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METHOD OF AND APPARATUS FOR FIBRATING EMULSIONS

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Fig. 1.

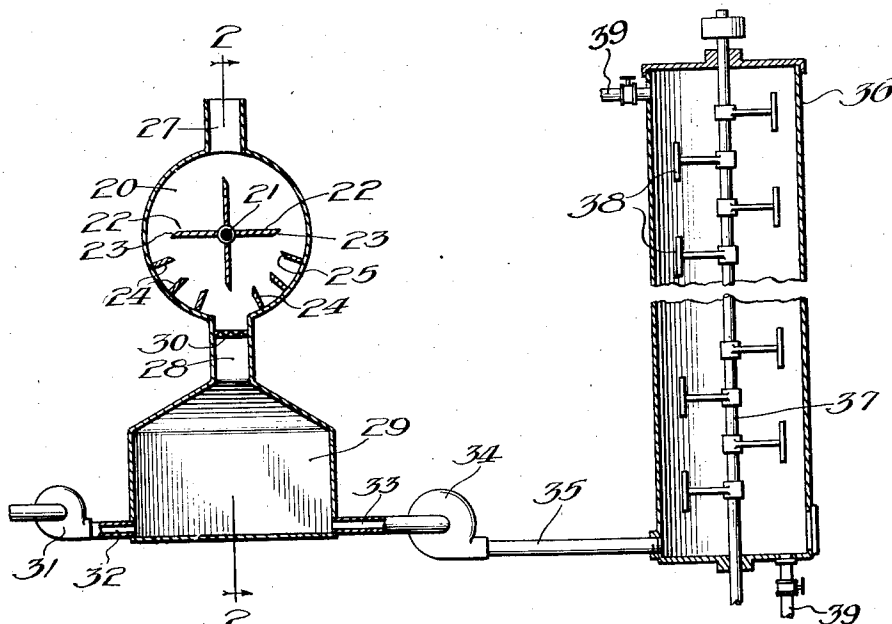


Fig. 2.

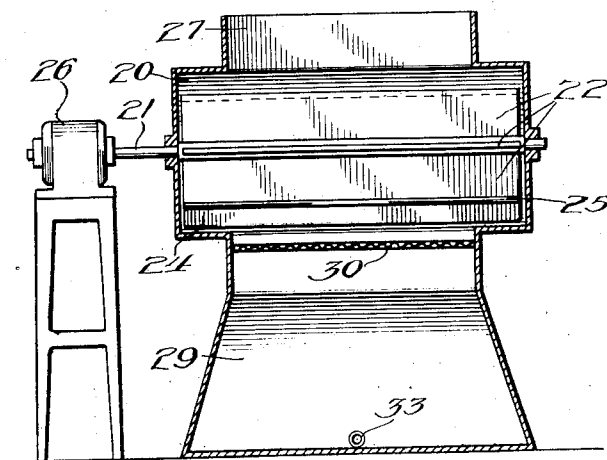
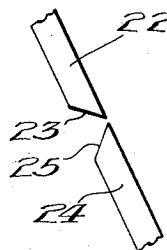


Fig. 3.



Witness:

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UNITED STATES PATENT OFFICE

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METHOD OF AND APPARATUS FOR FIBRATING EMULSIONS

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This invention relates to a method of, and apparatus for, fibrating bituminous compositions, and is concerned more particularly with an improved method of, and apparatus for, incorporating fibrous material in aqueous dispersions of waterproof material, such as asphalt, rubber, or the like.

Watery dispersions of asphalt, tar, pitch, rubber, and similar substances normally immiscible with water are well known and their application to various industrial uses is likewise known. In certain of these uses it is frequently necessary, or at least desirable, to combine with the dispersion, fibrous material of various types to render the dispersed product more plastic so that a single coat or at most, only a few coats thereof will suffice to produce a comparatively thick film or layer of the composition. Thus, where the dispersion product is employed as a roof plastic for repairing old or leaky roofs, or as a roof flashing, it is desirable that the composition be rendered more or less plastic so that it can be troweled in place in relatively thick layers. Again, where dispersions of this general type are combined with cementitious material, as for example, Portland cement, and with fine mineral aggregate such as sand, for making up a mastic composition suitable to the production of flooring, mastic wall structures, etcetera, it is necessary in many instances to fibrating the dispersion in order to eliminate contractional cracks in the finished structure that usually occur therein incident to the setting up of the mastic composition.

