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MEANS FOR PRODUCING FIBERS FROM SUITABLE MOLTEN MATERIALS

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Fig. 1.

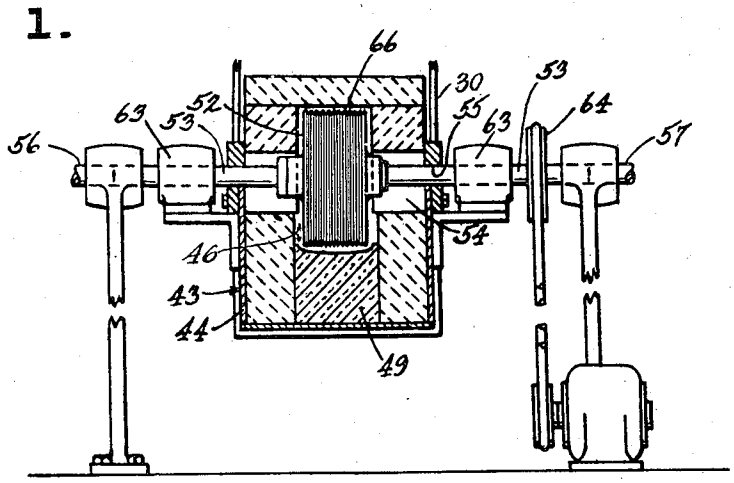
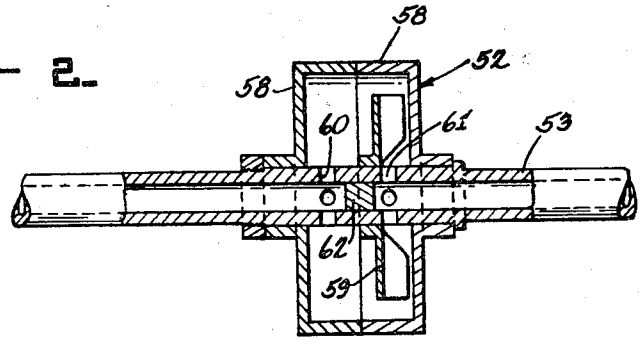


Fig. 2.



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MEANS FOR PRODUCING FIBERS FROM SUITABLE MOLTEN MATERIALS

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Original application January 6, 1936, Serial No. 57,791. Divided and this application April 22, 1939, Serial No. 269,375

4 Claims. (Cl. 83—91)

My invention relates to improved means whereby molten materials may be shredded into fibers, such as, for instance mineral wool or chemical asbestos and its chief object is to provide such means.

This is a division of my original application, Serial No. 57,791, which was filed January 6, 1936, and matured on July 11, 1939, into my United States Letters Patent No. 2,165,242. This original patent discloses my complete means and methods whereby the above mentioned molten materials are melted to provide a continuous stream of melted materials which is fed to a spinning apparatus, whereby the molten materials are centrifugally spun into long silky mineral fibers.

These means and methods are also fully described and illustrated in my United States Letters Patent No. 2,178,871, which was issued on November 7, 1939.

Inasmuch as each of the claims in the present application is directed specifically to the spinning apparatus of this invention, the present application is limited to such portions of my original application as are believed to be necessary to an understanding of this spinning apparatus. The reader is therefore referred to either of the above mentioned patents for a complete understanding of the entire converting operation whereby the raw materials are converted into fibers in accordance with my invention as originally disclosed.

In the production of mineral fibers, such as, for instance mineral wool, suitable raw materials in the form of lumps or rocks are now commonly melted in metal cupolas, the lower sidewall portions of which are water-cooled. The raw materials, after being melted flow out of an opening or spout provided in the cupola and form a small stream which falls upon a steam blast which shreds the molten stream into fibers.

These fibers are blown by this blast into a blow chamber having a continuously movable base or conveyor upon which the fibers are deposited from suspension in the heated gases and vapors of the blow chamber. The deposited fibers form an elongated mat on the conveyor by which they are carried out of the blow chamber to be prepared for shipment and use. When felted blankets or batts are to be produced, a suitable binding material is preferably co-mingled with the blast for the purpose of cementing the fibers together sufficiently to prevent them from separating from each other when the blankets or batts are being handled or transported. This process is, of course, old and has long been used by the industry, but, insofar as the process relates to the spinning of mineral wool fibers, it has disadvantages, the most serious of which are occasioned by the fact that the mineral fibers are suddenly chilled with a blast of steam which is approximately 2,000 degrees Fahrenheit cooler than the molten lava.

This sudden chilling obviously prevents the fibers from becoming properly annealed, renders them brittle, and causes the formation of an appreciable amount of "shot." This use of a relatively cool steam for shredding purposes is, in applicant's opinion, an obstacle to the technical development of the industry for the simple reason that it prevents the formation of ideal fibers which must be strong, silky and flexible.

