Nov. 23, 1943. R. F. KNIGHT 2,334,714

BRUSHING MACHINE

Filed Nov. 21, 1941

Fig.1.

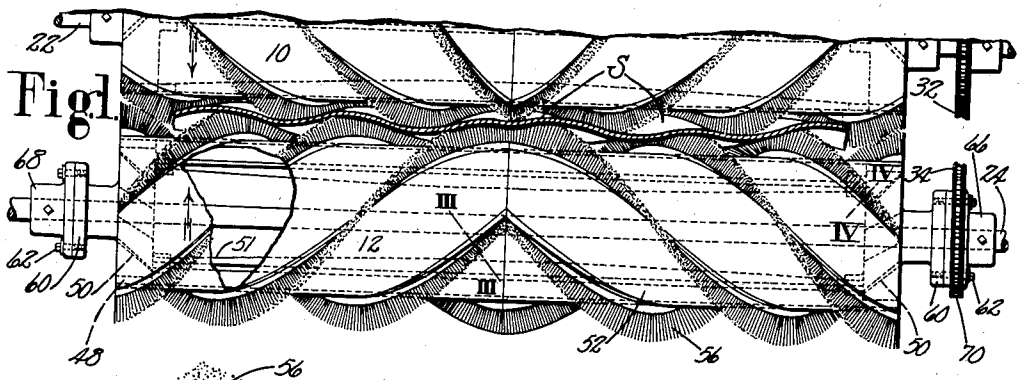


Fig.3.

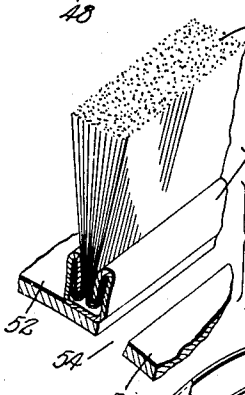


Fig.4.

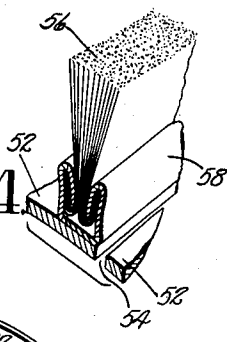
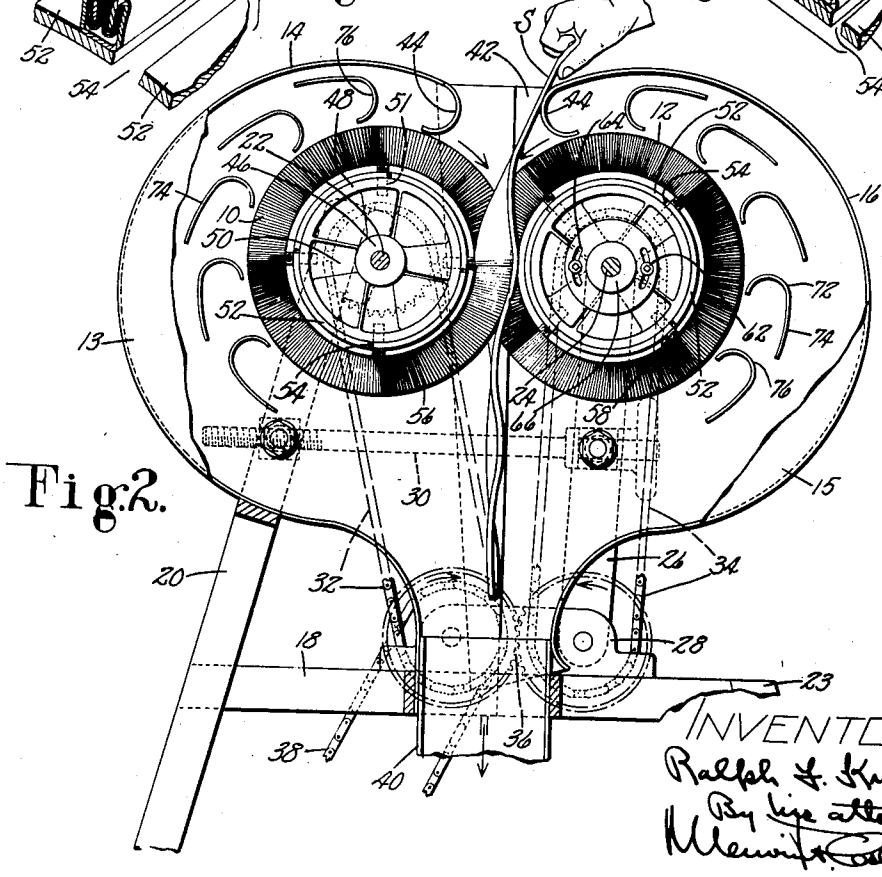


