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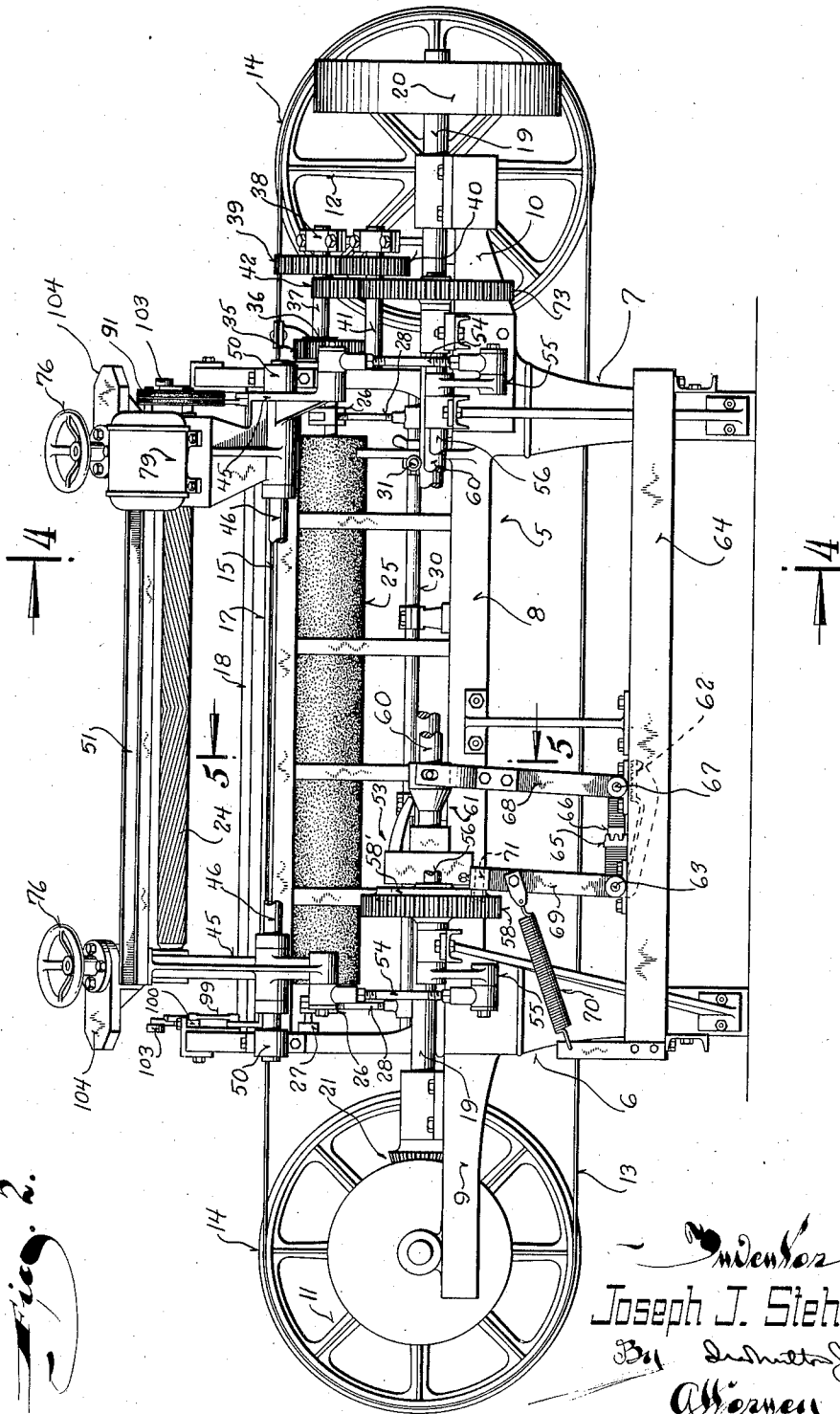
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LEATHER SPLITTING MACHINE

