Nov. 16, 1943. E. SMITH 2,334,588

LEATHER ROLLING MACHINE

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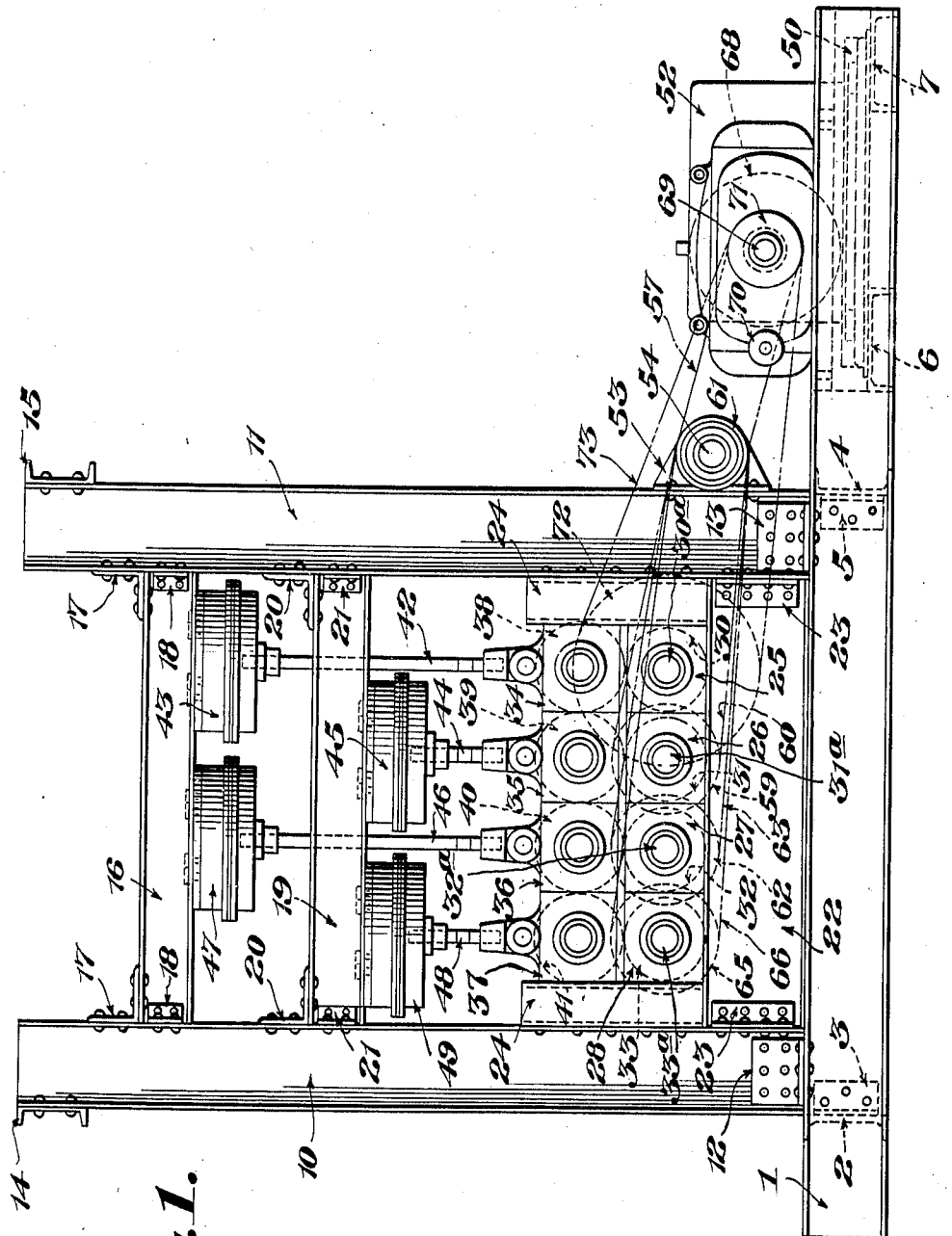


Fig. 1.

