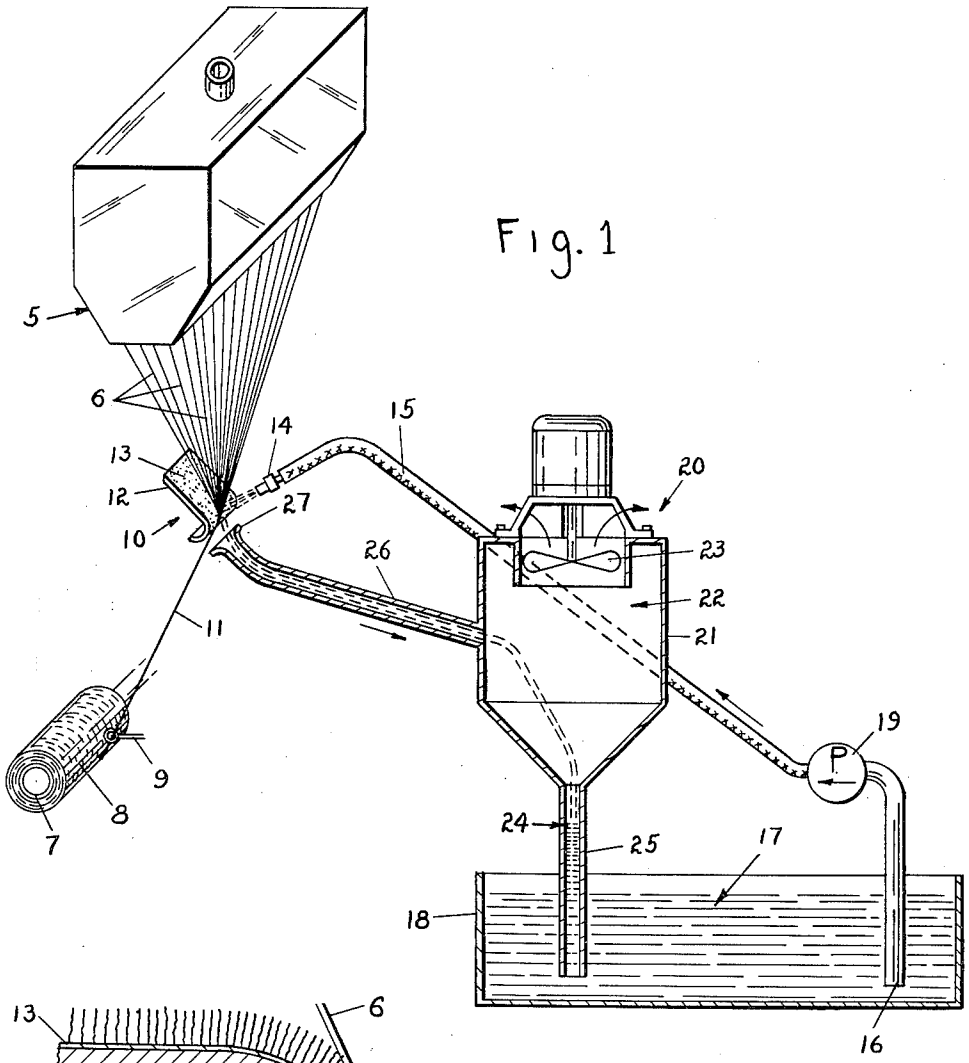
April 10, 1962 W. E. FERNER 3,029,161

LIQUID RECOVERY METHOD AND APPARATUS

Filed Nov. 25, 1957

Fig. 1



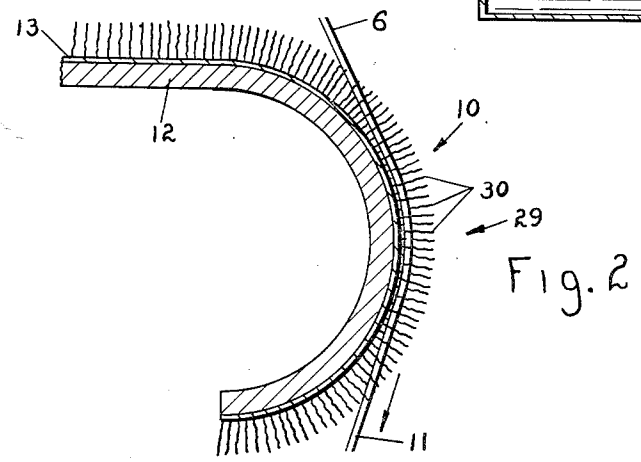


Fig. 2

INVENTOR.
Warren E. Ferner
BY
Robbe & Swope
ATTORNEYS

United States Patent Office 3,029,161 Patented Apr. 10, 1962

3,029,161

LIQUID RECOVERY METHOD AND APPARATUS

Warren F. Ferner, Toledo, Ohio, assignor, by mesne assignments, to Johns-Manville Fiber Glass Inc., Cleveland, Ohio, a corporation of Delaware

Filed Nov. 25, 1957, Ser. No. 698,434
2 Claims. (Cl. 117—102)

The present invention relates broadly to an improved method and apparatus for coating strands of textile material. More particularly, the invention pertains to a novel method and apparatus for recovering excess coating material in a process in which a multiplicity of fibers or filaments are grouped together in strand form and coated with a liquid coating material.

