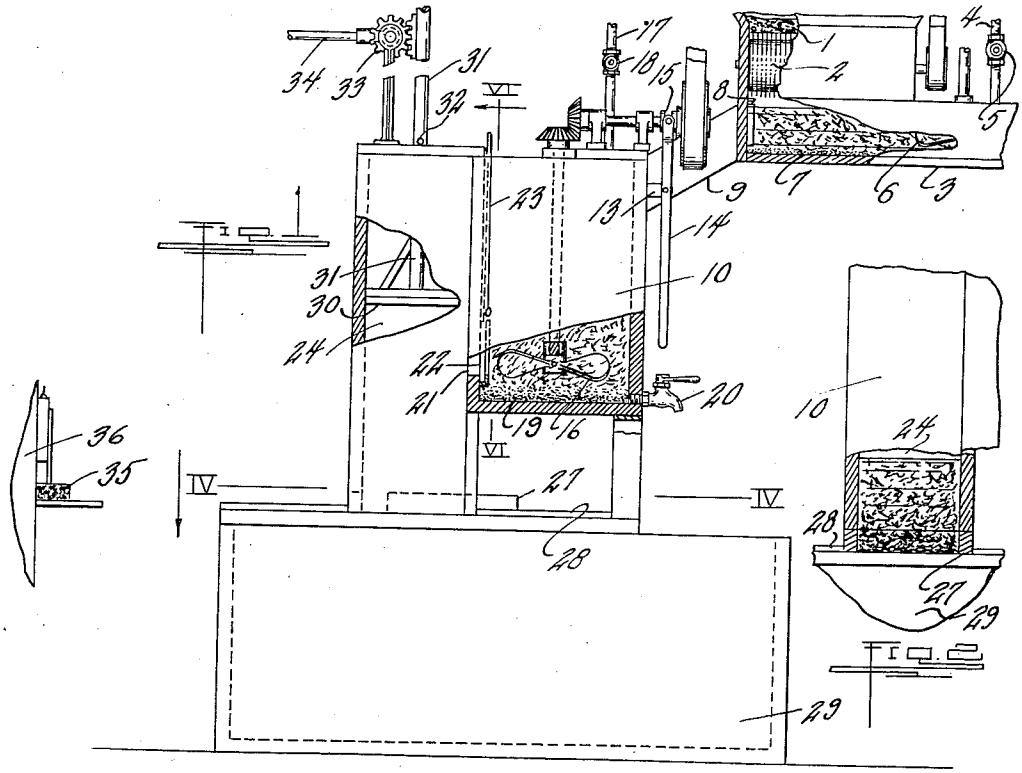
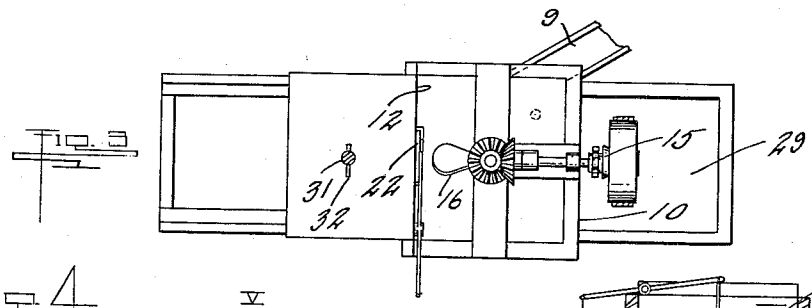
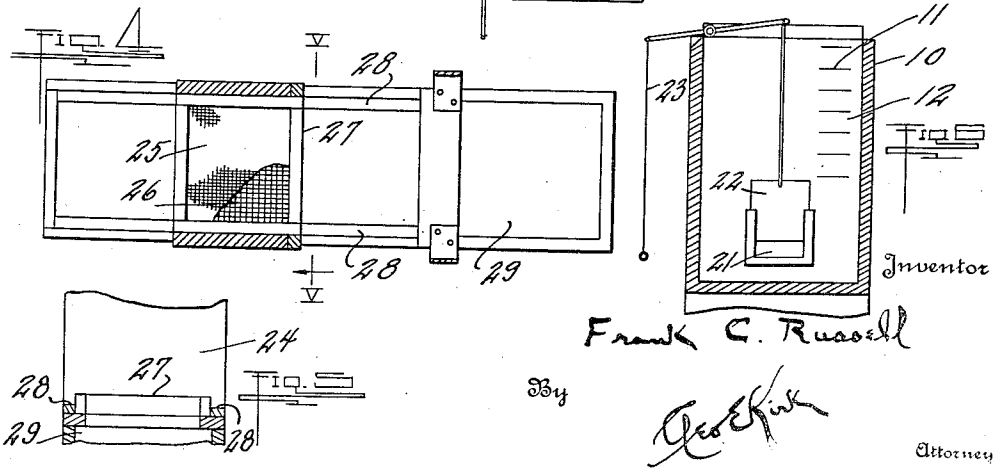
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FELTING, MORE PARTICULARLY FOR INSULATION BLOCKS