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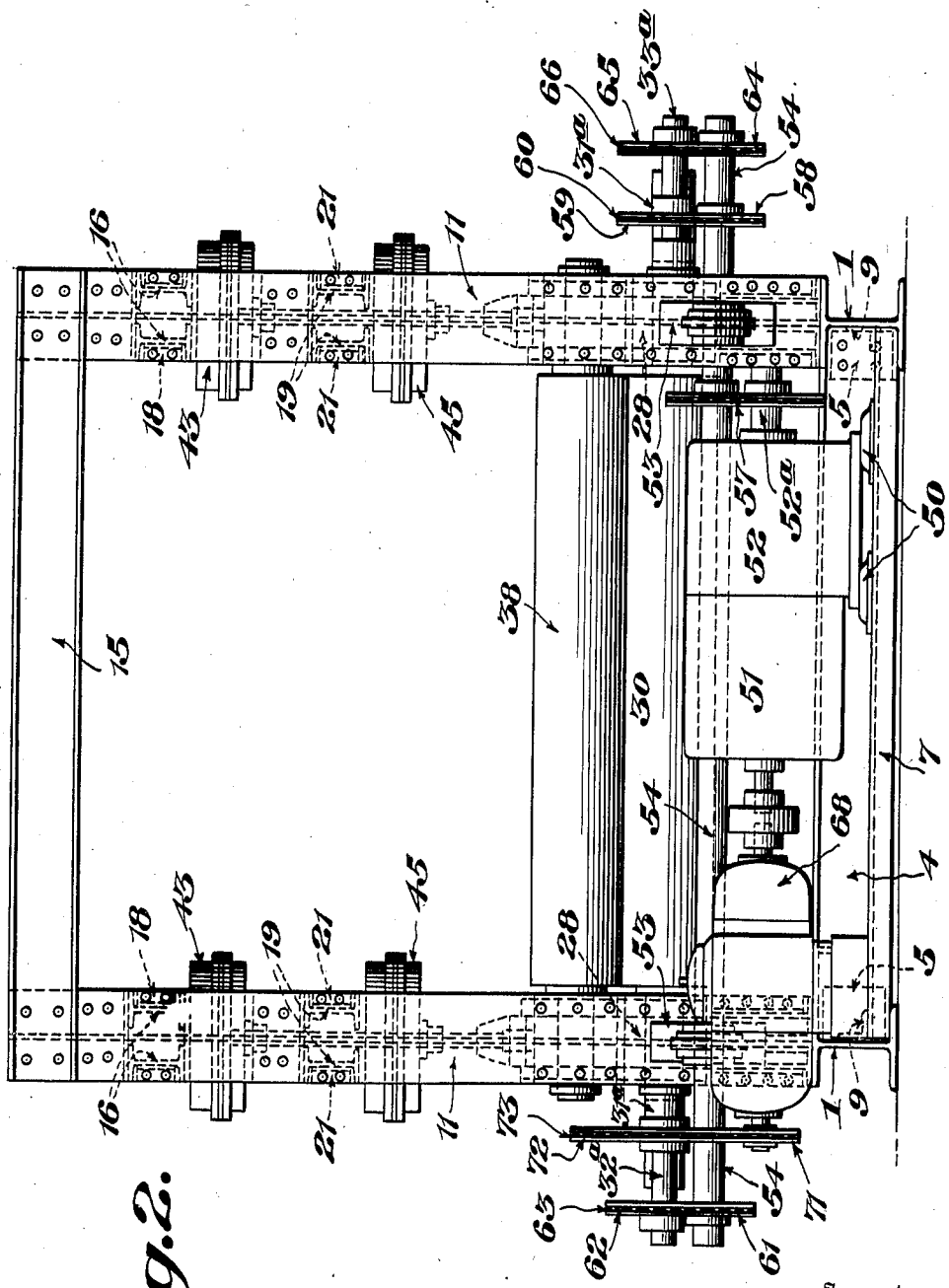


Fig. 2.

