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APPARATUS FOR DRAWING FINE THREADS OF FIBERS OF GLASS OR THE LIKE

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Fig. 1.

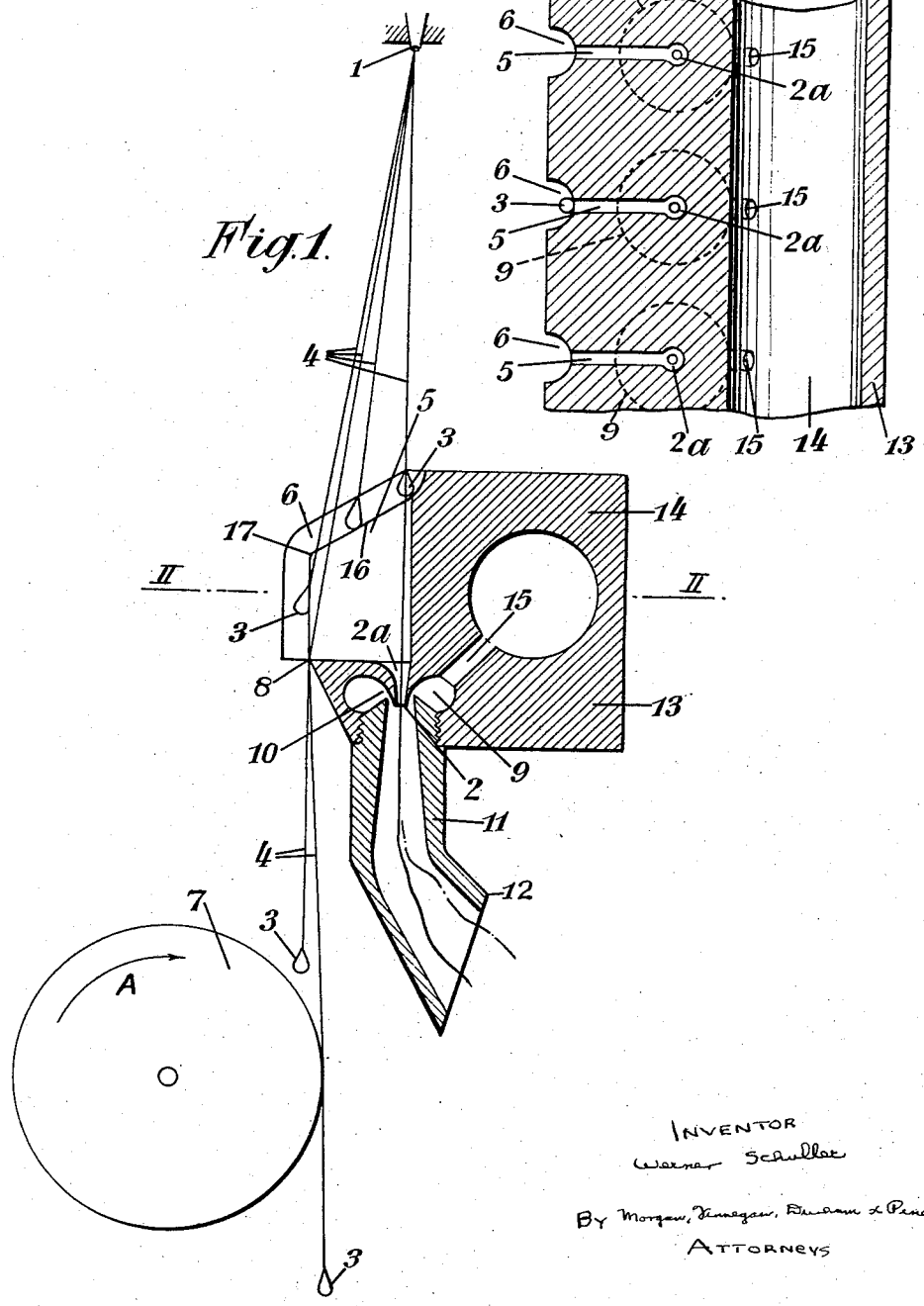



Fig. 2.




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# APPARATUS FOR DRAWING FINE THREADS OF FIBERS OF GLASS OR THE LIKE

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2 Claims. (Cl. 18—8)

The present invention relates to an apparatus for drawing fine threads, filaments or fibers from glass or other like material which is rendered fluid when heated.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the parts, constructions, arrangements, combinations and improvements pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawing, referred to herein and constituting a part hereof, illustrates one embodiment of the invention, and together with the description serves to explain the principles of the invention.

In one known process of drawing glass threads, one end of a glass rod is heated and the glass thread drawn by the drop of glass falling from the thread delivering position being connected to a winding mechanism. In another process, the thread leaving a container filled with liquid glass is brought into contact with a current of steam, air or other gases flowing at high speed under pressure. In the latter process the speed of movement of the thread is greatest when the current of gas is conducted through a jet the construction of which is adapted to the expansion of the gas current under pressure so that all the compression forces are directed towards increasing the speed of the thread. The effects on the glass thread would be particularly advantageous if the glass thread could be introduced into this gas current in the jet. In the known processes this has not been possible as there was no means to inject the thread into the jet. The practice hitherto has been to conduct the thread between two jets blowing on the thread from two sides of an acute angle and thus effecting the forward movement of the thread. In this way, due to the formation of whirling currents, a large part of the necessary pressure is used up with a corresponding loss in speed.

