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W. B. KELLEY

2,639,487

AIR BLOWER FOR LINEARLY FEEDING A CONTINUOUS STRAND

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FIG. 1.

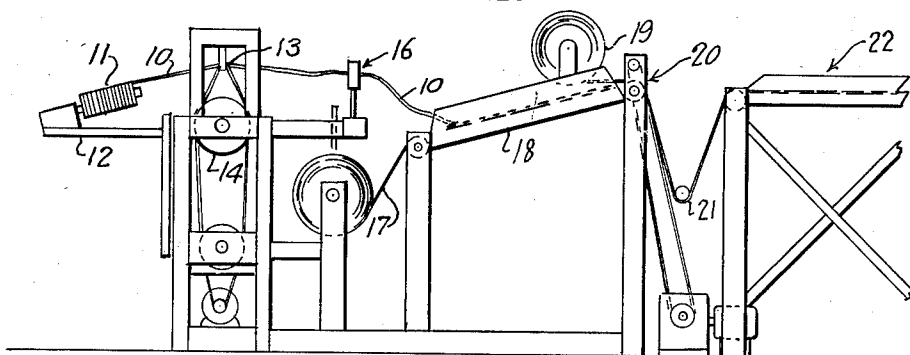
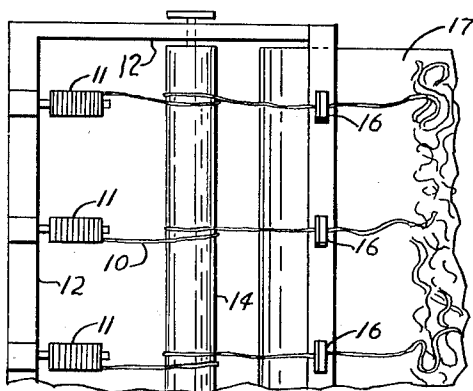
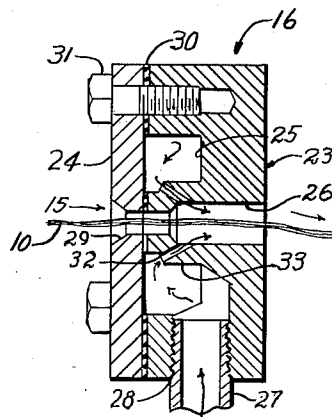


FIG. 2.

FIG. 4.

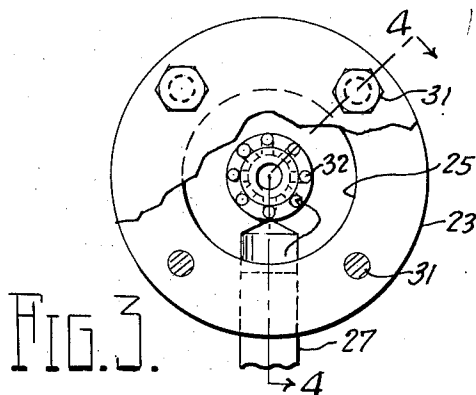


FIG. 3.

INVENTOR.
William B. Kelley
BY *Stallin & German*
ATTORNEYS

UNITED STATES PATENT OFFICE

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AIR BLOWER FOR LINEARLY FEEDING A
CONTINUOUS STRANDWilliam B. Kelley, Pawtucket, R. I., assignor to
Owens-Corning Fiberglas Corporation, a corpo-
ration of Delaware

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3 Claims. (Cl. 28—71.5)

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This invention relates to an air blower particularly designed for use in practicing the method of Roberts Patent No. 2,392,882 and consisting in an improvement over the air blower shown in that patent as being useful in the practice of the method.

