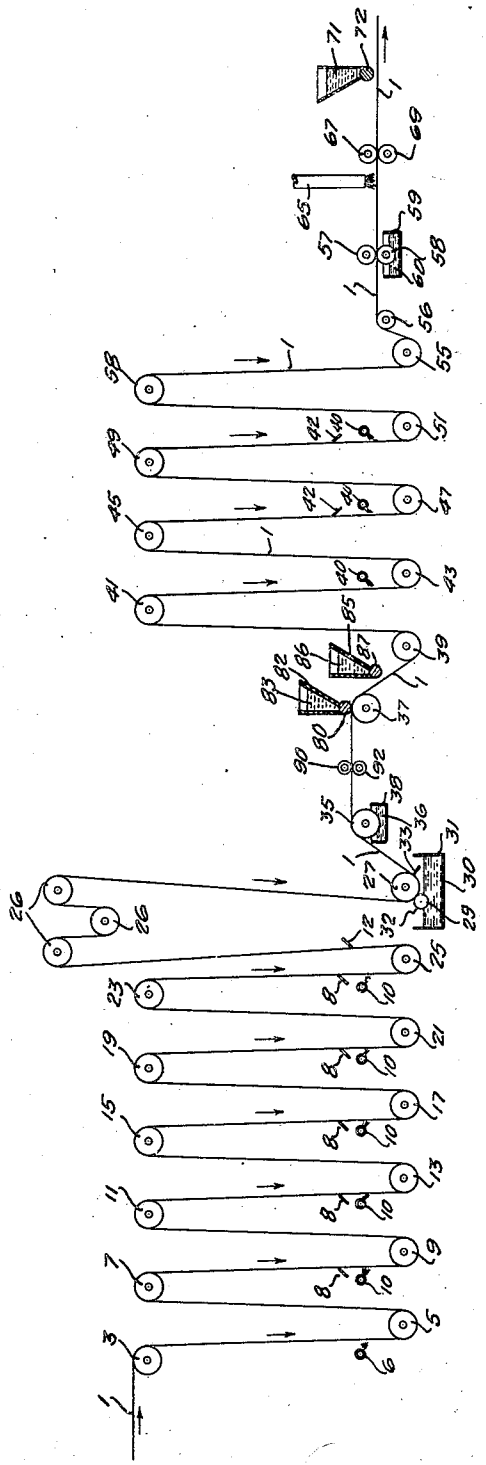
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PROCESS OF AND APPARATUS FOR IMPREGNATING WEBS

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PROCESS OF AND APPARATUS FOR IMPREGNATING WEBS

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This invention relates to the impregnation of a web of felted fibres and more especially to the methods of and apparatus for impregnating such a felted web with a waterproof or water-resistant saturant. The invention particularly relates to the impregnating or saturating of a sheet of roofing felt with a bituminous saturant, such as asphalt, for the production of composition roofing and shingles.

The impregnation and saturation of felted webs has been accomplished in various ways. Particularly in the production of composition roofing or so-called asphalt roofing it commonly has been the practice to pass a sheet of roofing felt through a bath of asphalt saturant maintained at a temperature to provide the necessary fluidity for the saturant to be absorbed by the felt. It has been desired in such processes to secure the absorption of as much asphalt as is possible for the felt to take up so that a well saturated or impregnated sheet of roofing felt is produced as a base upon which a coating of adhesive, usually a bituminous material such as asphalt, is applied which will seal the impregnating material into the felt. In many cases, moreover, this applied coating of asphalt, usually of higher melting point than the saturant, serves to bind to the saturated felt base sheet a surfacing of granular mineral material such as granular slate, sand, talc, or other powdered minerals.

In the endeavor to increase the amount of saturant which will be absorbed by the base felt it has been proposed to apply the impregnating material, such as hot asphalt saturant, to one face of the sheet in order to expel through the other face of the sheet the air and any moisture that may be carried by the sheet because of its porous absorbent capacity. By thus removing the air and moisture there are avoided certain difficulties in the roofing products made from such an impregnated sheet. Among these difficulties is the formation of blisters when the roofing is subjected to summer heat and sun causing expansion of the air and more particularly of the moisture and water vapor. This expansion tends to form a pocket and to push off the coating and the surfacing material. Moreover, when the felt base is not thoroughly saturated with the asphalt saturant it remains somewhat absorbent to moisture which, in addition to causing blisters, may cause decay of the fibrous material of the base and early disintegration of the roofing sheet. By applying the asphalt saturant from one side of the sheet and continuing the application until the saturant appears at the other face of the sheet the voids in the felted structure may become completely filled up with the saturant.

