Oct. 17, 1939. D. A. CUMFER 2,176,835

METHOD OF SATURATING

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Fig. 1.

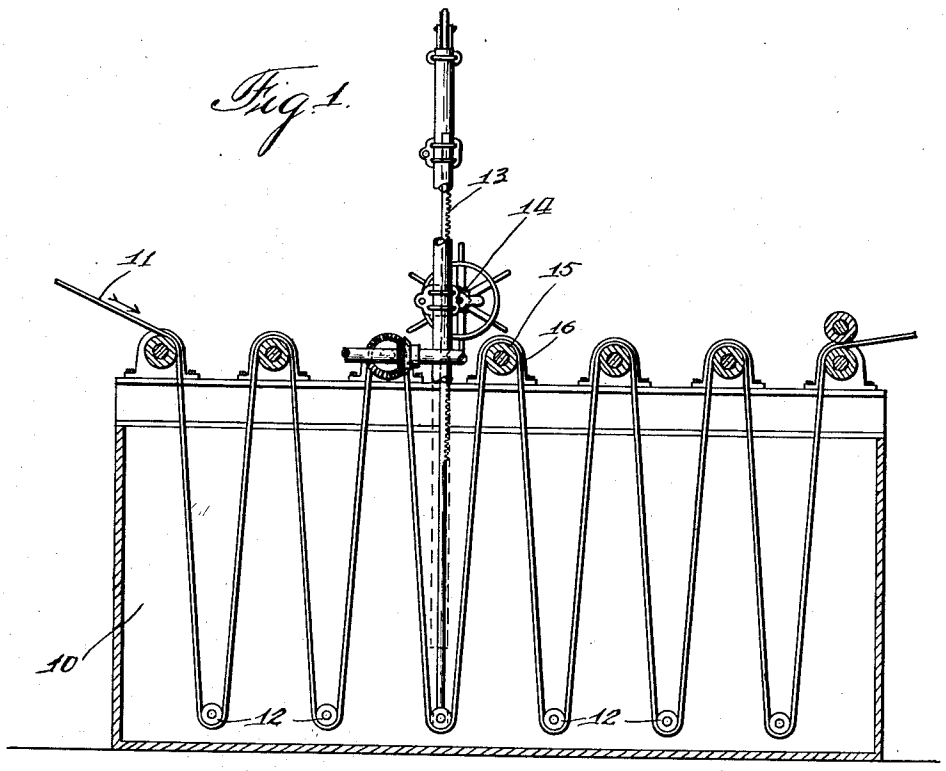
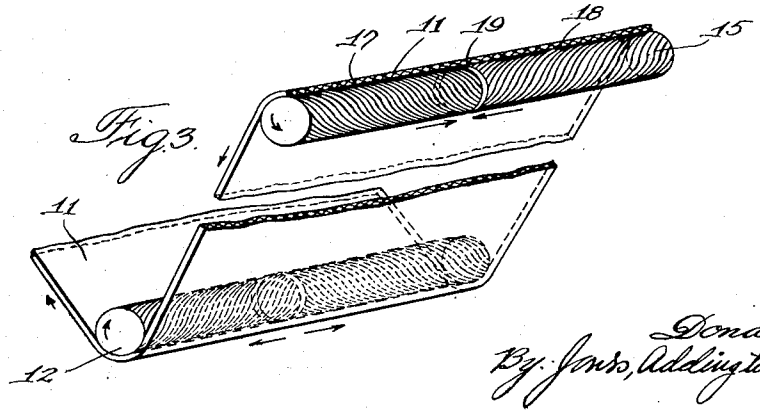


Fig. 2.



Fig. 3.



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METHOD OF SATURATING

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4 Claims. (Cl. 91—68)

This invention relates to an improved method for saturating a continuously moving web with a liquid medium and is herein illustrated in connection with machines for manufacturing asphalt impregnated roofing and the like. The improvement contemplates the provision of novel mechanism in the saturating tanks used with such machines, wherefrom improved operating characteristics are insured.

