixed to the end frames, a crank arm 25 secured to each end of the rock shaft and a connecting rod 26 connecting each crank arm with the upper free end of one of the swinging arms 14—15. These parts are so proportioned that a half turn of the rock shaft in one direction brings the lower pressure roll 8 into operative position directly under the upper roll 7 or on dead center to close the machine,

while a half turn of the rock shaft in the opposite direction swings the movable roll 8 out from under the upper roll 7 to open the machine.

Rocking movement is imparted to the shaft 23 by a fluid pressure motor comprising a piston 27 operating in a cylinder 28 and connected to a rack 29 which meshes with a pinion 30 fixed to the rock shaft. The rack 29 and pinion 30 are preferably encased within a housing 31 adapted to contain lubricant, and the mechanism is so designed that full pressure, that is, the full area of the piston 27, is used during the closure of the machine. To a large degree, however, the necessity for this latter advantage is obviated by the fact that with this invention the only work performed by the hydraulic mechanism 22 during closure of the machine is to swing the arms 14—15 and lift the rolls 8 and 12 into operative position and in that embodiment of the invention shown in Figures 1 to 4, inclusive, to lift the weight of the upper roll 7. With the construction shown in Figure 5, the load upon the mechanism 22 is even further reduced since in this case the upper roll is held up until the machine closes.

In both embodiments of the invention, however, as the machine is closed and the lower roll 8 assumes its operative position directly under the upper roll, fluid pressure responsive means, indicated generally by the numeral 32, operates to exert a downward yielding force upon the upper roll 7. This fluid pressure responsive means comprises a piston 33 connected to each bearing 19 and operating in a cylinder 34 fixed to the top of the end frame. A conventional O-ring 35 seated in a groove in the piston provides a leak proof connection between it and the bore of the cylinder, and to accommodate any possible misalignment between the bearings and the pistons and the slight movement of the bearings necessitated by the nature of the work, the connections between the bearings and their respective pistons incorporates a limited amount of play. In that form of the invention shown in Figures 1 to 4, inclusive, this slight play is obtained by having the heads of the cap screws or bolts 36 employed to effect the connection between the piston and bearing spaced a slight distance from the top of the flange of the piston connecting-rod through which they pass.

Projecting upwardly from the top of each piston 33 is a tension rod 37 with a nut 38 threaded upon its upper projecting end portion. The engagement of this nut 38 with the top of the cylinder, as shown in Figure 2, limits the extent to which the upper roll may drop by gravity as the machine opens; and since in every case it is desirable that during closure of the machine the distance the upper roll is lifted (in the embodiment shown in Figures 1 to 4, inclusive) be approximately the same, and with heavy stock the upper roll during operation of this machine is in a position farther from the lower roll than with light stock, the operator adjusts the nuts 38 accordingly.

Fluid pressure is supplied to the mechanism 22 and the means 32 from a single constant pressure variable volume pump 39 of known construction, which may be like that shown in Patent No. 2,064,421 issued December 15, 1936. This pump embodies a suitable governor 40 which varies the delivery in accordance with the pressure built up in the system and maintains any constant pressure desired without bypassing the oil or other liquid employed. One of the features of this type of pump is the fact thaat it may be readily regulated to maintain the maximum pressure at any

desired value. This regulating means comprises an adjustable screw 41 for varying the tension of a governor spring (not shown), the tension of which determines the pressure to be maintained. Tightening the screw increases the maximum pressure and vice versa. Thus, as will be clear the adjustment of the pressure exerted upon the work is a very simple matter compared with the arduous task of turning the tension nuts of the previous constructions.

The high pressure or output side of the pump 39 is connected through a line 42 with a manually controllable valve 43 which preferably is of the treadle type having a foot treadle 44 and a pawl and ratchet 45 by which the valve plug (not shown) is rotated from one position to another with successive depressions of the treadle. Two lines 46 and 47 lead from the valve 43, the former connecting as at 48 with the cylinder 28 under the piston 27 and also with the inlet port of a two-way valve 49. Upon depression of the treadle 44 to close the machine fluid pressure is established in the line 46 and hence under the piston 27 and at the same time at the inlet port of the valve 49, which, however, is spring held in a position at which it provides a pressure relief connection between the cylinders 34 and the reservoir 50 of the pump. To this end the valve 49 has one of its discharge ports connected through a branched line 51 with the top of each cylinder 34 and has another of its ports connected through a line 52 with the reservoir 50.

Upon the connection of the cylinder 28 with the pressure side of the pump, the piston 27 is projected upwardly to rock the shaft 23 in a clockwise direction and rotate its crank arm 25 through 180 degrees, thereby swinging the arms 14—15 to dispose the movable roll 8 on dead center directly under the nominally stationary roll 7. During the last few degrees of rotation of the rock shaft and as the machine is being closed, an arm 53 fixed to the rock shaft, as shown in dotted lines in Figure 4, collides with an actuating stem 54 projecting from the valve 49 to depress the same and thereby connecting the cylinders 34 with the pressure side of the pump.

