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FIBER BREAKING AND DIRECTING MACHINES

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Fig. 1.

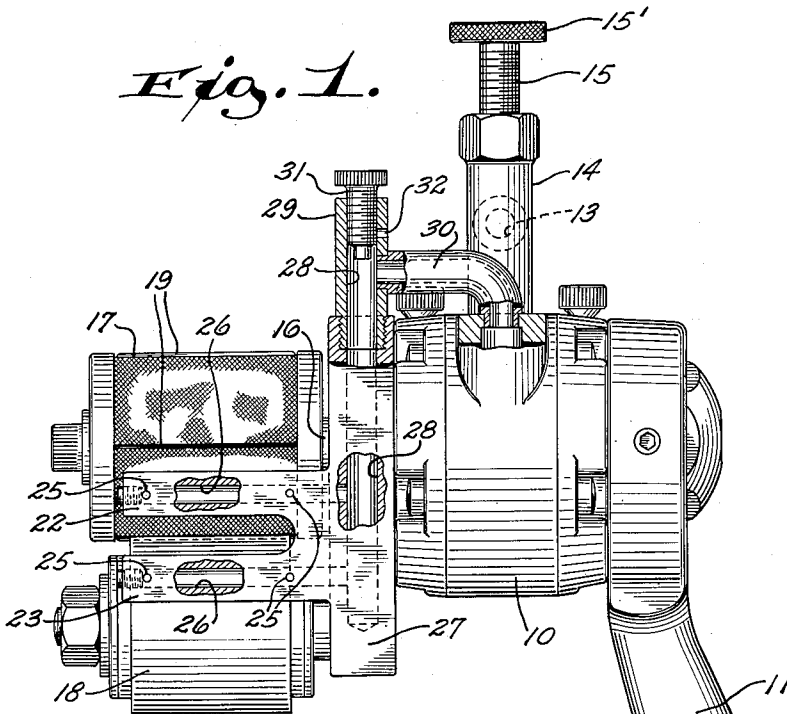
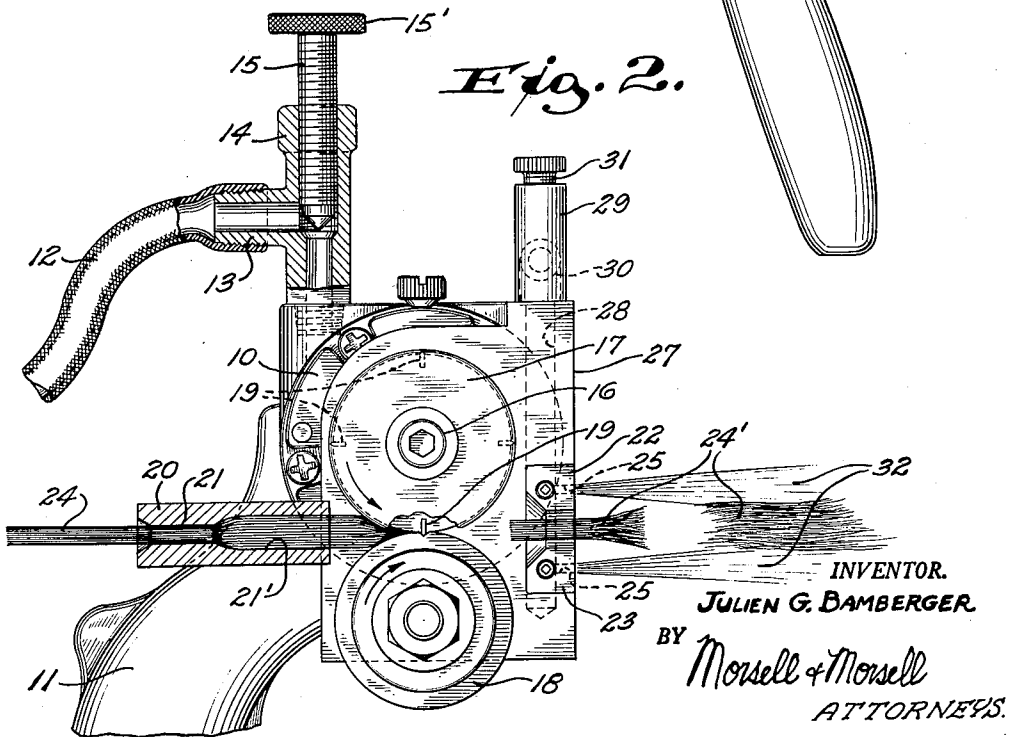


Fig. 2.