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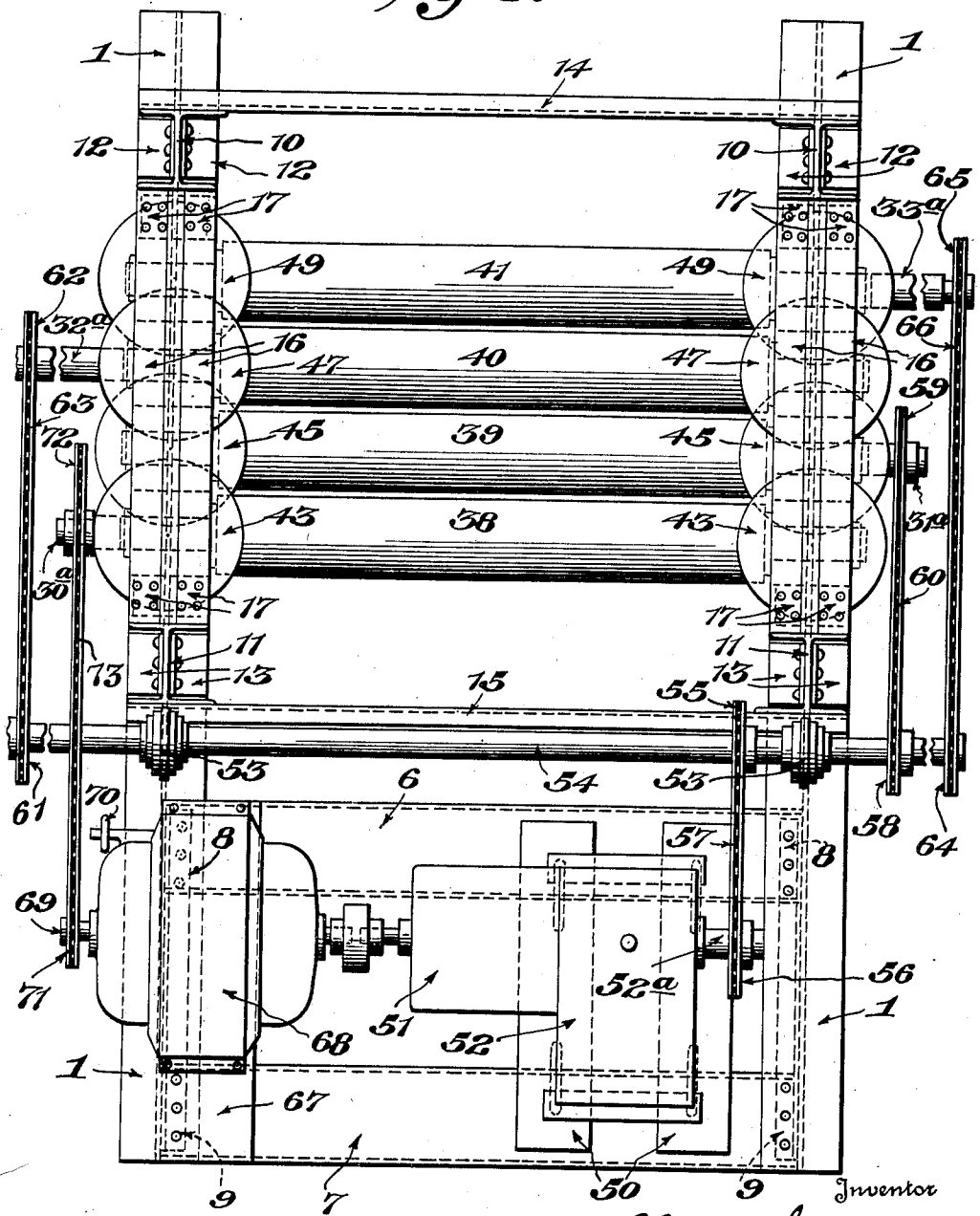
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LEATHER ROLLING MACHINE

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Fig. 3.



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Patented Nov. 16, 1943

2,334,588

UNITED STATES PATENT OFFICE

2,334,588

LEATHER ROLLING MACHINE

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Application January 10, 1942, Serial No. 426,351

14 Claims. (Cl. 69—43)

This invention is a novel machine for rolling leather, and one object is to provide a machine which will pull the wrinkles out of the leather instead of pressing or pushing same out, as done by the old-type hand rolling machines.

The machine produces rolled leather sides by stretching longitudinal advancing increments of the leather by frictional pull while the leather is under relatively light compression to initially remove wrinkles therefrom, and then pressing the advancing increments under relatively heavy compression to flatten out the leather while frictionally maintaining the increments stretched, and simultaneously frictionally polishing the leather while under compression.