In the manufacture of such roofing, it is usual continuously to pass or progress a web, to which the coating materials are to be applied, through a saturating asphalt contained in what is usually referred to as the saturator or saturating tank. The web is threaded over and under upper and lower rollers, respectively, to insure a number of in-and-out passages through the aforesaid saturating asphalt, being drawn under and over the aforesaid rollers by the rotation of the upper rollers which are driven.

The invention primarily comprises the use of upper driven rollers provided with threaded or grooved portions to insure the proper "tracking" or centering of the web as it passes over the driven rollers and contemplates the provision of certain definite grooved portions for such purpose which shall at the same time function to remove from the traction surface of the roll the excess asphalt saturant which tends to coat the same. Means are also provided to facilitate the stripping or elimination of such excess asphalt as may be gathered from the roller.

There is, however, an additional and at times even more desirable result which may be obtained by the utilization of the grooved rollers in the manner hereinafter set forth. By using rollers of the character just designated at the bottom as well as the top of the saturating tank, a more positive and desirable centering force is exerted on the web if the threads are correlated in one direction. It has, however, been discovered that, when the threads are arranged oppositely on the bottom roll to those on the top roll, any distortion or strain of the web fibers which may be caused by the top roll centering action is nullified or compensated for by the just-mentioned bottom roll.

Again, a further novel effect is secured in that, by arranging the threaded portions in such manner that the web is alternately subjected to forces working towards the center of the roll and then to forces working towards the edge of the web or the ends of the roll, a desirable increase in the absorption of the web of the saturant results.

Another feature of the present invention is the use of bottom rollers provided with the novel groove formation, one form of the latter feature comprising bottom rollers wherein the grooves are so formed that the web is urged to the center of rolls in the same manner as it is in connection with the grooved upper rolls, while still another form contemplates so grooving the bottom rolls on opposite portions of the middle as to compensate for the disturbing force that may be exerted on the web fibers by the oppositely helically threaded grooves on the upper rolls. Accordingly, one feature of the present invention is a process for insuring exertion of constant centering force on the web as it passes over the upper rollers, but at the same time providing a compensatory force acting on the web in a direction oppositely to the centering force, thereby to restore any displaced or strained fibers to their original condition and position.

The invention will be better understood in connection with the accompanying drawing, in which:

Fig. 1 is a diagrammatic side elevational view through a saturator tank showing the manner in which the web to be saturated is threaded therethrough;

Fig. 2 is an enlarged view showing an upper saturator roller embodying the invention of the present application; and

Fig. 3 is an elevational perspective view illustrating a further novel feature of the present invention comprising placing one or more grooved rollers at the bottom of the tank and correlating the pitch of the threads and the direction of rotation of the bottom rollers, either,

(1) When the threads run in a direction opposite to the direction illustrated, to cause the bottom rollers to provide further web centering forces or,

(2) When the threads run in the direction shown, to impart to the fibers in the web forces which compensate for the strain imposed thereupon by the centering forces exerted by the grooved upper rollers.

The drawing illustrates a saturator tank 10, through which a web or felt base 11, which is to be saturated with the asphalt, is passed. A saturating tank of this character is usually constructed with six or seven so-called "gates", at the bottom of which are mounted small rollers 12. These latter rollers are referred to as bottom rollers and are raised and lowered by means of a rack and pinion connection, the rollers being journalled at the bottom of racks 13, which latter mesh with pinions 14 to provide for the aforesaid raising and lowering. The lower or bottom roll-

ers 12 can thus be moved to facilitate the threading of web 11 through the machine.

The web is also threaded over upper or top rollers 15 which are journalled in standards 16 supported by the sides of the tank. These latter rollers are substantially the width of the web which is to be passed through the saturator tank and are driven to progress the web being treated through the tank.

In the past, these rollers have been smooth surfaced, and considerable difficulty has been experienced because the saturant carried by the sheet acts as a lubricant between the roller surface and the sheet, wherefrom the tractive or pulling effect of the driven rollers is very substantially decreased. Various other shortcomings arise because of the use of smooth surfaced rollers, particularly when they become coated with saturant, one of the major of which is the tendency of the web to weave or run "off center."