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FIBER BREAKING AND DIRECTING MACHINES
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This invention relates to improvements in fiber breaking and directing machines, and more particularly to a portable device adapted to break fibers into short lengths and to direct the same onto a surface being coated.

The general purpose of the present invention is to provide a simple and efficient device for use in manufacturing fiberglass products, or products formed of plastic or similar materials having a multiplicity of fibers embedded therein for reinforcement. The fibers employed in such materials are ordinarily purchased in the form of elongated rovings carried on spools, each roving comprising numerous fine strands. To utilize the fibers in plastic coatings and the like, it is necessary, of course, to break the same into short lengths and to disperse them over the surface being coated. Heretofore, fiber breaking devices of the general type hereinafter described have been driven by variable speed electric motors, and have been relatively large and expensive. Moreover, such conventional fiber breaking machines have not had any means for directing the fibers after the same have been cut. Due to their extreme lightness and susceptibility to air currents, the cut fibers are often misdirected, and with conventional breaking devices the distribution of the fibers on the material is frequently uneven and results in an imperfect coating.

With these problems in mind, the principal object of the present invention is to provide a fiber breaking apparatus wherein the actuating motor is driven by compressed air, such a motor being smaller, lighter, and less expensive than a comparable variable speed electric motor, and wherein the exhaust air from the motor is employed to direct the broken fibers, thereby insuring a uniform distribution of fibers throughout the material.

A more specific object of the present invention is to provide a portable hand apparatus for breaking and distributing fibers, wherein air-driven breaking rollers advance and break the fibers, and wherein exhaust air from the pneumatic motor, in the form of specially positioned jets, is utilized to spray the broken fibers onto the material being coated.

A further specific object of the invention is to provide a fiber breaking machine, as described, wherein the amount of compressed air directed to the pneumatic motor can be readily manually controlled to govern the speed of the rollers and the volume of fibers which are broken and distributed.

A further specific object is to provide a fiber breaking device, as described, wherein the amount of exhaust air employed to impel and direct the broken fibers can be easily regulated as desired.

Still further objects of the present invention are to provide a fiber breaking and distributing apparatus which is simple to use, and which device is reliable and efficient in operation.

With the above and other objects in view, the invention consists of the improved fiber breaking device, and all of its parts and combinations, as set forth in the claims, and all equivalents thereof.

In the accompanying drawing, wherein the same reference numerals designate the same parts in all of the views:

FIG. 1 is a front elevational view of the improved fiber breaking device, parts being broken away and shown in section; and

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FIG. 2 is a side elevational view of the device, with parts thereof being broken away, and showing the device in operation.

Referring now more particularly to the drawing, the portable fiber breaking device comprising the present invention includes a motor housing 10 which is generally cylindrical in form and which houses a conventional turbine type pneumatic motor. A hand grip 11 projects downwardly at one end of said housing, to facilitate handling, and a vertically disposed exhaust air manifold 27 is supported on the opposite end. Compressed air is supplied to the motor through a hose 12 which is connected to and leads from a remote source (not shown), and is directed into the housing through an inlet conduit 13 formed as part of a T-fitting 14 at the upper portion of said housing. The fitting 14 has a valve, including a threaded stem 15 therein, to control the volume of compressed air reaching the motor, and a knurled head 15' is formed on the upper end of said stem to permit the operator to easily and quickly regulate the speed of the motor, the importance of which device will be hereinafter seen.

As hereinbefore mentioned, the air motor is of a conventional type, and has a drive shaft 16 projecting laterally from the end of the housing opposite that on which the handle 11 is mounted. Rigidly mounted on said drive shaft is a breaking roller 17, which is adapted to be rotatably driven by said drive shaft in a counterclockwise direction, and rotatably supported on the housing directly below and in contact with said roller, is a rubber surfaced bed roller 18. As is best shown in FIG. 2, when the machine is in operation, the bed roller 18 is driven in a clockwise direction, through its engagement with the motor driven roller 17, thereby providing friction gripping means adapted to engage and advance fibers rovings 24 which are fed therebetween.

As is illustrated in FIG. 2, the upper driven roller 17 is provided with circumferentially spaced chopping bars 19 which project beyond the roller periphery and which are designed to break fiber strands 24 fed therebetween into the short sections, such as the sections 24', each time the roller reaches a point where one of said bars contacts the bed roller 18. The spacing of said chopping bars 19 is, of course, not limited and can be arranged to suit widely varied requirements, depending upon the desired length of the broken fibers.