Such a process is described in the patent to John E. Miller, No. 1,636,750, of July 26, 1927. It is a feature of the process of this patent, in addition to applying the asphalt saturant at one face of the sheet and in several successive applications as the sheet is moved over a series of loop forming rollers, that sufficient time is provided between the applications to permit the sheet to absorb or draw into itself the saturating material applied by means of a spray or jet at said face of the sheet. The applications are repeated in sufficient number to insure that the saturation appears at the opposite face of the sheet and blackens the sheet at said opposite face at least for the greater portion of its area. As disclosed in said patent the sheet is then passed through a bath of aphalt saturating material similar to that used in the prior art process first described above. The sheet thus has applied to it at both faces a final application of the saturating material. In practice it is then passed to a set of heated rolls called drying-in rolls to insure that the temperature of the sheet and the impregnating asphalt is maintained for sufficient time to complete the requisite absorption of the asphalt saturant. The sheet is then carried to a coating device where at both faces of the saturated sheet there is applied a coating of asphalt of higher melting point than the saturant to seal the saturated sheet at both faces thereof. Thereafter the sheet may be surfaced with a granular mineral material referred to above in the conventional manner.

The present invention has for an object the further improvement of the impregnation and saturation of a felt base sheet, particularly of roofing felts, with asphalt saturants. The invention constitutes an improvement on the process disclosed in the Miller Patent No. 1,636,750 for the purpose of securing a greater degree of saturation and preventing pocketing of air and moisture carried by the air which may occur in the practice of the process of said Miller Patent No. 1,636,750. In the practical carrying out of the process of said Miller Patent No. 1,636,750, because the sheet, at the face thereof which is opposite to that at which the asphalt is applied, may not have had the air and moisture completely driven through said opposite face before the sheet passes into the bath of asphalt saturant as above referred to, a certain amount of air and moisture may become entrapped at said opposite face of the sheet. Moreover, because the con-

tinuously moving sheet of necessity moves from the air into the mass of saturant contained in the bath it may carry air into the bath at both faces of the sheet, which air may become entrapped beneath the saturant thus applied. The coating in some cases may thereafter be immediately applied and may seal the thus entrapped air in the saturated and coated web. In other cases a looper, that is, an apparatus for looping or festooning the length of the sheet in the air, is used between the saturating bath and the point of application of the coating of higher melting point asphalt. In such cases, even if the entrapped air is able to escape from the saturant, there occurs a contraction of the saturating material by virtue of its cooling in the looper. This contraction may cause air and moisture to be drawn in at both faces of the saturated sheet, which also may be trapped by the coating thereafter applied.

In order to overcome this and other undesirable effects experienced in the practical carrying out of the process of saturating felted webs, and particularly by processes similar to or in accordance with the process of the Miller Patent No. 1,636,750, the invention proposes to modify the process described in the Miller Patent No. 1,636,-750. Instead of passing the sheet into the bath of asphalt saturant as proposed in the Miller Patent No. 1,636,750, the invention proposes to apply to that face of the sheet at which the saturating material has been initially applied a sealing coating of higher melting point asphalt at such time and at such a point in the travel of the sheet that the saturation and impregnation of the sheet by the saturant and coating applied at said face will be secured to a predetermined degree. As has been mentioned above, in the practice of the Miller process the application of the asphalt at one face of the sheet is continued until the asphalt appears and blackens a substantial part of the area of the opposite face of the sheet. In such practical operation of the Miller process the sheet may thus have absorbed 90% or more of the amount of saturant which it could take up if completely saturated at the temperature of the saturant. Within the scope of the invention the application of the sealing coating at said first face of the sheet may be effected when any degree of saturation of the sheet has been accomplished by the saturant entering the sheet at said first face thereof. In practice, however, the invention proposes to carry the saturation of the initially applied saturant to the degree usually accomplished in the practice of the Miller process. In some cases, however, a greater degree of saturation of the sheet approaching or substantially equal to complete saturation thereof at the temperature of the saturant may be effected by application of the saturant at the first face of the sheet before applying the coating to seal the saturant at said face of the sheet. In general, however, the coating is applied to the sheet before substantial contraction of the saturant which would draw air or moisture in the web has occurred.