Heretofore leather sides have been rolled in tanneries by hand, the worker manipulating the side of leather upon a concave or arcuate vertically movable head, disposed below a roll mounted at the lower end of a long swinging arm, the worker adjusting the pressure of the roll on the leather by means of a foot lever actuating the head, the adjustment being made according to the judgment of the worker. The quality of the work done by the old-type hand machines depended entirely upon the efficiency or judgment of the worker, and also on the length of time spent during operation upon the particular side of leather. Moreover, it required at least six to twelve months' time to train a worker how to use the old-type hand machines proficiently, while, at best, the old-type hand machines had an average output of about 400 rolled sides of leather a day when utilizing two workers.

A further object of my invention is to provide a novel machine designed to pull the wrinkles out of the side of leather, instead of pushing or pressing them out as done by the old-type hand machines, my novel machine consisting of a series of closely adjacent pairs of rolls, the lower rolls of each pair being of steel chromium-plated and polished in order to give a smooth finish to the grain side of the leather, and the lower rolls being approximately ten inches in diameter and six feet long. Cooperating with each of the chromium-plated rolls and contacting the upper peripheries thereof are upper rolls of substantially same diameter and length, but the upper rolls are covered with rubber of appreciable thickness for the purpose of taking care of different thicknesses of the leather.

In order to positively rotate the pairs of rolls, the lower or chromium-plated rolls are individually power-driven, the speeds of rotation of the pairs of rolls progressively increasing between certain pairs so as to give the side of leather being rolled any desired stretch as it passes from the first pair of rolls to the second pair; also from the second pair of rolls to the third, the second pair of rolls being normally driven at a speed slightly higher than the first pair to effect a stretching of the leather, the amount of stretch being controlled by a variable speed unit controlling the speed of rotation of the first pair of rolls. The third pair of rolls is driven slightly faster than the second pair in order to prevent any slack from developing in the leather between the second and third pairs of rolls. The fourth or last pair of rolls of the series is driven at the same speed as the third pair since the stretching and flattening-out process in the leather will have been accomplished before the leather passes from the third to and through the fourth pair of rolls.

In my invention means are further provided whereby the pressures between the pairs of rolls may be adjusted, as desired, the pressure between the first pair of rolls being relatively light so as not to press or roll the side of leather too firmly before the wrinkles are stretched out, while the pressure between the second, third and fourth pairs of rolls respectively are relatively much higher to cause the side of leather to be rolled smoothly and firmly. The pressure between the rolls of each pair is preferably pneumatically controlled by valves and gauges so that the worker can see, at all times, the amount of pressure he is using.

A still further object of my invention is to provide a machine which will effectively roll about 4,000 sides of leather a day, as compared with the old-type hand machines which could roll about only 400 sides of leather a day.

I will explain the invention with reference to the accompanying drawings, which illustrate one practical embodiment thereof to enable others familiar with the art to adopt and use the same; and will summarize in the claims, the novel features of construction, and novel combinations of parts, for which protection is desired.

In said drawings:

Fig. 1 is a side elevation of my novel leather rolling machine.

Fig. 2 is an end elevation thereof.

Fig. 3 is a plan view thereof.

My novel machine preferably comprises a frame consisting of a pair of horizontal spaced I-beams 1—1 adapted to rest upon a suitable foundation, and forming the base of the machine. The I-beams 1 are connected together prefer-

ably by means of a channel iron 2, adjacent one end, secured by angle iron clips 3 riveted to the webs of the members 1 and 2; also connected together by a channel iron 4, intermediate the ends of the I-beams, secured by angle iron clips 5. The I-beams 1 are further connected together, adjacent one end, by spaced channel irons 6 and 7 which are preferably wood-filled, same having their webs disposed horizontally to form a support for the motor and speed reducing mechanism hereinafter described, the channels 6 and 7 being connected to the webs of the I-beams 1 by angle iron clips 8 and 9.

