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IMPREGNATED REINFORCING STRUCTURE FOR WATERPROOFING SYSTEMS

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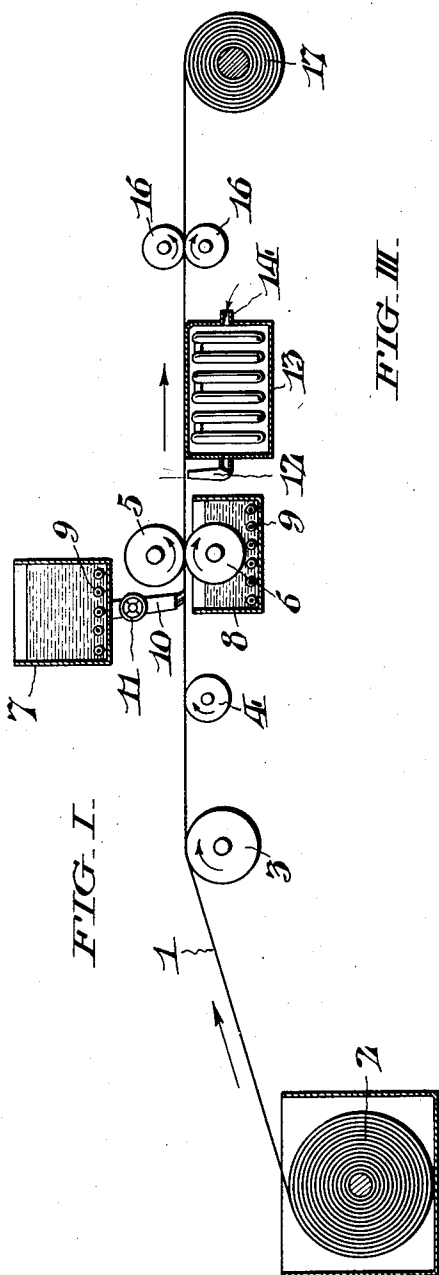


FIG. I.

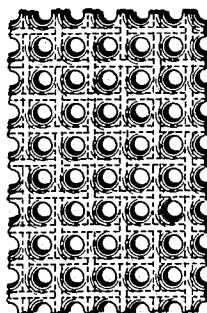


FIG. III.



FIG. IV.

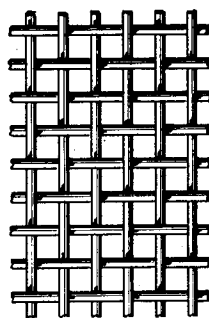


FIG. II.

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IMPREGNATED REENFORCING STRUCTURE FOR WATERPROOFING SYSTEMS.

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This invention relates to the art of reinforcing bituminous waterproofing systems used to waterproof concrete and other structures. Heretofore it has been customary to employ in such waterproofing systems waterproof fabrics or felts consisting of woven or felted fabrics, which are thoroughly coated with bituminous waterproofing material. In use, such waterproof fabrics are associated with other layers of bitumen, above and below the fabric layer, thus securing the requisite strength and waterproofing qualities.

I have found that difficulties arise in the proper construction of a waterproofing system upon this theory. This is due partly to the unintentional imprisonment of air between the layers, thus forming bubbles or air pockets which result from the attempt to place upon the lower bituminous layer, and in complete contact with it, the coated waterproof fabric which is to strengthen the layer and through which imprisoned air cannot escape; and partly to the lack of homogeneity between the two layers of bituminous substance which are completely separated by the waterproof fabric and thus prevented from coalescing.

According to my invention, I use as the reinforcement or strengthening element for a bituminous waterproofing system an open-work structure,—that is to say, an open textile fabric of which the fibres and threads have been impregnated and coated with bitumen (whereby the desired preservative qualities are secured), but in which the bitumen does not completely cover or coat the surface or surfaces of the fabric or completely seal its interstices or pores. Accordingly, the resulting reinforcement has the desired strength and durability without the disadvantage of unintentionally imprisoning air in the waterproofing system, and without the tendency to become a separate layer or lamination of the waterproofing system such as will prevent interpenetration of the bitumen of the lower layer and that of the upper layer. At the same time, its bituminous impregnation and coating cause it to coalesce with and adhere to the bitumen of the waterproofing system that is afterward applied to it much better than if it itself had not been previously bituminated at all.

In the practice of my invention I may

employ as the basis or ground work of the reinforcement a rather loosely woven textile, such as muslin or Osnaburg cloth. I may also use burlap or paper textiles, the precise nature of the fibre in the textile being immaterial provided it has sufficient capacity to absorb the bituminous material.

The fibres and threads of such textiles are thoroughly impregnated and coated with a bituminous saturating material such as a blown asphalt fluxed with a suitable petroleum residuum. This impregnating material is heated to say 250° or 300° F., rendering it thoroughly fluid, and the textile to be treated is brought in contact with it in such a way as to remove air and moisture and permit the complete impregnation and coating of the individual fibres and threads thereof, but without any extensive coating of the fabric as such.

It has heretofore been customary to accomplish the production of waterproofing fabrics by passing the fabric beneath the surface of a bath of bituminous substance liquefied by heat. For the purposes of my invention, I find that it is better to apply the hot liquid bitumen to the textile upon both sides as it is about to pass between revolving heated pressure rolls. While the bitumen is still warm and tender, the fabric is passed over a blast of air which punctures any films of bitumen which are spanning the meshes of said fabric, thus insuring the product desired.

In the drawings, Fig. I represents, diagrammatically, an apparatus suitable for the manufacture of my improved water-proof reinforcing fabric.

Fig. II is a fragmentary illustration suggestive of the construction of loosely woven open textile cloth such as I prefer to use as a base or ground work for the reinforcing fabric.