One of the objects of the present invention is to provide upper rollers which will automatically provide self-centering action on the web passing over these rollers. This is accomplished (Fig. 2) by providing oppositely directed helical grooves or screw threads 17 and 18 on the surface of the upper rollers. An annular depressed portion 19 is located at the center of the roller and at the apices or converging points of the aforementioned helical grooves.

The roller illustrated in Fig. 2 is driven in such direction that the top thereof turns away from the observer. Such rotation of the roller insures the centering of a web in contact therewith, because, if, for instance, the web tends to move to the right, the surface thereof will be in contact with more of the screw threads tending to bring the web back to the center than it will with those threads which tend to move it in an opposite direction. The reverse is, of course, also true should the web tend to move to the left.

Moreover, the excess asphalt or saturant which would otherwise tend to gather on a smooth-surfaced roller is positively moved along the grooves towards the center of the roller. If the same does not drop off under the action of gravity as it approaches the lowest point of the roller, it will run into the central annular groove 19 and the return thereof to the saturating tank will be thereby facilitated.

As hereinbefore indicated, a further novel phase of the present invention comprises placing one or more grooved rollers at the bottom of the tank. The grooves or threads of such rollers are so correlated with the direction of rotation of the bottom roller that the web is urged towards the center of the bottom roller as well as of the top roller.

Under some circumstances, however, the lower rollers are not required to be of the web centering type. In fact, the upper rollers, in centering the web, so affect some classes of felt, so far as acting upon the fibers thereof is concerned, that it has been found to be a further desirable novel feature to use bottom rollers the threaded portions of which are disposed in an opposite force producing sense to those on the surface of the upper rollers. A bottom roller of the latter construction is shown as used in combination with a grooved upper roller in Fig. 3. When such a combination of upper and lower rollers is used, the action which is exerted on the fibers by the upper rollers is nullified or compensated for by the oppositely directed grooves or threads on the bottom rollers, and thus the fibers of the web as it finally leaves the tank are not greatly distorted compared to their condition upon the entrance of the web into the saturating tank.

Another advantageous desirable effect resulting from utilizing upper and lower rollers with oppositely directed helical grooves is an alternate loosening and compacting action which renders the web more absorbent to the saturant and promotes an optimum absorption of the saturant by the web, which is a condition greatly to be desired in the production of many products which are produced on machines as here described, particularly, for instance, asphalt impregnated roofing material, wherein it is desired that the felt take up as much saturating asphalt as possible.

The present invention, accordingly, provides a process of saturating fibrous materials wherein a desirable action is exerted on the fibers, with the resultant optimum absorption of the saturant by the web. The amount of relative saturant absorption can be controlled by the speed of running the web, the pitch of the threaded grooves, and the correlation between these two factors.

Further modifications of this invention will be apparent to those skilled in the art and it is desired, therefore, that my invention be limited only by the showing of the prior art and the scope of the appended claims.

What I claim is:

1. The process of insuring optimum saturation of a fibrous web which comprises periodically exerting oppositely directed forces transversely of and substantially parallel to the broad surface of a web to cause alternate loosening and compacting of the fibers of said web while passing through a saturating medium.

2. The process of insuring optimum saturation of a fibrous web which comprises alternately exerting in opposite directions a force transversely of and substantially parallel to the broad surface of a web while passing through a saturating medium.

3. The process of insuring optimum saturation of a fibrous web which comprises exerting oppositely directed forces transversely of a web at one point during its travel through a saturating medium and exerting on said web at another point in said travel forces of an oppositely directed sense relative to said first mentioned forces.

4. The process of insuring optimum saturation of a fibrous web which comprises exerting oppositely directed forces transversely of a web toward the center of said web at one point during its travel through a saturating medium and exerting forces of an oppositely directed sense on said web from the center toward the edges of said web at another point in said travel.

DONALD A. CUMFER.