This invention is of particular utility and will be described herein with reference to its use in connection with the coating of strands of glass fibers produced by grouping endless filaments of glass that are drawn and attenuated to extremely fine diameters. However, it is to be understood that the invention may also be used in connection with other processes and, in general, is adapted for use wherever filaments, natural or synthetic, are grouped and coated to form substantially continuous strands.

In forming continuous strands from finely drawn filaments, where the filaments are grouped into strand form by passing said filaments over a guide, the common practice is to provide the guide with applicator means for supplying a liquid coating material, such as a lubricant, size or binder, to said filaments. The filaments are grouped together in strand form as they pass over the guide, and are coated with the liquid lubricant, binder or size, which prevents the filaments within the strand from scratching each other, or the coating may serve to give mass integrity to the group of filaments in strand form thereby preventing loose ends from fraying or breaking apart from the strand.

In applying the coating to the strand, the guide may be provided with a pad of felt or other absorbent material which is saturated with the coating liquid and which serves to wipe the coating liquid on the filaments as they pass thereover. Excess coating liquid may be recovered by providing a suitable recovery vessel under the guide, although it has also been the practice not to bother with any recovery system whatsoever. In the above-mentioned process, where an attempt has been made to recover the excess coating material, it has been found that much of the material is lost due to evaporation and splattering. Evaporation of the coating material occurs both in the recovery vessel and at other points throughout the process where excess liquid is present, as on the strand leaving the guide.

Where an attempt has been made to cut down on losses of excess coating material due to evaporation of splattering, such as by cutting down on the amount of liquid applied to the guide, it has been found that this resulted in incomplete and non-uniform saturation of the applicator pad which, in turn, resulted in poor distribution of the liquid material on the strand.

The present invention aims to overcome the aforementioned difficulties by providing a novel method and apparatus for recovering the excess coating material by the utilization of a suction adjacent the point at which the coating material is applied to the continuous strand.

Another object of the invention is to provide a continuous process and apparatus for the application of a coating material to filaments being grouped into strands and for the recovery of excess coating material, the excess coating material being recycled and reused.

Other objects and advantages of the invention will be

come apparent from the following description taken in conjunction with the drawings, in which:

FIG. 1 is an elevational view of the recovery apparatus of this invention shown in association with a filament forming and drawing apparatus; and

FIG. 2 is an enlarged sectional view of a conventional type of guide and applicator pad.

Referring to the drawing, the apparatus illustrated therein, by way of example, for mechanically drawing and attenuating molten glass in the form of continuous fine glass fibers or filaments comprises a container or bushing 5 for molten glass. The molten glass flows from the container through a plurality of small orifices in the bottom thereof and these streams of molten glass are drawn downwardly and attenuated into fine glass fibers or filaments 6 by means of a winding spindle 7 on which the fibers are wound into a package 8, with the aid of a suitable traverser 9, as well known in the art.

Located intermediate the bushing and winding spindle is a guide 10 adapted to group the filaments 6 into a strand 11 and to apply a liquid coating material to the filaments as they are grouped. The guide 10 ordinarily comprises an arm or plate 12 covered with a pad 13 of felt or other absorbent material for receiving the coating material and for wiping it onto the filaments as they are drawn over the pad.

The liquid coating material is applied to the filaments 6 as they are grouped together at the guide 10 and for this purpose there is provided a nozzle 14 through which the liquid coating material is sprayed upon the applicator pad 13, said nozzle being supplied with the liquid from a pipe or conduit 15, the opposite end 16 of which is received within a supply of the coating material 17 in a reservoir 18. Interposed in the conduit 15 is a pump 19 for supplying the liquid from the reservoir 18 to the nozzle 14.

The excess coating material which is applied to the pad 13 and/or strand 11 is recovered by a vacuum system indicated generally by the numeral 20. Essentially, this system comprises a vacuum chamber 21 defining an evacuated space 22. The vacuum is maintained within the chamber 21 by a blower 23 positioned in said chamber and by a fluid seal 24 formed by the liquid column in a conduit 25 leading from the lower portion of a vacuum chamber 21 into the reservoir 18. Also leading from a side of the vacuum chamber 21 is a conduit 26 terminating at its outer end in an orifice 27 positioned adjacent the guide 10 substantially at the point at which the individual filaments are grouped together.

