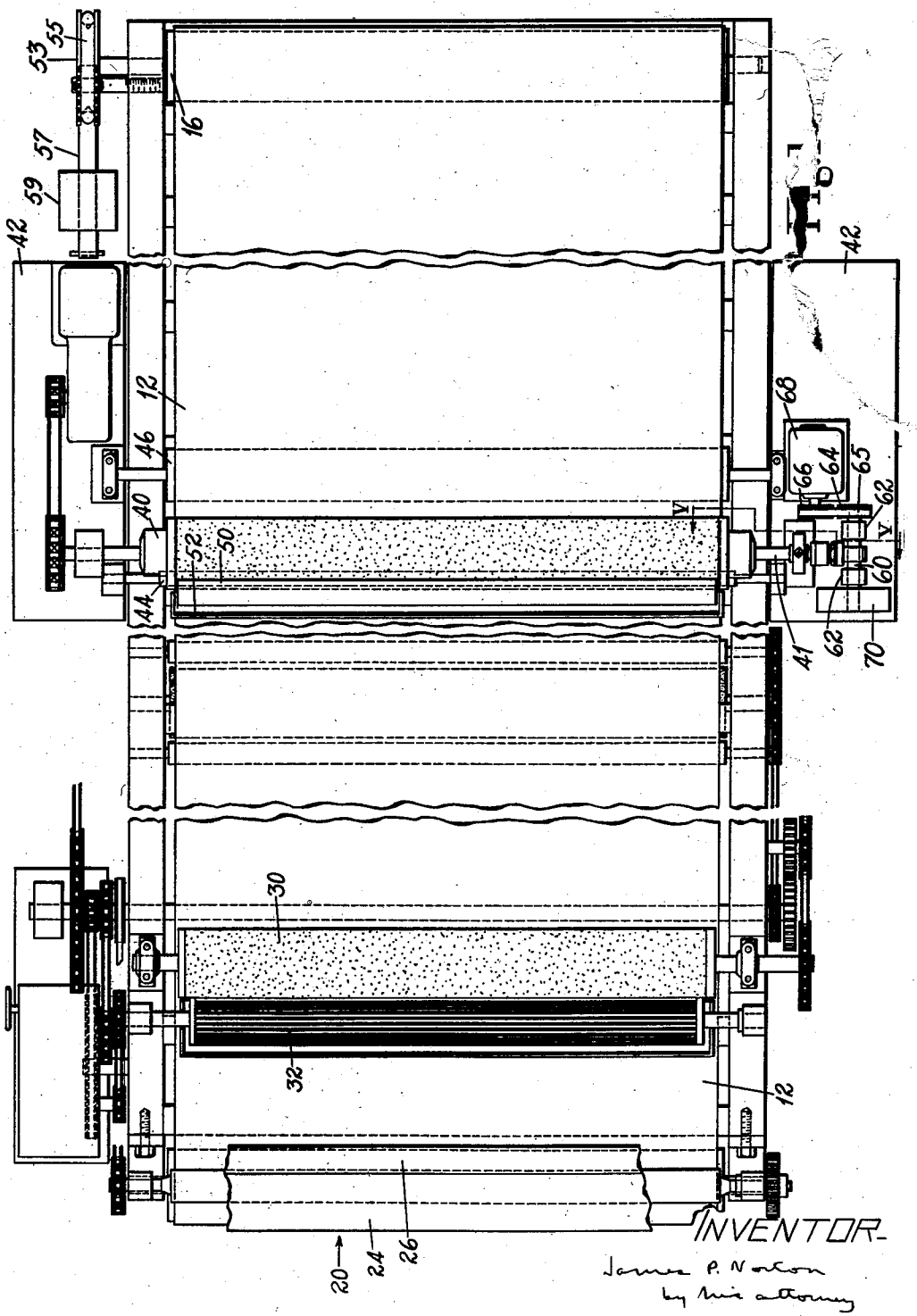
Sept. 5, 1944. J. P. NORTON 2,357,349

COATING MACHINE

Filed May 8, 1942 3 Sheets-Sheet 1



INVENTOR.