Mounted rearwardly of the rollers 17 and 18, and positioned to direct the elongated fiberglass rovings 24 or the like between said rollers, is a feed bar 20 (FIG. 2) having a plurality of horizontally spaced apertures 21 through which the rovings are fed when the apparatus is in operation. Said apertures bell outwardly toward their forward ends, as at 21', to permit the fibers to separate and expand as they are drawn forwardly toward the rollers during the breaking operation.

Projecting from the forward portion of the aforementioned exhaust air manifold 27, and extending laterally outwardly therefrom in front of the rollers 17 and 18, is a bifurcated air discharge unit comprising a pair of vertically spaced tubular arms 22 and 23, each of said arms having a longitudinal internal duct 26 (FIG. 1) and a pair of discharge orifices 25 in its forward face leading from the duct. The four orifices are arranged in a rectangular pattern so that air streams 32 (FIG. 2) emitted therefrom (as will be described) frame the cut fibers and prevent the same from moving in a random direction. It is to be understood, of course, that the illustrated structure is by no means the only possible arrangement, for the orifices.

The exhaust air manifold 27 has a duct 28 therein communicating with the ducts 26 of the lateral discharge arms 22 and 23, and the upper end of said duct 28 com-

municates with a duct continuation in a fitting 29 projecting upwardly from the housing top and communicating with the motor chamber by means of a tube 30.

When the device is in operation the exhaust air from the pneumatic motor is directed through the tube 30 to the exhaust manifold 27 and into the discharge arms 22 and 23, said compressed air being forcibly emitted from the orifices 25 in the form of jets 32 (FIG. 2), as mentioned. The upper end of the fitting 29 has a threaded by-pass valve 31 therein which is designed to open and close a small port 32 for by-passing some of the exhaust air to the atmosphere, to vary the volume of air directed into the discharge arms 22 and 23 and to thereby control the force of the jet streams.

In the operation of the improved fiber cutting device, continuous rovings 24, of fiberglass or the like, are unwound from their spool mountings (not shown) and fed into and through the apertures 21 in the feed bar, said rovings being continuously drawn into the bite of the oppositely turning rollers 17 and 18. Each time the roller 17 rotates to a point where one of the circumferentially spaced chopping bars thereon engages the bed roller, the fibers are broken off into short sections, such as at 24' shown in FIG. 2. After the fibers have been broken, they tend to separate into short individual strands and the air jets 32 discharged from the orifices 25, as described, function to spray said strands onto the surface being coated. As hereinbefore mentioned, the air jets are arranged to substantially encompass the cut fibers, thereby preventing their flying in all directions, and minimizing the possibility of an uneven distribution of fibers in the material.

The volume and velocity of the exhaust air discharged from the orifices 25 can be manually controlled by means of the by-pass valve 31 and the result is that the broken fibers can be sprayed onto a surface with as great or little force as is required for the particular job. In addition, of course, the volume of compressed air reaching the pneumatic motor can be readily adjusted through the valve stem 15, to regulate the roller speeds and to thereby control the speed of the fiber breaking operation.

From the foregoing detailed description it will be readily appreciated that the present invention provides a device which not only breaks fibers to a desired length, but which directs the broken fibers accurately and evenly onto the surface being coated. Moreover, the same motivating force which drives the motor also functions as the directing agent for the broken fibers, thereby promoting efficiency and economy of operation.

It has been found that the present invention is unusually well adapted for use in the production of fiberglass products, or products formed of plastic materials having reinforcing fibers embedded therein. As distinguished from conventional fiber breaking machines, which are large and expensive, the present machine is compact and maneuverable, and is relatively inexpensive to manufacture. The most important advantage, of course, is that with the present invention the fibers are not only broken to a desired length, but are forcibly sprayed onto the surface being covered, thereby preventing the fibers from straying from their intended course and substantially reducing the possibility of an uneven or imperfect coating.

It is to be understood that various changes and modifications may be made in the apparatus as above described, and in the design and arrangement of the members, without departing from the spirit of the invention, and all of such changes or modifications are contemplated as may come within the scope of the following claims.