In order to effect complete saturation of the felted web, particularly in such cases where the saturation through the first face of the sheet is not completely secured at the opposite face of the sheet, saturating asphalt may also be applied at said opposite face in successive steps in the manner disclosed in the Miller Patent No. 1,636,-750. The residual air and moisture, if any, contained in the felted web at said opposite face, by virtue of the heat of the asphalt saturant thus applied to this face of the sheet is driven out through the relatively thin layer of asphalt saturant which is taken up by the felt at this face of the sheet. Thus there may be accomplished complete saturation of the sheet to the desired degree with the exclusion of air and moisture. Immediately after completing the saturation of the sheet at said opposite face a sealing coating of higher melting point asphalt may be applied to said opposite face to effect final sealing of the saturated felt sheet.

In this manner before substantial cooling of the saturated web takes place, which would draw air and moisture into the face or faces thereof at which the saturating material is applied, the sealing coating is applied to said face or faces of the sheet to seal said faces so as to prevent air and moisture thereafter from entering the structure of the web. The heavier higher melting point coating material thus applied is present to follow the saturant into the structure of the felted web as the saturant therein contracts. Thus there is maintained complete filling of the voids and interstices between the fibers of the felted structure and the complete saturation of the web carrying on its faces the coatings referred to.

A further feature of the invention which may be utilized in some cases relates to the means for insuring that the saturation applied at the face of the sheet penetrates through the sheet to the opposite face thereof and substantially completely impregnates the sheet at said opposite face. While such a condition of the sheet may be accomplished by increasing the number of applications and the quantity of the asphalt saturant at the initial face of the sheet until the saturant appears at the opposite face in sufficient amount to insure that the whole of said opposite face shall be covered and impregnated with the asphalt saturant, according to my invention I may insure the spreading and the complete saturation at said opposite face by passing said sheet in contact with a spreading device which will spread the excess asphalt appearing at separated places on said opposite face so as to cover the whole surface of said opposite face.

A further feature of the invention relates to subjecting the sheet to a slight squeezing action when the asphalt applied at the first face of the sheet has appeared at the opposite face thereof to the desired degree. While in the prior art sheets, to which at a face thereof asphalt has been applied, have been subjected to a squeezing action to limit the amount of asphalt carried upon or in the sheet it has not heretofore been contemplated that the asphalt saturant which has been applied at one face of the sheet and carried therethrough by the capillary action of the fibrous structure of the sheet so as to appear at the opposite face thereof may be distributed in the fibrous structure at said opposite face and spread upon said opposite face by utilizing a slight squeezing action. According to the invention the slight squeezing action to which the sheet is subjected causes the asphalt carried by the fibrous structure of the sheet to a slight extent to be squeezed out upon the opposite not yet completely saturated face of the sheet. Thus an excess of saturant temporarily appears on said opposite face of the sheet and while so appearing may be spread thereover so as to effect complete and uniformly distributed saturation of the structure at this opposite face.

The spreading device above referred to may

also embody the device for effecting this squeezing action. Particularly when according to the invention the asphalt saturant carried by the fibrous structure of the sheet has been sealed in by the sealing coating at the first face of the sheet, under the squeezing action return of this asphalt saturant to the first face of the sheet is prevented and the whole of the squeezing action is effective to squeeze asphalt out upon the opposite face of the sheet. Upon release of the sheet from the squeezing action some of the asphalt saturant which has ben squeezed out upon said opposite face may return to the inner fibrous structure of the sheet but such excess as has been carried by the sheet at said opposite face has become spread and uniformly distributed at said opposite face.

Immediately after completion of the spreading of this excess asphalt which has passed completely through the sheet and the completion of the saturation at said opposite face I may apply the second coating above referred to so as to seal the saturant in the sheet at said opposite face. In such case the use of the second application of asphalt saturant according to the Miller process as above referred to becomes unnecessary. Within the scope of the invention the applications of the higher melting point asphalt as coatings on the two faces of the sheet may be made with only a short time interval therebetween, particularly when with the cooperation of a spreading device above described, or other means, the method of initial saturation from one face of the sheet only becomes effective to fully saturate the sheet and make it ready to receive the applications of the higher melting point coating asphalt.