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by his attorney

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COATING MACHINE

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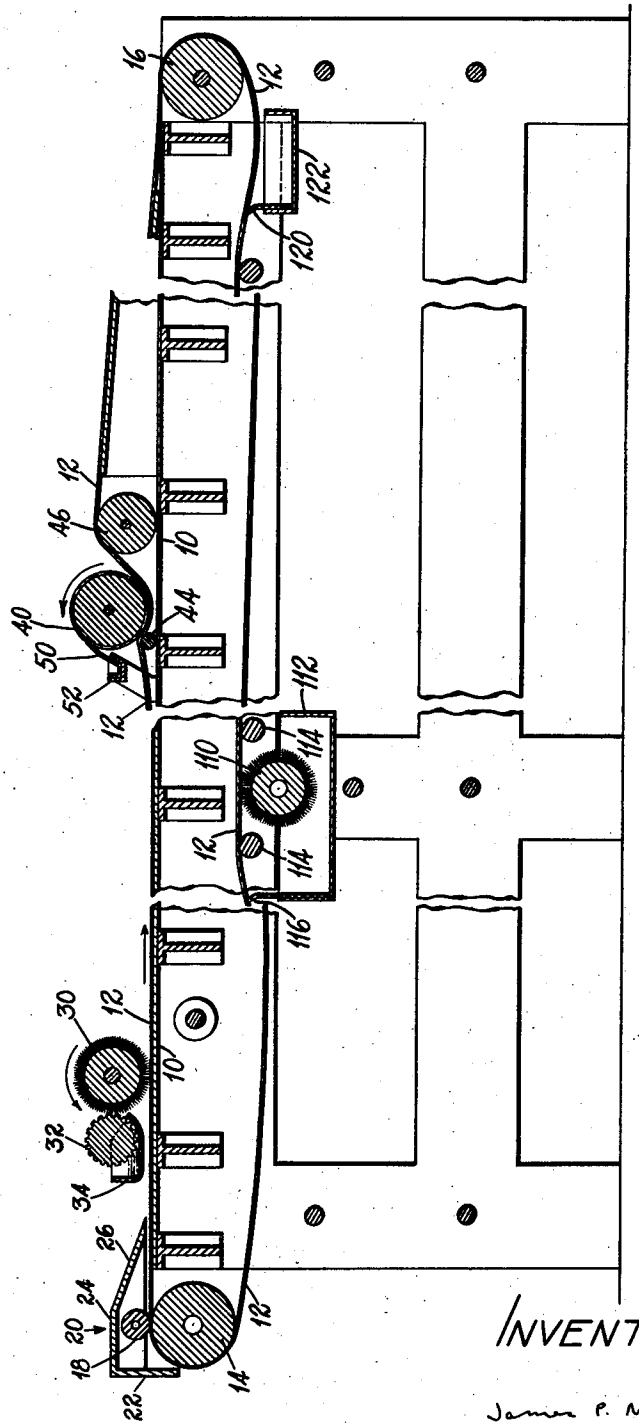