Filed April 5, 1937

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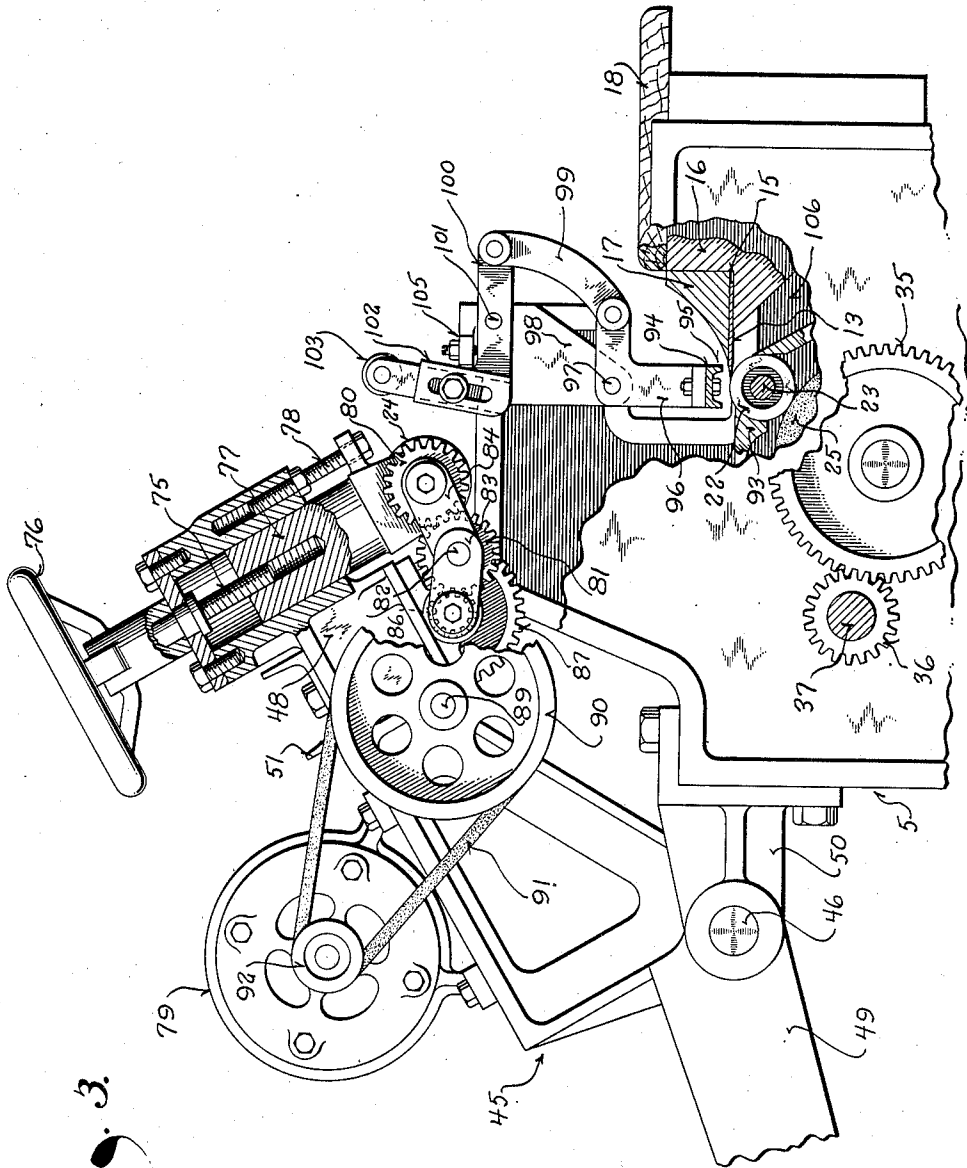
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*Fig. 3.*