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UNITED STATES PATENT OFFICE

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FELTING, MORE PARTICULARLY FOR INSULATION BLOCKS

Application filed December 5, 1927. Serial No. 237,798.

This invention relates to felting fibrous material.

This invention has utility when incorporated in connection with rock or mineral tread or fiber sections for building such into a mass, as blocks for insulation.

Referring to the drawings:

Fig. 1 is a side elevation, with parts broken away, of an embodiment of the invention;

Fig. 2 is a fragmentary view of the precipitation chamber of the device of Fig. 1;

Fig. 3 is a plan view of a portion of the device of Fig. 1;

Fig. 4 is a section on the line IV—IV, Fig. 1, looking in the direction of the arrow;

Fig. 5 is a section on the line V—V, Fig. 4, looking in the direction of the arrow; and

Fig. 6 is a view on the line VI—VI, Fig. 1, looking in the direction of the arrow.

Mass of material 1, say as artificially produced rock fiber, may be introduced into picker 2 there to be fluffed into a loose mass of threads or fiber. Such mass is discharged into vat 3 with addition of water as a controllable supply from line 4 as controlled by valve 5. This rock wool as in the vat 3 is worked into suspension by agitators 6 so that thread portions thereof are quite uniformly present in the suspension with granular portions 7 as a sediment in the bottom of the vat 3.

As the suspension is attained to quite thoroughly work out the heavier stone particles, gate 8 may be opened so that flow by chute 9 may be had to reservoir 10 having graduations 11 along side 12 thereof. This opening of the gate 8 may thus permit flow of the fiber as uniformly suspended in the water up to a desired quantity in the reservoir 10.

By bracket 13 there is mounted lever 14 for throwing in clutch 15 to effect driving of agitator 16 in the reservoir 10 thus to maintain the uniform suspension condition as well as additionally mix binder from line 17, the flow of which is controlled by valve 18 up to desired quantity as indicated by the graduations 11. The binder may be thus mixed in predetermined, or to the predetermined quantity for the suspended fiber.

In practice this binder may be water glass, china clay, flour, starch for high temperature conditions, or rosin say for refrigeration conditions of use of the insulation product.

With this agitation maintaining the fibers in suspension, there may be an additional settling out of the more heavy granular particles 19 in the bottom of the reservoir 10, which particles may be cleared off say by flushing out through nozzle 20.

Spaced from the bottom of this reservoir 10 is opening 21 normally closed by gate 22. As the mingling of the binder has become uniform and there is settling out of the objectionable granular matter, then rod 23 may be pulled to open this gate 22, allowing a sudden quick emptying or dumping of this charge into chamber 24. This quick flow of suspended mass accumulates such at once as a quiet uniform suspension body throughout the area in cross section of the chamber 24 of wire cloth bottom 25 reinforced by screen 26 therebelow. This wire cloth bottom is carried by frame 27 on guides 28 over tank or sump 29.

In practice, the charge as it is quickly delivered to the chamber 24 say even to height of twenty to thirty inches therein, may drain off or have the water extracted through the screen bottom 25, in as brief a time as say two minutes or less. This rapid outlet rate preferably approximates the settling travel of the suspension medium and thus knits the fibers as carried down by the water. The threads are carried down in slight gravity advance of the water to have a true felting or knitting together without any normal clear water region thereover. While such a clear water region might be obtained without materially detracting from the nature of the felting or knitting together of the fibers, it is of importance for maintained output capacity that the withdrawal rate through the perforate bottom 25 be not slower than the precipitation rate in the suspended fiber. In fact, the withdrawal rate may accelerate the precipitation of the suspended fibers and thus tend to work such fibers into interlocking relation.