Fig. 2

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Fig: 3

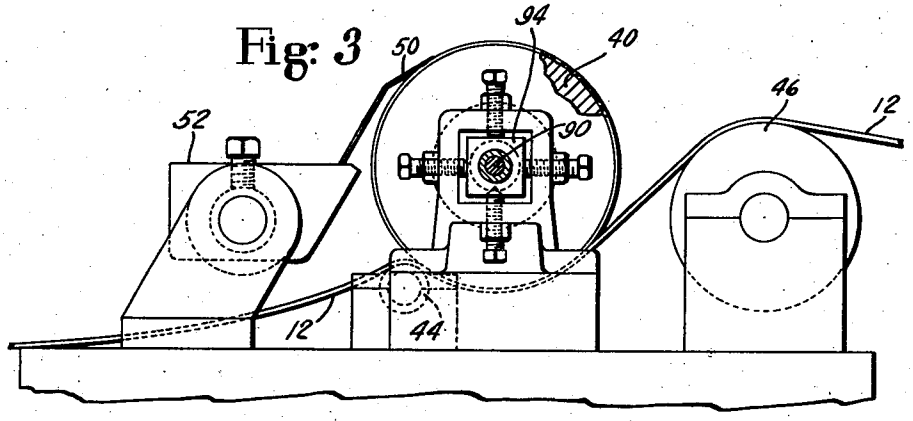


Fig: 4

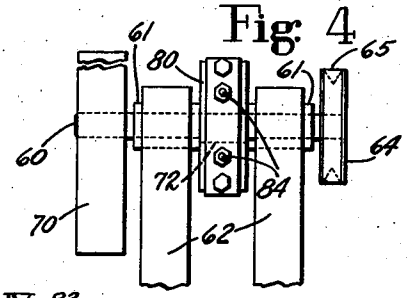
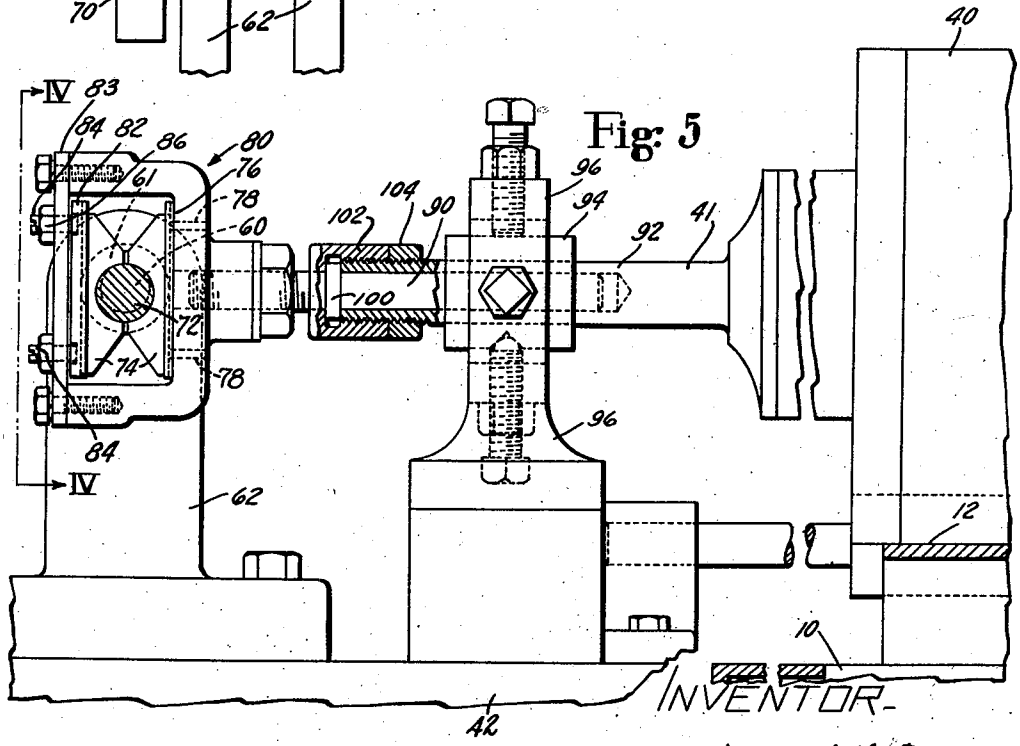


Fig: 5



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Patented Sept. 5, 1944 2,357,349

UNITED STATES PATENT OFFICE

2,357,349

COATING MACHINE

James P. Norton, Beverly, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application May 8, 1942, Serial No. 442,217

7 Claims. (Cl. 91—18)

This invention relates to machines for applying liquid coating material to the surfaces of flexible sheet materials such as hides and skins. While the invention is illustrated as embodied in a machine for applying seasoning material to the grain surfaces of tanned skins, it is to be understood that the invention and various important features thereof may have other applications and uses.