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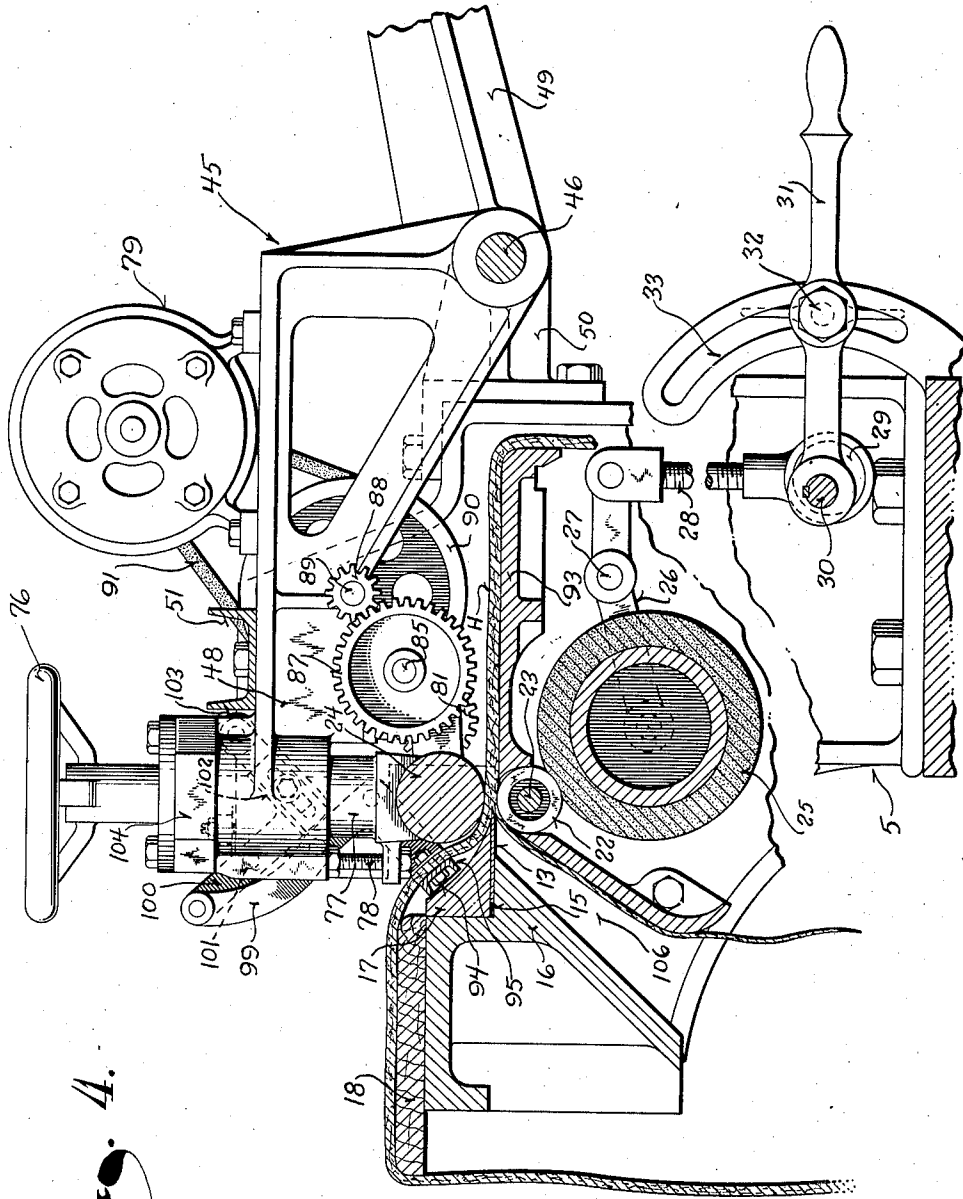
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*Fig. 4.*

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# UNITED STATES PATENT OFFICE

2,154,115

## LEATHER SPLITTING MACHINE

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8 Claims. (Cl. 149—8)

This invention relates to improvements in leather splitting machines and refers particularly to machines for splitting off excess thickness from the necks or other thick parts of hides before tanning.

To insure optimum results in tanning, it is desirable to have the entire hide of uniform thickness, or at least as nearly so as possible, and consequently, parts of the neck and other thick portions of the hide must be split off.

Heretofore, two forms of leather splitting machines have been in use for this purpose. In the earlier type of machine, the hide was pulled across a stationary knife mounted horizontally. The operator stood in front of the machine and threw the hide across the knife and then while the hide was held down on the knife, he pulled it across the knife either manually or by means of a power driven roller onto which the hide was wound.

This machine had many serious objections. The stationary knife made it impossible to obtain a smooth cut, and in view of the fact that the operator had to guide and control the winding of the hide onto the power driven roller which pulled it across the knife, considerable danger attended the operation of the machine. Very often the operator's arm would get caught in the hide as it was wound up on the roll. Moreover, this machine was slow, and after the splitting was done, the hide had to be unwound from the power driven roller.

In the later type of splitting machine devoted to this purpose, the stationary knife was replaced by a moving belt knife, but the speed of operation was not greatly increased even though the hide was pushed against the knife edge by feed rolls. This type of machine required at least two operators as the hides had to be fed into the machine at one side of the knife and removed from the other side, and the control of the cutting action was particularly cumbersome and unsatisfactory.