A further disadvantage of known apparatus is that the glass drop has to pass through the jets before the thread is formed. Owning to the large size of the drops relatively to the thread, the space between the jets, which are positioned adjacent, has to be very wide; the required space would be much less if the thread alone were passed. The large distance between the jets causes an increased whirl formation within the thread area and necessitates the use of an increased volume of steam and air.

These disadvantages are avoided by the apparatus according to the invention, in which beneath the thread delivering position there is provided, as a transport medium, a jet through which the thread passes and which surrounds the thread on all sides, the jet being connected with a drop conductor by a slit or narrow channel, both the cross-section of the jet and of the slit or channel being smaller than that of a thread-drop.



Figure 1 is a vertical section of apparatus according to the invention;

Figure 2 is a part horizontal section on the line II—II of Figure 1 on a slightly enlarged scale.

In the drawing, 1 denotes a thread-delivering position which may consist of the heated end of a glass rod or may be formed by the jet of a container for the molten glass.

According to the invention, a jet 2 surrounding the thread on all sides, is provided in a part 13 beneath the thread delivery position for the gaseous medium, such for example as steam. The cross-section of the jet 2 is less than the cross-section of a thread drop 3. The thread drop 3 normally draws with it the thread 4. The jet 2 is connected with a drop conductor or conveyor 6 through a slit or narrow channel 5, which is also of lesser section than the drop and which extends to the bottom of the part 13. The drop conductor 6 is adapted to convey the glass drop 3 together with the drawn thread 4 on to a receiving device, for example a winding drum 7, which rotates in the direction of the arrow A and is positioned at a suitable distance below the part 13. At the bottom of the slit or channel 5 there is provided a knife edge 8 over which the thread 4 passes before being wound over the winding drum 7.

The jet 2 is provided with a jet end 2*a* which extends into an annular channel 9. The jet end 2*a* is surrounded by the inner edge 10 of a conical part 11 of gradually increasing diameter. The outer end 12 of the part 11 is advantageously slightly bent to one side as illustrated in Figure 1, and screw-threaded into a cavity formed to receive it in the lower part of the part 13.

The part 13 serves as base for the annular channel 9. In the part 13 is provided a conduit 14 which is connected with the annular channels 9 by channels 15, and through which the pressure medium passes to the annular channels 9 around the jets 2.

In the example illustrated, the drop conductor or conveyor 6 is shaped in such manner that the drop is conducted first along a sloping part 16, from there to a position 17 whence the drop falls vertically on to the drum 7, during which time the thread 4 while still connected to the drop is positioned at the lower part between the walls of the slit or channel 5.

The apparatus operates as follows:

The glass drop 3 falls from the thread-delivering position 1, drawing with it the thread 4, on to the thread conductor or conveyor 6, and slides downwardly over the sloping part 16 with the thread until it reaches the winding drum 7 on which the thread is wound. The pull exerted by the drum accelerates the downward movement of the thread, causing the thread to be drawn to a greater fineness. The pull of the winding drum 7 also causes the thread to be severed from the drop at the knife edge 8, so that it is free to be subjected to the effects of the vacuum in the slit or channel 5 in which the lower part of the thread is positioned and is then sucked into the jet opening 2*a* by the gaseous or other fluid medium flowing through the jet 2, and passes into the conical part 11 to be ejected through the part 12. The retarding of the thread 4 at the delivering position 1 imparts a waving movement to the thread and within the jet 2 which has for its effect to increase the suction of the gases to entrain the thread and draw it with them. This effect is further increased by the elbow construction of the conical part 11 which forms continuous whirls of the fluid medium favourable for the drawing or suction of the thread.

Owing to the thread being surrounded by the jet 2 the whole periphery of the thread is contacted by the drawing or suction medium and the thread is effectively

drawn. Thus a continuous thread passes from the molten glass reservoir through the jet, to be wound on a drum or in any other suitable manner, and is interrupted only if the thread accidentally breaks or when the apparatus is stopped. If a thread breaks by accident, a glass drop immediately reforms and a new thread is started; restarting is thus automatic.

The apparatus according to the invention makes it possible to reduce the consumption of steam or air at the jet 2 to a minimum, which results in cheaper production. The apparatus is also suitable for the manufacture of wool from the finest glass thread, or threads of other elastic materials.

As illustrated in Figure 2, a number of jets 2 can be provided in juxtaposition, the distance of the jets from each other being dependent only on the diameters of the annular channels 9 which may be considerably smaller than those which to make the invention more clear have been illustrated on an enlarged scale in the drawing.

The invention in its broader aspects is not limited to the specific combinations and improvements described, but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

I claim:

1. In an apparatus for attenuating molten glass to filaments by the action of a gaseous jet, the improvement comprising means disposed below a source of molten glass to separate initial droplets of glass and incompletely attenuated filaments from completely attenuated filaments said means comprising guide means including a sloped surface for receiving said droplets, jet suction means disposed beneath said sloped surface toward the high side thereof, severing means disposed below the lower edge of said sloped surface, a filament inlet means in the guide means including the sloped surface and extending from said severing means to said jet suction means, said filament inlet means being smaller than said droplets, a rotating drum rotated below said severing means, the surface of said rotating drum being at least tangent to a plumb line from said severing means and means for rotating the drum in such direction as to increase the tension of the filament.



2. An improvement in an apparatus for attenuating molten glass to filaments as set forth in claim 1, wherein the filament inlet comprises a slit, the severing means consists of a severing edge, and the rotating drum increases the tension of the filament against the severing edge.


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