

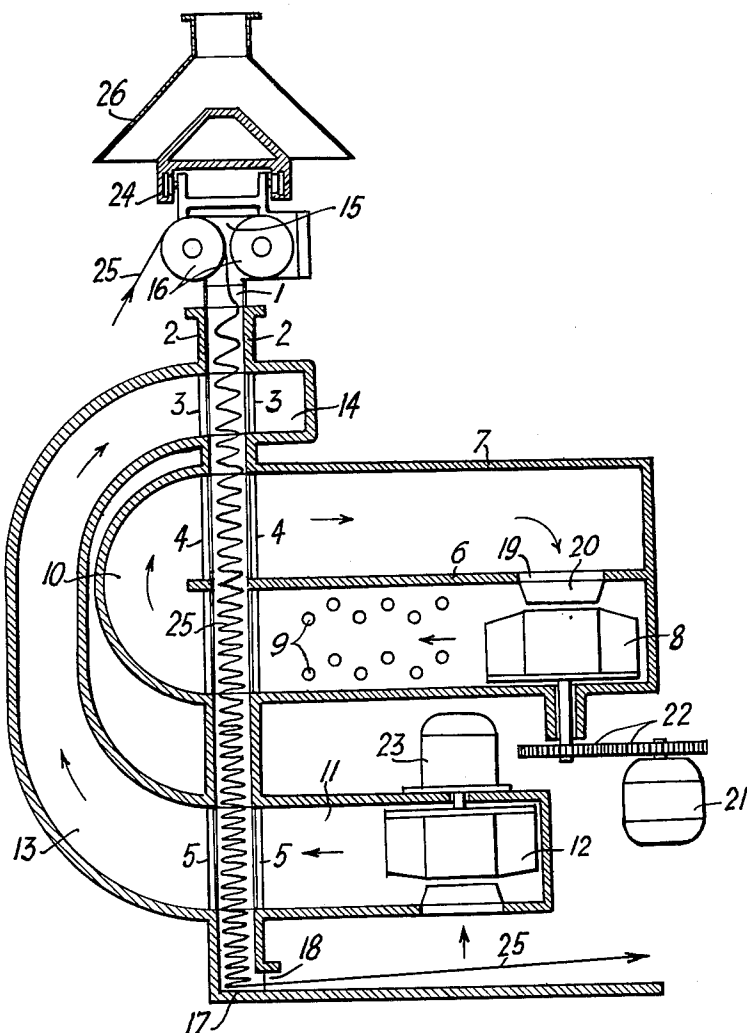
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DEVICE FOR THERMAL FIXATION OF SYNTHETIC FIBER CABLES

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DEVICE FOR THERMAL FIXATION OF SYNTHETIC FIBER CABLES

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The invention relates to a device for thermal setting of synthetic fiber tows, such thermal setting being achieved by the use of hot air.

A known device for continuous setting of synthetic fiber tows by hot air consists of a perforated conveyer made of stainless steel above which are arranged air nozzles, the latter being connected with a heater element or heater elements and a blower. Below the conveyer are arranged suction nozzles connected with a suction intake of the said blower. A hood is arranged above the end of the conveyer, a cooling fan being arranged under the hood. At the beginning of the conveyer is arranged a feeding device for the fiber tow.

Disadvantages of the known device are its large dimensions and a costly conveyer. The large dimensions are a cause of large heat losses. A further disadvantage of the prior device resides in the fact that the tow is not uniformly heated through a non-homogeneous fiber layer on the conveyer.

It is an object of this invention to eliminate the above mentioned drawbacks and disadvantages. The following features are characteristic of the device according to the invention. It consists mainly of a vertically arranged shaft formed by two partly impervious and partly pervious walls connected by two side walls. At right angles to the pervious walls, there is arranged on one side of the shaft a box partly divided by a horizontal partition wall and provided with a blower and heater elements. On the opposite side of the shaft is located a return channel which forms a closed air circuit with the box. A cooling box with a blower is connected under the divided box to the pervious wall on one side of the shaft. The pervious wall on the other side of the shaft is connected to one end of a channel whose other end is connected with the pervious wall of the shaft above the return channel. The other end of the channel is aligned with an outlet channel on the opposite side of the shaft. In the space above the shaft, there is movably located a carriage with feed rolls. An outlet aperture is provided at the bottom of the shaft.

The device according to the invention has very convenient dimensions which ensure good thermal efficiency. The losses of the heating system are at a minimum due to the provision of a shaft, and to pre-heating of the tow. The said shaft arrangement of the device creates a homogeneous fiber layer and promotes uniform heating-through of the tow.

Another advantage of the invention resides in the absence of a conveyor or other movable transportation means because the tow descends in the shaft under its own weight.

The invention will be best understood from the following specification to be read in conjunction with the accompanying drawing which illustrates a device according to the invention in a sectional front elevation.

Referring now to the drawing in greater detail, there is seen a shaft 1 formed by two upright walls 2 joined by non-illustrated upright side walls. The two walls 2 are formed at several places by groups of vertically elongated spaced rods 3, 4, 5 which constitute pervious wall portions. A box 7 is sealed at right angles to the pervious

wall portion 4 of the shaft 1. The box 7 is divided into two compartments by a horizontal partition 6 in an opening 19 of which the suction inlet 20 of a blower 8 is mounted. The blower draws air from the top compartment and discharges it into the lower compartment of the box 7. The box also houses heater elements 9. The blower 8 is driven by an electromotor 21 through a gear transmission 22. On the side of the shaft 1 opposite the box 7, there is arranged a return channel 10 which connects the levels of the two compartments.

