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2,333,267

APPARATUS FOR THE PRODUCTION OF GLASS YARNS

Original Filed March 3, 1939 2 Sheets-Sheet 1

FIG. 1.

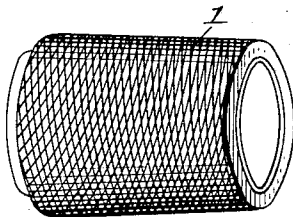


FIG. 2.

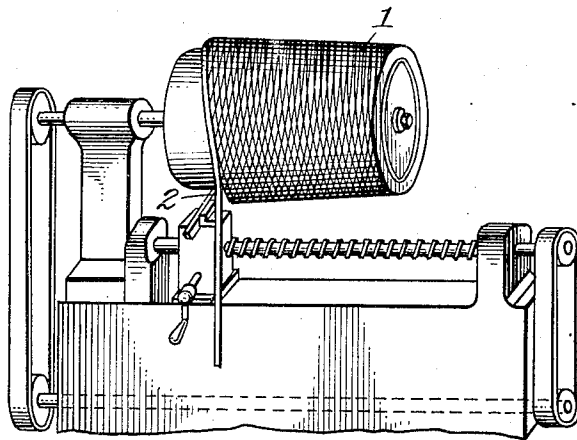


FIG. 3.

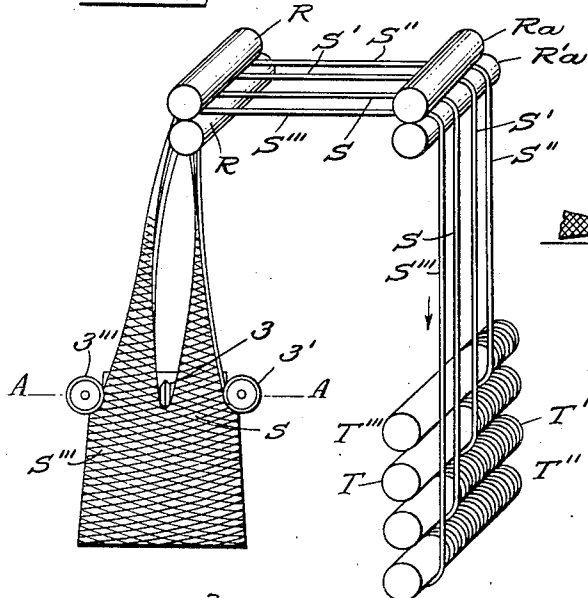


FIG. 7.

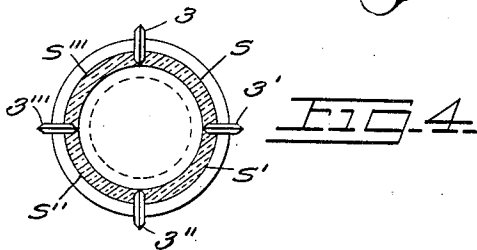
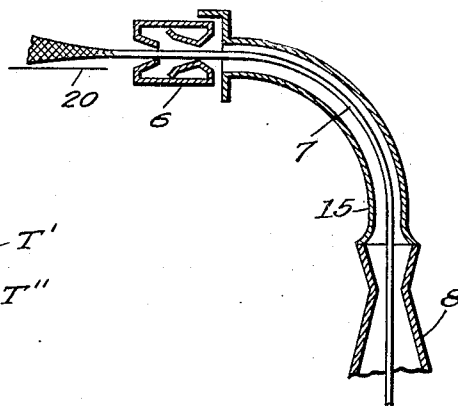


FIG. 4.