In the operation of the present invention, excess coating material applied to the pad 13 and/or strand 11 is drawn into the orifice 27 of conduit 26 from which it discharges into the vacuum chamber 21. The vacuum created within the chamber maintains a suction in the conduit 26 which draws the excess liquid coating material into the chamber 21 from which the liquid flows through the conduit 25 into the reservoir 18. The liquid coating material forms the fluid seal 24 in the conduit 25 leading to the reservoir, which seal acts, in conjunction with the vacuum blower, to maintain a constant rate of suction in conduit 26.

Although a vacuum blower 23 is shown as being the preferred embodiment whereby suction is maintained in the vacuum system, other equivalent evacuating means well known to those skilled in the art may be used equally as well.

The recovery system of this invention also provides a continuous system whereby the excess coating material which is recovered and returned to the reservoir 18 may be recycled and applied to the guide and/or strand substantially at the point at which the individual filaments 6 are grouped together. Thus, the excess liquid coating

material received in the reservoir 18 is pumped therefrom through the conduit 15, by means of the pump 19, and is sprayed through the nozzle 14 onto the applicator pad 13.

The guide 10 and applicator pad 13 are shown more in detail in FIG. 2, with the fibers or filaments 6 passing thereover and being grouped into the strand 11. The body fibers of the pad 13 are indicated generally at 29 and a substantially erect arrangement of the fibers, resulting from the flow of air past the pad, is indicated at 30. The air-flow past the applicator pad 13 into the orifice 27 of conduit 26 causes the erection of the fibers 29 of the pad, resulting in better contact between the liquid coating material carried on the pad and the filaments 6 making up the textile strand 11. An important advantage of the invention is that the recovery of the excess coating material permits the application of an amount of liquid coating material in excess of that needed, thereby assuring complete and uniform saturation of the pad, resulting in improved distribution of the coating material on the filaments and strand.

While the type of guide 10 illustrated in the drawings is preferred, other strand collecting devices may be used. Thus, it is contemplated that the individual fibers which make up the strand may be grouped together by passing them over a graphite block, or an applicator roll, or other types of guides well known in the art.

It is also contemplated that means other than the liquid spray device illustrated in the drawings may be used to apply the liquid coating material. For instance, a solid stream or jet of liquid coating material may be directed onto the applicator through a suitably designed nozzle. Also a gravity flow of liquid through a conduit onto the applicator, thereby flooding said applicator, may be used. Additionally, a needle-type nozzle may be inserted into the applicator pad and liquid forced therethrough to flood said applicator pad.

Various liquid binders, sizes, and lubricants well known in the art may be used in the above-mentioned process and the particular type of coating agent used does not form a necessary feature of this invention.

Although the invention has been specifically described with reference to the coating of strands formed by grouping substantially endless fibers or filaments of glass, it is susceptible of use with equivalent textile operations. The apparatus above described may be adapted for use wherever filaments, natural or synthetic, are simultaneously coated and grouped to form substantially continuous strands.

It has been found that with the present invention, it is possible to recover and reuse 50 to 75% of the amount of liquid coating material directed by the nozzle spray onto the applicator pad, thereby resulting in an appreciable saving of material. The recycling of the coating material also results in improved efficiency and all that is required in the continuous operation of the method are periodic additions of coating material to the liquid reservoir 18.

It is to be understood that the form of the invention herewith shown and described is to be taken as the preferred embodiment of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. The method of treating textile strand comprising the steps of: collecting a multiplicity of filaments; coating said filaments with liquid treating material at a point of application by passing said filaments into contact with the fibers of an applicator having extendable wetting fibers; erecting said fibers outwardly from the body of said applicator in a direction transverse to the path of movement of said filaments by inducing suction at said point of application; and withdrawing excess coating material from said fibers.

2. In combination, with guide means for a plurality of filaments as they pass thereover to form a strand, a fibrous applicator for applying a liquid coating material on said filaments at a point of application, vacuum means positioned adjacent to said point of application creating a suction and erecting the applicator fibers at said point of application in a direction transverse to the path of movement of said filaments, said vacuum means also serving to withdraw excess coating material, a reservoir for receiving said excess coating material, and means for recycling the liquid coating material to said applicator.

References Cited in the file of this patent

UNITED STATES PATENTS

1,338,624	Heppes et al.	Apr. 27, 1920
2,224,149	Fisher	Dec. 10, 1940
2,460,390	McDermott	Feb. 1, 1949
2,649,758	Cowgill	Aug. 25, 1953
2,780,909	Biefeld et al.	Feb. 12, 1957