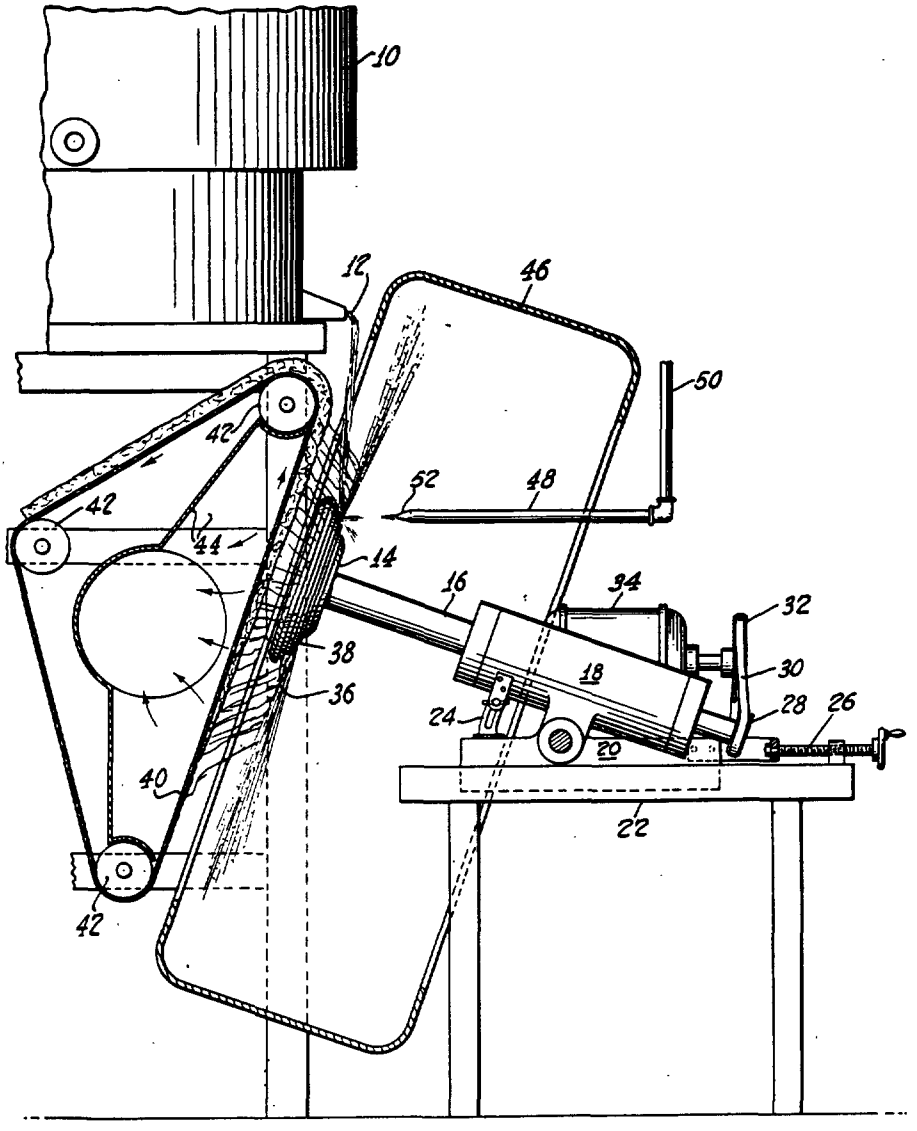
Case 683

PLAINTIFF'S EXHIBIT
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MINERAL WOOL APPARATUS

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MINERAL WOOL APPARATUS

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6 Claims. (Cl. 154—27)

My present invention relates to the manufacture of mineral wool and particularly to an improved apparatus for converting a stream of molten raw material into a mass or felt of fibers. The term "mineral wool" is employed herein in a generic sense to include wool or fibers formed from rock, slag, glass, mixtures thereof and the like.

Heretofore mineral wool has been formed in several ways including the conventional method of disintegrating the molten material into a multiplicity of fibers by the action of a high pressure steam jet. It has also been proposed to obtain the disintegrating of the molten material stream by the use of a spinner or rotor rotated at high speed and upon which the material impinges, and by which it is broken up into drops or masses which are thrown from the spinner by centrifugal force to be drawn into fiber or thread form. The instant invention is particularly concerned with and has for its principal object the provision of an improved apparatus of the latter type. Another object of the invention is the provision of means for causing deposition of such fibers in the form of a continuous layer or felt.

