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MACHINE FOR STRETCHING FLEXIBLE SHEET MATERIAL
ABOUT A SUBSTANTIALLY RIGID FORM
Original Filed April 10, 1948

2,709,268

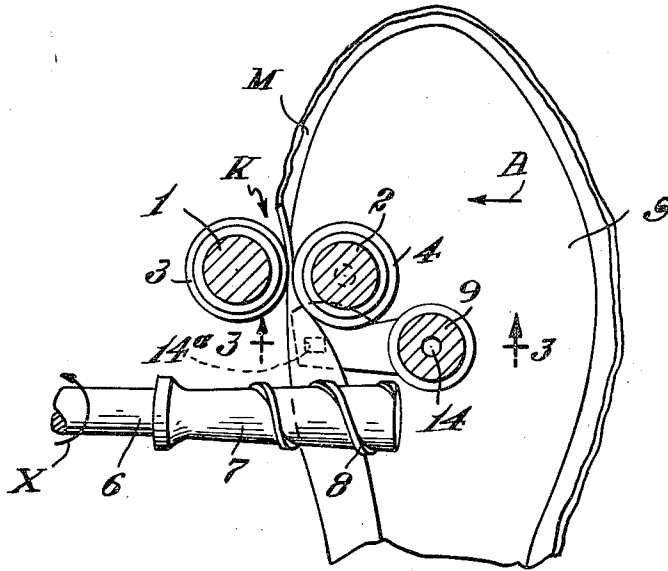


Fig. 1

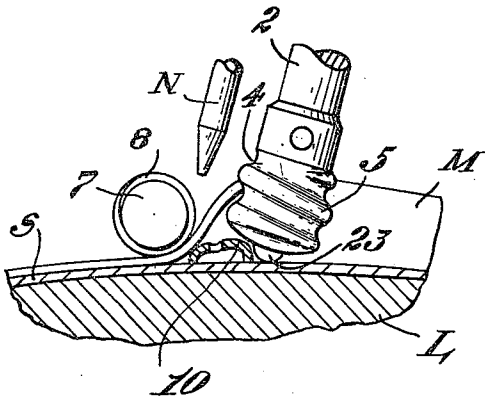


Fig. 2

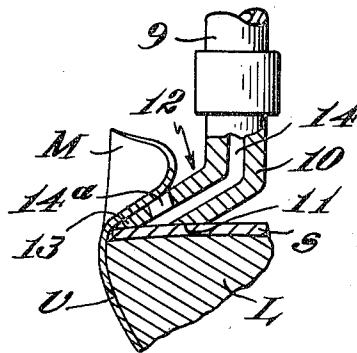


Fig. 3

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MACHINE FOR STRETCHING FLEXIBLE SHEET MATERIAL ABOUT A SUBSTANTIALLY RIGID FORM

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Original application April 10, 1948, Serial No. 20,297.
Divided and this application June 15, 1954, Serial No. 436,846

2 Claims. (Cl. 12—8.3)

This invention pertains to machines of the continuous acting type for stretching material about a substantially rigid form and with provision for supplying adhesive for securing the margin of said material after it has been stretched, the present application being a division of my copending application Serial No. 20,297, filed April 10, 1948, which is a continuation-in-part of application Serial No. 568,471, filed December 16, 1944, upon which Patent No. 2,467,385 issued on April 19, 1949.

In the above patent there is disclosed apparatus designed to grip the lasting margin of a shoe upper (the "covering material") between oppositely turning power driven gripper rolls while up-drafting stress is applied, the lasting margin being wiped inwardly over an insole secured to a last (said last with its attached insole being the "rigid form") by means of wipers after adhesive has been applied to the inner surface of the lasting margin. As here used, the term "lasting margin" is to be regarded as inclusive of that portion of the upper of a conventional shoe which is lasted in against the insole or its equivalent and also the wrapper or platform-cover of a California, platform or force-lasted shoe.

The present invention has for one object the provision of improved means for stretching and adhesively bonding covering material to a rigid form, and in particular the provision of apparatus of the kind wherein the margin of the covering material is gripped between oppositely rotating rolls while being uninterruptedly stretched and coated with adhesive and wherein an uninterrupted in-wiping stress is applied to the marginal material which has been stretched and which has escaped from between the rolls.

