Nov. 8, 1960 R. F. PENDERGAST 2,958,989

SPREADING AND FEEDING ASSEMBLY

Filed Jan. 2, 1959 4 Sheets-Sheet 1

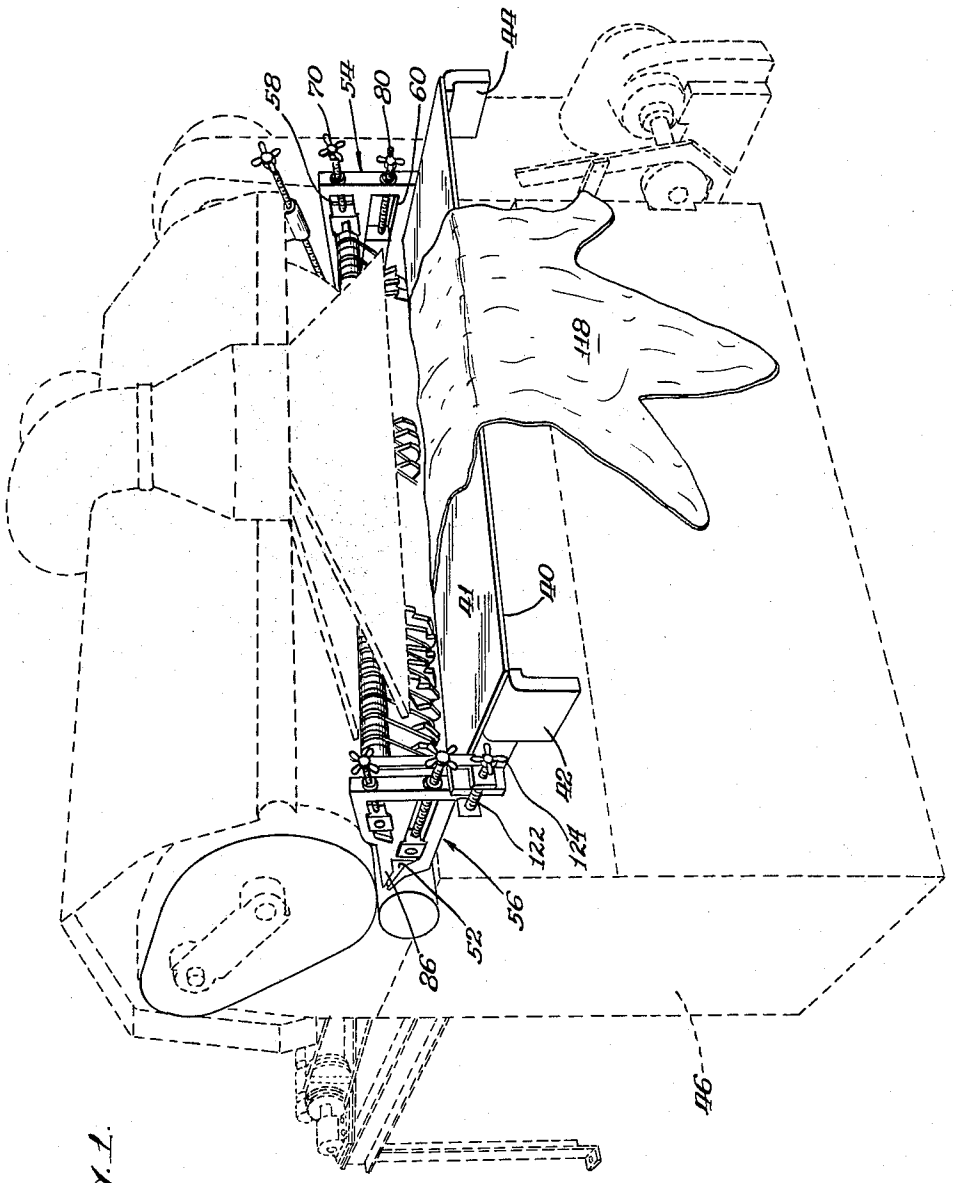


Fig. 1.

