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METHOD OF PRODUCING FIBERS FROM VITREOUS MATERIALS

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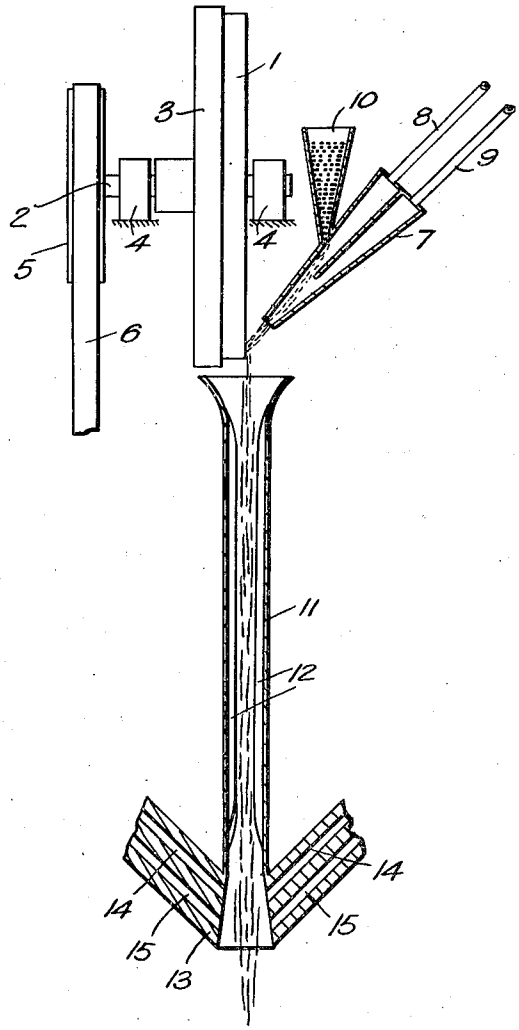


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# UNITED STATES PATENT OFFICE

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## METHOD OF PRODUCING FIBERS FROM VITREOUS MATERIALS

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My invention relates to a method of producing fibers from vitreous materials melting at high temperatures and the object of the invention is to devise a method by which such materials may be handled in the preliminary stages of the process in a convenient solid form and such that when the solid vitreous material is fused and reduced to filamentary form it shall not destructively adhere to contacting bodies employed in reducing the material to such filamentary form.

A further object is to devise a method which shall produce a fiber having tentacles formed by the adhering together of separate comparatively short fibers in order that any fabric constituted of such fibers shall have strength resulting from the fact that a strain imposed upon any fiber of such fabric is distributed to adjacent fibers engaging therewith.

A still further object is to form a stranded fiber which shall be extremely flexible by assembling, remelting, recooling and simultaneously redrawing in a controlled manner the initially formed fibers in such a manner that the individual strands of such stranded fibers will be greatly attenuated.

In carrying out my invention I preferably make use of the apparatus illustrated in the accompanying drawing in which:

The figure represents a diagrammatic view thereof.

1 is a rotating block of suitable refractory material such as silica, said block 1 being secured to the rotatable shaft 2 by means of the holder 3 which is keyed or otherwise secured to the shaft 2, said shaft 2 being mounted on suitable bearings 4 and is provided with a pulley 5 driven by a belt 6 from any suitable prime mover. 7 is a blow-pipe having oxygen and hydrogen inlet pipes 8 and 9 respectively connected to a source of gas supply under pressure, not shown.

10 is a hopper for feeding the powdered vitreous material into the blow-pipe 7, the spout of said hopper 10 being connected to the interior of the blow-pipe and arranged to discharge by gravity.

11 is a vertical guide tube disposed below the block 1 and so arranged as to receive the vitreous material from the blow-pipe 7 after it has impinged upon the face of the block 1 and has been thrown off therefrom under the action of centrifugal force produced by the rotation of the block combined with the velocity of the gas in which such finely divided material is suspended. 12 are spiral vanes provided in the interior of the guide tube 11 for giving a twist to the material passing therethrough.