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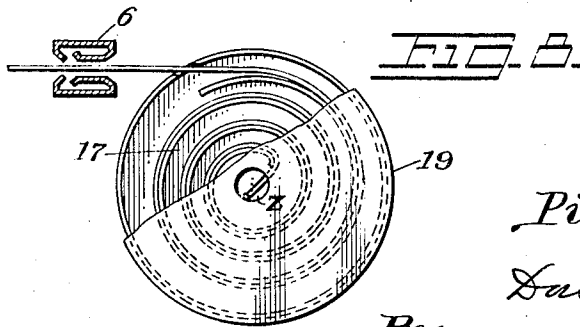
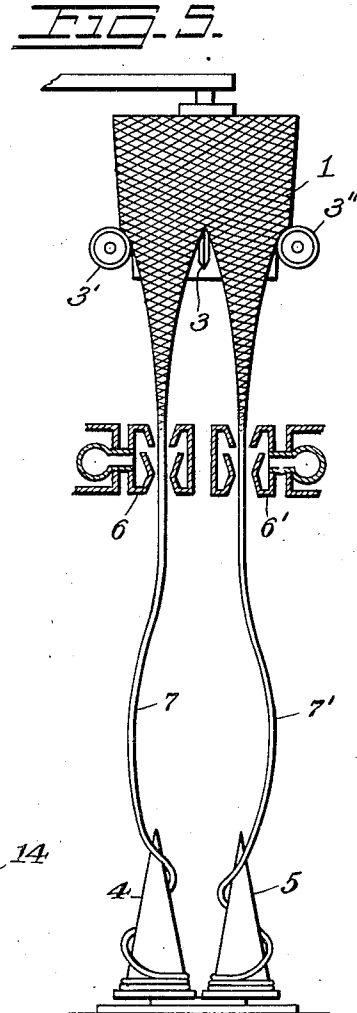
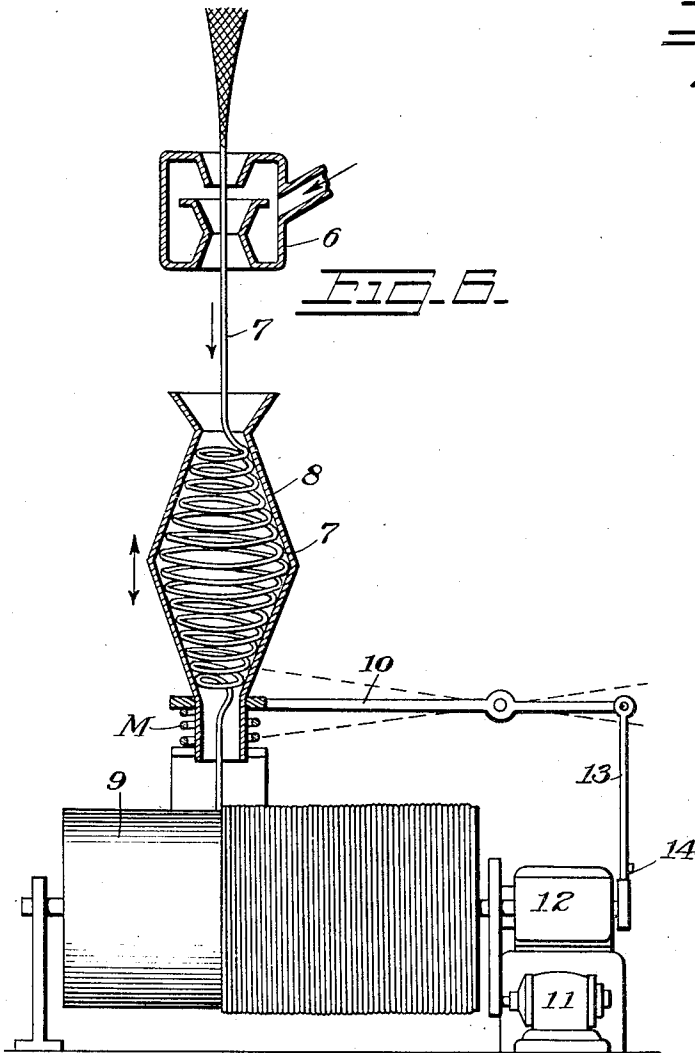
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APPARATUS FOR THE PRODUCTION OF GLASS YARNS

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UNITED STATES PATENT OFFICE

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APPARATUS FOR THE PRODUCTION OF
GLASS YARNS

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Original application March 3, 1939, Serial No.
259,706, now Patent No. 2,265,186, dated Decem-
ber 9, 1941. Divided and this application Decem-
ber 6, 1941, Serial No. 422,005. In Italy
March 14, 1938

8 Claims. (Cl. 28—1)

The present invention relates to a method of drawing and spinning glass particularly wherein the glass fibers are accumulated on a sheathing independent of the cylinder of the drawing machine.

This application is a division of my prior filed application now Patent No. 2,265,186, issued December 9, 1941.

In previous methods of spinning glass fibers, as described by applicant, the drawing and winding cylinders from which the fiber mat or felt was obtained by cutting helicoidally or in the direction of a generatrix, formed an integral part of the machine. It was thus necessary to treat the layer or fiber deposited during the drawing on the machine, which caused loss of time and interruption of the drawing operation with the attendant inconveniences.

According to the invention the fibers are deposited in the drawing stage so as to be easily removed in the form of a tubular layer.

The tubular fiber stratum is then carried to the machine from which, by helicoidally cutting, or pneumatic or mechanical stretching, or otherwise, the helicoidal or simply wound mat is transferred to an accumulating drum or cylinder.

According to one embodiment, the tubular strata of glass fiber are deposited, not on the cylinder of the machine but on a slightly conical tube or sleeve which can be easily slid on and withdrawn in the form of a sheath from the cylinder of the drawing machine, to be stored with its charge of fiber until it is passed to the machine for forming the mat.