Inventor:
Raymond F. Pendergast
By: Wayne S. Stone

Nov. 8, 1960 R. F. PENDERGAST 2,958,989

SPREADING AND FEEDING ASSEMBLY

Filed Jan. 2, 1959 4 Sheets-Sheet 2

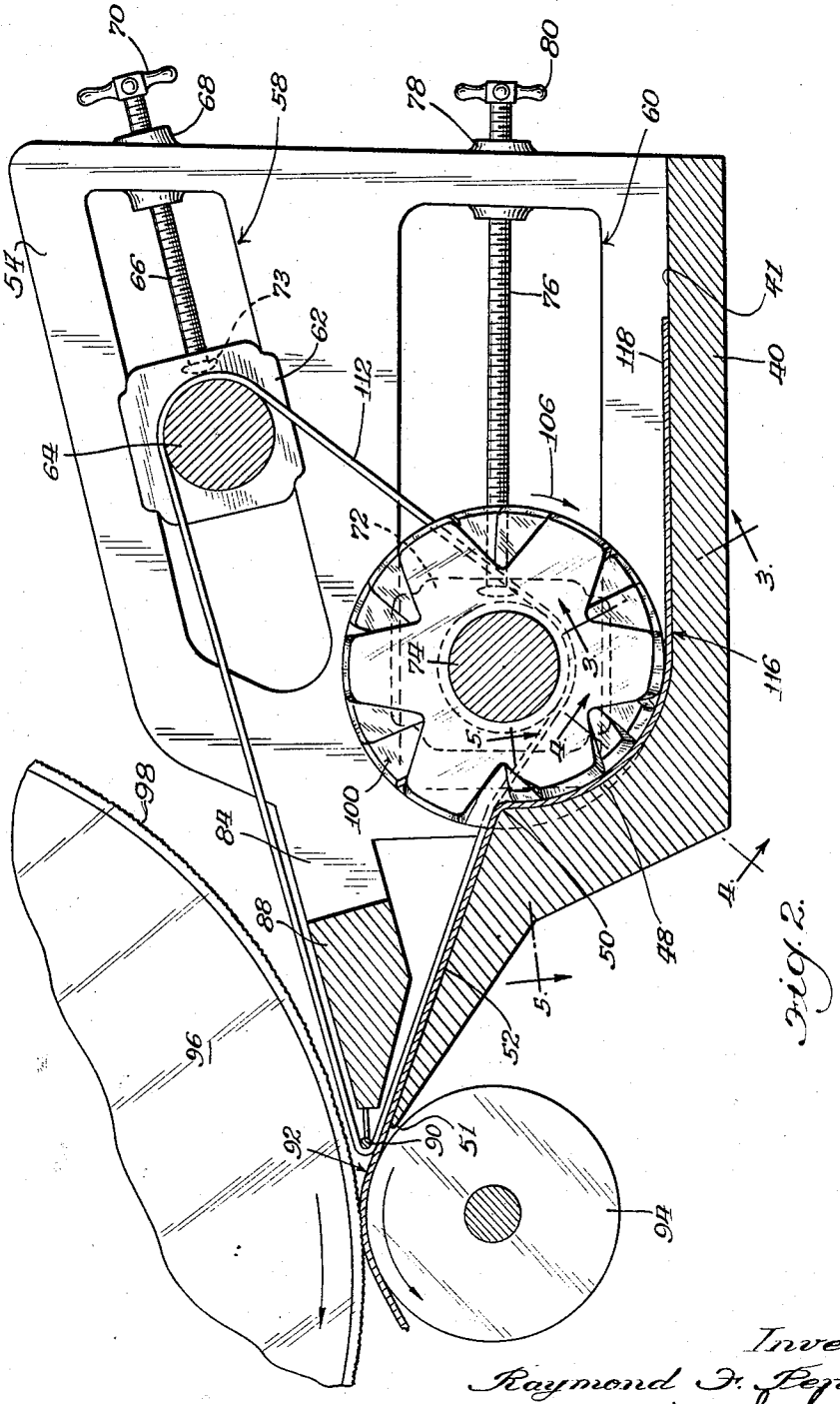


Fig. 2.

Inventor:
Raymond F. Pendergast
By Wayne S. Stone
Atty.

Nov. 8, 1960 R. F. PENDERGAST 2,958,989

SPREADING AND FEEDING ASSEMBLY

Filed Jan. 2, 1959 4 Sheets-Sheet 3

Fig. 3.