The above noted objects are attained by an improved apparatus in accordance with the invention which, briefly stated, comprises a spinning and felting means in combination with means for directly gathering and felting the newly formed fibers. The apparatus is constructed and arranged to provide this dual function and at the same time to secure improved products both with respect to the fibers, and the felted bodies formed therefrom. A further object is attained by the instant construction, namely, the dissemination of a binder throughout the newly formed felt.

My invention will be more fully understood and further objects and advantages thereof will become apparent when reference is made to the more detailed description which is to follow and to the accompanying drawing in which the single figure is a view partially in elevation and partially in section of an apparatus in accordance with the invention.

Referring to the drawing there is shown an apparatus comprising a melting furnace 10. The furnace shown is of the cupola type but it will be understood that any other suitable type of melting furnace such as a tank furnace may be employed. The furnace includes a discharge opening through which a stream 12 of molten mineral wool forming material is drawn. The raw material melted in furnace 10 and drawn therefrom may comprise rock, slag, glass and mixtures thereof, or other materials conventionally employed in the manufacture of mineral wool, glass wool and the like.

Below the outlet of the cupola and in position to receive the molten material stream is a rotor or spinner 14. The rotor is affixed to shaft 16 for rotation therewith, the shaft being supported in suitable bearings 18 carried on a mounting 20, supported preferably on a platform or other foundation 22. Means of any suitable type may be provided for adjustment of the mounting 20, to permit desired changes to be made in the position of the rotor with respect to the stream of molten material. Such adjusting means is indicated at 24 and 26. The shaft 16 supports a pulley 28 driven by a belt or other driving means 30 from a pulley 32 carried by the shaft of a motor or other power source 34. It will be understood that in lieu of the particular driving means shown any suitable arrangement may be employed for imparting high speed rotation to the shaft 16 and rotor 14.

Spinner or rotor 14 may take different specific forms but as illustrated preferably comprises a frusto conical member having an inclined edge or face portion 36 arranged to receive and operate on the molten material. Portion 36 is subdivided into a plurality of grooves by annular ribs 38. Rotor 14 is suitably positioned by the adjustment means so that, as illustrated, the molten material strikes the rotor at an acute angle with respect to portion 36.

Located behind the rotor, that is opposite the shaft 16, is a fiber collecting device comprising, in its preferred form, a foraminous conveyor 40 mounted for travelling movement in the direction indicated by the arrow on rolls 42. Suitable driving apparatus (not shown) is employed for rotating one or more of the rolls 42 to cause continuous movement of the conveyor during the fiber forming operation. Behind the forward reach of conveyor 40 there is disposed an air venting means or hood 44 connected to the suction side of a fan or the like (not shown) to create a suction effect through such forward reach. Conveyor 40 is located relatively close to the rotor 14 whereby the newly formed fibers are immediately caught up by the air stream created by the suction device, and are carried to and deposited directly on the conveyor.

Surrounding the rotor and at a substantial distance therefrom is a housing or casing 46. The casing limits the outward movement of fibers and unfiberized particles thrown off by the rotor and also confines the air stream created by the suction device to a path crossing the normal paths of the fibers.

A binder addition means is indicated generally at 48 and may comprise a binder conveying line 50 connected to a suitable source of binder supply (not shown), and a spray nozzle 52. Nozzle 52 is positioned to feed binder in desired quantities onto the new fibers substantially at the time of their formation. As illustrated, the binder is

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preferably introduced in the form of a spray, but an atomizer type applicator may be employed if desired. The binder may be any suitable material conventionally employed in mineral wool manufacture for equivalent purposes. For example, asphalts, thermo plastic and thermo setting resins, drying oils and the like, or mixtures thereof may be used.

