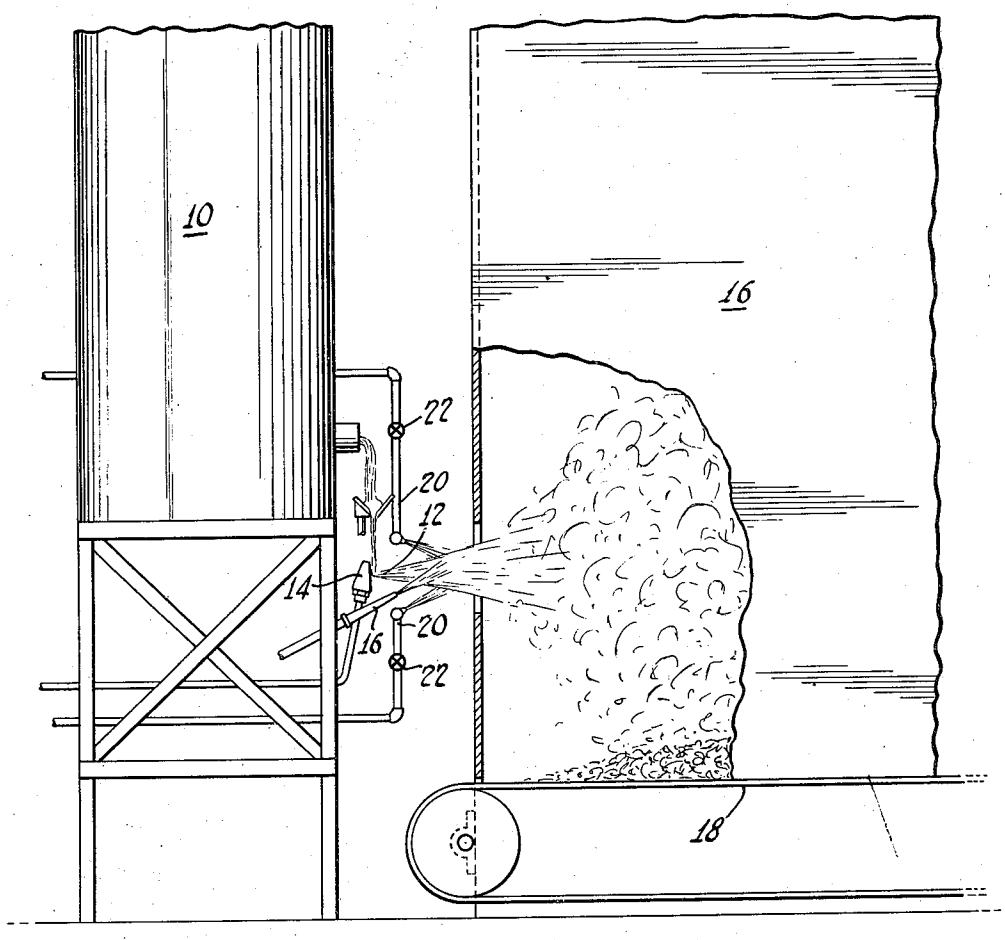
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METHOD AND APPARATUS FOR MANUFACTURING MINERAL WOOL

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INVENTOR
JOSEPH H. ZETTEL.
BY Virgil C Kline
ATTORNEY

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METHOD AND APPARATUS FOR MANUFACTURING MINERAL WOOL

Joseph H. Zettel, Plainfield, N. J., assignor to Johns-Manville Corporation, New York, N. Y., a corporation of New York

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The present invention relates to improvements in the manufacture of felted mineral wool products and more particularly to improvements in methods and apparatus for collecting and felting mineral wool fibres. It will be understood that the term "mineral wool" is employed herein in a generic sense to denote fibres, or products formed from fibres, made from rock, slag, glass, and other such raw materials and mixtures thereof.

