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MEANS FOR MAKING MINERAL WOOL.

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1,256,541. Patented Feb. 19, 1918.

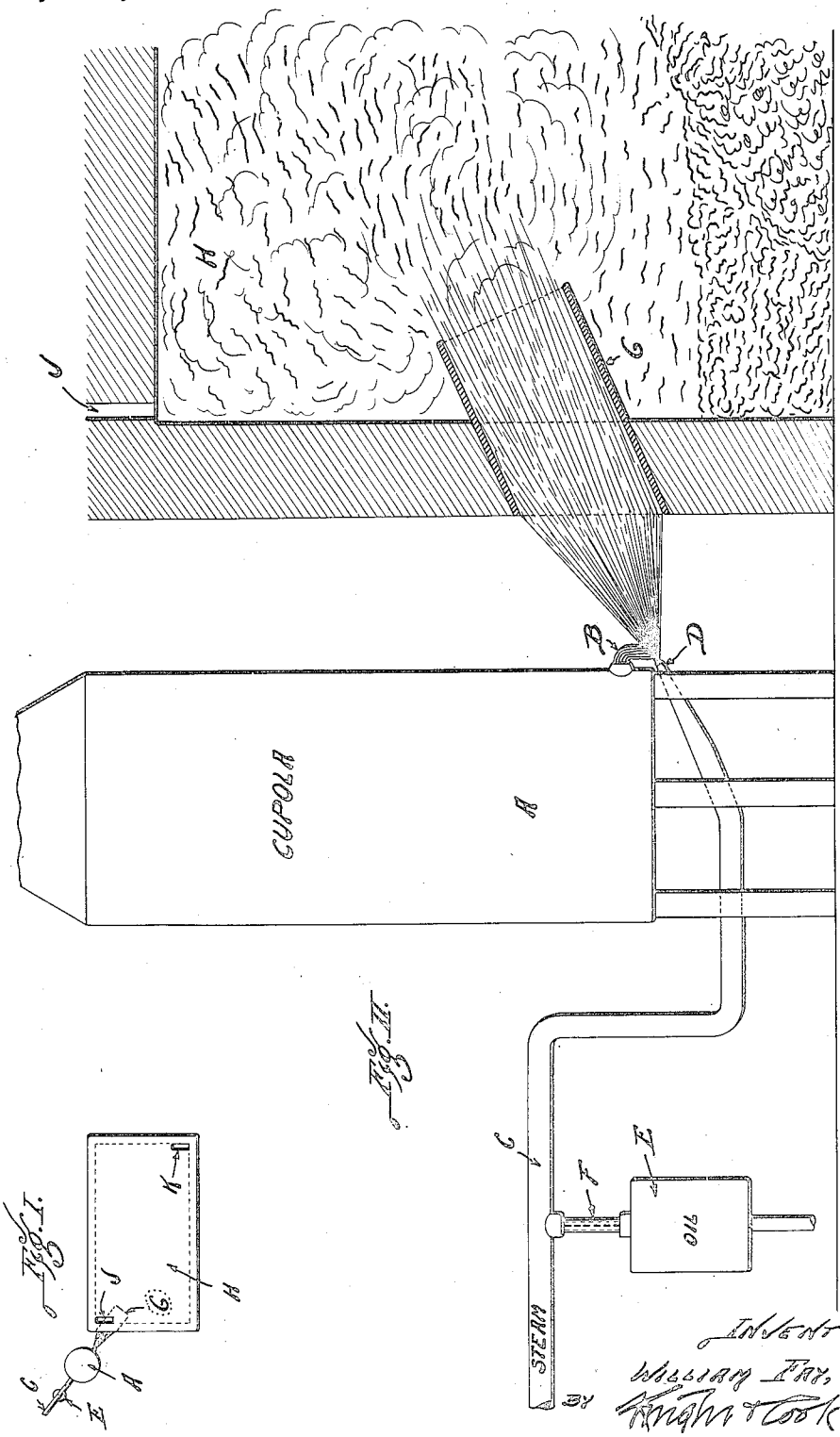

Fig. 1.

Fig. 2.

UNITED STATES PATENT OFFICE.

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MEANS FOR MAKING MINERAL WOOL.