A further object is to provide a machine for cement lasting wherein the marginal material is positively supported in inclined position such as to overhang the bottom of the form intermediate the points at which uninterrupted stress for stretching and in-wiping the covering material, respectively, is being applied, with provision for delivering a ribbon of fluid thermoplastic adhesive into the angle between the bottom of the form and the overhanging margin. Other and further objects and advantages of the invention will be pointed out in the following more detailed description and by reference to the accompanying drawings, wherein:

Fig. 1 is a diagrammatic plan view, partly in section and omitting parts, illustrating the operation of shoe lasting apparatus constructed in accordance with the present invention and wherein the lasting margin of a shoe is gripped, while being up-drafted, by oppositely turning gripping rolls and the lasting margin is wiped in uninterruptedly by means of a rotary wiper;

Fig. 2 is a fragmentary elevation, looking in the direction of the arrow A of Fig. 1, and also showing a heating jet nozzle, illustrating the sequence of steps of the lasting operation and the relation of the gripping, in-wiping, adhesive delivery and heating elements to the bottom of the shoe, the latter being in vertical section; and

Fig. 3 is a fragmentary elevation, partly in vertical section, substantially on the line 3—3 of Fig. 1, illustrating the operation of the hold-down applicator.

Referring to the drawings, and particularly to Figs. 1, 2 and 3, the numerals 1 and 2 designate a pair of parallel, oppositely rotating power driven shafts carrying gripping rolls 3 and 4 at their lower ends respectively. As here illustrated (Fig. 2), the axes of the shafts 1 and 2 are inclined downwardly and forwardly in the direction of progress of the work. As illustrated in Fig. 2, the rolls are provided with helical work-engaging ribs 5. For convenience in introducing the work between the rolls 3 and 4, the shaft 2 may be arranged to be moved away from the shaft 1. In the drawings a shoe upper U (Fig. 3) as an example of "covering material" is shown on a rigid form comprising a last L and an insole S fixed to the last. The upper U has an extension or lasting margin M. As shown in Figs. 1 and 2, the margin M is gripped between the continuously turning, oppositely rotating rolls 3 and 4 and while so gripped is subjected to up-draw tending to pull the upper U snugly about the last. In order to wipe in the margin M over the bottom of the insole S, there is provided a constantly rotating wiper device mounted on a driven shaft 6. The wiper device comprises a tapering body portion 7 (Fig. 1) which is of circular transverse section, having its smaller end secured to the constantly rotating shaft 6 in coaxial relation to the latter. The helical wiping element, here shown as a rib 8, is carried by the body portion of the wiper. As the wiper is rotated in the direction of the arrow X (Fig. 1) the rib 8, by engagement with that part of the marginal material of the upper which has just escaped from between the gripper rolls, impels or thrusts the margin M inwardly over the edge of the insole and presses it firmly down against the under surface of the insole.

A hold-down device is arranged intermediate the points of engagement of the margin by the rolls and by the wiper device respectively. This hold-down is carried by a normally fixed tubular support 9 which may conveniently be carried by the same part (not herein illustrated, but shown in Patent No. 2,467,385) which supports the bearings for the shaft 2. The support 9 is provided at its lower end with a foot 10 having the substantially horizontal flat under surface 11 (Fig. 3) which engages the exposed surface of the insole S and which thus limits movement of the shoe upwardly in response to the up-drafting stress. The foot 10 has an inclined top surface 12 over which the lasting margin is bent as shown in Figs. 1 and 3 by the action of the wiper device, it being noted (Fig. 2) that because of the taper of the wiper, that portion of the wiper surface which is opposed to the marginal material progressively approaches the surface 12, thus closely confining the margin. Moreover, that portion of the margin which extends from the bite of the rolls to the place where it is contacted by the wiper is positively supported by the surface 12 so that it overhangs but does not contact the insole, thus providing for the ready delivery of the adhesive to the place where it is needed. The foot 10 preferably tapers to an edge 13 which is substantially flush with the outer edge of the insole S during the operation. The foot 10 has a passage 14 which communicates with the bore in the tubular support 9 and this passage 14 terminates at the under surface 11 of the foot and, as here illustrated, has a branch 14* which opens at the inclined surface 12. Hot thermoplastic adhesive from a suitable source is supplied, either by gravity or by the employment of a pump (for example as disclosed in the above patent to Kamborian No. 2,467,385) to the bore in the support 9 and flows down through the passage 14 and is delivered as a continuous ribbon directly into contact with the

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exposed surface of the insole S and also, through the orifice 14^a, against the inner surface of the margin M. The delivery end of the passage 14 is preferably spaced from the extreme end 13 of the foot and the orifice 14^a is likewise spaced from the edge 13 so that the adhesive which is delivered onto the insole and onto the lasting margin does not extend to the outer edge of the insole, being deposited on the insole and on the inner surface of the margin M in the form of spaced ribbons. Since the application of heat to the working parts has been found to be advantageous, a jet nozzle N (Fig. 2) may be provided. This nozzle delivers a jet of hot air, or a jet of burning gas against the wiper 7, and preferably so that some of the hot fluid impinges upon adjacent parts.