As heretofore constructed seasoning machines have invariably required the attendance of at least one manual worker at the side of the machine to even out the liquid material on the surface of the skin undergoing treatment, to apply material to portions of the skin entirely missed by the applicator brush of the machine, and otherwise make uniform the appearance of the surface of the skin following the application of the liquid material by the applicator brush. In treating good sized calf skins, kips, and side leather, it is common to employ two hand swabbers, one on each side of the traveling work supporting table or belt. Although numerous attempts have been made to provide a machine which will turn out satisfactory work pieces without manual treatment thereof, no such machine is now to be found in the tanneries of this country, so far as I am aware.

It is an object of this invention to provide an efficient machine, of simple construction, for the application of liquid material to the surfaces of flexible materials such as hides and skins without the necessity of employing a hand swabber to supplement the machine operation in securing uniform appearance of the surface of the treated work piece.

To this end, and in accordance with an important feature of the invention, there is provided, in association with applicator means including a brush roll for applying to the moving surface of a work piece substantially uniform amounts of a liquid material progressively with the movement of the work piece, special means suitably spaced with respect to the applicator brush for uniformly smoothing out and otherwise perfecting the finished appearance of the treated surface while it is still in condition for such finishing operation.

In the illustrated construction, the described finishing means includes a rotary member having a napped or piled surface, such as that provided by a plush fabric, arranged to cooperate with the work supporting surface of the traveling work support in such manner as to operate with a relatively prolonged wiping stroke of the multitudinous nap or pile elements with relation to the surface of the work piece thereby to effect uniform spreading of the coating material previously applied to the surface of such work piece.

According to a preferred embodiment of the invention, the traveling work support is in the form of an endless belt so guided and controlled as to wrap successive portions of a work piece around a substantial portion of the cylindrical surface of a finishing roll, whereby the plush-like napped or piled surface of such roll operates upon a substantial surface area of the work piece at any given instant and with a relatively prolonged wiping action on such surface of the work piece and in a manner to minimize effectively any tendency to a stippling effect which would be likely to occur if the nap or pile elements of the finishing roll were allowed to merely contact the work and then spring forwardly as they leave the surface of the work piece in the direction of rotation of such roll. As shown, the wrap of the conveyor belt about the said cylindrical surface extends through an arc of at least 90°.

While the finishing roll has been described above as having a plush-like, napped or piled surface, it is to be understood that a brush roll may be employed having bristles of a suitable length and quality, particularly with respect to the necessary flexibility. It is evident that both the brush and the napped or piled surface function through a multitude of more or less uniformly spaced smoothing-out and evening elements in their action with respect to the liquid coating material on the surface of the hide or skin.

It is an important feature of the construction and arrangement of the finishing roll that it is vibrated endwise at a very high rate of speed during its rotation, thereby tending to minimize streaking of the surface by individual fibers and thus contributing to the excellent results secured through the operation of the other features of the finishing device.

These and other important features of the invention and novel combinations of parts will now be described in detail in the specification and then pointed out more particularly in the appended claims.

In the drawings,

Fig. 1 is a plan view of seasoning machine illustrating one embodiment of the invention;

Fig. 2 is a longitudinal sectional view along a plane extending vertically through the machine shown in Fig. 1;

Fig. 3 is an end view, partly in section, of the finishing roll and of parts associated therewith;

Fig. 4 is a detail of the mechanism for vibrating the finishing roll in an endwise direction as viewed from the line IV—IV of Fig. 5; and

Fig. 5 is a further detail of the vibrating means taken along the line V—V of Fig. 1, looking in the direction of the arrows, certain parts being in section.

In the illustrated embodiment of the invention, which is specially designed for the application of seasoning material to hides and skins, there is provided a framework including a table 10 (Fig. 2) over which passes an endless traveling belt 12, the latter being supported at each end of the table by rolls 14 and 16. Preferably and as shown, the belt 12 is driven by power applied to the shaft of the roll 14. To insure that the belt 12 is positively driven at a uniform rate of speed by the roll 14 there is provided a driven pinch roll 18 in firm contact with the upper surface of the belt 12, the axis of the roll 18 being directly above the axis of the roll 14.