In another embodiment, the tubular layer of glass fiber is formed on the cylinder of the drawing machine on a thin sheet, such as paper of any kind. On withdrawing the tubular stratum the thinner inner sheet follows the formation of the glass fiber and its function is merely to promote the sliding action between the surface of the cylinder and the tubular layer. The consistency or solidity of the tubular stratum is assured by the crossing of the fibres themselves. Thus a kind of cop or tubular mass of self-sustaining consistency is obtained. The same result may be obtained by forming the cylinder of the drawing machine of a plurality of segments having sectors adapted to be brought together or removed from each other by means of an expanding device operable, for example, by means of a head or the like. After the drawing is completed the system of segments or sectors is contracted and the cop or tubular mass is liberated,

and can thus be carried to the spinning machine proper.

The form of the sleeves or baskets which carry the tubular fiber layer may be conical internally and cylindrical externally. Also, the cop or tubular mass may be conical or cylindrical externally if desired, independently of the form of its internal bore which may be cylindrical or conical, for example.

The following spinning operation proper can be done in any desired manner from the tubular fiber layer thus mounted on a rigid sleeve of fiber, wood, metal or other material, after withdrawal of the latter.

A method consists in progressively and simultaneously cutting the tubular fiber stratum with knives which pass along its generatrices and which are located at regular distances, so as to form a number of strips which are subjected to a stretching operation. This stretching may be done mechanically and then the individual strips produce single wicks or strands which are wound individually on reels or drums. Or, the stretching may be done pneumatically, as described in application for Italian Patent No. 425/2652 of November 5, 1937, or U. S. application Serial No. 236,773, filed October 24, 1938, and the strands collected from the stretched strips with parallel fibers may pass onto straight cones externally, or into a hollow cone, or on a disc with spiral channels. When collected in a hollow cone of bi-conical form, the strand may be wound again and at once on a rotatable drum the velocity of which varies automatically according to the weight of the strand or wick accumulated in the bi-conical container.

These characteristics and advantages of the invention, and others, are explained by the description of a construction given by way of example only.

Figure 1 shows the new product obtained in the form of a cop or tubular mass.

Figure 2 shows the method of forming the strands on the machine provided successively with the spindles prepared by drawing on another machine, for example such as that of Italian Patent Reg. No. 428, No. 678, of March 9, 1938, corresponding to my U. S. application Serial No. 259,705, filed March 3, 1939.

Figure 3 shows a conical spindle or bobbin subject to the action of the knives to form strips which are mechanically drawn and wound.

Figure 4 is a horizontal sectional view along line 4—4 of Figure 3.

Figure 5 shows the same system of cutting the

tubular mass or receiving drum of fiber which are stretched by means of injector nozzles and collected on straight solid cones.

Figure 6 shows diagrammatically a system for collecting the strands produced by pneumatic stretching, with apparatus for automatically winding the collected strands.

Figure 7 shows the arrangement of the nozzle with its axis parallel with the table on which the mat cut from the spindle is deposited, for then passing the strand in the vertical direction, to be collected.

Figure 8 shows a disc with helicoidal channels and a cover, into which is passed the strand to be collected by means of the jet of air from the injectors, before being passed to a winding bobbin.

Referring specifically to the drawings:

In Figure 1, 1 is the tubular glass fiber stratum deposited on a hollow tubular member which is slightly conical so as to be easily slid on the cylinder, which also may be slightly conical, of the drawing machine, for example as shown in Figure 2. Each individual fiber or filament going to make up the glass fiber stratum is continuous and assuming that such fibers are unbroken, their length will be dependent upon the thickness of the stratum deposited on the tubular member. The slightly conical tubular member 1, formed of wound glass fibers, need not be provided with the conical tubular core when its consistency is such as to assure complete stability or indeformability during the periods of production, storage and transport. A thin sheet of paper, cardboard or other material, or the expansion of the machine cylinders, is then sufficient to facilitate insertion and withdrawal.

Figure 2 shows the knife 2 which cuts the tubular mass 1 into a helicoidal strip which may then be drawn as described, for example, in Italian Patent No. 351,056, to which corresponds U. S. application Serial No. 204,444, filed April 26, 1938.

According to Figure 3, the tubular mass 1 is cut progressively by the knives 3, 3', 3'', 3''' (Figure 4), forming four strips s, s', s'', s''', each about one-fourth as wide as the periphery of the tubular mass. Each strip forms a wick or strand S'', S', S, S'''. The stretching and paralleling of the crossed fibers on the tubular mass 1 is realized mechanically by pairs of rollers R, R'; and Ra, Ra'. The strands S'', S', S and S''' are wound on drums T'', T', T, T''', respectively.