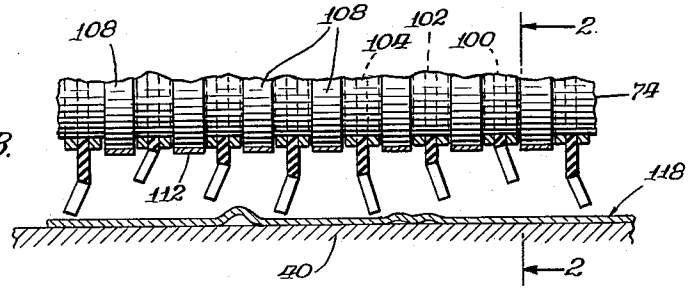


Fig. 4.

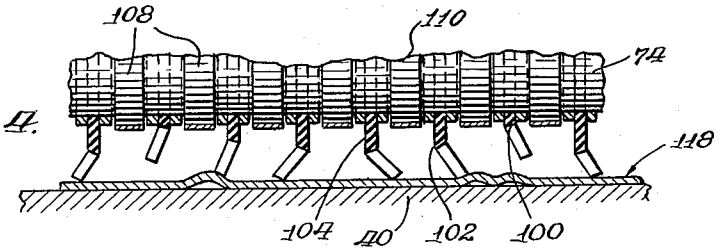
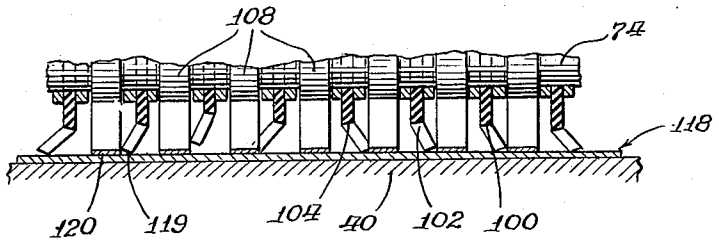


Fig. 5.



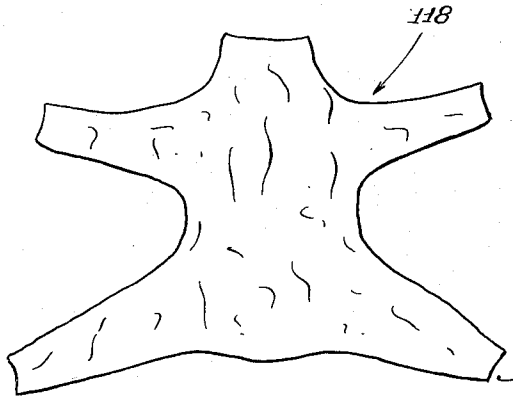


Fig. 6.

Inventor:
Raymond F. Pendergast
By: Wingard L. Stone
Atty.

Nov. 8, 1960 R. F. PENDERGAST 2,958,989

SPREADING AND FEEDING ASSEMBLY

Filed Jan. 2, 1959 4 Sheets-Sheet 4

Fig. 7.

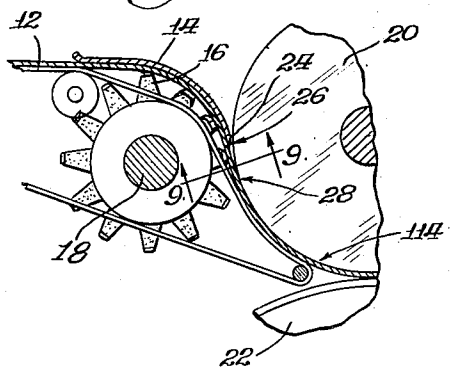


Fig. 8.

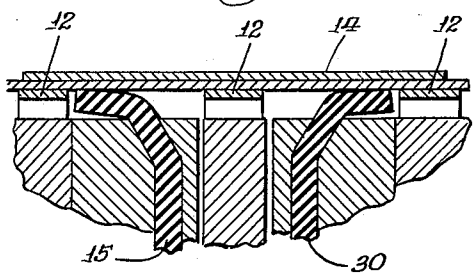


Fig. 9.