The incorporation of fibrous material in aqueous dispersions of bituminous or like substances has heretofore been a rather troublesome procedure and not always productive of the desired uniform dissemination of the fibers in the dispersion. Particularly with some kinds of fibres that are frequently employed, as for example, wool flocks, or other long fibres, there is a pronounced tendency of the fibres to clot or "ball" together in the form of lumps or clusters as they are introduced in the dispersion, and thereby prevent their uniform distribution in more or less individualized condition throughout the dispersion, and this difficulty is sometimes aggravated

when the dispersed particles are not of a desired fine order of subdivision.

My invention is concerned with an improved method of introducing fibers of various sorts into aqueous dispersions of asphalt or the like, and has as its primary object the provision of a method of this type which will enable the fibers to be introduced rapidly into the dispersions without any of the foregoing objectionable effects taking place. To this end, and stating my invention somewhat briefly, I propose to subject the fibrous material, or material which can yield the desired fibers by disintegration, to a shredding or individualizing operation whereby the fibers are separated one from another and become more or less individualized, the individualized fibers being maintained in extended condition with large volumes of air, in which conditions they are then blown or forced under air pressure into a batch of the dispersion while the latter is undergoing a rapid agitating action. To secure the best results in accordance with my invention the dispersion should comprise, or be made to comprise, dispersed particles of a fine state of subdivision.

The invention will be more clearly understood from the accompanying drawing, in which

Figs. 1 and 2 illustrate diagrammatically an arrangement of apparatus that may be used in carrying the invention into practise, and

Fig. 3 is a detail of part of mechanism shown in Figs. 1 and 2.

Referring more in detail to the drawing, the numeral 20 designates a conventional commercial form of disintegrator or shredding apparatus which may comprise an elongated cylinder within which is mounted a longitudinal shaft 21 having fixed thereto a radial series of blades 22, extending longitudinally thereof, the cutting edges 23 of the blades being sharpened to any desired extent. A series of longitudinally extending stationary blades 24 is fixed to the inner wall of the cylinder 20 in the lower portions thereof, for cooperation with the blades 22. The stationary blades 24 are sharpened along their free edges as shown at 25, the pitch of

the cutting edges 25 being substantially equal but directed oppositely to the pitch of the cutting edges 23 on the blades 22. The arrangement of the cooperating cutting blades and their respective cutting edges is such as to provide a relatively small clearance between the effective cutting edges as illustrated in detail in Fig. 3. Rotation of the blades 22 is effected by connecting the shaft 21, directly to a motor 26.

The cylinder 20 is provided along its uppermost portion with a feed conduit 27 through which the fibrous material may be delivered to the disintegrator from any convenient source (not shown). The lower end of the cylinder is joined by a conduit 28 to an enlarged receiving chamber 29, and a foraminous screen or sieve 30 of about $\frac{1}{4}$ " mesh may be mounted horizontally in the conduit 28. A small blower 31 is connected through a passageway or conduit 32 to one of the walls of the receiving chamber 29, while the opposite wall thereof is in open communication through a conduit 33 with the suction end of the blower 34, the pressure outlet of which is connected through a conduit 35, with any form of emulsion mixing apparatus 36.

In place of the blower 31, I may use a steam jet whereby steam, instead of air, may be forced into the chamber 29, the steam serving also to wet the fibers more or less, and thereby permit them to be more easily introduced into the dispersion.

The mixing apparatus 36 may comprise an enlarged tank provided with a rotatable shaft 37 mounted longitudinally therein and carrying a suitable number of paddle blades 38 for stirring or mixing a mass of dispersed bitumen, rubber or other emulsified base.