What I claim is:

1. A fiber-breaking machine comprising a compressed air motor having a housing and having a drive shaft, and said motor housing having air inlet and exhaust means, a valve in said inlet adapted to control the volume of compressed air admitted to said motor and hence the

speed of said motor, a cylindrical roller mounted on and rotatably driven by said motor drive shaft, said roller projecting outwardly from said motor housing, a bed roller rotatably mounted on and projecting from said housing in parallel and engaging relationship with said first roller for continuously advancing fibers fed therebetween, guide means mounted on said housing rearwardly of said rollers and adapted to direct elongated fiber rovings between said rollers, fiber-chopping means on and projecting beyond the periphery of one of said rollers and air blast means communicating with said motor exhaust and projecting from said motor housing forwardly of said rollers and having spaced jets positioned to discharge a plurality of air blasts at spaced locations around the discharged broken fibers to direct the latter in a desired path.

2. A fiber-breaking machine comprising a compressed air motor having a housing and having a drive shaft, and said motor housing having air inlet and exhaust means, a valve in said inlet adapted to control the volume of compressed air admitted to said motor and hence the speed of said motor, a cylindrical roller mounted on and rotatably driven by said motor drive shaft, said roller projecting outwardly from said motor housing, a bed roller rotatably mounted on and projecting from said housing in parallel and engaging relationship with said first roller for continuously advancing fibers fed therebetween, guide means mounted on said housing rearwardly of said rollers and adapted to direct elongated fiber rovings between said rollers, fiber-chopping means on and projecting beyond the periphery of one of said rollers and air blast means communicating with said motor exhaust and projecting from said motor housing forwardly of said rollers and having a rectangular arrangement of spaced jets positioned to discharge a plurality of air blasts at spaced locations around the discharged broken fibers to direct the latter in a desired path.

3. In a portable machine for breaking fibers and directing the same to a point of use, the combination comprising a compressed air motor having a housing and having a drive shaft projecting laterally outwardly from said housing, said motor housing having compressed air inlet and exhaust means, a valve in said inlet means controlling the volume of compressed air admitted to said motor and hence the speed of the motor, an exhaust air manifold on one side of said housing connected with said exhaust means, a cylindrical roller mounted on and rotatably driven by said motor drive shaft and projecting laterally outwardly from said motor housing adjacent said exhaust chamber, a second roller rotatably mounted on and projecting laterally from said housing directly below and parallel with said first roller and engaging and being rotatably driven by said first roller, said rollers forming friction pulling means for continuously advancing fibers fed therebetween, guide means on said housing rearwardly of said rollers positioned to feed fiber rovings between said rollers, a plurality of circumferentially-spaced chopping bars on and projecting beyond the periphery of one of said rollers for breaking said fibers into short lengths, a pair of vertically spaced hollow arm members projecting laterally outwardly from said exhaust manifold forwardly of said rollers and positioned to receive the cut fibers therebetween, and said arms having spaced orifices in their forward faces adapted to discharge motor exhaust air in the form of spaced jet streams, said jet streams being arranged to surround the cut fibers and to direct the same in a desired path.

4. In a portable machine for breaking fibers and directing the same to a point of use, the combination comprising a compressed air motor having a housing and having a drive shaft projecting laterally outwardly from said housing, said motor housing having compressed air inlet and exhaust means, a valve in said inlet means controlling the volume of compressed air admitted to said motor and hence the speed of the motor, an exhaust air

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manifold on one side of said housing connected with said exhaust means, a cylindrical roller mounted on and rotatably driven by said motor drive shaft and projecting laterally outwardly from said motor housing adjacent said exhaust chamber, a second roller rotatably mounted on and projecting laterally from said housing directly below and parallel with said first roller and engaging and being rotatably driven by said first roller, said rollers forming friction pulling means for continuously advancing fibers fed therebetween, guide means on said housing rearwardly of said rollers positioned to feed fiber rovings between said rollers, a plurality of circumferentially-spaced chopping bars on and projecting beyond the periphery of one of said rollers for breaking said fibers into short lengths, a pair of vertically spaced hollow arm members projecting laterally outwardly from said exhaust manifold forwardly of said rollers and positioned to re-

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ceive the cut fibers therebetween, and said arms having spaced orifices in their forward faces adapted to discharge motor exhaust air in the form of spaced jet streams, said jet streams being arranged to surround the cut fibers and to direct the same in a desired path, and a by-pass valve in said exhaust means adapted to control the volume of exhaust air discharged from said orifices.

References Cited in the file of this patent

UNITED STATES PATENTS

2,618,817	Slayter	Nov. 25, 1952
2,719,336	Stotler	Oct. 4, 1955
2,729,028	Slayter et al.	Jan. 3, 1956
2,787,314	Anderson	Apr. 2, 1957
2,808,884	Shann	Oct. 8, 1957