Conventionally, mineral wool is manufactured by disintegrating a molten stream of raw material into a multiplicity of fibres by means of a steam blast or the like. A binder is applied adjacent to the blast by dripping, spraying, or otherwise injecting the binder into the suspension of fibres in the gaseous stream created by the blast. The suspension of fibres and intermingled binder enter a blow chamber and are collected on the floor thereof, on a suitable conveyor, in interfelted relationship. Where relatively large amounts of a combustible binder are employed, such as asphalt or other bitumens, waxes, or the like, it has heretofore been necessary to include with the binder a suitable fireproofing ingredient, such as a chlorinated, aromatic or cyclic hydrocarbon, for example, the material sold under the name "Halowax." As will be understood, when, say, fifteen per cent or more binder (determined on the weight of the felt) is employed without a fireproofing agent, ignition of the binder is caused by slugs or chips of hot slag which inevitably fall into the blow chamber. The localized fires thus started at times spread into large fires destroying a large portion of the felt as a commercial product and sometimes causing the rapid burning of loose dry material hanging on the side walls of the blow chamber with a minor explosive effect. The chlorinated hydrocarbons previously employed as fireproofing agents have unduly increased the cost of manufacture and, furthermore, have been difficult to handle and have caused trouble in the binder supply equipment as well as creating dangerous fume conditions.

The principal object of the instant invention is the provision of a method and apparatus which will prevent fires in the blow chamber and at the same time will not add in any substantial degree to the cost of the operation or in any way impair the quality of the product formed.

Another object is the provision of a method and apparatus to condition the blow chamber and the felt formed therein so that combustion of the binder is prevented.

A still further object of the invention is the provision of such a method and apparatus as will result in an improved product.

Briefly stated, my invention resides in the addition of a given quantity of moisture in atomized form into the suspension of fibres and binder. The moisture settles with the fibres and uniformly permeates the felt, cooling and wetting it to such an extent that destructive fires cannot occur. At the same time a sufficient amount of the moisture is evaporated into the air entering the blow chamber with the fibres to create high humidity conditions in the blow chamber.

In addition to the foregoing, it has been determined that the water permeating the felt improves the quality thereof in that the water aids in forming loosely felted material more evenly deposited over the blow chamber conveyor. Also the water reduces binder ignition loss in the hot blast.

My invention will be fully understood and further objects and advantages thereof will become apparent when reference is made to the more detailed description thereof which is to follow and to the accompanying drawing, in which the single figure is a diagrammatic elevational view, with parts broken away for the purpose of illustration of a fibre-forming and receiving apparatus incorporating the instant invention.

Referring now to the drawing, there is shown a melting furnace 10, which may be a cupola or tank furnace of any conventional design, a cupola being selected for purposes of illustration. The molten slag, rock, or other mineral-wool-forming material flows from the cupola and falls in a stream into the path of a jet 12 of high pressure steam or the like issuing from a nozzle 14. A suitable binder is projected into the suspension of newly formed fibres, for example, as by spraying the binder into the suspension through nozzle 16. It will be understood that the instant invention is not limited to the use of any particular type of binder, but is of particular importance where relatively large proportions, say fifteen per cent or more by weight of the product, of combustible binders are used, such as asphalt, asphalt fluxes, gilsonite, resins, waxes, and similar thermoplastic materials. The fibres and binder carried in the gaseous suspension enter a blow chamber indicated generally at 16 and settle therein onto the floor, preferably comprising a movable conveyor 18 which carries the felt thus formed from the blow chamber to subsequent operations.

In accordance with the instant invention, one or more water sprays 20 are provided, preferably one below and one above the blast, the sprays being of a character to inject water in atomized form into the suspension of fibres. Preferably the sprays are directed at substantially a 45° angle to the main direction of movement of the suspension. Valves 22 are provided whereby the

quantity of water entering the blow chamber can be controlled to conform with varying conditions.

In the operation of the apparatus and method, a sufficient amount of moisture is sprayed into the suspension of fibres and binder, to create a humid atmosphere in the blow chamber which will inhibit blow chamber explosions, and to cause a moisture content in the felt sufficient to prevent the occurrence of destructive fires. It has been determined that, where a combustible binder content of approximately fifteen per cent by weight of the felt is employed, the amount of moisture in the felt should constitute from one to four per cent of the weight of the felt. It will be understood, however, that variations in the type of binder, the quantity employed and the humidity conditions prevailing may cause variations in the amount of moisture to be added.