As fluid pressure is established in the cylinders 34 above the pistons 33 the upper nominally stationary roll 7 is pressed down toward the movable roll to squeeze a hide or skin therebetween, and it is important to note that because the upper roll is pressed down hydraulically, all parts of the hide or skin will be subjected to the same pressure regardless of variations in thickness.

It is also important to observe that at the time the movable roll 8 is swung into its operative position the cylinders 34 are not connected with the pressure side of the pump. Hence, the only resistance which the upper roll 7 can offer to the final closing of the machine is that occasioned by the weight of the upper roll and even this is eliminated with the modified embodiment of the invention shown in Figure 5. In the latter case fluid pressure is at all times manifested in the cylinders 34' either above the pistons 33' to press the upper roll down as described or beneath the pistons 33' to lift the upper roll out of the path of the movable roll as it assumes its operative position. This desirable additional advantage is achieved by merely connecting another port of the valve 49 with the cylinders 34' beneath the pistons 33' by means of a line 55.

In its normal condition the valve 49 communicates the lines 46 and 55 and when the movable roll assumes its operative position and the arm 53 depresses the actuating plunger 54, the valve 49 communicates the pressure line 46 with the branched line 51 and communicates the line 55 with the return line 52. It is, of course, understood that in this form of the invention the bottom of the cylinder 34' is closed by a wall 56 in which the piston has a snug sliding fit pressure sealed by an O-ring 57. To afford the necessary relative motion between the pistons 33' and the bearings which they suspend, the lower ends of the piston rods have ball and socket connections 58 with the bearings.

To open the machine it is only necessary to again step upon the treadle 44 which actuates the valve 43 to connect the upper ends of the cylinders 28 with the fluid pressure source through the line 47 and connect the lower ends thereof through the line 46 and a return line 59 with the reservoir 50.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in this art that this invention greatly simplifies the construction and operation of machines of the character described and that the elimination of the mechanical parts which characterized machines of this type heretofore in use is especially desirable in view of the messy conditions under which apparatus of this type must be operated. More important, however, is the fact that employment of fluid pressure to force the upper roll down assures uniform pressure upon all portions of the hide or skin moving through the machine, notwithstanding variations in thickness thereof, and the fact that adjustment of the pressure to be exerted entails merely tightening or loosening an adjusting screw on the variable volume constant pressure pump which provides the fluid pressure source.

What I claim as my invention is:

1. In a machine having companion pressure rolls, one of which is movable to and from its operative position coacting with the other roll which is nominally stationary but has limited movement toward and from the operative position of the movable roll, the combination of: fluid pressure responsive means for moving the movable roll to and from its operative position; fluid pressure responsive means for pressing the nominally stationary roll toward its companion; a variable volume constant pressure pump supplying fluid under pressure to both said two fluid pressure responsive means; manually operable control means for governing the operation of the first named fluid pressure responsive means; and control means automatically rendering said second named fluid pressure responsive means operative as the movable roll assumes its operative position.

2. In a hide and leather working machine: a pair of companion rolls between which work to be acted upon passes, one of said rolls being nominally stationary and the other movable; means mounting the nominally stationary roll for limited movement toward and from the operative position of the movable roll; means mounting the movable roll for bodily swinging movement to and from its operative position; fluid pressure responsive means for pressing the nominally stationary roll onto the other roll; fluid pressure responsive means for biasing the normally stationary roll away from the other roll; fluid pressure responsive mechanism for swinging the movable roll to and from its operative position; and a single variable volume

constant pressure pump for supplying fluid under pressure to all of said fluid pressure responsive means.

3. The combination set forth in claim 2 further characterized by the provision of: a manual control governing the application of fluid pressure to the fluid pressure responsive mechanism which swings the movable roll to and from its operative position; and automatic control means actuated by a part moved by said mechanism as the movable roll assumes its operative position for governing the application of fluid pressure to the other fluid pressure responsive means.

4. In a machine, the combination of: a pair of companion rolls between which work is gripped in the operation of the machine; means mounting one of said rolls for limited movement toward and from the other roll when the latter is in its operative position; means mounting said other roll for bodily swinging movement to and from its operative position; fluid pressure actuated mechanism for swinging said other roll to and from its operative position comprising, a fluid pressure motor, a rack movable by said fluid pressure motor, a pinion meshing with the rack, a rock shaft fixed to the pinion, a crank arm secured to said rock shaft, and linkage connecting the crank arm with the mounting means for the movable roll, movement of the rack in one direction swinging the movable roll to its operative position and movement thereof in the opposite direction swinging the roll out of operative position; fluid pressure responsive means for pressing the first named roll toward its companion; a single variable volume constant pressure pump supplying fluid under pressure to the fluid pressure motor and the fluid pressure responsive means; a manually operable valve controlling the application of fluid pressure to the fluid pressure motor; an automatic valve controlling the application of fluid pressure to said fluid pressure responsive means; and a valve actuator fixed to a part of the motion transmitting linkage between the fluid pressure motor and the mounting means for said movable roll and positioned to actuate the automatic valve to apply fluid pressure upon said fluid pressure responsive means as the movable roll assumes its operative position.