As a safety feature, the roll 18 is covered by a box-like structure 20 having a vertical wall 22 which extends downwardly far enough to render it extremely unlikely that anyone will attempt to introduce a skin onto the belt 12 where it would have to pass between the rolls 14 and 18. Furthermore, the wall 22 will prevent anyone from inadvertently getting either hand into the bite between the rolls 14 and 18. The structure 20 also includes an upwardly facing wall 24 which covers the roll 18, a slanting wall 26 being provided to direct a work piece such as a skin into contact with the upper surface of the belt 12. Conveniently, the wall 26 serves as a feeding-in table upon which a work piece may be spread out prior to and while it is being moved into contact with the belt 12 which carries the work pieces one at a time into position for the application of seasoning liquid.

Located adjacent to the entering or front end of the machine is an applicator roll 30 in the form of a brush roll having a part of its lower peripheral portions in contact with the endless belt 12 so that, as a work piece comes along, the brush roll will have a substantial part of its periphery at any given instant in contact with the work piece. Conveniently this roll is driven at about 200 R. P. M. For applying coating material to the brush roll 30, there is provided a fluted roll 32 arranged to contact the brush roll 30, the roll 32 being mounted in a pan 34 to take liquid material therefrom and to distribute it upon the brush roll 30. For driving the fluted roll 32, there is conveniently provided a Reeves speed control device capable of adjustment to drive the said roll at various speeds. For example, while the first coat is being applied the roll 32 is driven at about 25 R. P. M., while applying the second and third coats at about 20 R. P. M., while applying the fourth coat at about 10 R. P. M., and while applying the fifth coat at about 5 R. P. M. This means that the fluted roll 32 transfers to the brush roll 30 a larger quantity of the first coat than of any of the others, for application to the work pieces, this being necessary because of the fact that the first coat is more of a covering coat at a time when much of it will sink into the surface of the work piece. other coats being of different ingredients, and particularly with less pigment, and requiring a smaller amount to effect the desired result. It will be readily understood that a certain batch of skins will be run through the machine to receive the first coat which must be allowed to dry for a time before the second coat is applied. Preliminary to the application of the second coat, the speed of the fluted roll 32 is adjusted downwardly to about 20 R. P. M. and at the same time the liquid in the pan 34 is changed. Not infrequently the same coating material is used for the second and third coats and at about the same speed (20 R. P. M.) of the fluted roll. Usually, after the third coat, the skins are plated in a smooth plating press having a hot plate or platen. Subsequently the batch of plated skins are put through for the fourth coat with the fluted roll turning at 10 R. P. M., the fifth coat being different from the fourth and applied in smaller amount. After the fifth coat has dried thoroughly, the skins are again smooth plated at a suitable pressure and temperature.

Spaced from the applicator roll 30 is a finishing means comprising a finishing roll 40 which is preferably about eight inches in diameter and covered with a plush fabric having a nap of about one-eighth of an inch in length to present a working surface of smooth and uniform curvature. It is to be understood, however, that a suitable bristle brush surface may be employed in place of the napped fabric surface. This roll is rotated through power applied to its shaft 41 so that its work contacting surface is traveling in the same direction as the work supporting belt 12 but at about twice the speed of that of the belt, that is, about 75 to 80 feet per minute. It is an important feature of the invention that the finishing roll 40 is so located relatively to the work supporting belt 12 that the latter wraps the work piece over a considerable area of such finishing roll, the wrap of the work piece corresponding to an arc of about 90° as a minimum on the cylindrical surface of the roll 40. This insures that the finishing roll will bring a sufficient portion of its surface to bear at every given instant on the surface of the work piece to distribute the material applied by the applicator roll 30, the finishing roll also having the function of making uniform the appearance of the work piece through thorough distribution of the material in intimate contact with the treated surface of the hide or skin. Another purpose of having a substantial wrap of the work piece about the surface of the finishing roll 40 is to provide in this manner for a relatively long wiping action of the nap or pile elements of the surface of the work piece and for their gradual withdrawal from such surface to avoid the well-known tendency of both nap and brush elements to flip or spring suddenly away from the treated surface just as the end of the nap or bristle is leaving such surface, due to a certain resiliency in both nap and bristle elements. On the other hand, the smaller the angle between the napped or bristled surface of the finishing roll and the work piece, at the right of the roll 40 in Fig. 2, the more a wiping action is provided and the less the tendency for the bristle or nap elements to spring from the surface of the work piece in such manner as to spatter any of the liquid material upon the smoothed out surface of the work piece.