Corresponding to this mechanical stretching arrangement shown in Figures 3 and 4, is shown a pneumatic stretching arrangement in Figure 5, in which a battery of four injector nozzles such as 6, 6', etc., take from the tubular mass 1 the strips formed by the knives 3, 3', 3'', 3''' which provide the strands 1', 1'' . . . deposited on straight cones 4, 5, etc.

To obtain an accumulation of the strands, use may be made of the system shown in Figure 6 wherein the strand 7 is passed into a vessel 8 in the form of a bi-conical amphora, which presses on a spring M and actuates a lever 10 which acts through a rod 13 on the crank 14 of an internal change speed system 12 acting on the transmission shaft actuated by a motor 11 which sets a winding drum 9 in movement. This diagram shows that the greater the weight of the mat deposited in the vessel 8, which is provided with an upper inlet and a lower outlet, the greater is the speed at which the winding

drum 9 rotates, for the purpose of establishing equilibrium between the source of continuous production of the strand in the nozzle 6 and the apparatus for collecting the strand on the drum 9.

Figure 7 shows the nozzle 6 arranged on its horizontal axis to collect the strand deposited on a table 20. The passage 15 serves to pass the strand 7 into the bi-conical vessel disposed on its vertical axis. A rapid rotational movement may also be imparted to the member 8 to apply the strip 7 along its interior walls by means of centrifugal force.

Figure 8 shows that the nozzle 6 may pass the strip or strand into a spiral passage formed in the receiving drum 16 adapted to be covered with the lid 19. The air passing through the spiral passages 17 carries the strand therein to the center Z from which it can be withdrawn. The receiving drum 16 may also serve as a storage reservoir for the collected strip or mat, like the bi-conical member 8.

Summarizing: The cops or tubular mass mounted on a light core are adapted for an infinite variety of uses, for spinning on a machine independent of the drawing machine and by methods entirely independent of difficult and imperative conditions prevailing during the production of the fiber. The slightly conical form of the tubular mass permits it to be easily inserted by stretching the narrowest part of the cop or tubular mass.

The materials used for the light hollow core forming the support of the tubular mass may be of the most widely varied kind, but those which are lighter and stronger are, of course, preferable.

The invention is described and shown by way of example only, it being understood that numerous modifications may be provided without departing from the scope of the invention, which is also applicable to the handling of other artificial fibers having physical characteristics similar to glass.

I claim:

1. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cutting knives angularly displaced around the drum for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, means for stretching the fibers of the strips into strands, and means for collecting the strands.

2. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cuttings knives angularly displaced around the drums for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, a plurality of pairs of rollers for stretching the fibers of the strips into strands, and a plurality of drums for collecting the strands formed from each of the strips.

3. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cutting knives angularly displaced around the drum for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, pneumatic means constituted by injector nozzles for stretching the fibers of the strips into strands, and cones for receiving the strands formed from each of the strips.

4. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cutting knives angularly

displaced around the drum for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, pneumatic means comprising an injector nozzle for stretching the fibers of the strip into the form of a strand, and a storage chamber for the strands.

5. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cutting knives angularly displaced around the drums for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, pneumatic means comprising an injector nozzle for stretching the fibers of the strip into the form of a strand, a storage reservoir for the strands formed as a bi-conically shaped vessel having an inlet opening and an outlet opening, means for collecting the strand issuing from the outlet opening comprising a drum, driving means for rotatably actuating said drum, and transmission means connected between said vessel and said driving means for controlling the latter in accordance with the weight of the former to vary automatically the collection of the strands on the drum in conformity with the amount of strand stored in said reservoir.

6. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cutting knives angularly

displaced around the drums for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, pneumatic means comprising an injector nozzle for stretching the fibers of the strip into the form of a strand, a storage reservoir for the strands formed by a pair of complementary disc elements which are coupled and closed and define a spiral passage on the interior thereof and having an inlet for the strands upon the outer periphery thereof and an outlet therefor near the center.

7. In an apparatus of the class described, a spinning drum carrying a mat of artificial fibers thereon, a plurality of cutting knives angularly displaced around the drums for cutting the mat into a plurality of strips extending in parallel to the axis of the drum, pneumatic means comprising an injector nozzle for stretching the fibers of the strip into the form of a strand, a storage chamber for the strands extending at an angle with respect to the injector nozzle, and an arcuate passage between the storage chamber and the injector nozzle.

8. In combination with an injector nozzle for projection of a strand of artificial fibers, a device for varying the direction of the strand comprising an arcuate tube having a curvature of 90°.

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