

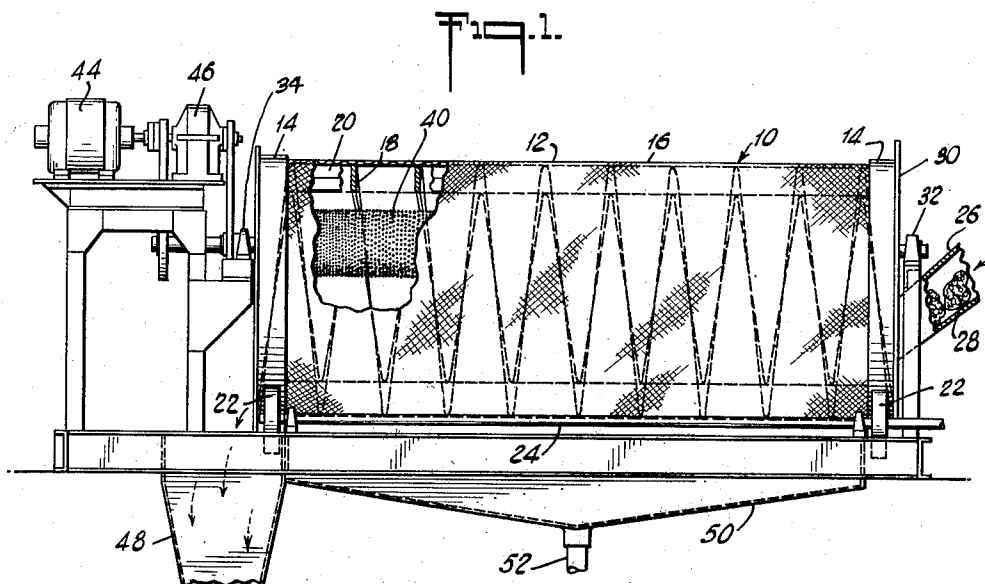
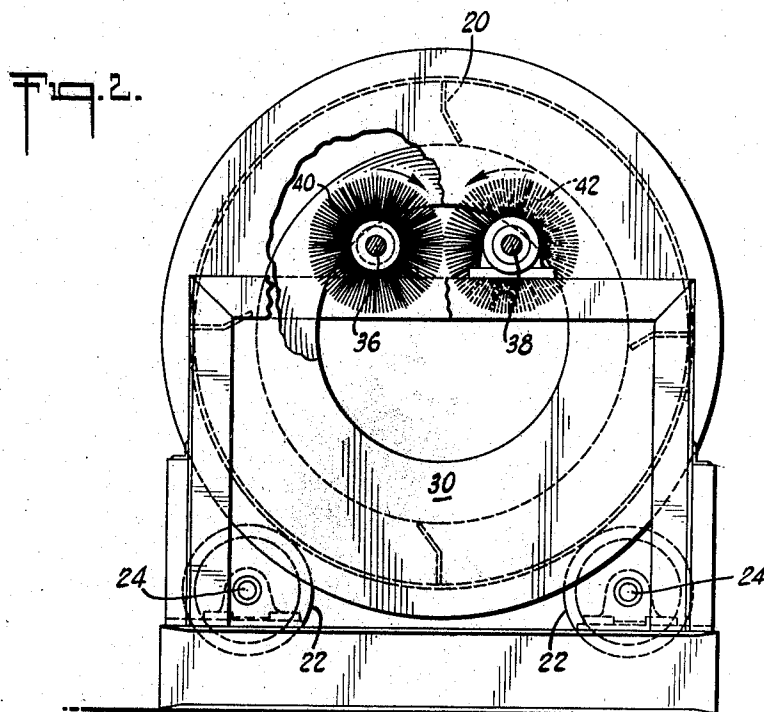
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BRUSH ROLL APPARATUS FOR OPENING AND TUFTING FIBROUS
MATERIALS AND MIXING THE FIBERS WITH BINDERS

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BRUSH ROLL APPARATUS FOR OPENING
AND TUFTING FIBROUS MATERIALS AND
MIXING THE FIBERS WITH BINDERSJoseph H. Zettel, Martinsville, N. J., assignor to
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The instant invention relates to an apparatus for opening, tufting and dividing fibrous masses into smaller tufts, nodules or aggregates and of distributing treating materials therein. The invention finds a particular field of use in connection with the production of mineral wool products, which term includes fibrous products formed of rock, slag, glass, mixtures thereof and other fusible materials and will be described in that connection. It will be understood, however, that the invention is also applicable to use with other materials.