With these and other objections to past and existing leather splitting machines in mind, it is an object of the present invention to provide a machine which is so constructed that a single operator standing in front of the machine can feed hides into the machine and receive them after they have been passed across the splitting knife, at a production rate far greater than any machine heretofore in use has been capable of.

Another object of this invention is to improve leather splitting machines of the character described by providing novel means for controlling

the amount to be split off, which is so constructed and designed that any desired thickness may be automatically maintained.

More specifically it is an object of this invention to provide a leather splitting machine of the character described wherein an upper feed roll coacting with a ring roll mounted beneath the knife edge, feeds the hides over the knife, and wherein the feed roll is mounted to be capable of quick elevation to permit the insertion of a hide into the machine, and quick return to operative position.

Another object of this invention is to increase the safety of leather splitting machines of the character described by providing a guard which covers the knife edge when the machine is open to receive the hide.

In this connection it is another object of the present invention to provide novel means for automatically moving the guard away from the knife edge to expose the same upon closure of the machine preparatory to feeding the hide across the knife.

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 herein disclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is an end view of a leather splitting machine embodying this invention;

Figure 2 is a back view of the machine;

Figure 3 is an enlarged end view of part of the machine with portions thereof broken away and in section;

Figure 4 is a cross sectional view taken through Figure 2 on the plane of the line 4—4, but illustrating the machine closed and operating on a hide; and

Figure 5 is a detail sectional view taken through Figure 2 on the plane of the line 5—5.

Referring now particularly to the accompanying drawings in which like numerals indicate like parts throughout the several views, the numeral 5 designates the supporting structure of the machine which constitutes two end frames 6 and 7 connected by a transverse casting 8. Extending

outwardly from the end frames 6 and 7 are brackets 9 and 10, respectively, upon which pulleys 11 and 12 are journaled. Encircling the pulleys 11 and 12 is a belt knife 13 with its cutting edge facing the back of the machine and its back edge abutting flanges 14 on the pulleys. Suitable take-up mechanism (not shown) is provided to adjust the tension of the belt.

The upper stretch of the belt knife is its active portion and the hides are caused to move thereover in a manner to be hereinafter described. To hold the upper stretch of the knife in a fixed plane, it is guided as best shown in Figure 4 in a guideway 15 which extends longitudinally across the front of the machine. This guideway may be formed by a stepped surface of a casting 16 and a guide bar 17 secured thereto. The top of the casting 16 mounts a wooden table or platform 18.

The belt knife is driven from a main drive shaft 19 which extends longitudinally across the entire width of the machine and has a pulley 20 mounted on one end to provide means for driving the main shaft from a countershaft or other suitable source of power. The opposite end of the main drive shaft 19 has a bevel gear connection 21 with the pulley 11. The belt knife is thus constantly driven so that its upper stretch has a continuous longitudinal motion.

Directly beneath the edge of the knife's upper stretch is a ring roll 22 which is composed of a plurality of rings in side-by-side relationship loosely mounted on a shaft 23. This ring roll forms the lower support for the hide H at its point of contact with the knife edge and coacts with an upper feed roll 24 to determine the thickness to which the hide is to be split.

The upper feed roll 24 is a solid cylinder adjustably mounted in a manner to be hereinafter described, but the ring roll by virtue of its special formation yields to unevenness in the thickness of the hide. To hold the ring roll in such a manner as to permit relative motion of its rings as required by unevenness in the thickness of the hide, a rubber roll 25 presses against the bottom of the ring roll.

The rubber roll is adjustably mounted for movement toward and from the knife edge by arms 26 medially pivoted as at 27 to the end frames 6 and 7. The opposite ends of the levers 26 are connected by links 28 to eccentrics 29 mounted on a shaft 30 journaled in fixed bearings so that by rotation of the shaft 30, an up and down motion can be imparted to the rubber roll. To impart rotation to the shaft 30, a lever 31 is keyed thereto and to secure the shaft in any adjusted position, a locking bolt 32 carried by the lever 31 is provided which travels in an arcuate groove 33 formed in a part rigidly mounted on the supporting structure.

The rubber roll 25 is driven in a clockwise direction (as viewed in Figure 4) to drive the ring roll in the opposite direction for feeding the hides toward the knife. The drive for the rubber roll comprises a gear 35 fixed to the shaft of the rubber roll and meshing with a pinion 36 mounted on a short shaft 37 which is journaled in bearings carried by the end frame 7 and an auxiliary end frame 38 mounted on the arm 10. The axis of the shaft 37 coincides with the pivotal axis 27 of the levers 26 which support the rubber roll so that adjustment of the rubber roll does not affect the driving relationship between the gear 35 and pinion 36.