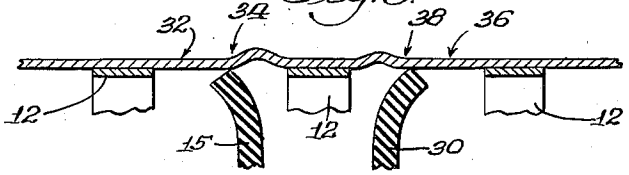
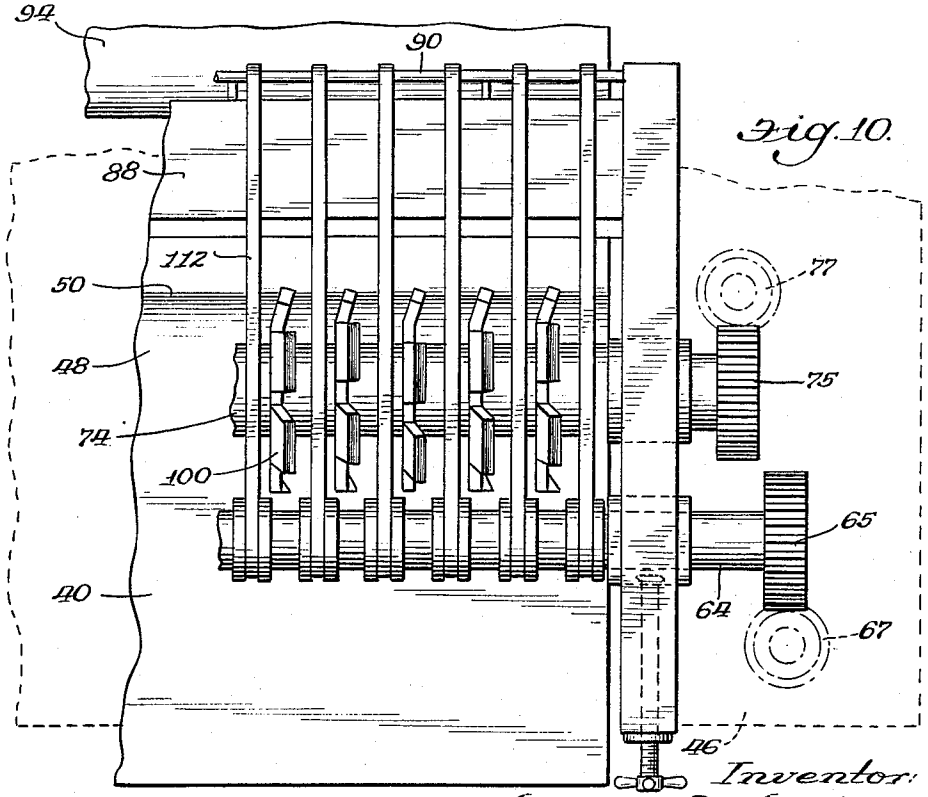


Fig. 10.



Inventor:
Raymond F. Pendergast
By: Wyer S. Stone
Atty.

United States Patent Office 2,958,989 Patented Nov. 8, 1960

2,958,989

SPREADING AND FEEDING ASSEMBLY

Raymond Francis Pendergast, 330 Oak Grove Ave., Minneapolis, Minn.

Filed Jan. 2, 1959, Ser. No. 784,762
16 Claims. (Cl. 51—139)

This invention relates to a spreading and feeding assembly for introducing flexible sheet material into equipment which will perform additional work thereon. This invention discloses an improvement over that shown in applicant's United States Patent No. 2,860,454, dated November 18, 1958, entitled "Leather Sander."

More specifically, this invention relates to a machine which will spread laterally a piece of work such as a hide, and feed it in spread condition to equipment which will perform some operation on that work. The invention is shown in connection with sanding equipment. This was true of the disclosure in the aforesaid patent. However, since the leather spreader was placed on the market, the feed equipment alone has been discovered to be useful in feeding various other types of equipment, as for example, wringers, spreaders and shavers. There are also devices for measuring the area of a skin and for eliminating hard spots, the latter being called tempering machines, both of which function better when the flexible material is fed into them in a transversely taut, i.e., stretched, condition.

The parent invention discloses a plate having a concave surface engaged by canted fingers mounted on a shaft. The curved portion of the plate is above the canted fingers. The axis of the shaft and the curvature of the plate are so related that on the delivery side of the plate the fingers are pressed against the plate, whereas on the lead side they merely engage it. In this movement, the fingers are bent outwardly, being initially canted either to the right or to the left, with the result that they spread the flexible material. The general structure of the aforesaid patent is illustrated in Figure 7 of this application, which is a portion of Figure 5 of the aforesaid patent.