Fig. III is a view of the fabric after application of the waterproofing material; and

Fig. IV is a sectional view of the same.

Referring to Fig. I, the cloth indicated at 1 is drawn from a supply roll 2 and first passed over an idler roll 3 and then over a "worm" roll 4 designed to straighten out the fabric laterally and prevent formation of longitudinal folds or wrinkles. The cloth next passes between the heated pressure or

coating rolls 5—6 by which the waterproofing bitumen is quickly and simultaneously applied and distributed upon its opposite sides. The bitumen is supplied in a molten condition from tanks 7 and 8 heated by pipe coils 9—9. The discharge from the upper tank passes through a spout 10 having a flow regulating valve 11 interposed therein, and is directed for distribution upon the upper surface of the cloth immediately to the fore of the roll 5. The bitumen is applied to the lower surface of the cloth 1 by virtue of having passing contact with the roll 6 which turns partly submerged in the tank 8.

Directly after the application of the bitumen as just described, the doubly bituminated fabric is subjected to a blast of heated air from the subjacent nozzle 12 of a heater conventionally represented at 13. Air under pressure is conducted to the heater through a pipe line 14 from a convenient source of supply not shown. Movement of the fabric through the apparatus is induced by draft rollers shown at 16—16 and it is finally collected up as a finished product at 17. From Figs. III and IV it will be observed that although the crossed threads of the finished fabric are well coated with the bitumen, its open or interstitial appearance is still retained, as a result of having been subjected to the lateral air blast as aforesaid.

A suitable bituminous saturating material for this purpose may be produced from any heavy residuum of petroleum or from a mixture of residuum and a solid native asphalt. My preferred method of production and material are as follows:

I heat a residuum from Mexican or other asphaltic petroleum by suitable means to a temperature of from 400° F. to 550° F., and blast the same with air until it has been converted into a solid asphalt having a melting point of about 300° F. Such an asphalt is thereupon fluxed with petroleum residuum, preferably from asphaltic petroleum but of the same character as the original residuum which has been air blown, having a flash point of about 400° F., in the proportions of about equal parts of each, producing thereby a finished bituminous material having a melting point of from 225° to 250° F. This may be done by adding to the just blown asphalt, while it is still warm and therefore in a liquid condition, about an equal quantity of unblown residuum, and mixing the two together until a homogeneous mixture is produced. It is necessary to avoid the use of air agitation for this mixing operation: accordingly, live steam agitation may be employed, or mechanical stirring.

The advantage in using the fluxed blown asphalt is two fold.

In the first place, all air blown asphalt

contains some light, thin oil as the result of incipient decomposition or cracking of the hydrocarbons by the local overheating incidental to the exothermic chemical reactions of the process. This is present as free oil and for some unknown reason it sweats out of the asphalt in time, causing a soft, greasy surface on the product. While this oil of decomposition or reaction does not recombine with the blown asphalt, I have discovered that it will combine with the unblown residuum of petroleum from which it and the blown asphalt was originally derived.

In the second place, I find the fluxed blown asphalt more advantageous in that while the added residuum quickly absorbs the free oil of the air blown asphalt, it combines more slowly with the asphalt itself. The mixture apparently is a mechanical one, as no known chemical reaction occurs between the several substances involved. However, on account of the selective solubility of the residuum, it first engages and fixes the free oil of decomposition heretofore mentioned. When this freshly prepared compound is brought in contact with the fibres of a woven cloth fabric, a selective action or absorption is found to take place. The fibres first satisfy their absorptive capacity with the more fluid portion of the compound, leaving a film of the less fluid air blown asphalt upon the surface of the threads.

By reason of this selective fluxing of the bituminous compound and selective absorption of the fabric, it is possible, I have discovered, to produce a waterproofing fabric of the type described without the use of a saturating bath and by reason of the rapidity of the treatment to employ with perfect safety temperatures which would, in the use of a saturating bath, be detrimental to the fabric.

It is possible to make a more thorough saturation of the fabric by my methods than by those heretofore in use.

The reinforcement which I thus produce is capable of lasting for an indefinite period by reason of the complete protection of each individual fibre, and I find that this protection is more complete and the resistance to decay greater than where the effort has been to impregnate and coat the entire fabric as such. A waterproofing system produced by embedding such a bitumenized reinforcement within a layer of waterproofing bitumen has the desired qualities of strength, homogeneity, and durability, and may be compared to the commonly practiced systems of metallic reinforcement for concrete structures with expanded metal. The impregnated reinforcing fabrics of my invention (compared with prior waterproofing fabrics) are less sticky, and are more easily handled both in transportation, marketing

and laying of the material in the work. Being more flexible, they more readily adapt themselves to any irregularities in the shape of the waterproof layer or system which it is desired to produce.

When I speak of the material as "open" or interstitial, I do not mean to imply that all of the interstices of the fabric must be open, since in practice there may be some accidental closure of some of the interstices. It is only necessary that in the main the open work structure be maintained.

Having thus described my invention, I claim:

1. A reenforcement for a bituminous waterproofing system comprising a fibrous textile fabric having its threads impregnated with bitumen, but having open meshes in

use permeable to and readily coalescent with applied bitumen of such waterproofing system by virtue of its open character and of the bituminous impregnation.

2. A reenforcement for a bituminous waterproofing system comprising a loosely woven fibrous fabric with its threads impregnated and coated with bitumen, but with open meshes.

3. A reenforcement for a bituminous waterproofing system comprising a textile fabric with its fibres and threads impregnated and coated with fluxed blown asphalt, but with open meshes.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 23rd day of February 1922.

CHARLES N. FORREST.