The full nature of my invention and its other objects and advantages will be understood by the accompanying drawing and the following descriptions and claims.

In the drawing:

Figure 1 is a vertical sectional view showing a preferred form of my spinning apparatus and driving mechanism associated therewith, and

Figure 2 is a fragmentary sectional view of the spinning wheel or drum shown in Figure 1.

In Figure 1, I have shown a pool or trough member **43** having a rigid sheath **44** which is preferably welded to brackets **30** which may in turn be welded or otherwise secured to any suitable support (not shown) such as, for instance the base portion of the furnace shown and described in each of my above identified United States Letters Patents. This sheath encloses the base and wall portions of said trough member, the wall portions of which are preferably formed of fire brick or blocks substantially as shown.

On the inside of the sheath **44** I have provided a pool or trough bed **49** which is preferably formed of clay but may, of course, be made of any suitable material. The inner portion of this bed may be relatively deep and may extend rearwardly in a manner adapted to receive a continuous stream of the molten material which is in operation fed forwardly and shredded into mineral fibers by a drum means **52**.

This drum means **52** is positioned immediately above the trough bed **49** and may be made of any suitable construction. This drum member, as depicted, preferably includes a hollow shaft **53** which passes through suitable openings **54** and **55** in the sheath and wall of a passageway **46**, through which the molten material is fed to this drum means. This shaft **53** is operatively

connected to any suitable stationary water inlet and water outlet means 56 and 57 through which water may be supplied to and be discharged from my spinning apparatus. A split drum 58 having within it an impeller 59 is fixedly secured to the hollow shaft 53. Suitably positioned openings 60 and 61 and a plug 62 are provided in the shaft 53 for the purpose of permitting the water in the shaft to be drawn by centrifugal force through the drum 58. The shaft 53 is, mounted on any suitable bearings 63 and is adapted to be rapidly rotated by any suitable means, such as, for instance a pulley 64. The circumferential surface of the drum is preferably provided with numerous annular V-shaped grooves 66 which provide additional lava contact surface and appreciably aid in dividing the lava into numerous tiny molten streams or filaments which, when hurled off of the drum and chilled, form fibers substantially without "shot."

From the above it will be seen that I have provided means whereby a film of lava, without being first subjected to a chilling blast, may be separated by centrifugal force from its main body portion and divided into filamentary particles to the end that ideal fibers may be formed.

Various modifications may, of course, be made in the details of my spinning apparatus without departing from the true spirit of my invention. I, therefore, wish to be limited only by the scope of the following claims.

I claim:

1. In apparatus for spinning fibers from suitable molten materials, a hollow shaft and means for rotating said shaft, said shaft having a fluid inlet and a fluid outlet and adapted to be operatively connected to a supply of cooling fluid without said shaft, a hollow drum mounted thereon and having its interior in operative communication with said fluid outlet and said fluid inlet of said shaft and an impeller means within the interior of said drum for centrifugally forcing a cooling fluid from said supply through said inlet to the interior of said drum and through said outlet, said drum being adapted to operatively maintion a velocity in excess of one thousand R. P. M.

2. In apparatus for spinning fibers from suitable molten materials, a hollow shaft and means for rotating said shaft, said shaft having a fluid inlet and a fluid outlet and adapted to be operatively connected to a supply of cooling fluid without said shaft, a hollow drum mounted thereon and having its interior in operative communication with said fluid outlet and said fluid inlet of said shaft and an impeller means having radially extending members within the interior of said drum for centrifugally forcing a cooling fluid from said supply through said inlet to the interior of said drum and through said outlet, said drum being adapted to operatively maintain a velocity in excess of one thousand R. P. M.

3. In apparatus for spinning fibers from suitable molten materials, a hollow shaft and means for rotating said shaft, said shaft having a fluid inlet and a fluid outlet and adapted to be operatively connected to a supply of cooling fluid without said shaft, a hollow drum mounted thereon and having its interior in operative communication with said fluid outlet and said fluid inlet of said shaft and an impeller means within the interior of said drum for centrifugally forcing a cooling fluid from said supply through said inlet to the interior of said drum and through said outlet, said drum being adapted to operatively maintain a velocity in excess of one thousand R. P. M., and having an exterior circular surface portion provided with a plurality of closely spaced annular grooves concentric with said shaft.

4. In apparatus for spinning fibers from suitable molten materials, a hollow shaft and means for rotating said shaft, said shaft having a fluid inlet and a fluid outlet and adapted to be operatively connected to a supply of cooling fluid without said shaft, a hollow drum mounted thereon and having its interior in operative communication with said fluid outlet and said fluid inlet of said shaft and an impeller means within the interior of said drum for centrifugally forcing a cooling fluid from said supply through said inlet to the interior of said drum and through said outlet, said drum being adapted to operatively maintain a velocity in excess of one thousand R. P. M., and having an exterior grooved circular surface portion concentric with said shaft.

DANIEL C. DRILL.