In order to provide for wrapping of the work piece about the finishing roll 40 there is mounted in auxiliary frame members 42, which also provide bearings for the finishing roll 40, a relatively small roll 44 beneath the upper run of the work supporting belt 12 to press the belt against the surface of the finishing roll at one side of the plane passing vertically through the axis of the roll 40, there being provided another much larger roll 46 also beneath the work supporting belt 12 to cause a substantially longer wrap of the work piece about the finishing roll 40 at the right of said plane, that is, about a substantial portion of the rear side of the said roll 40, the roll 46 being so spaced with respect to the finishing roll 40

and being of such a height as to carry the work supporting belt 12 upwardly in a direction such that is leaves the finishing roll 40 in a way that the nap or bristle elements of the finishing roll are given a rather long wiping action with respect to the surface of the work piece, and any tendency of the nap or bristle elements to flip or spring suddenly away from the surface of the work piece is eliminated or, at least, minimized.

Since coating material is apt to collect on the surface of the finishing roll 40 there is conveniently provided a scraper element 50 in light contact with the surface of the finishing roll to remove the finishing material and deposit it by gravity in a small trough 52, which may have a pipe (not shown) leading to any convenient reservoir.

Since the rolls 44 and 46, through their upward pressure on the conveyor belt 12, tend to tension the belt 12 about the finishing roll 40, particularly when the belt is driven from one end only, namely, by the rolls 14 and 18, it is preferred to provide controlling means for the slackness in that portion of the belt 12 between the pinch roll 18 and the supporting roll 16 by placing an adjustable brake on the latter, it being noted in this connection that the relatively stiff belt 12 is positively fed to the right along the top of the table 10 through cooperation of the driven roll 14 and the driven pinch roll 18. Hence by putting a brake on the roll 16 there is created a relative slackening in the upper run of the conveyor belt 12. Such a brake comprises a pulley 53 (Fig. 1) on the shaft of the roll 16 to which is applied a brake band 55 having one end connected to a pivoted lever 57 having adjustably slidable thereon a weight 59. In this way the amount of tension in that portion of the belt 12 wrapped about the roll 40 may be controlled. If desired, a brake may be adjustably applied also to the roll 46. An alternative construction would be provided by driving the roll 16 positively as well as the roll 14, the latter being driven at a slightly higher rate to provide slackening in the upper run of the belt, thereby obviating, as stated above, too great pressure between the finishing roll 40 and the adjacent surface of the belt 12.

Since the amount of coating material applied to the surfaces of the work pieces varies with the different coats and with the condition of the surfaces of the work pieces, the finishing roll 40 and all the parts associated therewith are mounted upon the auxiliary frames 42 so that, through proper adjustment of the latter, the finishing roll may be adjusted in directions toward and from the applicator roll 30. Were it not for this adjustment in spacing between the finishing roll 40 and the applicator roll 30, it would be quite possible for the coating material to be either too wet or too dry by the time it reaches the finishing roll 40 for proper operation of the latter in its distributing and uniforming functions.