In the fabrication of laminated sheet materials such as reinforced paper, covered wire meshes, reinforced cloth and the like, the method of the Roberts patent has great utility for the deposition of strands of tough fibrous material such as glass fiber strands on the sheet material in heterogeneous arrangements of swirls and loops. The method of the Roberts patent contemplates that the fibrous material shall be fed at a relatively continuous linear rate and delivered onto a travelling sheet of material to be reinforced in random swirls and loops which, when adhered to the material by compression between the receiving sheet and a covering sheet or by adhesive spread on or between the sheets, will greatly strengthen and reinforce the paper by distributing stresses over large areas of its surface.

In order to effectively project the strands onto a travelling web of the material to be reinforced, it is best to project them linearly through the air allowing the natural resistance of air to their travel to cause them to fall in random overlay loops and swirls.

It is, therefore, the principal object of this invention to provide an air blower for delivering continuous strands of material such as glass fibers in such a manner that the strands will swirl and loop and can be projected onto a sheet material to be reinforced.

It is a more specific object of this invention to provide an air blower through the axis of which a continuous strand of glass fibers can be fed by air pressure and which blower is so designed as to eliminate the necessity for close machining in order to provide for a constant rate of feed of the air through the blower and, consequently, of the strand.

More specific objects will be apparent from the specification and drawings in which:

Fig. 1 is a generally schematic view in elevation and partly broken away of a machine for carrying out the manufacture of reinforced sheet material in accordance with the teachings of the Roberts patent above mentioned and employing an air blower embodying the instant invention.

Fig. 2 is a fragmentary plan view of the left portion of the machine shown in Fig. 1.

Fig. 3 is a greatly enlarged view in elevation with a cover partly broken away of an air blower embodying the invention.

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Fig. 4 is a sectional view taken along the line 4—4 of Fig. 3.

In the machine schematically illustrated in Figs. 1 and 2 a supply of continuous strands 10 of tough fibrous strands, such as glass fiber strands, is provided in the form of a plurality of spools 11 which are mounted upon a frame 12. Each of the strands 10 is led through a guiding eye 13 and then around the periphery of a driven feeding drum 14. Frictional engagement between the surface of the drum 14 and each of the strands 10 feeds the strands off the spools 11. Each of the strands is then led around and through the guiding eye 13 a second time and then through a central passageway 15 in a blower head 16 to which a supply of air under pressure is fed. In a manner to be described below the strand 10 is projected to the right in Fig 1 from the blower head 16 at a substantial linear rate of feed. Air resistance to its movement causes the strand to gradually slow up as it proceeds farther away from the blower head 16 and it falls in random loop and swirl patterns on a continuously moving web 17 of the material to be reinforced. The web 17 is fed up an inclined table 18 providing the surface on which the random loops and swirls of strand 10 fall. After the strands fall on the web 17 it is laminated with a second web 19 by means of pressure rollers 20 and then passes down and around a tensioning roller 21 and onto a cutting table 22. When making reinforced laminated paper, asphalt or other adhesive may be applied to the web 17 before it reaches the zone of strand deposition.

Each of the blower heads 16 consists of a machined body 23 and a generally flat cover plate 24. The body 23 has an annular groove 25 cut in one of its faces concentric with a center bore 26 and that forms an annular chamber in communication with an air pipe 27 that is threaded into a radial hole 28 drilled through the body 23. The cover plate 24 has a central opening 29 coaxial with the bore 26 in the body 23 and having a flared inlet to facilitate original insertion of a strand 10 to be fed thereby. A gasket 30 may be provided to tightly seal the plate 24 to the body 23 and a plurality of studs 31 may be threaded into tapped holes spaced around the rim of the body 23.

A plurality of inclined orifices 32 are drilled through the shoulder of a sleeve-like portion 33 of the body 23 which surrounds the central bore 26. The orifices 32 are spaced circumferentially from each other and inclined inwardly at an angle of less than 45° to the axis of the blower 16. Their outer ends lead to the annular space

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formed by the groove 25 and inner face of the cover 24. Each of the orifices 32 functions to provide a straight jet of air along a line such that the force created thereby has its major components along the axis of the blower 16. By reason of their being a plurality of circumferentially spaced orifices 32, the radially directed components of the forces balance each other and the strand 10 is maintained generally at the center of the center bore 26 and blown along the axis of the blower 16.