In the operation of the apparatus described above the stream 12 of molten material impinges upon the serrated or grooved edge of rotor 14 while the rotor is rotated at high speed through the medium of the drive means. The molten material is thrown outwardly by centrifugal force from the spinner in the form of drops or particles, which for the most part are drawn out into fine fibers as they move at high velocity through the air. The air stream created by the suction means moves across the normal path of the fibers and unfiberized particles. The fibers due to their low mass are caught up by the air stream and deposited on the surface of the conveyor to form a felt which is gradually built up to a maximum thickness at approximately the point that the conveyor passes around the upper roll 42. The unfiberized particles, due to their greater mass and hence higher inertia are substantially unaffected by the air stream and are driven forwardly until they strike the casing walls. They may be removed from the casing in any suitable manner.

The binder supplied by means 48 is broken up into minute droplets during the fiberizing action and becomes deposited upon the individual fibers while the latter are suspended in the air stream whereby the binder substantially uniformly permeates the felt formed on the conveyor. The felt is carried around the upper roll 42 and may be removed from the conveyor in any suitable manner.

An apparatus in accordance with the invention provides for a rapid and efficient fiberization and deposition of the fiberized material in the form of a coherent felt. The construction permits the addition of the binder with the binder disseminated in the form of small droplets throughout the formed felt whereby products for many uses may be obtained.

Although the invention has been described in rather complete detail it will be understood that these details need not be strictly adhered to but that variations and modifications will 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 a mineral wool apparatus including means for melting mineral wool forming material and discharging the same in a molten stream under the influence of gravity, a rotor supported for rotation in a plane to expose a peripheral edge surface to the molten stream, means to rotate said rotor at high speed whereby the molten material from said stream is converted into fibers, a foraminous member located closely adjacent said rotor and means for drawing air through said member across the path of said fibers to cause said fibers to be drawn immediately toward said foraminous member and deposited directly thereon.

2. In a mineral wool apparatus including means for melting mineral wool forming material and discharging the same in a substantially vertical molten stream, a rotor supported for rotation in a plane at an angle to the horizontal to place a peripheral edge surface in position to receive said stream, means to rotate said rotor at high speed whereby said molten material from said stream is converted into fibers, a foraminous conveyor located closely adjacent said rotor and in a plane substantially parallel to the plane of the rotor and means for drawing air through said foraminous conveyor across the path of said fibers to cause said fibers to be drawn immediately toward said foraminous conveyor and deposited directly thereon.

3. In a mineral wool apparatus including means for melting mineral wool forming material and discharging the same in a substantially vertical molten stream, a rotor supported for rotation in a plane at an angle to the horizontal and having an inclined peripheral edge face including concentric ribs positioned in the path of said stream, means to rotate said rotor at high speed whereby molten material from said stream is converted into fibers, a foraminous conveyor located closely adjacent said rotor, means for moving said conveyor, and means for drawing air through said conveyor across the path of said fibers to cause said fibers to be drawn immediately toward said conveyor and deposited directly thereon.

4. In a mineral wool apparatus including means for melting mineral wool forming material and discharging the same in a molten stream under the influence of gravity, a rotor supported for rotation in a plane to expose a peripheral edge portion to said stream, said portion having concentric ribs, means for rotating said rotor at high speed, whereby the molten material of said stream is converted into fibers, a foraminous member located closely adjacent said rotor, and means for drawing air through said member across the path of said fibers to cause said fibers to be drawn immediately toward said foraminous member and deposited directly thereon.

5. In a mineral wool apparatus including means for melting mineral wool forming material and discharging the same in a substantially vertical molten stream, a rotor supported for rotation in a plane at an angle to the horizontal and including a peripheral stream contacting portion having concentric ribs and lying at an acute angle with respect to said stream, means to rotate said rotor at high speed whereby molten material from said stream is converted into fibers, a foraminous conveyor located closely adjacent said rotor and in a plane substantially parallel to the plane of said rotor, and means for drawing air through said conveyor across the path of said fibers to cause said fibers to be drawn immediately toward said conveyor and deposited directly thereon.

6. In a mineral wool apparatus including means for melting mineral wool forming material and discharging the same in a substantially vertical molten stream, a rotor supported for rotation in a plane at an angle to the horizontal to expose a peripheral edge surface to the molten stream, means to rotate said rotor at high speed whereby the molten material from said stream is converted into fibers, a foraminous member located closely adjacent said rotor, and means for drawing air through said member across the path of said fibers to cause said fibers to be drawn immediately toward said foraminous member and deposited directly thereon.

EDWARD R. POWELL.

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