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PROCESS OF PRODUCING FELTED MATERIALS CONTAINING BITUMEN

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My invention is related to the production of felted sheets from bituminous pulps, which are pulps in which bituminous material exists in minute, uncoated particles in stable suspension with the fibrous material, and the object of my invention is the provision of a way of making such sheets containing a softer bitumen than has heretofore been possible.

Methods of making bituminous pulps have been described in the co-pending applications of Harry C. Fisher, Ser. No. 314,551, filed October 23, 1928, and of Earl P. Stevenson and Harry A. Buron, Serial No. 316,611, filed November 1, 1928. These ways comprise a pre-mixing, i. e. an association of bituminous material with fibrous material, and a subsequent pulping or beating operation. Thus it is possible to introduce wet fibrous material and bituminous material into a mixer, and to mix them together to the extent of producing a mass which will break down when worked in the presence of water, and may be beaten into a true pulp, feltable upon a screen. The bitumen in such processes is generally non-solid during the pre-mixing stage, and may be so during the beating stage, but before felting, it is the practice to cool it (this is readily accomplished in the necessary dilution of the stock before it comes onto the paper making machine) to such an extent as to carry the bitumen below its adhesive range. This procedure avoids the gumming up of the paper making instrumentalities. The bitumen is not again softened until after the sheet has been felted, the water driven out, and the heat of the drying rolls on the paper making machine applied to it. Thus the association of the bitumen with the fibers in felted or webbed form, prevents any difficulty.

It has been considered necessary, at least with the paper making instrumentalities in general use, to employ a bitumen hard enough to be non-tacky at the felting temperature. Preferably one is also chosen, which will be as soft as possible at the pre-mixing temperature, and these requirements have led to the preferred use of bitumens which are both comparatively hard, and have a short gummy range. While many factors govern this matter, I have not in general found it advisable to make bituminous pulps containing a bituminous material softer than one having a penetration of say 20 at 77–100–5.

As hereinabove stated, the primary object of my invention is to provide a way of making sheets containing bitumens substantially softer than this, and I accomplish the object of my invention by that process, of which I shall now describe an exemplary embodiment, it being understood that a number of modifications may be made in it without departing from the spirit of my invention.

Briefly my invention comprises the formation of a bituminous pulp containing the required fibrous ingredient and a portion of the required bituminous ingredient, which portion will be of a character convenient for the manufacture of a bituminous pulp. To the bituminous pulp so formed, I add a percentage of bituminous material softer than that desired in the finished article, and I add this bituminous material in a non-adhesive form. It will, of course, be so soft as to make trouble upon the paper machine, unless rendered non-adhesive. The fibrous material and the two bituminous materials, in the practice of my invention, felt out together upon the screen, and when the sheet has dried, and heat is applied to it, the two bituminous materials flux together quite uniformly. They will have been chosen as to characteristics and respective proportions so that when fluxed together the resulting bituminous substance is of the required softness. My invention is important in that for certain uses, exemplary of which are roll roofing and flooring, bitumenized webs are required, which are softer in their characteristics than those most conveniently produced from the bituminous pulps hereinabove re-

ferred to. As illustrative of my invention, I shall now describe the manufacture of a material which may be compared to a felted web saturated with a bituminous material having a penetration of 56 or thereabouts at 77–100–5. In the exemplary embodiment described, the sheet is intended to have the equivalent of 100% saturation.