Fig.2.



INVENTOR

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By his attorney

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UNITED STATES PATENT OFFICE

2,334,714

BRUSHING MACHINE

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Application November 21, 1941, Serial No. 419,819

7 Claims. (Cl. 15—21)

This invention relates to brushing machines and more particularly to machines utilizing coacting brushes for removing dust from the opposed surfaces of tanned hides and skins.

Brushing machines for the treatment of skins to remove the dust therefrom are subject to the disadvantage that after a period of use there is a decided tendency for the dust particles to stick to the brushes and to be redeposited upon the skins. Even if the brushes are enclosed in a suction hood, the air currents are carried around the peripheries of the rotatable brushes without disturbing the dust which has settled on the bristles or which may be held there by static electricity.

Accordingly, an object of the invention is to provide an improved brushing machine which will be simple, inexpensive to manufacture and more efficient.

By making the brushes with spaced rows of bristles or the like and driving these brushes in such a fixed relation that the rows of bristles of one brush intermesh with the rows of bristles of the other brush I obtain a fluttering or vibrating action of the skins which tends to loosen the dust left on the surface thereof after buffing or the like and to render it easier to remove all of this dust.

In order to obtain greater cleanliness in the brushes themselves and to overcome the tendency for these brushes to hold dust removed from the skin, I provide, in accordance with features of the invention, a brush construction in which strips of brush elements are mounted on a hollow cylinder having openings between the rows of bristles. As a result, the centrifugal force set up by the rotation of the brushes causes the air sucked in at the open ends of the brushes to be thrown out through these openings, through the bristles and thence directly against the surface of the skin. In order to make this action more uniform along the length of the brush, these openings increase in size as they approach the midportion thereof.

As herein shown, a casing is provided which surrounds the brushes and which contains reversely curved vanes or baffles arranged to reverse the air currents set up by the rotation of the brushes and to turn them back toward the suction outlet. As illustrated also, this casing is made in two parts, each carrying one of the brushes, and the two parts are relatively adjustable to permit change in the intermeshing relation of the brushes, at the same time keeping each brush in predetermined desired relation to the associated baffles.

These and other features of the invention will best be understood from the consideration of the following specification taken in connection with the accompanying drawing, in which

Fig. 1 is a plan view of a portion of two brushes in which the brush elements are arranged in double-helical or herringbone rows;

Fig. 2 is an end elevation of the machine with an end portion of the casing broken away;

Fig. 3 is a fragmentary view of a portion of a brush strip and an adjacent slot taken along the section line III—III in Fig. 1; and

Fig. 4 is a similar view taken along the line IV—IV in Fig. 1.