In order, however, to secure a better control of the thickness of the coatings on the two faces of the sheet, preferably the coating applied to the second face of the sheet is applied at a point somewhat removed from that at which the coating is applied to the first face of the sheet. By thus spacing lengthwise of the movement of the sheet the points of application of the coating asphalts, a film or layer of coating of definite thickness may be secured upon the face at which the initial saturation is applied to the sheet. This layer or film of coating asphalt may be printed on from a roll on which the coating is controlled to a definite thickness. This control may be accomplished by any of the conventional methods, such as doctor blades acting against the printing roll. The film thus applied to the sheet may be somewhat in excess of that required upon said face of the sheet. By passing the coated face of the sheet against or over a scraper positioned so that the sheet will bear against the edge of the scraper with substantially uniform pressure the coating remaining on the sheet may be kept of uniform thickness regardless of variations in the surface contour of the sheet lengthwise thereof. Application of the coating on the opposite face may be similarly effected, or in some cases the coating applied at this opposite face of the sheet may be gauged so as to secure a uniform thickness of the finished coated sheet.

By the above methods of saturating and coating a felted web, such as a roofing felt for production of asphalt roofing, the usual dip tank or coating pan containing a bath of high melting point asphalt commonly used is eliminated, with the result that the tension necessary to draw the sheet through the bath is eliminated. No great amount of tension is necessary to draw the sheet over the coating or printing rolls which are used for printing the coating on the sheet. Especially with coatings which are filled with comminuted mineral materials and which, therefore, are heavy and viscous, this reduction in the amount of tension is appreciable. In addition it is necessary to handle less coating when the coating is applied with the printing roll than when coating is applied to both faces of the sheet by passing the sheet through a bath of coating in the coating pan. These conditions effect savings by eliminating breaks and consequent waste, and the loss of time and expense caused by such breaks. An improved saturated and coated sheet is obtained, one which carries a greater amount of saturation and a more uniformly controlled coating. Moreover, a better bond between the coating and saturated sheet is effected by virtue of applying the coating to the saturated sheet substantially immediately upon completing the saturation of the sheet at the respective faces thereof.

The invention will be further understood from the description of the drawing to follow, in which the single figure shows a diagrammatic elevation of the apparatus used to carry out the process of the invention.

At the left hand portion of the figure is shown a saturating apparatus similar to that disclosed in the Miller Patent No. 1,636,750. In connection with such a saturator commonly the sheet 1 is delivered in the direction of the arrow to the roll 3 from the dry felt looper or other container for a length or roll of dry, unsaturated felt. From the roll 3 the dry felt 1 passes downwardly to and around the roll 5 a distance which may be 8 to 12 feet. In this downward movement, preferably adjacent to lower roll 5, asphalt heated to a temperature, which may be between 350° F. and 450° F. to secure the necessary fluidity for saturation, is delivered in the form of a jet or spray from the pipe 6. This temperature may vary depending upon the type and composition of the felt to be saturated and the quality of the asphalt used. In the passage of the sheet 1 upwardly from the roll 5 to the roll 7 and from roll 7 downwardly toward roll 9 time is available for the saturant applied through the pipe 6 to be absorbed by the felt sheet 1. At 8 is shown a scraper bearing against the face of the sheet at which the asphalt saturant is applied to scrape therefrom any of the asphalt saturant which may have partially congealed upon the outer portion of the applied saturant. Thereafter from the pipe 10 a second application of asphalt saturant in the form of a spray or jet is directed to the same surface of the felt to which the previous application of asphalt saturant was directed. During the passage of the sheet around the rolls 9 and 11 and downwardly towards the roll 13 further absorption of the asphalt saturant occurs. Adjacent this downwardly moving stretch of the sheet 1 are arranged another scraper 8 and another jet pipe 10 acting similarly to the previous scraper and jet pipe. During further passage of the sheet 1 over rolls 15, 17, 19, 21, 23 and 25 additional scrapers 8 and jets 10 act respectively to remove any congealed surplus asphalt and for the further application of the saturant. The number of rolls 3 to 25 may vary to secure the passage of the saturant through the sheet to the face thereof which is opposite that against which the jets of asphalt are directed. In the particular embodiment illustrated in the figure the number of flights or stretches of the sheet in passing over the rolls 3 to 25 may be taken to

represent those necessary to effect about 90% of complete saturation of the sheet, with the asphalt appearing upon the opposite face of the sheet. This selection of the number of applications of asphalt by means of jets 6 and 10 may be determined for practical reasons of space, differences in the weight and absorptive capacities of the felt being treated, variations in the quality of the asphalt, and other considerations.