A further feature of this invention resides in the inclusion in the water spray of a relatively small percentage, say of the order of two per cent based upon the weight of the felt, of a drying adhesive such as a ligneous adhesive material, for example, calcium ligno-sulphonate. It has been determined that, although no subsequent heat treatment is employed, the inclusion of the small proportion of an adhesive of this type serves to increase the strength of the product beyond what would normally be expected, considering the amount of the material used. The adhesive may be mixed into the water spray in any suitable manner.

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 will suggest themselves to one skilled in the art, all falling within the scope of the invention as defined in the subjoined claims.

I claim:

1. The method of manufacturing felted mineral wool products comprising disintegrating a stream of molten material into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material, projecting water in finely divided form into said suspension, and collecting said fibres in a layer with water in minor quantities substantially uniformly distributed therein.

2. The method of manufacturing felted mineral wool products comprising disintegrating a stream of molten material into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material, spraying water in atomized form into said suspension, and collecting said fibres in a layer with the water in minor quantities substantially uniformly distributed therein.

3. The method of manufacturing felted mineral wool products comprising projecting a steam blast against a stream of molten material to convert the same into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material, spraying atomized moisture into said suspension adjacent to the place of formation of said suspension, and collecting said fibres in a layer.

4. The method of manufacturing felted mineral wool products comprising projecting a steam blast against a stream of molten material to convert the same into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material present in proportion of the order of 15% by weight of the finished product, spraying atomized moisture into said suspension, and collecting said fibres in a layer, the amount of moisture projected into said suspension by said spray being sufficient to provide a moisture content in said layer of the order of 1 to 4% by weight of the layer.

5. The method of manufacturing felted mineral wool products comprising disintegrating a stream of molten material into a multiplicity of fibres, forming a gaseous suspension of said fibres and of a finely divided combustible binding material present in amounts to provide a binder content of at least 15% by weight of the product, spraying water including a drying adhesive into said suspension in sufficient quantities to provide a moisture content in said product of the order of 1–4% by weight of the product, and collecting said fibres in a layer.

6. The method of manufacturing felted mineral wool products comprising disintegrating a stream of molten material into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material present in amounts to provide a binder content of at least 15% by weight of the product, spraying water including ligneous adhesive material into said suspension in sufficient quantities to provide a moisture content in said product of the order of 1–4% by weight of the product, and collecting said fibres in a layer.

7. The method of manufacturing felted mineral wool products comprising disintegrating a stream of molten material into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material present in amounts to provide a binder content of at least 15% by weight of the product, spraying water including calcium ligno-sulphonate into said suspension, in sufficient quantities to provide a moisture content in said product of the order of 1–4% by weight of the product, and collecting said fibres in a layer.

8. The method of manufacturing felted mineral wool products comprising disintegrating a stream of molten material into a multiplicity of fibres, forming a gaseous suspension of said fibres and a finely divided combustible binding material present in amounts to provide a binder content of at least 15% by weight of the product, spraying water including calcium ligno-sulphonate into said suspension in proportions of the order of 2% by weight of the product, and collecting said fibres in a layer.

9. An apparatus comprising means for disintegrating a stream of molten material into a multiplicity of fibres carried in gaseous suspension, means for injecting a finely divided binder into said suspension, means for spraying atomized water into said suspension adjacent said disintegrating means and at an angle to the direction of movement of said suspension, and means for collecting said suspension in the form of a felt.

10. An apparatus comprising a steam blast for disintegrating a stream of molten material into a multiplicity of fibres carried in gaseous suspension, means for injecting a finely divided binder into said suspension, atomizing spray heads adjacent said blast and above and below the same for projecting water into said suspension, and means for collecting said suspension in the form of a felt.

JOSEPH H. ZETTEL.