The settling down may be say to four or

six inches in this brief time interval to approximate a solid mass.

The side walls of this chamber 24 serve as guide for plunger 30 which has stem 31 upwardly extending therefrom to be held from interfering with the settling operation by pin 32. As the gravity settling and extraction draw off has occurred to collect the precipitation in the mass, the pin 32 may be withdrawn to allow the plunger 30 to contact the wet precipitation. Thereafter, pressure may be applied say through rack and pinion drive 33 as actuated by removable arm 34. This compression may be to a determined thickness desired for the block and at least as far down as the top of the frame 27 so that upon lifting the plunger 30 by the rack and pinion device 33, the frame 27 may be slid from the guide 28 clear of the chamber 24. As thus removed from the region of the chamber 24, a block 35 therefrom may be inserted in oven 36 say by dumping the frame 27 or even leaving in the frame 27 for the final drying out operation.

There is accordingly formed hereunder a predetermined thickness unstratified felted insulation fiber block of a predetermined dimension, uniform throughout its extent for the flooding of the chamber 24 insures the uniform distribution of the material for the precipitation. The determination of the density of the suspension in the vat 3 is a matter of precontrol which as checked by the measured quantity in the reservoir 10 allows cooperation in the general set up so that the binder may be introduced in a standard dilute solution of say 3% at the reservoir 10. This general layout is one which may be quickly operated in producing a high-grade, unstratified block of good insulation properties as to uniformity of cellular structure.

The binders as heretofore discussed herein are of an especial value for insulation against the escape of heat or heat transference as to the article to be covered. In instances where the article to be covered is of lower temperature and there is sweating or humidity accumulation, the binder used herein is water proof. This allows the fiber to keep to its low specific gravity in the block and still is not absorbent to moisture. In carrying out this water-proofing block feature of the invention, emulsified asphalt is used as the binder. This felted block has a tensile strength for a section ¾ inch by 6 inches, of as much as 9¾ pounds, and for a block 1¼ inches by 6 inches, the tensile strength is as much as 23 pounds, while the block per cubic foot is of a weight as low as 14 pounds for the non-water proofed binder. A block 1 inch by 6 inches with water proofed binder has a tensile strength up to 20 pounds.

This felting in the presence of the emulsified asphalt, effects a knitting together with the binder in such a way that capillarity is defeated and the block does not become water soaked.

In addition to the binder heretofore enumerated, satisfactory results have been obtained in the use of Wilkenite. Accordingly, there may be an inorganic binder used herein with silicates greatly predominating, freely divided as a colloidal suspension in water.

What is claimed and it is desired to secure by Letters Patent is:

1. The method of assembling fiber comprising fluffing a mass of the dry fiber to loosen, subjecting such fluffed fiber to suspension, separating granular material from suspension by upwardly agitating the fluffed material in a liquid in separating the fiber away from the precipitated granular material settling out below therefrom, removing the precipitated granular material, establishing a ratio of binder to the separated fiber as uniformly distributed, and depositing the suspension material for precipitation away from the granular material theretofore removed therefrom.

2. The method of assembling fiber comprising fluffing a mass of the dry fiber to loosen, subjecting such fluffed fiber to suspension, separating granular material from suspension by upwardly agitating the fluffed material in a liquid in separating the fiber away from the precipitated granular material settling out below therefrom, removing the precipitated granular material, establishing in the suspension material a ratio of binder to the separated fiber as uniformly distributed, and accelerating the distribution of the suspension as precipitating by effecting gravity removal of the liquid in downward direction therefrom away from the granular material theretofore removed therefrom.

3. The method of assembling fiber comprising fluffing a mass of the dry fiber to loosen, subjecting such fluffed fiber to suspension, separating granular material from suspension by upwardly agitating the fluffed material in a liquid in separating the fiber away from the precipitated granular material settling out below therefrom, removing the precipitated granular material, establishing in the suspension material a ratio of binder to the separated fiber as uniformly distributed, accelerating the distribution of the suspension as precipitating away from the granular material theretofore removed therefrom in giving the material a felted form, by effecting gravity removal of the liquid in downward direction therefrom, and supplementally compacting the precipitate form directly into a block.