Referring to Figure 7 herein, the secondary object of the present invention is to improve the feeding of the flexible material into the spreader. By referring to Figure 7, the skin is laid on the parallel belts **12** which carry it under the plate **14** where it is picked up by the fingers **16**. Because of gravity, the skin, being between the belts and the fingers, sags a bit. The man feeding the skin has no firm surface upon which to work. A feature of the present invention is the inversion of the entire equipment by placing the plate **14**, again referring to Figure 7, beneath the spreading finger shaft **18** and the positioning of the feed roll **20** beneath the sanding roll **22**.

The primary object of this invention is to grip the skin at the moment that the fingers have spread it as tightly as they can and carry the spread flexible material to whatever is to work upon it. In explanation of this object, referring again to Figure 7, the fingers **16** exert their maximum spreading effect at the lower end **24** of the plate **14**. In between the point **26** and the point **28**, the fingers commence to straighten out, with the result, referring now to Figures 8 and 9, of this application, that the fingers **15** and **30** move respectively from the points **32** to **34** and from the points **36** to **38**. In so doing, they are moving the stretched skin back to its unstretched position. There is nothing to stop this until the belts **12**, referring to Figure 7, engage the stretched material at **28** and press it against the feed roll **20**.

The principal feature of this invention is the provision of a holding surface commencing at the edge **24** of Figure 7, and not shown in this figure, which holding surface is engaged by the belts so that at the moment of maximum spreading, the belts grip the flexible work material and

hold it irrespective of further activity by the fingers. As will appear, the holding surface intersects the spreading surface at a comparatively sharp angle so that the flexible material is redirected into this plane. This edge of intersection is called the transfer edge. The fingers move across this edge and snap it straight.

Another object of the invention is associated with the spreading and feeding assembly as distinct from the particular type of machine with which it is used. As suggested above, in the case of sanding equipment, the feed roll for use with this spreader is beneath the sanding roll or the sanding belt. This object of the invention seeks to provide a ready means for varying the degree of deflection of the fingers at the transfer edge. It is desirable that the fingers slip as little over the surface of the flexible feed material as is consistent with properly spreading it, and since the material varies, it is desirable to be able to adjust with little difficulty the extent of the spreading effect provided by the fingers.

A feature of this invention is the mounting of the spreading finger shaft on pillow blocks which can be slid in guideways so as to come closer to the concave portion of the spreading plate adjacent the transfer edge.

Another object of the invention is to provide means for positively driving the belt. In the aforesaid patent, the belts were driven by the feed roll of the sanding machine, engaging them as shown in Figure 7. These belts should be synchronized with the surface speed of the feed roll in order to obtain the best results.

These and such other objects as may hereinafter appear are attained by the embodiment of the invention disclosed in the accompanying drawings, wherein:

Figure 1 is a perspective view of the feed side of the spreading and feeding assembly, mounted on a sanding machine which with the exception of the belt and feed roll is shown generally in dotted outline;

Figure 2 is a section taken on the line **2—2** of Figure 1, which line is to the left of the center of the spreader shown in Figure 1 by three finger star wheels, that is, on the line **2—2** of Figure 3;

Figure 3 is a view taken on the line **3—3** of Figure 2;

Figure 4 is a view taken on the line **4—4** of Figure 2;

Figure 5 is a view taken on the line **5—5** of Figure 2;

Figure 6 is a plan view of a skin showing typical wrinkles;

Figure 7 is a portion of Figure 5 of the aforesaid patent;

Figure 8 is a reproduction of Figure 9 of said aforesaid patent;

Figure 9 is a view taken on the line **9—9** of Figure 7 for the purpose of showing how the fingers can release and tend to re-crease the skin when it is moving through the short distance indicated by the arrows **26** and **28** of Figure 7; and,

Figure 10 is a plan view of the right end of the spreader with the hide omitted as presented in Figure 1 with drive means for connecting to a sanding machine.

Continuing to refer to the drawings, the numeral **40** identifies a spreading plate which constitutes the base of the assembly. It is mounted by any suitable brackets such as **42** and **44** on the feed side of whatever type of apparatus the sheet material is to be fed into. In this case, it is shown on the feed side of a sanding machine **46**, shown in dotted outline. The spreading plate **40**, referring to Figure 2, is a heavy casting having a concave cylindrical upwardly directed wall **48**, called the spreading surface, which terminates at the edge **50** where the spreading surface is intercepted by a holding surface **52**, which lies in a flat plane. Returning to Figure 1, mounted by any suitable means at opposite ends of the spreading plate are end members **54** and **56**. Each end member carries two guideways such as **58** and **60** on member **54**. Mounted in the guideway **58**, referring to

Figure 2, is a slide 62 carrying a pillow block for holding a belt tension shaft 64. The shaft 64, therefore, is held between the frame members 54 and 56, and its position is adjustable in the guideways by means of bolts such as 66 having threads engaging an internally threaded block 68 mounted on the frame 54. The slide 62 may be moved to the left or the right by turning the handle 70. The end 73 of the bolt 66 is seated in a socket in the slide 62.