The total cross section of the orifices 32 in a construction embodying the invention does not depend upon how closely the elements of the blower are machined and assembled but is determined solely by the easy to maintain accuracy of the diameter of the orifices. This elimination of the close machining between the body 23 and cover plate 24 in order to control the cross section of the jet orifices and thus the cubic feet of air fed per minute for a certain pressure and, consequently, the forces acting on the strand and the resultant rate of feed of the strand constitutes an important simplification over the jet heads or blowers illustrated in Patent 2,392,882 to Roberts. In the structure of that patent careful control over the machining of the mating portions of the blower head is essential to maintain the air passageways at a constant and predetermined cross section. On the other hand, in a blower embodying the instant invention no close tolerances are required.

The effective cross sectional area of the annular space formed by the groove 25 and inside of the cover plate 24 is substantially larger than the total cross sectional area of the orifices 32. Therefore, the dimensions of the annular space are not critical and control of rate of feed of the air for any given pressure depends solely upon the orifices 32 themselves.

Comparative tests made between a blower construction according to the showing of the above mentioned patent and a blower constructed according to the teachings of the instant application reveal that in order to produce the same linear feed of the same type of strand, the blower illustrated in the patent must be operated at a gauge pressure of 10 p. s. i. and requires approximately 4 cubic feet of air per minute while a blower embodying the instant invention operates at only 5 pounds gauge pressure and consumes only one cubic foot of air per minute.

Thus not only does a blower embodying the instant invention represent a simplification from the standpoint of manufacture, but it is believed that by eliminating the swirling movement of the air in the central orifice or passageway of the blower itself the jet force is more effectively employed in entraining and progressing the strand to be delivered.

The precise nature of the improvements in construction constituting the instant invention are set forth in the claims which follow.

Having described the invention, I claim:

1. An air blower for linearly feeding a continu-

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ous strand comprising, in combination, a body having an axial bore and a radially spaced annular groove cut in said body concentric with said bore, a centrally bored cover for such annular groove, secured to said body and forming with such groove an annular space in communication with a source of air under pressure, the bore in said cover being axially aligned with the bore in said body, said body having a generally sleeve-like portion surrounding said axial bore, there being a plurality of circumferentially spaced, inclined orifices in said portion communicating between said annular space and said axial bore for delivering radially balanced jets of air into said axial bore for feeding a strand there-through.

2. An air blower for linearly feeding a continuous strand comprising, in combination, a generally cylindrical body having an axial bore and a radially spaced annular groove cut in one end face of said body concentric with said bore, a centrally bored cover for such annular groove, secured to the end of said body and forming with such groove an annular space in communication with a source of air under pressure, the bore in said cover being axially aligned with the bore in said body, said body having a generally annular, sleeve-like portion surrounding said axial bore and forming the inside wall of said annular groove, a plurality of orifices through said sleeve-like portion connecting said annular space and said axial bore, said orifices being circumferentially spaced and inclined to the axis of said body at an angle less than 45° whereby the resolution of forces created by air jetting through said orifices is balanced radially and feeds a strand introduced through the bore in said cover axially through the bore in said body, projecting said strand therefrom.

3. An air blower for linearly feeding a continuous strand comprising, in combination, a body having a longitudinal bore and a radially spaced groove cut in said body concentric with said bore, a bored cover for such groove, secured to said body and forming with such groove a space in communication with a source of air under pressure, the bore in said cover being aligned with the bore in said body, said body having a generally sleeve-like portion surrounding said bore, there being a plurality of circumferentially spaced inclined orifices in said portion communicating between said space and said bore for delivering radially balanced jets of air into said bore for feeding a strand therethrough.

WILLIAM B. KELLEY.

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