In the passage of the sheet upwardly from the roll 25 the scraper 12 is arranged adjacent the face of the sheet to which the asphalt has been directed to remove therefrom that excess of the asphalt applied by the sprays 10 which would interfere with the application of the coating about to be applied. This scraper 12 is thus arranged adjacent the roll 25 so that the asphalt which must be removed is so removed before it has had the opportunity to chill. The sheet which has thus had the excess asphalt removed therefrom is then passed upwardly to the set of rolls 26 which may be heated by suitable means to maintain the asphalt at proper temperature and prevent undue cooling of the asphalt while at the same time the sheet has time to absorb the asphalt which has been applied to it at one face thereof during its passage from the roll 25 to the roll 27. This roll 27 forms part of the coating apparatus.

Saturated sheet 1 moving in the direction of the arrow passes around the roll 27. In contact with the opposite side of the sheet and with its periphery moving with the sheet is arranged the roll 29 dipping in the asphalt 30 carried in the coating pan 31. The roll 29 is driven by suitable means not shown, and carries asphalt from the bath 30 upwardly toward the sheet 1 passing around the roll 27. A doctor blade 32 is arranged in relation to the roll 29 to determine the thickness of the coating carried by the roll 29 for application upon the face of the saturated asphalt sheet 1. It will be noted that this coating which, as in the normal roofing practice, is of higher melting point than the saturant, is applied to that face of the sheet at which the saturant has been directed to the sheet during the saturation thereof.

Also arranged adjacent to the roll 27 and so that the coated face of the sheet passes between the roll 27 and the roll 35 is a scraper 33. This scraper is arranged in such relation to the sheet that the sheet bears against the edge thereof with a substantially uniform pressure. As the thickness of the felted sheet or web may vary and, therefore, the face surface thereof may be of irregular contour rather than a plane surface, in order to secure uniform thickness of coating upon this face of the sheet the scraper under the substantially uniform pressure of the sheet thereagainst acts to scrape off the excess coating but to leave upon this face of the sheet a coating of substantially uniform thickness conforming to the contour of the face of the base sheet, that is, to the elevations and depressions in the surface of the sheet.

The sheet thus coated with a higher melting point asphalt 30 contained in the coating pan 31 passes over the roll 35 which at its lower portion dips into a mass of comminuted material 36 such as talc contained in the receptacle 38. There is thus applied to the coating 30 upon the sheet a mineral surfacing which will prevent the coating sticking to the rolls in contact with which the sheet subsequently passes in the roofing machine and, as well, when the finished product is handled.

From the roll 35 the sheet 1 passes around roll 37 and around rolls 39, 41, 43, 45, 47, 49, 51, 53 and 55 arranged similarly to the saturator of the type of the Miller Patent No. 1,636,750. Adjacent the downwardly moving stretches of the sheet 1 are arranged pipes 40 for directing a jet or spray of saturating asphalt against the opposite face of the sheet 1 from that at which the initial application of saturating asphalt was made through the jet pipes 6 and 10. Also arranged adjacent this opposite face sheet and above the jets 40 are scrapers 42 for removing any congealed excess asphalt applied by the previous spray 40. The stretches of the sheet 1 between the rolls 43, 45, 47, 49, 51, 53 and 55 provide for the absorption of the asphalt in the manner similar to that of the Miller Patent No. 1,636,750.

It will be noted that the first application of the saturant by means of the sprays 6 and 10 was sealed into the sheet 1 when the asphalt applied at this face of the sheet substantially fully impregnated the sheet at said face and when the excess had been removed from said face. After the application of the higher melting point coating 30 the entrance of air or moisture into the sheet through said face thereof is prevented. The saturation of the sheet at the other face thereof then is completed by application of asphalt through the spray pipes 40. The asphalt delivered through the pipes 40 is at a temperature such as will secure the necessary fluidity for absorption of the asphalt into the sheet through this opposite face thereof. Thereafter the sheet should be sealed at this opposite face in a manner similar to that carried out by the printing roll 29. For this purpose the sheet 1 passes from the roll 55, over the break roll 56 to secure proper alignment of the sheet, and into the device for subsequent treatment.