As a further means for facilitating the smoothing out and uniforming operations by the finishing roll 40, provision is made for vibrating the latter at high speed while it is being rotated. In the illustrated construction, the vibrating means comprises a shaft 60 (Figs. 4 and 5) mounted in bearings 61 provided by posts 62 carried by brackets secured to the auxiliary frame members 42. At one end of the shaft 60 is a pulley 64 for the reception of a belt 65 which also passes over a pulley 66 (Fig. 1) on the shaft of a motor 68. By this means the shaft 60 is driven at high speed, so much so that it is desirable to provide a balance wheel 70 at the other end of said shaft. Formed with the shaft 60, at or about its middle point, is an eccentric 72 rotatable in a slide member consisting, for convenience in assembly, of two parts 74 slidably mounted in bearing plates or guide members one of which, 76, is pinned as at 78 to a head member 80, the other guide member, designated 82, being pinned to a removable side member 83 of the head member 80 as indicated at 84, the pins 84 being adjustable with respect to side member 83 through adjusting nuts 86, whereby the guide member 82 may be adjusted as may be found desirable. It will be clear that, during rotation of the eccentric 72, the slide member 74 will be reciprocated rapidly in an up-and-down direction relatively to the head member 80 Since the head member 80 is secured, by means which will now be described, to one end of a rod 90 which is held endwise in fixed relation to the shaft 41 of the finishing roll 40, it follows that the said roll is reciprocated endwise by the eccentric 72. As shown, the rod 90 is slidably received in a hollow extension part 92 of the shaft 41 of the finishing roll 40. Further, the shaft portion 92 is mounted for rotation in a block 94 adjustably held approximately centered in a supporting bracket 96 also carried by the auxiliary frame member 42. It is to be understood that the shaft 92 is rotatable in the block 94 and is also endwise reciprocable therein by means including the eccentric 72 and rod 90. It will be noted that the rod 90 has secured thereto a collar member 100 rotatably receivable in a screw threaded cap member 102 which may be screwed on or off (for ease in assembling the parts) the exteriorly screw threaded portion at the end of the hollow shaft member 92, there being provided also a collar member or nut 104 to lock the cap member 102 in its operative position wherein the rod 90 and collar 100 are fixedly secured in a predetermined endwise relation to the shaft member 92 and shaft 41 to permit relative rotation without undue friction. Since the rate of endwise reciprocation of the finishing roll 40 is at very high speed, it is proper to speak of such movement as endwise vibration of the finishing roll, the rate being preferably in a range of about 2000 as a minimum to about 4000 as the maximum. It will be readily understood that this vibration of the rotary finishing roll 40 contributes substantially to a uniforming effect in the distribution of the coating material on the surface of the hide or skin.

In order that the work supporting surface of the belt 12 may be kept clean enough to avoid staining the under surfaces of the hides or skins supported thereon, there is conveniently provided a washing means for the said surface of the belt 12, said means, in the illustrated construction, including a washing brush 110 turning in a tank of water or other cleaning liquid 112, the belt at this part of its run being supported by idle rollers 114 at each side of the brush 110. Preferably, also, there is provided a wiper 116 secured to one wall of the tank 112 in position to direct the water or other cleaning liquid back to the tank. It will usually be found desirable to provide a scraper for the belt 12 at the delivery end of the machine so that coating material which is deposited on the work supporting surfaces of the belt may be removed, in large part at least, while it is still in liquid condition, the said means comprising a scraper 120 so posi-

tioned as to direct the reclaimed coating material to a tank 122 from which it may be collected at suitable intervals.

In operating the machine shown in the drawings, the operator introduces one work piece at a time by placing it on the surface 24 of the box member 20 and on the slanting feeding-in table 26, this being an advantage since the operator may readily spread out the work piece, particularly in lateral directions, prior to its entry into the field of operation of the applicator roll 30. As the work piece leaves the feeding-in table 26, it passes on to the surface of the conveyor belt 12 and is carried along below the applicator roll 30 to receive the desired amount of coating material therefrom as previously determined by the operator. In the travel of the conveyor belt 12, the forward end of the work piece reaches the finishing roll 40 which is rotating in a direction to facilitate entrance of the leading end of the work piece thereunder. This finishing roll 40 is constructed and arranged, as above described, to smooth out and make uniform the coating material with respect to the exposed surface of the work piece. The result is that the coating material is so well distributed that the appearance of the finished surface is uniform and with uniform distribution of the coating material, thereby rendering it possible to dispense with services of the customary hand swabber. At the delivery end of the machine the work pieces are removed one by one by an attendant and hung over slots to dry either in a suitable room or in a drier provided for the purpose.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for applying liquid coating material to flexible sheet material, a traveling conveyor belt, an applicator means at the work entering end of the machine, a finishing roll arranged to be power rotated and suitably spaced beyond the applicator means, means to secure a substantial wrap of the said belt and of a work piece thereon smoothly about that portion of the cylindrical surface of the finishing roll which faces the rear of the machine, means for providing slack in the portion of the belt wrapped about the finishing roll, and means for axially vibrating said roll.