Upon each I-beam 1 adjacent the channels 2 and 4 are uprights preferably comprising I-beams 10 and 11 secured at their lower ends to the I-beams 1 by angle iron clips 12 and 13, the pair of uprights 10 being connected together at their upper ends by a channel iron 14, and the pair of uprights 11 being connected together by channel iron 15. Uprights 10 and 11, at each side of the frame, are connected together adjacent their upper ends by an upper pair of horizontal I-beams 16 secured by angle iron clips 17 and 18, the pair of I-beams 16 at each side of the frame each suspending pairs of pneumatic cylinders, hereinafter described. Below the pair of I-beams 16 at each side of the frame is a second pair of horizontally disposed I-beams 19 secured to the uprights 10 and 11 by angle iron clips 20 and 21, the second pair at each side of the frame likewise each suspending pairs of pneumatic cylinders, hereinafter described. Below the pair of I-beams 19, at each side of the frame, and seating upon the top of the I-beam 1 is a pair of I-beams 22 secured to the uprights 10 and 11 by angle iron clips 23.

Secured to each of the uprights 10 and 11 directly above each of the I-beams 22 is a spaced pair of guide channels 24; and positioned between the pairs of guide channels 24 at the lower ends thereof and resting upon the tops of the I-beams 22 is a series of bearing blocks 25, 26, 27 and 28 of the lower set of fixed rolls 30, 31, 32 and 33, which rolls are preferably of steel, chromium-plated and polished and are of the same diameter (preferably about ten inches), their upper peripheries being disposed in the same horizontal plane, the chromium-plated and polished periphery of the rolls 30—33 imparting to the grain side of the leather a smooth finish. Positioned between the pairs of guide channels 24, above the bearing blocks 25, 26, 27, 28, respectively, are vertically-adjustable bearing blocks 34, 35, 36 and 37 respectively, carrying rolls 38, 39, 40 and 41, respectively, which rolls are preferably of about ten inches in diameter and are covered with rubber about ⅞ inch in thickness, in order to take care of different thicknesses of the sides of leather, the rolls 38, 39, 40 and 41 normally resting directly upon their underlying fixed rolls 30, 31, 32 and 33 respectively.

In order to adjust the pressures between the respective pairs of upper and lower rolls 38—30, 39—31, 40—32, and 41—33 pneumatic means are provided controlling the bearing blocks 34—37 of the upper set of rolls 38—41 inclusive at each side of the frame. As shown, the bearing blocks 34 at each side of the frame are connected at their upper ends with piston rods 42 entering pneumatic cylinders 43 secured to the undersides of the upper pairs of I-beams 16. The bearing blocks 35 are connected to piston rods 44 entering pneumatic cylinders 45 connected to the lower pairs of I-beams 19. The bearing blocks 36 are connected to piston rods 46 entering pneumatic cylinders 47 connected to the upper pairs of I-beams 16, while bearing blocks 37 are connected by piston rods 48 entering pneumatic cylinders 49 connected to the lower pairs of I-beams 19.

Each pneumatic cylinder is connected to a suitable source of compressed air (not shown) provided with gauges and controlled by valves so that the pressures may be visualized, and any desired downward pressures may be exerted upon the blocks 34—37, respectively, independently of the pressures on the remaining blocks, it being understood that the same arrangement of pistons and cylinders is provided for the blocks at each side of the frame, and that the corresponding cylinders 43, 45, 47 and 49 at each side of the frame would be controlled by the same valve means so that the pressures on the block at the opposite ends on the individual cylinders 38, 39, 40 and 41 respectively would be the same. The above construction thus provides a machine having series of pairs of rolls in which the upper rolls of each pair may be individually controlled to exert various pressures on the lower rolls.

Means are also provided whereby the speeds of rotation of the pairs of upper and lower rolls may be varied, the drive being applied only to the lower set of rolls 30—33, inclusive, and the upper rolls being rotated by their lower rolls or by the side of leather when passing thereunder so that the rolls of each pair rotate at substantially the same speed.

As shown, wood or other base plates 50 are secured across the horizontal channel irons 6 and 7 upon which is mounted a combined motor and fixed speed-reducing unit, the motor being indicated by the reference numeral 51, and the fixed speed-reducing unit by reference numeral 52. The particular type of motor and speed-reducing unit however forms no part of my present invention, the motor being preferably of substantially constant speed type, and the speed-reducing unit serving merely to step down the motor speed to that desired.