Rotary, substantially cylindrical brushes 10 and 12 are mounted upon parallel shafts 22, 24 within a casing having curved parts 14 and 16 which are supported upon a frame 18 having rigid legs 20 on the upper end of which and in the casing the shaft 22 of the brush 10 is mounted. Normally, these brushes mesh with one another within an intermediate zone. In Fig. 2, most of the near end walls 13, 15 of the casings are broken away. On its other side the frame is supported upon another pair of legs 23. The shaft 24 of the brush 12 is journaled in swinging arms 26 pivoted on a bearing block 28 on the frame 18. The casing part 16 which is attached to these arms is arranged for adjustment toward and away from the casing part 14 by means of one or more screws 30 so that the distance between the two brush axes may be adjustably detemined for a purpose which will later appear. The brushes are rotated in opposite directions by chain-and-sprocket drives 32 and 34 which are maintained in fixed relation by a pair of gears 36 to which power is delivered from any suitable source (not shown) by means of a chain 38. As a consequence, any row of bristles on one brush will always be received in a space between adjacent rows of bristles on the other brush, and there will be no end-to-end contact of the bristles. A suction outlet 40 at the bottom of the casing parts and supported by the frame 18 may be connected to a suction fan if it is desired to accelerate the removal of the dust.

In presenting work such as a skin S to the machine, one edge is held in the operator's hand 43 and the other edge is introduced in an entrance opening 42 provided between two rounded edges 44 of the opposite casings adjacent to the meshing zone of the brushes and is drawn in to the machine between the downwardly moving sur-

faces of the oppositely rotating brushes. The operator then pulls the skin against the action of the brushes and draws it out of the machine. After this the skin is reversed and the untreated portion of the skin is introduced and withdrawn in a similar manner.

Only four rows of bristles have been shown on each of the cylindrical brushes but this is wholly for the sake of simplifying the patent drawing, and it should be understood that any desired number of rows of brush strips may be utilized so long as sufficient space is left between adjacent rows so that the strips upon the opposing brushes may intermesh. Furthermore, in the illustrated construction the brush strips are disposed in the form of a double-helical or herringbone pattern around the periphery of the brush so as to gain the added advantage of spreading out the skin from its middle portion toward its edges as it is being treated. It will be found, however, that many of the advantages of the invention may be secured without using this helical arrangement.

The brush 10 is constructed upon the periphery of a spider made up of end hubs 46 each having a peripheral ring 48 supported upon radial arms 50 which are set at an angle oblique to the brush axis so as thereby to obtain a fan action as the brush rotates. The end rings of the spider are joined by parallel transverse bars 51 to which may be secured, as by welding thereon, thin plates 52 spaced to provide intermediate openings such as the slots 54. Each plate carries, along one edge, a brush strip 56. Each brush strip is made up of a row of bristles or equivalent parts held in a backing strip 58. The particular brush strip herein shown is disclosed in Letters Patent of the United States No. 2,302,761, granted November 24, 1942, upon an application in the name of William Goodhue, and which is assigned to the assignee of this application. However, any similar brush strip might be utilized to make up of a cylindrical brush of the type shown. As a matter of convenience, in the double-helical, herringbone brush illustrated in the drawing, the plates 52 extend only to the center of the brush. The design of these plates is such that the slots 54 or any other suitable perforations are much larger near the center of the brush than they are at the ends, as is shown in Figs. 3 and 4 where the sections are taken near the center and near an end respectively. As a result, the currents of air sucked in through the ends and thrown out through the bristles by centrifugal force will be equalized along the length of the brush.

In order to adjust the angular relation of the rows of bristles on the two brushes, when setting up the machine or when replacing one of the brushes, provision is made in the brush 12 for angular adjustment of the brush with respect to its shaft. This is accomplished by providing flanges 60 (Fig. 1) at each end of the brush in which are threaded bolts 62 extending through slots 64 (Fig. 2) in the face of a pair of flanged collars 66 and 68 which are held on the shaft 24 by means of set screws. This makes it possible to adjust the brush 12 around its shaft 24 without disturbing the drive chains, one of which is placed around a sprocket 70 secured to the collar 66. This is a matter which becomes of greater importance as the number of rows of brush elements is increased.