The lower end of the guide tube 11 is connected to a compound gas blast nozzle 13 which comprises opposed blow-pipes 14 arranged to feed a mixture of oxygen and hydrogen under pressure to a point of impingement centrally located between the discharge orifices of such blow-pipes. 15 are opposed air blast orifices located below the blow-pipe orifices and similarly arranged to discharge cooling air to a point of impingement centrally located between the discharge ends of such orifices. Both blow-pipes and air blast orifices are so directed that the resultant gas and air blasts shall impel the materials acted upon in a downward direction, but if so desired a suction fan can be connected to the compound gas blast nozzle in such manner as to assist the flow of the gases through the gas blast nozzle.

The gas blasts from the blow-pipes 14 are arranged to produce, whether by combustion or preheating, a melting zone at their point of impingement and the air blasts 15 are designed to create a cooling zone at a predetermined distance below such melting zone in order that the materials fused within the melting zone shall be definitely solidified at the point of impingement of the air blasts. The air blasts provided through air blast

nozzles 15 are of such velocity and pressure as to carry forward at highly accelerated velocities the filamentary materials received from the guide tube and remelted by the blow-pipe gases discharged from the blow-pipes 14.

The vitreous material in powdered form is fed through the hopper 10 into the gas blast of the blow-pipe 7, thereby resulting in a finely divided spray of comminuted material distributed through the last which is maintained at a melting temperature for such materials.

The melted and sprayed material thus projected onto the face of the refractory rotating block 1, adhering thereto, immediately attains the tangential velocity of the rotating block and is thrown off therefrom by the centrifugal force resultant from such velocity derived from the block assisted by the velocity of the blast.

The result of such action is that such particles of fused material are immediately drawn into elongated filaments which are received by the guide tube 11 which by means of spiral guides causes the fibers to cross each other and to be disccharged in this condition from the bottom end of the tube into the gas blast nozzle 13 where the gases from the blow-pipes 14 acting thereon fuse such crossed assembled fibers throughout and weld them together at their points of contact one with the other, such blasts from the blow-pipes 14 being so disposed and of such pressure as to simultaneously impel forwardly in the general direction of flow the fibrous materials while in a molten state. The cooling air blasts from the air orifices 15 thereupon carry forward the solidified fibrous filamentary products with the result that a drawing zone is produced between the point of fusion under the heated gas blast from the blow-pipes 14 and cooling blasts from the air orifices 15 and the fibrous materials are redrawn therein to a greater degree of attenuation while being continuously constrained by the pressure of the gas or air acting thereon.

The product of the process herein described in which the strands have adhering tentacles or projections such as to engage with adjacent strands or fibers is thus adapted to distribute the strains to which any fabric formed therefrom is subjected.

What I claim as my invention is:

1. In a method of producing fibers from vitreous material the step which consists in assembling elongated fibers of such material and passing same through a composite melting and drawing gas blast adapted to attenuate and elongate such fibrous material while in a molten state.

2. In a method of producing fibers from vitreous material the step which consists in assembling elongated fibers of such material and passing same through impinging composite melting and drawing gas blasts adapted to attenuate and elongate such fibrous material while in a molten state therein, said impinging blasts creating a definite drawing zone.

3. In a method of producing fibers from vitreous material the step which consists in fusing a plurality of cross fibers at their points of contact and causing them to adhere together.

4. In a method of producing fibers from vitreous material the step which consists in fusing a plurality of crossed fibers at their points of contact and causing them to adhere together and simultaneously drawing the fused fibers while in a molten state into more greatly attenuated form.

5. That improvement in the formation of filaments from vitreous material particles which consists in subjecting said particles to a heated gaseous melting blast and immediately thereafter subjecting said particles to a cooling and solidifying gaseous blast in such manner that elongation and attenuation of such particles in filamentary form is effected by the successive action of the gaseous blasts.

In testimony whereof I affix my signature.

JOHN GRANT JACKSON.