Similarly, the guideways such as 60, continuing to refer to Figure 2, receive for reciprocating movement a slide 72 which carries a pillow block which supports the spreading finger shaft 74. Reciprocal movement of the shaft toward or away from the spreading surface 48 is effected by a bolt 76 threaded through a block 78 on the frame 54. It may be turned by the handle 80. The slide 60 is parallel to the surface of the spreading plate 40. This in itself is not important, but it is important that the transfer edge 50 and the axis of the shaft 74 be in a line substantially parallel to the longitudinal axes of the guideways such as 60. The shaft 74, therefore, can be moved toward or away from the spreading surface.

Extending forwardly of each of the frames 54 and 56 are arms 84 and 86. The ends of these arms are joined to each other by a heavy bar 88, see Figures 2 and 10. Mounted on the forward end of this bar and supported at intervals is a small shaft 90. As shown, this shaft is not rotatable. It has a very smooth surface and with certain belts, particularly nylon belts, it is useful because its small diameter enables the operator to insert the delivery side of the spreading assembly deep into the bight 92 between the feed roll 94 and the sanding surface 96 (belt or roll). Where the work requires the use of a belt which does not slide easily over the surface of 90 but requires a rotatable shaft, such a shaft is mounted at the position of 90 although closer to the cross bar 88 to accommodate its greater diameter.

Returning now to the spreading finger shaft 74, Figure 2, there is keyed to the shaft a plurality of spaced star wheels composed of flexible material such as rubber. As shown, each star has six points and the ends of the points are flattened, see Figure 2, so as to provide a long surface for engaging the work. Viewed from the side, as in Figure 2, the stars are staggered with respect to each other. Referring to Figure 3, the lower halves of the stars 100, 102 and 104 and the belts 112 are shown in cross section with the shaft and pulleys in elevation. These star wheels are keyed to the shaft and turn in a clockwise direction as indicated by the arrow 106 in Figure 2.

Returning to Figure 3, between adjacent star wheels on the spreading finger shaft 74 are pulleys such as 108 and 110. These pulleys are freely rotatable on the shaft 74. Entrained over each pulley such as 108 over the shaft 64, referring to Figure 2, and over the small shaft 90, is a belt 112. The structure may be generally perceived in Figures 1 and 10, and is seen to consist of a plurality of spaced belts between which operate the star wheels which engage the spreading surface 48.

Unlike the spreader in applicant's copending application, where the belts are driven at the same speed as the feed roll, referring to Figure 7 of this application, because they engage the feed roll in the arc between the arrow 26 and the arrow 114, in the construction here, the belts do not engage the feed roll 94, referring to Figure 2, at any point of their flight. Consequently, the belts must be driven. In the present application, referring to Figure 10, the drive is from the tension shaft 64 which by a gearing 65 is driven from a worm 67 of the principal machine 46 at a speed such that its linear speed and that of the entrained belts is identical to the surface speed of the feed roll 94.

The shaft 74, carrying the finger spreading star wheels, is driven (by a gear 75 and worm 77 from the principal machine) at a speed such that at the point of first contact with the work, i.e., at 116, see Figure 2, the work will be moving at the same speed as the belt. As the work 118 approaches the transfer edge 50, with the shaft 74 in the position shown, it will tend to move a little more slowly, but the belt picks it up and resumes speed. There may be some circumferential spreading between the fingers and the work on the spreading surface, depending upon the extent of the shortening of the radius between the point 116 and the transfer edge 50. The coupling for driving either shaft from whatever type of machine the spreader is mounted upon is conventional. It is not necessary that the work not slip on the feed roll. Actually, the relationship of the various components causes the work to adjust itself as it goes through the equipment that is operating on the work.