During the rotation of the brushes at substantial speeds, currents of air will be carried along with the peripheries of the brushes and will in a measure interfere with the action of the air drawn in through the entrance 42 and out through the suction outlet 40. Accordingly, curved vanes or baffles 72 have been positioned between the end plates of the casing members 14 and 16 and have been disposed in such a way close to the periphery of the brush that the air drawn around frictionally by the rotating brush will be reversed and caused to pass out through a series of similar openings such as that between the tail portion 74 of one baffle and the curved portion 76 of the next baffle into the space between the baffles and the casing and thence into the suction outlet 40.

As one-half of a skin S is dropped into the entrance opening 42 it will be caught by the brushes and drawn into the casings until stopped by the operator and pulled backward. During this time the half portion of the skin which is being treated will be not only brushed in the customary fashion but will also be subjected to the repeated blows of rows of bristles upon opposite faces of the portion between the brushes pushing the skin first one way and then the other into the spaces between rows on the opposite bristles. This will cause the skin to vibrate or flutter and therefore it is subjected to somewhat the same sort of an action as when an operator shakes it in the open air as he would a rug. The extent of the beating or fluttering action, which is somewhat exaggerated in Fig. 2, will be controlled by adjusting the screw 30 without thereby varying the relation between the brush 12 and the adjacent baffles 72. At the same time the skin will be subjected to a blast of air, forced out through the slots 54 by centrifugal action, which will pass through the bristles radially and impinge upon the surface of the skin. Furthermore, the currents of air carried around by the brushes will be reversed by the baffle plates and caused to travel more readily toward the exhaust outlet 40 so that the size of fan which is required for the suction may be cut down.

That method of cleaning which may be carried out with the use of the above-described machine is not claimed herein since it forms the subject-matter of a divisional application, Serial No. 455,762, filed August 22, 1942.

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

1. In a brushing machine, a rotary brush having intercommunicating end and peripheral openings, the area of said peripheral openings per unit of length of the brush increasing from the ends toward the midportion of the brush.

2. In a brushing machine, a cylindrical brush comprising a cylindrical support mounted for rotation and having end openings, spaced brush elements secured to the periphery of the said support, openings through said support along said brush elements, said openings being larger adjacent to the midportion of the length of the brush.

3. In a brushing machine, a cylindrical brush comprising a spider mounted for rotation about an axis of the cylinder, plates attached to said spider and extending from an end toward a midportion of said brush, said plates having brush strips secured along a narrow margin adjacent to corresponding edges of successive plates and disposed generally lengthwise of the brush, said plates being spaced to provide slots, adjacent to the brush strips, tapered lengthwise of the brush.

4. In a brushing machine, a cylindrical brush

comprising a spider mounted for rotation about an axis of the cylinder, plates attached to said spider extending from an end toward a midportion of said brush, said plates having strip brushes adjacent to corresponding edges of the plates, and which strip brushes intersect all planes normal to the axis of the brush within its length, said plates being spaced to provide slots wider at the midportion of the brush than at the end.

5. In a brushing machine, coacting brushes disposed upon parallel axes and meshing with each other along a limited zone, a casing surrounding said brushes having an opening adjacent to the meshing zone of the brushes, a suction opening disposed upon the other side of the casing away from the entrance opening, and curved baffle plates supported in the casing adjacent to the periphery of the brush and spaced from the inner surface of the casing, the curvature of said plates tending to reverse the direction of movement of the air carried around by the brushes.

6. In a machine for treating hides and skins, a cylindrical treating member for engagement with a piece of leather, a casing partly surrounding the treating member, and stationary dust-deflecting vanes extending lengthwise of said treating member, said vanes being disposed with an edge adjacent to the periphery of said member and curved therefrom outwardly and rearwardly with respect to the rotation of said member, the other edge of each vane being spaced from the inner surface of the casing.

7. In a brushing machine, coacting cylindrical brushes oppositely rotatable upon parallel shafts, casing members partially surrounding said brushes, means for supporting one of said casing members and one of said brushes for movement together to control the space between the brushes, and baffle plates in said movable casing member maintained in fixed relation to the periphery of the brush regardless of the adjustment of the casing member.

RALPH F. KNIGHT.