I may take 100 parts of fibrous material, comprising 25 parts of rags, 25 parts of kraft pulp, and 50 parts of mixed paper, of which at least the rags have preferably been subjected to some fiber liberating process, such as a beating. The entire fibrous material may be introduced into a mixer in the form of a pre-beaten half stock, or the like, which has been thickened to a plastic consistency. The mixer may be of any kind desired. Exemplary mixers are of the Werner Pfleiderer type, or of a type equipped with a pressure ram to force the materials down into the blades. In the latter type of mixer, by reason of the intense mechanical action, the time cycle is shorter. Into the mixer with the fibrous material, I may introduce 50 parts by weight of 15 penetration asphalt, or a melting point of 140 to 160° F. I mix the asphaltic material and the fibrous material together under the influence of heat, and from time to time add some water to compensate for that which is evaporated. At the end of the mixing operation, I may, if necessary, break down the stock in the presence of water by dilution, and continued mixing, if the product of the mixer is lumpy; and in any event, I will transfer the pre-mixed material to a beating engine, where I will beat it to fit the fibers for felting, adding such amounts of water as may be required.

It is during the beating operation that I preferably add the softer asphalt. In order to render it non-adhesive, I prefer to emulsify it by any one of the processes, which are well known in the art. To the beater I will add, in the present instance, 50 parts of an asphalt of 100 penetration in emulsified form. This asphalt may have a ball and ring softening point of 120 degrees F. or thereabouts. It is then thoroughly mixed with the beaten stock, and the resultant pulp transferred, if desired, to a Jordan for further refining, after which with the required dilution, it will be felted out upon the cylinder molds or screens of the ordinary paper making machines. The felted sheet will pass through squeeze rolls, where some of the water will be pressed out of it, and will then be passed over drying cylinders, where the remainder of the excess water will be evaporated. The heat of the drying cylinders after the expulsion of the water, will cause the bituminous material to melt and flow within the sheet, saturating the fibrous material completely, and fluxing the two different kinds of bitumen together, to form a homogeneous saturant of the required softness and in the required proportions. The presence of the softer material will assist in the fluxing of the hard, although in this instance, the harder asphalt used is one easily softened upon the drying cylinders.

The point at which the bituminous emulsion of soft asphalt is added may be varied. It need not be added in the beater, but can be added and mixed with the beaten or the refined stock at any time before the felting operation. Where the soft bitumen is emulsified with a substance such as waste sulphite liquor, or is emulsified without any dispersing agent as in a colloid mill, the proportions given will hold fairly well, and the completed sheet will have approximately 100% saturation, with an asphalt of approximately a penetration of 56. Where, however, the bitumen has been emulsified with some substance, such as colloidal clay, which acts as a filler, and which adds appreciably to the weight of the combined mass, the percentage of the different asphalts will have to be varied so as to take into account the extra filler weight in attaining the required percentage of saturation, and so as to compensate for the hardening effect upon the binder or saturant, which is the result of the presence of filler.

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

1. That process of making felted sheets of bituminous pulp, containing soft bitumen, which comprises forming a bituminous pulp containing a harder bitumen, and mixing with the said pulp a quantity of a softer bitumen, which has been rendered non-adhesive, felting the combined stock upon a screen and drying and heating the felted product whereby the two bitumens flux together into a homogeneous saturant of the required characteristics.

2. That process of forming felted sheets of a bituminous pulp, which comprises forming a bituminous pulp of fibrous material and bitumen having a penetration substantially less than 25, mixing with the pulp so formed a quantity of bituminous substance in emulsified form having a greater penetration, and felting the combined pulp on a screen.

3. That process of producing felted sheets of a bituminous pulp, which comprises mixing with a bituminous pulp a quantity of emulsified asphalt, felting the said mixed pulp upon a screen, drying the felted structure so formed, and heating it to fuse together the said bituminous substance.

4. That process of producing a felted product of a bituminous pulp, which comprises forming a bituminous pulp of fibrous material, and less than the required final amount of bitumen, the said bitumen being harder than that required in the final prod-

uct, adding to the said pulp a quantity of bitumen sufficient to bring the total quantity to the required amount, the said added bitumen being rendered non-adhesive, and having a pentration sufficient to give when fluxed with said first mentioned bitumen, a bituminous binder of the desired penetration, felting the combined pulp upon a screen, drying the felted structure and heating it sufficiently to flux together said two bituminous substances into a homogeneous saturant of the desired characteristics.

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