The shaft 37 also mounts a gear 39 which

meshes with a gear 40 fixed to another short shaft 41 journaled in bearings carried by the end frame 7 and the auxiliary frame 38, and fixed to the shaft 41 is a large diameter gear 42 which meshes with a pinion 43 mounted on the main drive shaft 19. The train of gears just described thus provides a gear reduction from the main drive shaft 19 to the rubber roll to drive the same at proper speed for feeding the hides across the knife.

As noted hereinbefore, the ring roll 22 coacts with the upper feed roll 24 to feed the hides across the knife and also to determine the thickness to which the hides are to be split. This upper feed roll 24 is carried by a hinged frame, indicated generally by the numeral 45, and adapted to swing on a pivot 46 from a closed position shown in Figure 4, at which the roll 24 is in proper feeding relation to the ring roll, to an open position shown in Figures 1 and 3, with the roll 24 spaced from the ring roll to permit the insertion of a hide therebetween.

The frame 45 which carries the roll 24 comprises two similar castings each of which has a forwardly extending portion 48 and a rearwardly projecting lever 49. Intermediate their ends, these castings are mounted on the pivot shaft 46 which is carried by brackets 50 fixed to the end frames 6 and 7. A cross beam 51 fixed to the forwardly directed portions 48 of the castings coacts with the shaft 46 to maintain the castings in proper spaced relationship.

Opening and closing movement of the pivoted frame 45 between definite limits is effected by power driven means, indicated generally by the numeral 53. This mechanism is mounted at the rear of the machine and comprises two pitmans 54, each attached at one end to the outer end of one of the levers 49 and connected at their other ends to crank arms 55 fixed to a shaft 56. The throw of the crank arms 55 is such that when their crank pins are at the top of their circular path, the upper feed roll 24 is in its operative closed position. Motion is imparted to the crank arms by a clutch controlled drive which consists of a gear 58 fixed to the shaft 56 and meshing with a pinion 59 loosely mounted on a shaft 60, but drivably connectible therewith through a clutch 61.

The clutch 61 is manually controlled from a treadle 62 located at the front of the machine. This treadle is fixed to a shaft 63 journaled in bearings carried by cross beams 64 which form part of the supporting structure of the machine, and extends to the rear of the machine where it mounts a gear segment 65. The segment 65 meshes with another segment 66 which is fixed to a stub shaft 67 and on which the shifter arm 68 controlling the clutch is mounted. The shaft 63 also has a lever 69 fixed thereto, the free end of which lies opposite the gear 58.

A spring 70 yieldingly urges the lever 69 toward the gear 58 to engage a stop lug 71 carried thereby with the face of a flange 58' carried by the gear. At two diametrically opposite points, the inner face of the flange 58' has notches 72 to receive the lug 71. These notches are so located with respect to the crank arms that when the lug 71 is engaged in either notch, the pivoted frame 45 is at one or the other of its two limits of movement.

Upon depression of the treadle 62, the lever 69 and the shifter arm 68 are swung toward each other to simultaneously withdraw the stop lug 71

from the notch in which it is engaged and engage the clutch and effect actuation of the frame 45.

After the stop lug has been disengaged from the notch 72, the operator releases the treadle so that thereafter the stop lug rides on the face of the flange 58' and thus holds the clutch engaged until the shaft 56 has made a one-half revolution whereupon the lug 71 snaps into the other notch 72. Concomitantly with the engagement of the stop lug in this notch, the clutch is disengaged and the pivoted frame 45 is locked in the position to which it has been moved.

The shaft 60 derives its power from the main drive shaft 19 through a gear 73 meshing with the pinion 43.

The feed roll 24 is adjustable vertically by means of screws 75 mounted at the front ends of the casting portions 48 and rotatable by hand wheels 76. The screws 75 are held against the longitudinal motion and are threaded in posts 77 slidably mounted in the forward ends of the frame portions 48. The lower ends of these posts carry bearings in which the shaft of the roll 24 is journaled and a locking screw 78 is provided for each post to secure the same in adjusted position.

The surface of the roll 24 is spirally fluted, as shown in Figure 2, to provide a more positive drive for the hides and to also spread or flatten the hide or "put it out", as it is termed in the industry.