Mounted in bearings 53 on the adjacent faces of uprights 11 is a horizontal shaft 54 carrying a sprocket 55 opposite a sprocket 56 on the shaft 52*a* of speed-reducing unit 52, and a chain 57 runs around sprockets 55 and 56 to drive shaft 54 at substantially constant speed. Shaft 54 projects beyond the sides of the frame and carries adjacent one end a sprocket 58 opposite a sprocket 59 on the shaft 31*a* of the lower roll 31, and a chain 60 runs around sprockets 58 and 59 whereby the lower roll 31 will be driven directly by shaft 54. Adjacent the opposite end of shaft 54 is a sprocket 61, opposite a sprocket 62 on the shaft 32*a* of the next adjacent lower roll 32, and a chain 63 runs around sprockets 61 and 62, the sprockets being of such size as to rotate roll 32 at a slightly greater speed than roll 31, the increase in speed preventing any slack developing in the side of leather being rolled while passing between the pairs of rolls 39, 31 and 40, 32. At the end of shaft 54 adjacent sprocket 58 is a sprocket 64 opposite a sprocket 65 on the shaft 33*a* of the lower roll 33, and a chain 66 runs over sprockets 64 and 65 and drives roll 33 at the same speed as roll 32 in order to prevent further stretching or flattening of the leather between the pairs of rolls 40, 32 and 41, 33, as the stretching and flattening-out of the leather will have been completed be-

fore the leather enters between the last pair of rolls of the series.

Mounted upon a wooden or base plate 67 secured across the horizontal channels 6 and 7, is a variable speed-reducing unit 68 driven directly by the shaft of motor 51 and having a hand wheel 70 for varying the speed of its driven shaft 69. Shaft 69 carries a sprocket 71 opposite a sprocket 72 on the shaft 30a of the first lower roll 33 of the series, and a chain 73 runs around sprockets 71 and 72 for the purpose of driving the first pair of rolls 38, 30. By adjusting the hand wheel 70 the speed of rotation of the first pair of rolls 38, 30 may be made to correspond with that of the next adjacent pair of rolls 39, 31 of the series, or may be adjusted to a somewhat slower speed in order to control the amount of stretch of the side of leather passing between the first and second pairs of rolls 38, 30 and 39, 31.

In operation

In operation, the side of leather to be rolled is placed opposite the first pair of rolls 38, 30 of the series with its grain side downward. Before entering same between the rolls the pneumatic cylinders 43, 45, 47 and 49 are adjusted respectively to exert the desired pressures between their respective pairs of rolls. Under ordinary conditions the pneumatic cylinder 43 of the first set of rolls 38, 30 may be set for about 25 pounds pressure per square inch, which pressure is purposely relatively light so as not to press the leather too firmly before the wrinkles therein have been straightened out. The pressure cylinders 45, 47 and 49 may be set for a pressure of about 80 pounds per square inch in order to roll the side of leather smoothly and firmly.

The motor 51 is then started, to positively rotate the pairs of rolls. On the first run of the leather through the machine, the hand wheel 70 should be adjusted so that the first pair of rolls 38, 30 rotate at a speed somewhat slower than the next adjacent pair of rolls 39, 31 in order to cause a stretching of the side of leather passing between the first and second pairs of rolls, the amount of stretch controlled by the setting of the hand wheel 70 of the variable speed unit 68. The third pair of rolls 40, 32 constantly rotates a little faster than the second pair of rolls 39, 31 so as to prevent any slack from developing in the side of leather while passing between the second and third pairs of rolls. The fourth pair of rolls 41, 33 rotates at the same speed as the third set 40, 32, this being purposely since the stretching and flattening-out of the side of leather has been already completed.

The side of leather on the first run is permitted to pass through the machine, its grain side contacting the lower set of rolls 30—33 inclusive which are chromium-plated and polished, and its flesh side contacting the upper set of rolls 38—41 inclusive which are rubber covered. When the leather emerges from the last pair of rolls 41, 33, the majority, if not all, of the wrinkles will have been smoothed out and the leather will be stretched and polished. However, if it should be desired to again pass the leather through the machine, the hand wheel 70 should first be adjusted so as to cause the first pair of rolls 38, 39 to rotate at substantially the same speed as the second pair 39, 31, since a further stretching of the side of leather might result in tearing due to over-stretching, the full stretch being imparted thereto during the first run of the leather through the machine.