In the particular embodiment illustrated in the figure roll 57 is arranged at the upper face of the sheet 1, that is, at that face upon which the second application of asphalt has just been made. The weight of the sheet is carried by the roll 58 which conveniently may dip into the pan 59 carrying a quantity of talc or mica 60 to prevent sticking of the roll 58 to the bottom face of the sheet 1. The roll 57 thus contacting the upper face of the sheet serves to spread over this face any asphalt applied through the sprays 40 which may not yet be absorbed by the felt and to insure that the sheet at this face thereof shall be substantially uniformly and completely saturated before receiving the sealing coating to be applied to this face of the sheet. The roll 57 preferably is a rubber roll or composition roll which would have the necessary surface characteristics effectively to spread the asphalt upon the face of the sheet with which it is in contact.

From the rolls 57 and 58 the sheet passes beneath a pipe or pipes 65 for delivery of asphalt of high melting point to the upper face of the sheet 1 to coat and seal the sheet at this face. The roll 67 serves to spread the coating asphalt over the face of the sheet, the roll 69, between which and the roll 67 sheet 1 passes, serving to maintain the surface of the sheet 1 in contact with the roll 67. Thus the coating is applied so as to secure a uniform thickness of the finished coated sheet. Thereafter from a suitable hopper 71 having feed roll 72 slate or other granular surfacing material may be delivered to

the sheet for surfacing said coating upon the sheet.

In some cases the second application of asphalt saturant through the pipes 40 may be dispensed with. This is particularly true when the application of saturating asphalt from the sprays 6 and 10 has been carried out under such conditions that the sheet has been substantially fully and uniformly saturated through to and upon the opposite face thereof as it is delivered to the roll 27. By the use of a suitable number of sprays 10 and control of the temperature of the saturant and by proper adjustment of the apparatus this condition of the sheet may be obtained. Immediately upon thus securing the substantially complete saturation of the sheet sealing of the opposite face thereof by the application of coating should be effected in order to prevent drawing in of air and moisture by contraction of the saturating asphalt carried by the sheet. This may be accomplished by means of print roll 80 shown adjacent the roll 37 supplied from a fountain 82 containing a supply 83 of high melting point asphalt. In order to surface the coating thus applied a hopper 85 provided with feed roll 87 may be arranged adjacent the stretch of the sheet 1 between the rolls 37 and 39 to apply the surfacing material 86 to the coated sheet. The construction consisting of the rolls 41 to 55 then may be dispensed with.

If desired, or necessary, a spreader roll 90 may be placed immediately after the roll 35 and in contact with said opposite face of the sheet for the purpose of spreading any excess of the saturating asphalt which may exist upon said opposite face of the sheet and to secure uniform and complete saturation at said face before application of the coating by the roll 80. The sheet 1 may be held in contact with the roll 90 by means of the roll 92. It will be seen that effective sealing of both faces of the sheet may be accomplished within the scope of the invention by the methods and means which form a part thereof, so as to secure and maintain a complete and uniform saturation of the sheet at both its faces.

Having thus described my invention what I now claim is:

1. Process of impregnating an absorbent web which comprises applying the impregnating material at one face of the web, continuing the application of said impregnating material at said face of the web until the web is impregnated through to the other face of said web, applying a sealing coating at said face of the web at which said impregnating material is applied to seal said web against absorption of air and moisture at said face thereof while leaving said other face of the web unsealed until the web at said other face is completely impregnated, completing the impregnation of said web, and then applying at said other face of the web a sealing coating to prevent absorption of air and moisture at said other face of the web.

2. Process of impregnating an absorbent web which comprises applying the impregnating material at one face of the web until the impregnating material appears at the opposite face of the web over a substantial portion of the area of said face, applying at said first face of the web before substantial contraction of said impregnating material in said web takes place a sealing coating to prevent absorption of air and moisture at said face of the web, applying impregnating material at the opposite face of said web to complete the impregnating of said web, and applying at said opposite face of the web a sealing coating to prevent absorption of air and moisture at said opposite face of said web.

3. Process of impregnating an absorbent web which comprises applying the impregnating material at one face of the web until the web is substantially completely impregnated through to and at the opposite face of the web, applying at said first face of the web before substantial contraction of said impregnating material in said web takes place a sealing coating to prevent absorption of air and moisture at said face of the web, and applying at said opposite face of the web before substantial contraction of the impregnating material at said opposite face takes place a sealing coating to prevent absorption of air and moisture at said opposite face of the web.

4. Apparatus for impregnating a web of felted structure comprising means for applying impregnating material at one face of said web and so as to drive from the other face of the web air and any moisture contained in said felted structure, means for applying at said first face of the web a sealing coating to prevent entrance of air and moisture at said face of the web, means for completing impregnation of said web, and means for applying to said other face of said web a sealing coating to prevent entrance of air and moisture at said face of the web.