The roll 24 is driven continuously from a motor 79 mounted on one of the hinged frame castings and drivingly connected with the roll through a train of gears and a belt drive. The train of gears comprises a gear 80 fixed to one end of the shaft of the roll 24 and meshing with a gear 81 journaled on a pin 82 which pivotally connects and is supported by two links 83 and 84.

The link 84 has its opposite end supported from the shaft of the roll 24 and the link 83 is mounted on a stub shaft 85 journaled in the adjacent frame portion 48. Fixed to the outer end of the stub shaft 85 is a pinion 86 which is in constant mesh with the gear 81, and mounted on the inner end of the shaft 85 is a gear 87 which meshes with a pinion 88 fixed to the inner end of a shaft 89 which is also journaled in a bearing carried by the adjacent frame portion 48.

The outer end of the shaft 89 has a pulley 90 secured thereto over which a belt 91 is trained to transmit driving force from the motor driven pulley 92. In this manner a gear reduction driving connection is established between the motor and the roll 24 in a manner permitting vertical adjustment of the roll without affecting its drive.

Obviously, the direction of rotation of the roll 24 is in a clockwise direction, as viewed in Figure 4, and its peripheral speed is substantially the same as that of the ring roll 22 or slightly faster.

In operation, if the roll 24 is down in its operative position, the operator first causes the frame 45 to swing on its pivotal mounting to raise the roll and open the machine by stepping on and releasing the treadle 62. He then inserts a hide across the knife and between the ring roll 22 and the top roll 24 with the neck or other thick portions thereof innermost so that the entire hide does not have to pass across the knife. To support the inner thick parts of the hide, a table 93 is mounted between the end frames 6 and 7, as clearly shown in Figure 4.

With the hide in position, the operator again depresses and releases the treadle 62 to cause

the pivoted frame 45 to swing and lower the top roll 24 onto the hide whereupon the hide immediately begins to move forwardly against and across the knife, the relative positions of the top roll 24 and the ring roll 22 having been previously adjusted to maintain a predetermined thickness for the hide.

To protect the operator against being cut on the knife during the insertion of the hide, a guard 94 is provided. This guard consists of a bar 95 sufficiently long to extend from one end frame to the other and of a width to adequately cover the exposed edge portion of the knife. The ends of this bar are supported by bell crank levers 96 pivoted as at 97 from supporting brackets 98 fixed to the end frames.

In the operative position of the guard, the bell crank levers 96 hang by gravity in positions holding the bar 95 over the edge of the knife, as shown in Figure 3, and when the pivoted frame 45 swings down into operative position, the bell crank levers are automatically actuated to swing the bar 95 forwardly and away from the knife edge to a position illustrated in Figure 4.

For automatically swinging the guard to this position exposing the knife edge, the bell crank levers 96 are connected through link 99 with the outer ends of levers 100 which are medially pivoted as at 101 to the brackets 98. The inner ends of the levers 100 have upwardly directed arms 102 from which rollers 103 are adjustably mounted. These rollers lie in the paths of extensions 104 projecting outwardly from the casting portions 48. The adjustment of the rollers 103 is such that as the frame 45 swings to its closed position, the rollers 103 are depressed a distance sufficient to swing the bell crank levers, and consequently the guide bar 95 to its knife exposing position illustrated in Figure 4.

Upon opening of the machine by swinging the pivoted frame upwardly, gravity returns the guard to its operative position at which the bar 95 covers the knife, this position being defined by an adjustable stop 105 which abuts the inner end of one of the levers 100.

As will be observed from Figure 4, during the operation of the machine, the hide proper is expelled forwardly across the table or platform 18 while the portions which have been split off from the undersurface of the hide are ejected downwardly through an inclined channel 106.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art, that this invention provides a substantial improvement in leather splitting machines, and that it greatly increases production and insures the safety of the operators.

It is also apparent that adjustment of the ring roll 22 and the top drive roll 24 with respect to the knife edge is quickly and easily effected to provide for any desired hide thickness, and it is further apparent that while the machine is intended primarily for splitting off the excess thickness from certain portions of the hide prior to tanning, it is also readily adaptable to the splitting of leather and other similar sheet material or flat stock for other purposes.

What I claim as my invention is:

1. In a splitting machine of the character described: a knife; means for feeding flat stock against the cutting edge of the knife, said means including a part movable from an operative position adjacent to the knife to an inoperative position enabling the insertion of flat stock across

the knife and into the machine; a guard positionable over the cutting edge of the knife when said part is moved to its inoperative position; and means actuated by the return of said part to its operative position for moving the guard away from the cutting edge of the knife.