The principal object of the invention is the provision of an apparatus whereby entangled masses of fibrous or other materials, such as masses of mineral wool fibers, may be subjected to a severe shearing and combing action to sub-divide them into smaller nodules or tufts and, where desired, to distribute treating materials, such as binders and the like, in the nodules or tufts. These operations produce small tufts or nodules in which the treating material originally carried by the fibrous masses or introduced with the fibrous material into the apparatus, is substantially uniformly distributed within the nodules. Also, the action of the apparatus causes a smearing or distribution of the material on the individual fibers, the latter, together with the uniform distribution of a binding material, contributing to the strength and shear resistance of blocks or other products made from the fibrous material.

Another object of the invention is the provision of an apparatus in which a pair of brush rolls is employed to perform the fiber tufting and material distributing functions. The brush rolls are supported in closely adjacent relationship and are rotated preferably at different speeds and in opposite directions with their upper surfaces approaching. Means are provided for depositing the fibrous material together with the treating material, where such is to be included, onto the brush rolls. The construction provides for the repeated delivery of the material to the brush rolls to insure the desired sub-division of the fibrous masses and the distribution of the treating material therein.

A further object of the invention is the provision of an apparatus as referred to above including a rotating drum in which the brush rolls extend longitudinally and in which means are provided to repeatedly elevate the material and deposit it on the brush rolls.

My invention will be more fully understood and further objects and advantages thereof will be-

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come apparent when reference is made to the more detailed description of the preferred embodiment which is to follow and to the accompanying drawings, in which:

Fig. 1 is a side elevational view, with parts broken away for clearness of illustration, of an apparatus in accordance with the invention and for carrying out the method thereof; and

Fig. 2 is an end elevational view, with parts broken away for clearness of illustration and on an enlarged scale, of the apparatus of Fig. 1.

As previously mentioned, the apparatus of the invention is particularly adapted to reduce relatively large, fibrous masses, for example, masses or chunks of matted, entangled, mineral wool fibers obtained by any of the mineral wool fiber forming operations, into relatively small nodules or tufts, and the following description will be directed particularly to that concept, but the invention may be used with other fibrous materials. The invention also provides for the distribution within the nodules or tufts of a material, such as a liquid or powdered resin, asphalt or other binder or treating material.

Referring now to the drawings, there is shown a drum 10 consisting of an open-ended, cylindrical barrel 12 including flange rings 14 constituting the end segments of the barrel, and a cylindrical wall section 16 preferably composed of an open mesh screen. The wall section is supported by a continuous spiral land or rib 18 extending from one end of the barrel to the other, and cross members or cleats 20 extending between adjacent spirals of the land. The barrel is mounted for rotation on rolls or trunnions 22 supported on shafts 24, the rolls riding on flanged rings 14. Shafts 24 are driven in the same direction to cause rotation of rolls 22 and, hence, of the barrel, by any suitable means (not shown). At one end of the barrel is a chute 26 by which the fibrous masses, indicated at 28, together with a treating material where desired, are introduced into the drum. This end of the barrel (see particularly Fig. 2) may be partially closed by an end member 30 to prevent back flow of the materials from the drum.

Extending longitudinally within the barrel and supported on suitable bearings 32 and 34, respectively at opposite ends of, and preferably exteriorly of the barrel, are parallel shafts 36 and 38, the shafts carrying brush rolls 40 and 42, respectively. The brush rolls, which are preferably of the same but any standard construction, are relatively stiff and, for this purpose, are suitably composed of wire bristles. These, in addi-

tion to their stiffness as opposed to fiber bristles, also have the advantage of resisting the abrasive action of the mineral wool. Shafts 36 and 38 supporting the brush rolls are horizontally spaced and are so positioned that the adjacent peripheral surfaces of the brushes are in substantial contact, that is, they are approximately tangent to one another.

Shafts 36 and 38 are driven in opposite directions at different speeds with the upper surfaces approaching each other by any suitable means which may comprise a motor 44, speed control device 46 and appropriate drive connections.

Below the delivery end of the barrel is a hopper 48 in which the treated nodules or aggregates are deposited for delivery to other apparatus which forms no part of the instant invention. A hopper 50 may be positioned below the main portion of the barrel to receive waste material discharged through the mesh wall of the barrel, the hopper preferably including a discharge pipe 52 leading to any suitable waste receptacle.