In the operation of the machine, the margin M is gripped between the rolls 3 and 4, as shown in Fig. 1, and the shoe is progressed in the direction of the arrow K, the rolls gripping the marginal material between them and holding it upright, that is substantially perpendicular to the bottom of the insole S while up-drafting stress tensions the upper and margin. As the shoe is progressed, the marginal material escapes from between the rolls and is urged inwardly by the action of the helical wiping element 8. The wiping element bends the margin M down over the inclined top surface 12 of the foot 10, so that it overhangs the insole and as adhesive exudes through the passages 14 and 14^a, ribbons of adhesive are deposited on the inner surface of the margin and the exposed surface of the insole, and as the margin slips from the foot 10 it is pressed down onto the bottom of the insole S by the wiper and firmly adheres to the insole. During this operation the insole is held from rising by its contact with the under surface 11 of the foot 10. If desired, the roll 4 may have a holddown button 23 (Fig. 2) at its lower end for contact with the bottom surface of the insole S. The above operation may be continued all of the way around the shoe or throughout such portion or portions of the periphery of the shoe as may be desired. The operation of the wiper is continuous and uninterrupted and the place at which the wiping stress is applied is always at the same distance from the point at which the marginal material is gripped between the rolls 3 and 4. This mechanism thus provides for the progressive up-drafting of the lasting margin, for coating it with adhesive and for uninterruptedly wiping it in, all in a single operation, thus eliminating the necessity for applying the adhesive as a preliminary and separate operation. Since the operation of the wiper is continuous and uninterrupted, every point, longitudinally of the lasting margin, receives the in-wiping stress, and thus the lasting margin is laid down smoothly and firmly onto the bottom of the shoe.

It is to be understood that the invention is broadly inclusive of any and all such other arrangements and modifications as fall within the scope of the appended claims. It is further to be understood that when such words as "up," "down," "below," "above," etc., have been employed herein they are used in a relative sense and with respect to the drawings and for convenience only and are not to be regarded as limitations with respect to the mode of operating the apparatus.

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As herein disclosed, the stretching of a shoe upper over a last is instanced as one specific utility of the invention. The stretching of the cover over the cushioning pad of a chair seat may be instanced as another utility, it being understood that the last and the chair bottom, respectively, are examples of rigid or substantially rigid "forms," and that the shoe upper and the cover for the chair seat cushion are cited as examples of "coverings" of stretchable material, which, in accordance with the present invention, are drawn snugly about such form.

I claim:

1. In a machine of the class described having, in combination, front and rear, oppositely turning gripper rolls whose axes are parallel and inclined downwardly in the direction of the advance of the work, said rolls being operative to grip the margin of sheet material and, while stress is being applied for stretching the sheet material snugly about a substantially rigid form, concomitantly to advance the work uninterruptedly, wiping means comprising a rotary, helical, work-engaging element which tapers in diameter and which is fixed at its smaller end to a supporting shaft and which is free at its larger end from contact with other mechanical parts, said helical element being arranged to contact the outer surface of the margin of the sheet material and uninterruptedly to wipe said margin inwardly over the bottom of the form, a part which engages the inner face of the margin of the sheet material and which forms a support for said margin after it is released from the rolls and before it is engaged by the wiping means, said part having a sloping work-engaging face having an orifice through which hot thermoplastic fluid adhesive exudes and deposits as an uninterrupted ribbon directly on the inner surface of said margin, and means defining a conduit through which a solid stream of adhesive flows to said orifice.

2. In a machine for stretching covering material about a substantially rigid form, in combination a pair of oppositely turning gripper rolls which grip the margin of the covering material while stretching stress is being applied thereto, a rotary wiper having an elongate body portion which is fixed at one end to and which is in coaxial relation to a constantly turning drive shaft, the opposite end of said body portion being free from contact with other mechanical parts, said latter end being of a diameter at least as great as the end which is fixed to the shaft, the body portion being provided with a helical wiping element operative uninterruptedly to engage the outer surface of the marginal portion of the covering material, thereby to urge said marginal portion inwardly across the edge of the exposed surface of the form, means for rotating the wiper carrying shaft, and a part which engages the inner surface of the margin of the covering material just before said margin is engaged by the wiper, said part having an orifice through which liquid adhesive is delivered as a continuous ribbon into direct contact with the inner surface of the marginal material, and means for supplying hot thermoplastic adhesive to said orifice.

No references cited.