1,256,541. Specification of Letters Patent. Patented Feb. 19, 1918.

Application filed March 3, 1917. Serial No. 152,329.

To all whom it may concern:

Be it known that I, WILLIAM FAY, a citizen of the United States of America, a resident of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Means for Making Mineral Wool, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in means for making mineral wool. The structure I have shown includes means for introducing a blast of fluid into a stream of molten scoriaceous material, thereby projecting the molten material and dividing it into fine filaments which form the mineral wool. By the term "scoriaceous material" I mean to include slag, rock and any other material adapted to be melted and then projected to form mineral wool.

One of the objects of the invention is to provide a highly efficient means for subjecting the fibers to the action of oil or other suitable dust-settling fluid, so that the mineral wool may be handled, packed and shipped without further treatment. More specifically stated, an object is to obtain this and other advantages without chilling and hardening the fibers.

The blast carrying the dust-settling fluid (preferably oil) is injected very forcibly into the stream of molten material, and since this blast constitutes the means for dividing the material into a mass of fine filaments or fibers, it will be apparent that all of the filaments or fibers are thoroughly acted upon by the oil. The product is free of loose dust or fine powder and in such a condition that it may be packed and shipped to the consumer. The oil is introduced in such a manner that it does not smoke or discolor the product. However, this oil is very forcibly injected into the stream of material, and it serves to lay the fine dust or powder which would otherwise fly freely from the product.

To avoid undue cooling, which would chill and harden the molten material, the oil is preferably heated before it reaches said material. In the preferred form of the invention, the oil is commingled with steam, and this hot mixture is forcibly injected into the stream of molten material.

The steam protects the oil; prevents it from being burned or carbonized by the molten material, the oil laden steam being projected at a high velocity into the receiving chamber. Instead of being consumed by the molten material, the constantly flowing stream of oily vapor is introduced into the receiving chamber, where it commingles with the flying fibers of mineral wool, also penetrating the body of wool in the lower portion of the chamber.

Figure I is diagrammatical plan view, on a very small scale, showing an apparatus constructed in accordance with my invention.

Fig. II is an enlarged side elevation, partly in section.

A designates a cupola in which the scoriaceous material is melted. B designates a stream of molten material flowing from the lower portion of the cupola. A blast pipe C terminates at a nozzle D near the lower portion of the cupola. A receptacle E adapted to contain a heavy hydrocarbon oil, or other suitable dust-settling fluid, is connected to the blast pipe C by means of a tube F.

The blast pipe is connected to a suitable steam generator, and the oil is caused to flow, drop by drop, through the tube F and into the blast pipe C, where it commingles with the steam. An ordinary force-feed lubricating apparatus can be used to feed the oil. The blast pipe constitutes a long angular mixing chamber for the steam and oil. The hot mixture of steam and oil, discharged at a very high velocity from the nozzle D, divides the stream of molten material B into a mass of long incandescent filaments. A tube G, passing through a wall of the receiving chamber H, is arranged to conduct the stream of hot vapor and mineral wool filaments, or fibers, into said receiving chamber.

To avoid combustion, or the production of smoke or carbon, the dust-settling fluid is preferably a high-boiling oil which will not flash or burn when momentarily subjected to the heat of the molten material. I have found in actual practice that an oil of this kind protected by a relatively large volume of steam, will produce highly desirable results.

It will be observed that the steam is an inexpensive heating agent for the oil, and that the oil is very thoroughly commingled with the steam before it reaches the discharge nozzle. The oil is thus heated and forcibly distributed throughout the mass of

material so that all of said material is very thoroughly acted upon by the hot blast of oil-laden steam.

Heretofore, wool receiving chambers have been provided with large vents or outlets and the streams of wool have been projected toward such vents or outlets. As a result, the flying fibers circulate freely toward the large vent and accumulate to form a relatively large body of wool near the vent. Since the path of least resistance is in a straight line from the blow tube to the large vent, the wool rushes rapidly in this general direction. At the beginning of the operation, when the wool receiving chamber is empty, the wool collects on the floor near the large vent, and as the operation continues, the projected fibers flowing in the path of least resistance, all tend to rush rapidly toward the large vent until they are stopped by striking the main mass of wool or some other object. Obviously, there is an opportunity for an appreciable amount of the fine particles to escape freely through the large vent. However, the most important point is that almost all of the projected fibers rush quickly to a given point where they are stopped, instead of being permitted to circulate or float freely in the wool chamber.