In operation the fibrous material in chunks or masses is discharged into the barrel of the drum through hopper 28. Where a binder or other treating material is to be included, this may be originally distributed in the masses and carried into the drum therewith, or may be separately delivered to the fibrous material in the drum. The treating material may be either in liquid or powdered form and may be supplied in any suitable preparation, say, up to 30% by weight of the fibers. As the fibrous material enters the drum, it is caught up by members 20 and elevated thereby as the drum rotates, and finally deposited onto or between brush rolls 40 and 42. As previously stated, the brush rolls are driven in opposite directions to have their upper surfaces approach each other. The rolls are driven at different speeds, one of the rolls being driven at, say, 300 R. P. M. and the other roll being driven at, say 100 R. P. M. As the fibrous masses pass between the rolls, they are subjected to a shearing, combing and tearing action which divides them into relatively small nodules or tufts and at the same time distributes the binder therein, the binder tending to become smeared along the fibers.

After the materials pass between the brushes and fall to the bottom of the drum they are again picked up by members 20 and again deposited onto the brush rolls, this operation being repeated several times during their travel from end to end of the drum. As illustrated particularly in Fig. 1 the drum is preferably slightly tilted to cooperate with the spiral land 18 in promoting travel of the materials lengthwise of the drum. As the nodules reach the end of the drum they are deposited in hopper 48.

The rotation of the barrel and the rotation of the brush rolls are preferably under separate control, as illustrated, in order that the speed of the brush rolls may be increased or decreased, as required, depending upon the character of the particular material operated on to produce the desired sub-division and binder mixing.

Through the use of the apparatus and operations described above the fibrous masses are reduced to relatively small, open, fibrous nodules, flakes or tufts with the treating material distributed therein and smeared on the individual fibers. The constant rolling and tumbling of the fibrous masses causes the major portion of any unfiberized particles to be separated, such particles passing through the open mesh screen and

into hopper 50. The operation, when used in connection with the production of mineral wool blocks or blankets, has been found to greatly increase the strength and particularly the shear resistance of the blocks, due to the better distribution of the binder throughout the tufts. It will be appreciated that the invention will have similar and other advantages for other uses.

Having thus described my invention in rather full detail, it will be understood that these details need not be strictly adhered to but that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the subjoined claims.

What I claim is:

1. In an apparatus for opening and tufting fibrous material, a rotatable drum, brush rolls in said drum, said brush rolls lying in substantially tangential relationship, means to rotate said brush rolls with their upper surfaces approaching, and means carried by said drum for depositing materials on the brush rolls for action thereby.

2. In an apparatus for opening and tufting fibrous material, a pair of brush rolls in adjacent, substantially tangential relationship, means for rotating said rolls in opposite directions with the upper surfaces approaching, and means for repeatedly delivering fibrous material to said rolls for action thereby.

3. An apparatus comprising a rotatable drum, means to introduce fibrous material into said drum, a pair of brush rolls in said drum in adjacent, substantially tangential relationship with their axes substantially parallel and in substantially the same horizontal plane, means to rotate said rolls in opposite directions with their upper surfaces approaching, and means carried by the drum for repeatedly delivering fibrous materials to said rolls for action thereby.

4. An apparatus comprising a drum, means to rotate said drum, means for introducing fibrous material and a treating material into said drum, brush rolls in said drum extending longitudinally thereof and in adjacent, substantially tangential relationship, means to rotate said rolls in opposite directions, a spiral land adjacent a wall of the drum for rotation therewith, and members extending between the spirals of the land for elevating the introduced material and depositing it on said brush rolls.

5. An apparatus comprising a drum, means for rotating said drum, means for introducing fibrous material and a treating material into said drum, a spiral land supported by a wall of said drum, brush rolls in said drum extending longitudinally thereof and in adjacent, substantially tangential relationship, means for rotating said rolls, and means extending between spirals of the lands for elevating said introduced material as the drum rotates to repeatedly deposit it on said brush rolls as the material travels longitudinally of said drum.

6. In an apparatus for opening and tufting fibrous material, a pair of brush rolls in adjacent, substantially tangential relationship, means for rotating said rolls in opposite directions at relatively different speeds with the upper surfaces approaching, and means for repeatedly delivering fibrous materials to said rolls for action thereby.

7. In apparatus comprising a rotatable drum, means to introduce fibrous material into said drum, a pair of brush rolls in said drum in adja-

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cent, substantially tangential relationship with their axes substantially parallel and in substantially the same horizontal plane, means to rotate said rolls in opposite directions and at relatively different speeds with their upper surfaces approaching, and means carried by the drum for repeatedly delivering fibrous materials to said rolls for action thereby.

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