Operation

The workman lays a hide on the flat surface 41 in Figure 1 as shown. Initially, the hide is picked up by the fingers of the star wheels and since this engagement is not too positive, the workman can control the hide until it passes over the transfer edge 50. At this edge 50, the work is held by the belts at a tension such that the workman can no longer hold the hide. He does, however, have four or five inches in the initial feed which gives him some control in doing his part of the feeding.

The hide is automatically carried to the bight and the product inspected. If one is putting through a sheepskin, the spreading required may be quite different from what is required for a pig's hide. The adjustability of the pressure of the fingers against the spreading surface is of great importance and this is the advantage of mounting the spreading finger shaft on slides such as 22 which can be easily and delicately adjusted with respect to the spreading surface. Upon inspection, if the surface indicates that it needs more or less sanding, the operator may increase the pressure exerted by the pressure roll, or increase the speed of the sanding belt or sanding roll, or increase the speed of the feed roll. By increasing the speed of the feed roll, he will automatically increase the speed of the element, i.e., shaft 64, that is driving the belts 112 because of the direct mechanical connection between this element and the feed roll of the machine.

The rapidity with which a skin is fed through the spreading mechanism is substantially immaterial. For certain hides, the linear speed of the hide may be as much as 20 feet a second, which means that the hide when gripped at the transfer edge 50 disappears from the spreading plate 41 faster than the eye can follow it. For other operations, i.e., detecting hard spots in a hide, the machine and spreading assembly will be operated much more slowly. The speed at which the sanding surface of the drum 98 engages the work is not material to the spreader. This speed may be several times that of the feed roll 94.

The pressing of the star finger shaft, referring to Figure 2, toward the spreading surface 48 is limited by the necessity of keeping the fingers out of alignment with the belts. Referring to Figure 5, the spreading edge 119 must not be farther to the left than that shown when it reaches the transfer edge 50 of Figure 2. If it does, it will catch momentarily under the belt 120, which will wear both the belt and the fingers and to some extent impair the spreading effect.

As suggested heretofore, the feeding assembly may be inserted into the bite of whatever it is feeding to any selected depth. This is effected by two shafts, one at each side of the feeding assembly, such as 122, see Figure 1. By adjusting the finger wheel 124, the entire assembly may be moved forwardly or rearwardly, the particular attachment to the machine being immaterial.

In the claims, the surface 52 is referred to as the "holding surface," and it is intended that the belts 112 engage this surface throughout its entire extent from the delivery-transfer edge 50 to the feed edge 51. The numeral 50

identifies the transfer edge, and in some claims is referred to as the "delivery-transfer edge" and it defines the line between the holding surface **52** and the spreading surface **48**. The external arc here is in excess of 180°. As a practical matter, it is best to have it close to 240°. The spreading surface is the arcuate surface of the plate **40**. As shown, it is approximately a 90° segment of a cylinder and like the holding surface is smooth. The surface **41** is the layout surface upon which the operator can lay out the skin. The plate **40** is shown as a single casting which is one way of making it, but the holding surface and spreading surface and layout surface may be referred to as a "holding surface on the plate" in the claims. It may be that these surfaces will be formed out of plates shaped in dies in preference to using a casting.

Having thus described my invention, applicant claims:

1. A spreading and feeding assembly comprising a frame, a shaft mounted horizontally on the frame, a plate having a smooth spreading surface mounted on and below the shaft and having a straight delivery-transfer edge parallel to the shaft and a receiving edge, and means mounted on the shaft intermediate the delivery and receiving edges and engageable with the smooth surface of the plate for moving toward the delivery edge and for spreading toward opposite ends of the plate a piece of flexible sheet material passed between the shaft and the plate, whereby the sheet material may be rested on the plate before engagement by the spreading means on the shaft.

2. The spreading and feeding assembly of claim 1 wherein the smooth spreading surface is concave.

3. The spreading and feeding assembly of claim 1 wherein the spreading surface is a concave segment of a cylinder.

4. In combination with the spreading and feeding assembly of claim 1, a machine for performing operations on the surface of flexible material wherein a feed roll is mounted adjacent the delivery side of the spreading and feeding assembly and the mechanism for performing operations on the flexible sheet material is mounted above the feed roll.

5. The combination of claim 4 wherein the machine is a sanding machine having an intake bight between a lower feed roll and an upwardly disposed cylindrical sanding surface.

6. In combination with the spreading and feeding assembly of claim 4, a machine having a driven feed roll and means for driving the piece of flexible sheet material through the spreading and feeding assembly at the same speed as the feed roll.