5. Apparatus for impregnating an elongated web of felted structure comprising means for moving the web in the direction of its length, means for applying impregnating material at one face of said web and so as to drive from the other face of the web air and any moisture contained in said felted structure, means for continuing the impregnation of said web at said face until said impregnation at said face is substantially completed, and means for applying at said face a sealing coating to prevent absorption of air and moisture at said face of the web, means for applying impregnating material at said other face of said web to complete the impregnation of said web, and means for applying a sealing coating at said other face of said web to prevent absorption of air and moisture at such other face of said web.

6. In an apparatus for impregnating an elongated web of felted fibrous structure, means for moving the web in the direction of its length, a plurality of means spaced along the length of said moving web for flowing upon said face of the web at said spaced points asphalt saturant in heated condition to effect impregnation of the web from said face thereof through the felted structure to the other face thereof, means for controlling the amount of saturant thus applied to the web to leave said structure substantially saturated at said first face without substantial excess of the asphalt upon said first face of the web, means for applying to said first face of the web before substantial contraction of the saturating asphalt due to cooling occurs a sealing coating of asphalt to prevent absorption of air and moisture by the saturated web at said face thereof as said saturant contracts, means for flowing asphalt saturant upon the opposite face of said web at points spaced along the length of the moving web to complete the saturation of said web, means for controlling the amount of asphalt saturant thus applied to complete the saturation without substantial excess of said asphalt saturant upon said opposite face of the web, and means for applying a sealing coating of asphalt

to said opposite face to prevent absorption at said face of air and moisture by the saturated felted structure.

7. Process of impregnating an absorbent web which comprises applying impregnating material at one face of the web until the web is impregnated through to the opposite face thereof over a substantial part of the area of said opposite face, applying a sealing coating at said first face of the web to seal said web against absorption of air and moisture at said face thereof while leaving said opposite face of the web unsealed, and squeezing said impregnated and coated web to cause impregnating material carried thereby to complete the impregnation of said web at said opposite face.

8. Apparatus for impregnating an elongated web of felted structure comprising means for moving the web in the direction of its length, means for applying impregnating material at one face of said web and so as to drive out at the other face of the web air and any moisture contained in said felted structure, means located along the length of the web in the direction of its movement from said impregnating means and supplied from a source separate from that of said impregnating material for applying at said face a sealing coating to prevent absorption of air and moisture at said face of the web, and means located at the opposite face of the web and along the length of said web in the direction of its movement from said means for applying said sealing coating for applying impregnating material only to the opposite face of said web.

9. Apparatus for impregnating an elongated web of felted structure comprising means for moving the web in the direction of its length, means for applying impregnating material at one face of said web and so as to drive out at the other face of the web air and any moisture contained in said felted structure, means located along the length of the web in the direction of its movement from said impregnating means for applying at said first face a sealing coating to prevent absorption of air and moisture at said face of the web, means located along said web in the direction of its movement from said means for applying said sealing coating for applying impregnating material to the opposite face of said web, and means for applying to said opposite face of the web a sealing coating to prevent entrance of air and moisture at said face of the web.

10. Process according to claim 7 which comprises applying to said opposite face of the web a sealing coating to prevent absorption of air and moisture at said opposite face of the web.

11. Apparatus for impregnating an elongated absorbent web which comprises means for moving said web in the direction of its length, means for applying impregnating material to one face of said web and so as to drive out at the other face of the web air and any moisture contained in said absorbent web, means located along the length of the web in the direction of its movement from said impregnating means for applying to said first face a sealing coating to prevent entrance of air and moisture at said face of the web, means located at the opposite face of the web and along the length of said web in the direction of its movement from said means for applying said sealing coating for applying impregnating material only to said opposite face of said web, and means located between said two last named means for squeezing said web to cause impregnating material carried thereby to appear upon said opposite face of said web.

12. Apparatus for impregnating an elongated absorbent web which comprises means for moving said web in the direction of its length, means for applying impregnating material to one face of said web and so as to drive out at the other face of the web air and any moisture contained in said absorbent web, means located at the opposite face of the web and along the length of the web in the direction of its movement from said means for applying impregnating material at said first face for applying impregnating material only to said opposite face, and means located between said last two means for squeezing said web to cause impregnating material carried thereby to appear upon said opposite face of said web.

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