In the preferred form of my invention, the wool receiving chamber H is provided with restricted vents J and K in its ceiling or top wall, the vent J being formed at a point directly above the tube G. The vent K is preferably formed at a point diagonally opposite the vent J. The vents are so small that the mass of flying fibers does not circulate freely toward either vent. Moreover, the slight circulation due to the flow of fluid through the oppositely disposed vents, results in counter currents which do not cause a free circulation to any definite point.

Owing to the size and location of the restricted vents, a substantial pressure is created in the wool chamber by the blast of steam laden oil; and this oily vapor under pressure commingles with the fine wool fibers which float freely in the wool chamber. The free fibers are thoroughly acted upon by the vapor before they settle on the body of wool, and the entire body of wool is constantly acted upon by the oily vapor. A most effective treatment is, therefore, obtained by maintaining the vapor in the wool chamber under pressure, instead of permitting it to escape freely.

If the incandescent filaments are chilled suddenly, they will harden and form glassy shot or fine glass-like strings. To obtain the best results, the fibers should be permitted to cool slowly. It is, therefore, an advantage to cause the fibers to float freely in the warm vapor, for a considerable period of time, before they strike a relatively cool object.

It will now be understood that the warm oily vapor confined under pressure in the wool chamber, settles the dust, causes the fine particles to cling to the larger fibers, and prevents the hot fibers from cooling too rapidly. In addition to enabling the product to be packed and shipped in bags, this treatment increases the yield by retaining the fine particles in the main mass of wool, also by avoiding the production of a large percentage of shot.

Mineral wool is sometimes broken up or reduced to fragments by a treatment known as "cycloning." When so treated the fine dust-like particles flying from the mass are permitted to escape, and if recovered they have very little if any value. If the wool is treated as herein shown and described, a relatively small percentage of dust will fly from the fibers during the "cycloning" operation, and the loss will be materially decreased.

The method of process herein disclosed is claimed in an application for patent filed by me Feb. 23, 1917, Serial Number 150,451.

I claim:—

1. In an apparatus for making mineral wool, a cupola having an outlet for the discharge of a stream of molten scoriaceous material, a combined blast pipe and mixing chamber arranged to discharge its contents into the stream of molten material, means for conducting steam into said combined blast pipe and mixing chamber, and means for conducting a dust-settling fluid into the steam before it reaches the discharge end of said combined blast pipe and mixing chamber, said combined blast pipe and mixing chamber having a long angular portion wherein the steam and dust-settling fluid are commingled with each other.

2. In an apparatus for making mineral wool, a cupola having an outlet for the discharge of a stream of molten scoriaceous material, a steam blast arranged to project said material to form mineral wool fibers, a wool chamber arranged to receive the projected steam and fibers, and means for confining the contents of said wool chamber so as to maintain a pressure created therein by the steam blast.

3. In an apparatus for making mineral wool, a cupola having an outlet for the discharge of a stream of molten scoriaceous material, a combined blast pipe and mixing chamber arranged to discharge its contents into the stream of molten material, means for conducting steam into said combined blast pipe and mixing chamber, means for conducting a dust settling substance into said combined blast pipe and mixing chamber, a wool chamber arranged to receive the projected wool fibers and the blast of steam and dust settling substance, and means for preventing the fluid contents of said wool chamber from escaping freely, thereby con-

fining the wool fibers, steam and dust settling substance under a pressure created by the blast.

4. In an apparatus for making mineral wool, a cupola having an outlet for the discharge of a stream of molten scoriaceous material, a steam blast arranged to project said material to form mineral wool fibers, a wool chamber arranged to receive the projected steam and fibers, said wool chamber having oppositely disposed restricted vents at its upper portion, and being otherwise closed to confine the steam and mineral wool fibers under pressure created by said blast.

In testimony that I claim the foregoing I hereunto affix my signature.

WILLIAM FAY.