2. In a machine for applying liquid coating material to sheet material, a traveling conveyor belt, an applicator means at the work entering end of the machine, a finishing roll suitably spaced beyond the applicator means, means for bending the traveling conveyor belt upwardly on the rear side of the finishing roll to secure a substantial wrap of the said belt and of a work piece thereon about the rear portion of the cylindrical surface of the finishing roll, power driven rolls arranged to engage the upper and lower surfaces of the conveyor belt at the work entering end of the machine to move the conveyor belt positively in the direction to and past the finishing roll, and means cooperating with said driven rolls for causing slackness in the wrapped portion of the conveyor belt.

3. In a machine for applying liquid coating material to sheet material, a traveling conveyor belt, an applicator means at the work entering end of the machine, a finishing roll suitably spaced beyond the applicator means, means for bending the traveling conveyor belt upwardly on each side of the finishing roll and to a greater extent on the rear side of said roll to secure a substantial wrap of the belt and of a work piece thereon about the lower and rear sides of the cylindrical surface of the finishing roll, means for supporting and driving said conveyor belt including a roll at the work entering end of the machine and a similar roll at the delivery end of the machine, a pinch roll cooperating with the roll at the entering end, power means for driving said pinch roll and the roll cooperating therewith thereby to advance the conveyor belt positively toward the finishing roll, and braking means associated with the roll at the delivery end of the machine for producing and controlling the amount of slack in the conveyor belt as it passes around the finishing roll.

4. In a machine for applying liquid coating material to hides and skins, an endless belt conveyor for the work pieces, an applicator means at the entering end of the machine to apply coating material to the work piece, a finishing means including a roll suitably spaced from the applicator means to even out and make uniform the coating material, said endless belt conveyor having a portion wrapped about a part of the cylindrical surface of said roll to cooperate with the latter in evening and making uniform the coating material on the surface of the work piece, and means for vibrating said roll axially at high speed, whereby the coating material is smoothed out and made uniform through relative movement of the work piece and of the finishing roll in two directions angularly related to each other.

5. In a machine for applying liquid coating material to hides and skins, an endless belt conveyor for the work pieces, an applicator means at the entering end of the machine to apply coating material to the work piece, a finishing means including a roll having a multitude of smoothing-out and evening elements projecting radially therefrom, said roll being suitably spaced from the applicator means, and said endless belt conveyor having a portion wrapped about a part of the cylindrical surface of said roll to cooperate with the latter in evening and making uniform the coating material on the surface of the work piece, means for rotating the finishing roll so that its work contacting surface is moving in the same direction as the traveling belt conveyor and at a much higher rate of speed, and means for vibrating said roll axially, during its rotation, at very high speed.

6. In a machine constructed according to claim 5 in which the finishing roll is vibrated axially within a range from about 2000 to about 4000 vibrations per minute.

7. In a machine for applying a liquid coating to flexible sheet material, a belt conveyor for the work pieces, an applicator means at the front end of the machine to apply coating composition to the work pieces, a finishing means including a roll arranged to be power rotated and presenting a plush-like surface of uniform curvature, said roll being suitably spaced from the applicator means, means for axially vibrating the said roll, and means for causing a portion of the belt conveyor to be wrapped for a substantial arcuate distance about the finishing roll whereby said belt conveyor cooperates with the finishing roll in smoothing the surfaces of the work pieces.

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