In carrying the method of my invention into practise with equipment such as above described, the fibrous material to be incorporated in the dispersion is delivered to the shredding or disintegrating device 20. Where wool fibers are to constitute the fibrating material for the dispersion, the material delivered to the shredder will usually be in the form of wool flocks. In some instances cotton linters, shoddy, or even scrap garments composed of the desired fibers may be used as the source of the fibrating material to be delivered to the shredder. In any event, however, the material delivered to the shredder will be disintegrated and the fibers substantially individualized by the cutting and disintegrating action of the cooperating blades. The shaft 21 carrying the rotary blades 22 will generally be operated at a rotational speed of 800 to 900 R. P. M. The disintegrated and individualized fibers will fall by gravity through conduit 28 into the receiving chamber 29 while any lumps or flocks of fibers not sufficiently disintegrated will be retained on the foraminous screen 30

and prevented thereby from entering the chamber 29. The air introduced into the chamber by means of the blower 31 serves to prevent the fibers from settling to the bottom of the chamber, and also, by reason of the large volumes of air thus associated with the fibers, retains the individualized fibers in an extended condition, thus enabling them to be carried along in extended and individualized condition by the blower 34 to be introduced in the form of a fibrous cloud into the dispersion.

Mixer 36 may be charged with emulsion through one of the pipes 39, the other pipe 39 serving as an outlet for the fibrated product. Necessarily, the emulsion must be introduced to the mixer 36 before addition of the fiber, and the material agitated before as well as during the introduction of the fibers. In other words, this operation would be a batch operation. The amount of fiber incorporated in the emulsion may range from 2 to 6%, more or less, by weight of the emulsion, depending upon the use to which it is to be put.

In carrying the invention into practise, I find that where wool fibers weighing about three pounds per cubic foot are employed, the operation is most efficient when the blower 31 is operated to supply 100 to 150 cubic feet of air per pound of fiber withdrawn at 33. A suitable quantity of aqueous dispersion is fed to the beater 36 and undergoes agitation therein through the action of the revolving paddles 38, and while being so agitated individualized fibers are continuously withdrawn from the receiving chamber 29 by the sucking action of the blower into the emulsified or dispersed material. By thus introducing the fibers in more or less individualized condition and in what may be termed a "fibrous cloud" due to the presence of the large volumes of air, into the dispersion while agitating the same, the incorporation of fibrous material is effected in a very smooth manner and the fibers become uniformly disseminated therethrough without any tendency of the fibers to clot or ball together as they are introduced into the dispersion.

It is to be understood that the invention is applicable to the fibrating of emulsions of any particle size, although a superior type of fibrated dispersion product can be secured if the dispersed particles are finely subdivided, for instance, if the dispersion is of such a fine state of subdivision that a great many of the particles are of colloidal order, most of them being within the range of 0.1 to 5 microns, while the largest particles, of which only a relatively small number are present, do not substantially exceed 10 microns in size.

The fibers are incorporated into or absorbed by the dispersion and homogeneously

distributed therethrough in individualized condition with the result that a fibrated dispersion product of uniform consistency and smooth body is produced.

5 I claim as my invention:

1. The method of incorporating fibrous material in aqueous dispersions of substances normally immiscible with water, which comprises disintegrating fibrous material to thereby render the same substantially individualized, and introducing said fibers into the dispersion in a stream while maintaining the individualized condition of the fibers.

2. The method of incorporating fibrous material in aqueous dispersions of substances normally immiscible with water, which comprises disintegrating fibrous material to thereby render the same substantially individualized, and introducing said fibers into the dispersion in a fluid stream while maintaining the individualized condition of the fibers and while the dispersion is being subjected to agitating action.

3. The method of incorporating fibrous material in aqueous dispersions of substances normally immiscible with water, which comprises disintegrating fibrous material to thereby render the same substantially individualized, and forcing said individualized fibers into said dispersion under fluid pressure in a stream in which the fibers are in an extended condition.

4. The method of incorporating fibrous material in aqueous dispersions of substances normally immiscible with water, which comprises disintegrating fibrous material to thereby render the same substantially individualized, and forcing said individualized fibers while extended with large volumes of air, into said dispersion while the dispersion is being subjected to agitating action.

5. The method of incorporating fibrous material in aqueous dispersions of substances normally immiscible with water, which comprises subjecting the fibrous material to a mechanical action whereby to individualize the same, and introducing said fibers into the dispersion in a stream while maintaining the individualized condition of the fibers.

6. The method of incorporating fibrous material in aqueous dispersions of substances normally immiscible with water, which comprises subjecting the fibrous material to mechanical action to individualize the same, and introducing said fibers into the dispersion in a fluid stream while maintaining the individualized condition of the fibers and while the dispersion is being subjected to agitating action.

60 In testimony whereof I affix my signature.
EDWIN O. GROSKOPF.