APPARATUS FOR PRODUCING FIBERS FROM THERMOPLASTIC MATERIAL

Filed Feb. 21, 1956

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This can result notably when the centrifugal body is surrounded by a combustion chamber having as expansion orifices, a continuous slot, or holes or slots very close together. In these circumstances there is formed below the centrifugal body a turbulent motion of air or gases which create a low pressure zone below the centrifugal body with a tendency to carry into that zone the hot gases from the combustion chamber and hence the fibers entrained therein. This phenomenon can cause several serious drawbacks, especially the sticking of fibers under the centrifugal body and a sticking together of the hot regurgitated fibers and possibly collecting deformed filaments appearing as rigid and breaking small rods. These deficiencies are more noticeable as the number of orifices in the centrifugal body are increased and production of fibers enlarged.

One of the objects of the present invention is to correct the above deficiencies, and provision is made for the direction of the fiber entraining and drawing gaseous currents issuing from the combustion chamber in such a way as to restrain their movement toward the axis of the centrifugal body or even cause their movement away from said axis after the gaseous currents come into contact with and entrain the filaments projected by the centrifuging body. This guidance of or control over the gaseous currents issuing from the combustion chamber may be effected by the use of air or gas currents or mechanical deflection elements located below the centrifugal body.

According to the embodiments of the invention illustrated herein, mechanical deflection elements of conical outline are provided below the centrifugal body to guide the entrained filaments outwardly from below the center of the centrifugal body to prevent the sticking of the filaments therebelow. The deflection effects attained by these elements may be realized by fitting the lower part of the centrifugal body with a truncated cone guide surface. The guide surface may also be independent of the centrifugal body and may be placed below it and assume the form of a fixed conic surface.

In the drawings which illustrate preferred embodiments for executing the invention:

FIG. 1 is a fragmentary vertical section through the centrifugal body and the combustion chamber, showing a frusto-conical apron at the bottom of the centrifugal body for guiding and deflecting the hot gases from the combustion chamber and the fibers entrained the rein and drawn thereby; and

FIG. 2 is a sectional view showing the use of a conical member to induce the spread of the hot gases from the combustion chamber carrying the entrained fibers.

In the illustrated embodiments of the invention, a centrifugal body I, rotating at high speed about its axis, through appropriate driving means at a speed of 3,000 revolutions per minute, or higher, carries at its peripheral part a cylindrical wall 1b bearing 2 to 20 rows of projection orifices 2 of suitable diameter, through which the molten material is projected at a temperature of about 1300° C.

It is advantageous for the orifices provided in the frontal peripheral wall of the centrifugal body to be separated in such a way that the distances separating the neighboring orifices be about the same. A suitable spacing of the orifices can be made by placing them according to regular quincunial arrangements. A combustion chamber 3 of general annular shape is provided with an expansion orifice or orifices 4 which delivers the combustion gas at a very high speed and high temperature. The orifice 4 and the wall or walls defining the same are so positioned in respect to the peripheral wall 1b of the centrifugal body and the orifice orifices contained therein that the molten material or filaments, as they are projected from the centrifugal body or at a slight distance therefrom are thrown into and picked up, entrained in and drawn by the hot gases passing across the peripheral surface of the
centrifuge wall 1b and at an angle to the normal line of projection of the filaments from the centrifugal body. These hot gases pass lightly over the peripheral wall of the centrifugal body and are in contact with all the projection orifices.

FIG. 1 shows a truncated cone guide surface 8 attached to the centrifugal body. Its generatrix makes a “gamma” angle with the axis of the centrifugal body. This “gamma” angle may be of the order of 10°. As a consequence the hot gases with the entrained fibers will be deflected outwardly and away from the axis of the centrifugal body.

FIG. 2 shows a stationary conic element 11 placed below the centrifugal body to produce also the spread of hot gases and the entrained fibers. The conic element may be attached in any convenient manner, for example, by means of a rod 12 placed along the axis of the centrifugal body or it may be supported from below.

In both forms of the invention, the centrifugal body will be heated internally by an appropriate burner or burners (not shown) so as to maintain the motion supply of material passing through the tube and into the interior of the centrifuge in a homogeneous state and at the proper centrifuging temperature.

Likewise in both forms of the invention, the fibers projected from the orifices in the centrifugal body enter but do not pass through or beyond the hot gases issuing from the combustion chamber. Once the fibers enter the ring of hot gases or are picked up by those gases they are entrained the rein and turned downwardly and attenuated and drawn into fine fibers by the travel and traction exerted by those gases. This end will be attained by appropriately adjusting or regulating the centrifugal force and the force of the hot gases issuing from the hot chamber.

What is claimed is:

1. In apparatus for producing glass fibers from thermostable vitreous material, the combination of a centrifugal body having a peripheral wall provided with a plurality of superposed rows of orifices therein and adapted to receive at its interior portion a supply of the thermoplastic material in the viscous state, said body being rotatable at a speed sufficient to project the viscous material outwardly and uniformly through said orifices, a combustion chamber located adjacent said body and provided with a discharge opening having walls shaped to direct the discharge of gases from said chamber at high temperature and high velocity in a ring-like blast across said rows of orifices close to and in line contact with the peripheral wall of said body, said gases travelling at an angle to the plane of rotation of said body whereby said streamlets of viscous material issuing from the orifices of the rotating body are turned, entrained and drawn out by said gases, and means below said centrifugal body for diverting said streamlets outwardly from the center of said centrifugal body comprising a conical element below said centrifugal body with its smaller end nearest said body.

2. An apparatus as set forth in claim 1 wherein said conical element is of frusto-conical outline and is attached to the bottom of said centrifugal body.

3. An apparatus as set forth in claim 1 wherein said conical element is spaced below said centrifugal body co-axially therewith.

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