7. A spreading and feeding assembly comprising a frame, a shaft mounted on the frame, a plate having a smooth spreading surface facing the shaft and mounted on the frame, said plate having a straight delivery edge parallel to the shaft called the transfer edge, a plate having a smooth holding surface mounted on the frame and extending from said transfer edge at an external angle exceeding 180°, means on the shaft engageable with the spreading surface for spreading toward opposite ends of the plate at the transfer edge a piece of flexible sheet material passed between the shaft and the plate, and means engageable with the holding surface commencing at the transfer edge for holding the spread, flexible sheet material and advancing it across the holding surface.

8. The spreading and feeding assembly of claim 7 wherein the holding and advancing means engageable with the holding surface comprises belts engaging said surface at the transfer edge and moving away from the edge of said surface.

9. The spreading and feeding assembly of claim 7 wherein the smooth spreading surface is arcuate.

10. The spreading and feeding assembly of claim 7 wherein the smooth spreading surface is a segment of a cylinder.

11. The spreading and feeding assembly of claim 7 wherein the means for spreading the flexible material are spaced star wheels having flexible fingers spaced one from another, and wherein the means for holding the flexible material against the holding surface comprises an idler shaft mounted on the frame parallel to the first shaft, a delivery edge on the plate having the holding surface parallel to the transfer edge, a shaft of comparatively small diameter mounted on the frame and spaced from said delivery edge and a plurality of belts entrained over the idler shaft and the last-mentioned shaft so as to engage the holding surface commencing at the transfer edge and extending near the delivery edge.

12. The spreading and feeding assembly of claim 11 wherein the idler shaft is mounted forwardly of the main shaft and the belts are entrained additionally over the main shaft, each between adjacent star wheels.

13. A spreading and feeding assembly comprising a frame, a shaft mounted on the frame, flexible fingers having a common radius mounted on the shaft, a plate having a segment of a smooth, concave, cylindrical surface produced by a radius approximately equal to the radius of the fingers facing the fingers and the shaft, and means for altering the radial spacing between the shaft and a line parallel to the axis of the cylinder while maintaining the radial spacing between said shaft and said surface of the plate at a point approximately 90° of arc therefrom.

14. A spreading and feeding assembly comprising a frame having two oppositely disposed end members, a guideway mounted in each end member, said guideways being in transverse alignment, a slide in each guideway, means associated with each slide for positioning them in their associated guideways, a shaft having its opposite ends mounted in said slides, flexible fingers having a common radius mounted on the shaft, and a plate mounted on the frame and having a smooth, concave, approximately 90° cylindrical surface facing the shaft and fingers, said plate having a delivery-transfer edge lying in a line parallel to the longitudinal axes of the guideways and a receiving line approximately 90° away from the delivery-transfer edge and at a distance from the shaft approximating the radius of the fingers, whereby movement of the slides toward the delivery-transfer edge will press the fingers more tightly against the plate as they approach the delivery-transfer edge.

15. A spreading and feeding assembly comprising a frame having two oppositely disposed end members, a guideway mounted in each end member, said guideways being in transverse alignment, a slide in each guideway, means associated with each slide for positioning them in their associated guideways, a shaft having its opposite ends mounted in said slides, flexible fingers having a common radius mounted on the shaft, a plate mounted on the frame and having a smooth, concave, approximately 90° cylindrical surface facing the shaft and fingers, said plate having a delivery-transfer edge lying in a line parallel to the longitudinal axes of the guideways and a receiving line approximately 90° away from the delivery-transfer edge and at a distance from the shaft approximating the radius of the fingers, a second guideway and reciprocatable slide disposed therein mounted on each end member, a tension shaft mounted between these two slides, a fixed shaft mounted between the end members and that side of the main shaft on which lies the delivery-transfer edge of the plate and spaced outwardly from said edge, and a plurality of belts entrained over the fixed shaft, the tension shaft and the main shaft, each belt passing between adjacent sets of fingers.

16. The spreading and feeding assembly of claim 15 wherein a plate having a smooth holding surface is disposed between the delivery-transfer edge of the first plate and a point adjacent the fixed shaft and engageable by said belts.

References Cited in the file of this patent

UNITED STATES PATENTS

2,860,454 Pendergast ---------- Nov. 18, 1958