2. In a leather splitting machine: a belt knife; a ring roll mounted beneath the cutting edge of the knife; a top feed roll cooperable with the ring roll for feeding leather against the cutting edge of the knife; means mounting said top feed roll for movement from an operative position in juxtaposition to the knife to an inoperative position permitting the insertion of leather between the rolls; a knife guard automatically positionable over the cutting edge of the knife upon movement of the top roll out of its operative position and automatically movable away from the cutting edge of the knife upon return of the top feed roll to its operative position.

3. In a leather splitting machine of the character described: a belt knife; a ring roll mounted beneath the cutting edge of the knife; a top feed roll cooperable with the ring roll for feeding leather against the cutting edge of the knife; a pivoted frame mounting the top feed roll for movement from an operative position adjacent to the knife to an inoperative position spaced a substantial distance from the knife; a knife guard to cover the cutting edge of the knife when the top feed roll is moved out of its operative position; a pivoted support for the knife guard; and an actuator operable by the swinging movement of the pivoted frame for swinging the knife guard away from the cutting edge of the knife upon return of the top roll to its operative position.

4. In a splitting machine: a knife; cooperating rolls for feeding flat stock against the cutting edge of the knife, said rolls being separable to permit the disposition of flat stock therebetween; a knife guard to cover the cutting edge of the knife when said rolls are separated; and means for moving the knife guard away from the cutting edge of the knife to expose the same upon return of the rolls into cooperable relationship.

5. In a splitting machine of the character described: a knife; cooperating rolls for feeding flat stock against the cutting edge of the knife, said rolls being in close juxtaposition to the knife when in operative relationship and being separable to permit the insertion of flat stock across the knife and between the rolls; and a guard automatically movable into a position covering the cutting edge of the knife upon separation of the rolls and automatically movable away from the cutting edge of the knife upon return of the rolls into operative relationship.

6. In a flat stock splitting machine: a horizontal belt knife arranged with its cutting edge toward the rear of the machine and away from the front of the machine at which the operator

stands; a ring roll mounted below the edge of the knife; an upper feed roll above the ring roll to coact therewith in feeding flat stock forwardly against the cutting edge of the knife; a frame carrying said top feed roll; a hinge support for the frame located at the rear of the machine so that swinging movement of the frame raises and lowers the top feed roll and provides unobstructed access to the space between the top feed roll and ring roll to permit an operator standing in front of the machine to throw flat stock across the knife to be fed forwardly against the cutting edge of the knife; power driven means controlled from in front of the machine for swinging the frame about its hinged mounting; bearings in which the top feed roll is journaled movably mounted in the pivoted frame; and means for rapidly adjusting the position of said bearings in the frame to positively carry the top feed roll toward or from the ring roll regardless of the position of the frame.

7. In a flat stock splitting machine: a horizontal belt knife arranged with its cutting edge toward the rear of the machine and away from the front of the machine at which the operator stands; a ring roll mounted below the edge of the knife; an upper feed roll above the ring roll to coact therewith in feeding flat stock forwardly against the cutting edge of the knife; a frame carrying said top feed roll; a hinge support for the frame located at the rear of the machine so that swinging movement of the frame raises and lowers the top feed roll and provides unobstructed access to the space between the top feed roll and ring roll to permit an operator standing in front of the machine to throw flat stock across the knife to be fed forwardly against the cutting edge of the knife; power driven means controlled from in front of the machine for swinging the frame about its hinged mounting; bearings in which the top feed roll is journaled movably mounted in the pivoted frame; means for rapidly adjusting the position of said bearings in the frame to positively carry the top feed roll toward or from the ring roll regardless of the position of the frame; a drive motor carried by the pivoted frame; and a drive transmission carried by the pivoted frame for connecting the top feed roll with the motor to maintain a driving connection between the motor and top feed roll unaffected by adjustment of the top feed roll bearings.

8. In a splitting machine: a knife; cooperating rolls for feeding flat stock against the cutting edge of the knife, said rolls being separable to permit the disposition of flat stock therebetween; a knife guard to cover the cutting edge of the knife when said rolls are separated; and means for moving the knife guard away from the cutting edge of the knife to expose the same before the rolls return to cooperable relationship.

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