4. The method of assembling fiber comprising fluffing a mass of the dry fiber to loosen, subjecting such fluffed fiber to suspension, separating granular material from suspension by upwardly agitating the fluffed mate-

rial in a liquid in separating the fiber away from the precipitated granular material settling out below therefrom, removing the precipitated granular material, establishing in the suspension material a ratio of binder to the separated fiber as uniformly distributed, accelerating the distribution of the suspension as precipitating away from the granular material theretofore removed therefrom in giving the material a felted form, by effecting gravity removal of the liquid in downward direction therefrom, supplementally compacting the precipitate form directly into a block, and drying the compacted block.

5. The method of assembling fiber comprising fluffing a mass of the dry fiber to loosen, subjecting such fluffed fiber to suspension, separating granular material from suspension by upwardly agitating the fluffed material in a liquid in separating the fiber away from the precipitated granular material settling out below therefrom, removing the precipitated granular material, establishing in the suspension material a ratio of binder to the separated fiber as uniformly distributed in providing a predetermined charge, and distributing the suspension as a uniform unstratified layer away from the granular material theretofore removed therefrom.

6. An insulation felting equipment embodying a fiber pulling out fluffer, a fibrous material suspension maintaining vat and granular material separator, a charge receiver for suspension material from the vat apart from the granular material, a binder supply to the receiver, and a precipitation chamber having delivery connection thereto of capacity for flooding transfer of suspension to form at once a quiescent pool in the chamber, said chamber having a perforate bottom thereby effective at once throughout the charge total quantity as an extractor for the liquid in accelerating suspension gather into a form upon said bottom.

7. An insulation felting equipment embodying a fiber pulling out fluffer, a fibrous material suspension maintaining vat and granular material separator, a charge receiver for suspension material from the vat apart from the granular material, a binder supply to the receiver, and a precipitation chamber having delivery connection thereto of capacity for flooding transfer of suspension to form at once a quiescent pool in the chamber, said chamber having a perforate bottom thereby effective at once throughout the charge total quantity as an extractor for the liquid in accelerating suspension gather into a form upon said bottom, the capacity of said bottom for liquid removal promoting the gravity rate of the material for getting out of suspension whereby the liquid discharge from the chamber approximates the precipitation rate for maximum capacity of the chamber with suspension knitting of the fibers effected at the precipitated extent.

8. An insulation felting equipment embodying a fiber pulling out fluffer, a fibrous material suspension maintaining vat and granular material separator, a charge receiver for suspension material from the vat apart from the granular material, a binder supply to the receiver, a precipitation chamber having delivery connection thereto of capacity for flooding transfer of suspension to form at once a quiescent pool in the chamber, said chamber having a perforate bottom thereby effective at once throughout the charge total quantity as an extractor for the liquid in accelerating suspension gather into a form upon said bottom, the capacity of said bottom for liquid removal promoting the gravity rate of the material for getting out of suspension whereby the liquid discharge from the chamber approximates the precipitation rate for maximum capacity of the chamber with suspension knitting of the fibers effected at the precipitated extent, and a compactor for reducing the thickness of the precipitate deposit to a block form.

9. An insulation felting equipment embodying a fiber pulling out fluffer, a fibrous material suspension maintaining vat and granular material separator, a charge receiver for suspension material from the vat apart from the granular material, a binder supply to the receiver, a precipitation chamber having delivery connection thereto of capacity for flooding transfer of suspension to form at once a quiescent pool in the chamber, said chamber having a perforate bottom thereby effective at once throughout the charge total quantity as an extractor for the liquid in accelerating suspension gather into a form upon said bottom, the capacity of said bottom for liquid removal promoting the gravity rate of the material for getting out of suspension whereby the liquid discharge from the chamber approximates the precipitation rate for maximum capacity of the chamber with suspension knitting of the fibers effected at the precipitated extent, a compactor for reducing the thickness of the precipitate deposit to a block form, said perforate bottom for the chamber having a frame, and a guide for the frame permitting shifting of the bottom and frame as carrying the block clear of the chamber for access to the block.

In witness whereof I affix my signature.

FRANK C. RUSSELL.