My novel machine has many obvious advantages over the old style hand rolling machine, in which the rolling pressure is applied by the worker through a foot lever according to his judgment, ability or efficiency. According to the old hand method the quality of the work depended upon the skill of the work and the time spent in rolling the side of leather. In my machine the speed and pressures will remain constant for certain kinds or grades of leather until purposely changed, the speed pressures being controlled to suit the particular type of leather being rolled. When using my machine the quality of the work will always be the same; and the worker may be taught how to use the machine in only a few minutes, as compared to six to twelve months' apprenticeship required for the worker to learn how to use the old-type hand machine. My novel machine will effectively roll approximately 4,000 sides of leather per day, whereas with old hand-type machines only about 400 sides of leather could be rolled per day.

I do not limit my invention to the exact form shown in the drawings, for obviously changes may be made therein within the scope of the claims.

I claim:

1. A leather rolling machine comprising a frame, a series of closely adjacent pairs of rolls journaled therein, the rolls of the pairs contacting in the same horizontal plane; fixed journals carrying the lower rolls of each pair; individual vertically movable bearing blocks carrying the upper rolls of each pair; said upper rolls being freely rotatable in their bearing blocks; means for rotating the intermediate pairs of rolls at successively increased fixed speeds; means for varying the speed of the first pair of rolls; and means for varying the pressures between the rolls of each pair.

2. In a machine as set forth in claim 1, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; and separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series.

3. In a machine as set forth in claim 1, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series; and the drive means rotating the last two pairs at the same speed.

4. In a machine as set forth in claim 1, said varying means comprising a motor; manually controlled variable speed reducing means operated by said motor; and drive means connecting the reducing means and the lower roll of the first pair.

5. In a machine as set forth in claim 1, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series; said speed varying means comprising a manually controlled variabel speed reducer operated by said shaft rotating means; and driving means connecting the reducer and the lower roll of the first pair.

6. In a machine as set forth in claim 1, said rotating means comprising a countershaft journaled on the frame; means for rotating said

shaft; separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series; the drive means rotating the last two pairs at the same speed; said speed varying means comprising a manually controlled variable speed reducer operated by said shaft rotating means; and driving means connecting the reducer and the lower roll of the first pair.

7. In a machine as set forth in claim 1, said pressure varying means comprising pneumatically operated pistons engaging the respective bearing blocks of the upper rolls of the pairs adapted to exert variable downward pressures thereon.

8. A leather rolling machine comprising a frame, a series of closely adjacent pairs of rolls journaled therein, the rolls of the pairs contacting in the same horizontal plane; fixed journals carrying the lower rolls of each pair; individual vertically movable bearing blocks carrying the upper rolls of each pair; said upper rolls being freely rotatable in their bearing blocks; means for rotating the intermediate pairs of rolls at successively increased fixed speeds; means for varying the speed of the first pair of rolls; means for varying the pressures between the rolls of each pair; the lower rolls of the series being polished and adapted to engage the grain side of the side of leather passing through the series; and the upper rolls of the series being rubber covered to allow for variations in the thickness of the leather, and adapted to engage the flesh side of the leather.

9. In a machine as set forth in claim 8, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; and separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series.

10. In a machine as set forth in claim 8, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series; and the drive means rotating the last two pairs at the same speed.

11. In a machine as set forth in claim 8, said varying means comprising a motor; manually controlled variable speed reducing means operated by said motor; and drive means connecting the reducing means and the lower roll of the first pair.

12. In a machine as set forth in claim 8, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series; said speed varying means comprising a manually controlled variable speed reducer operated by said shaft rotating means; and driving means connecting the reducer and the lower roll of the first pair.

13. In a machine as set forth in claim 8, said rotating means comprising a countershaft journaled on the frame; means for rotating said shaft; separate driving means connecting the shaft and the respective lower rolls of the second to the last pair of the series; the drive means rotating the last two pairs at the same speed; said speed varying means comprising a manually controlled variable speed reducer operated by said shaft rotating means; and driving means connecting the reducer and the lower roll of the first pair.

14. In a machine as set forth in claim 8, said pressure varying means comprising pneumatically operated pistons engaging the respective bearing blocks of the upper rolls of the pairs adapted to exert variable downward pressures thereon.

ELMER SMITH.