5. In a hide and leather working machine having a nominally stationary upper roll and a movable lower roll swingingly mounted for movement to and from an operative position directly under the upper roll, the combination with said rolls of: means for swinging the lower roll to and from its operative position; fluid pressure responsive means for pressing the upper roll down onto the lower roll; and means for automatically connecting said fluid pressure responsive means with a source of fluid pressure as the lower roll assumes its operative position under the upper roll and for automatically disconnecting the same from said source as the lower roll moves out of its operative position.

6. In a hide and leather working machine, the combination of: an upper roll; bearings for the upper roll constrained to limited up and down movement; a lower roll; pivoted arms mounting the lower roll for swinging movement to and from an operative position disposed directly under the upper roll; means applying an upward force upon the bearings of the upper roll as long as the lower roll is in any but its operative position; and means for automatically applying a downward force upon said bearings as the lower roll assumes its operative position.

7. In a hide and leather working machine, the combination set forth in claim 6 further characterized by the fact that said last named means comprises a cylinder mounted above each bearing, a piston connected with each bearing and operating in the cylinder thereabove, and means for applying fluid under pressure to the cylinders above the pistons.

8. In a hide and leather working machine, the combination set forth in claim 6 further characterized by the fact that said last named means comprises: a cylinder mounted above each bearing, a piston connected with each bearing and operating in the cylinder thereabove, and means for supplying fluid under pressure to the cylinders above the pistons to force the pistons downwardly and thereby press the upper roll against the lower roll; means for supplying fluid under pressure to the cylinders under the piston therein to lift the upper roll; a multiposition valve controlling the application of fluid under pressure to said cylinders; means automatically actuating said valve to a position at which fluid under pressure is fed to the cylinders above the pistons to press the upper roll down as the lower roll assumes its operative position; and means automatically actuating said valve to a position at which fluid under pressure is fed to the cylinders under the pistons to lift the upper roll as the lower roll is moved out of its operative position.

9. In a hide and leather working machine, the combination of: a pair of companion pressure rolls between which the work is squeezed in the operation of the machine, one of said rolls being nominally stationary and the other movable; a pair of swingingly mounted arms carrying the movable roll and operable to swing the same to and from a position coacting with the nominally stationary roll; a rock shaft parallel with the axis about which the arms swing; a crank connected to the rock shaft opposite the free end of each of said arms; a link connecting each crank arm with one of said arms; the crank arms being of such length that in one dead center position thereof the movable roll is in its operative position adjacent to the nominally stationary roll to close the machine, while in the other dead center position thereof the movable roll is swung its maximum distance from the nominally stationary roll to open the machine; a pinion fixed to the rock shaft; a rack meshing therewith; a fluid pressure motor connected to the rack for reciprocating the same; bearings in which the nominally stationary roll is journalled; fluid pressure responsive means connected with said bearings and by which said bearings may be forced toward the operative position of the movable roll; means for supplying fluid under pressure to said fluid pressure responsive means, including an automatic valve actuated by the motion of the rock shaft during its final range of movement in closing the machine so that said fluid pressure responsive means becomes operative as the machine closes; and manually operable means for supplying fluid under pressure to the fluid pressure motor so that the closing and opening of the machine is under manual control.

10. In a hide and leather working machine: companion upper and lower pressure rolls between which work to be acted upon passes; means mounting the upper roll for limited up and down movement; means mounting the lower roll for bodily swinging movement to and from its operative position below the upper roll; fluid pressure responsive mechanism for swinging the

lower roll to and from its operative position; fluid pressure responsive means for biasing the upper roll upward; fluid pressure responsive means for biasing the upper roll downward; manually operable valve means controlling the application of fluid pressure to said fluid pressure responsive mechanism so that the swinging of the movable roll to and from its operative position is under manual control; valve means controlling the application of fluid pressure to the two fluid pressure responsive means which act upon the upper roll, said last named valve means allowing fluid pressure to be applied to only one at a time of said two fluid pressure responsive means; and actuating means interconnected with the mechanism for swinging the lower roll to and from its operative position and operable to actuate said last named valve means to effect the application of fluid pressure upon said two fluid pressure responsive means so as to apply a downward bias upon the upper roll as the lower roll assumes its operative position and to apply an upward bias upon the upper roll as

the lower roll is swung away from its operative position.

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