Under the box 7 is located a cooling box 11 equipped with a blower 12 and a motor 23. The cooling box 11 is attached to the pervious wall portion 5 of the shaft 1. On the side of the shaft 1 opposite the cooling box 11, there is attached one end of a channel 13 whose other end is joined above the return channel 10 to the pervious wall portion 3. An outlet channel 14 is joined to the wall portion 3 opposite the channel 13. Above the shaft 1, a carriage 15 provided with feed rolls 16 is horizontally guided on bars 24. An outlet slit 18 extends from one non-illustrated side wall to the other at the bottom 17 of the shaft 1 in one wall 2. The tow 25 is laid in the shaft 1. An exhaust hood 26 is arranged above the carriage 15 for leading vapors away.

The device is equipped with a conventional non-illustrated temperature control mechanism and with such other controls, not shown, which permit the device to be used as a part of a continuous production line.

The tow 25 of synthetic fibres, normally containing a certain content of water and processing materials, is fed by the feed rolls 16 on the carriage 15 into the shaft 1 while the carriage 15 is moved back and forth on the bars 24 by a non-illustrated mechanism. The speed of the carriage 15 is lower than the rate at which the rolls 16 feed the tow so that the tow 25 is laid down in the shaft without tension. The tow 25 leaves of the shaft 1 through the outlet slit 18 at the bottom 17 of the shaft 1, the stacked tow 25 in the shaft 1 dropping to the bottom 17 of the shaft 1 by its own weight. In the course of this movement, the tow 25 passes between the pervious walls 3 where it is pre-heated by air that is discharged from the blower 12 and cools the pre-heated tow 25 as the latter passes between the wall portions 5. The air from the blower 12 thus accumulates heat from the tow and continues in pre-heated condition through the channel 13. The pre-heated tow 25 passes between the pervious walls 4 where it is further heated to the setting temperature by the air circulated by the blower 8 over the heater elements 9 in the closed system formed by the box 7 with the partition 6 and the return channel 10. From this heating space the tow 25 passes between the pervious walls 5 where it is cooled, as has already been indicated, by the air stream discharged by the blower 12. After passing the cold tow 25, the air stream mixed with vapors released from the tow 25 is guided out of the building by the outlet channel 14 in a conventional manner not further illustrated.

The illustrated and described example does not cover the full scope of the invention and many modifications will readily suggest themselves to those skilled in the art on the basis of the above teachings.

What we claim is:

1. An apparatus for setting synthetic fibers comprising, in combination:

(a) a vertically extending shaft constituted by upright wall means,

(1) said wall means defining a feed opening at the top of said shaft and a discharge opening at the bottom of said shaft,

(2) said wall means including a plurality of vertically spaced pairs of gas pervious wall portions,

(3) the wall portions of each pair being arranged

- on a common level and on opposite sides of said shaft;
- (b) first conduit means communicating with one wall portion of a first one of said pairs;
- (c) second conduit means communicating with the other wall portion of said first pair and with a first wall portion of a second pair of said pervious wall portions;
- (d) third conduit means communicating with the other wall portion of said second pair and with said first conduit means, whereby said first, second, and third conduit means and said first and second pairs of wall portions define a closed circuit for the flow of a heating gas through said shaft on two levels;
- (e) first blower means for circulating said heating gas in said closed circuit;
- (f) heating means for heating said gas in said circuit;
- (g) fourth conduit means communicating with one wall portion of a third pair of pervious wall portions downwardly spaced from said first and second pairs;
- (h) fifth conduit means communicating with the other wall portion of said third pair and with one wall portion of a fourth pair of said pervious wall portions upwardly spaced from said first and second pairs;
- (i) sixth conduit means communicating with the other wall portion of said fourth pair of wall portion, whereby said fourth, fifth, and sixth conduit means and said third and fourth pairs of wall portions define a path for a cooling and pre-heating gas passing through said shaft on two spaced levels;
- (j) second blower means for actuating movement of said cooling and pre-heating gas in said path from said fourth to said sixth conduit means; and
- (k) feed means for feeding fibers to said feed opening.
2. An apparatus as set forth in claim 1, wherein said first and third conduit means jointly include a box member and a horizontally extending partition dividing the space in said box member into two compartments respectively communicating with said one wall portion of said first pair and said other wall portion of said second pair, said compartments being connected by said first blower means.
3. An apparatus as set forth in claim 2, said heating means being arranged in one of said compartments.
4. An apparatus as set forth in claim 1, wherein said feed means include a pair of feed rolls.
5. An apparatus as set forth in claim 1, wherein each of said pervious wall portions is constituted by a plurality of spaced rod members.
6. An apparatus as set forth in claim 1, wherein at least one of said fourth and sixth conduit means communicates with the atmosphere.
7. An apparatus for setting synthetic fibers comprising, in combination:
- (a) a vertically extending shaft constituted by upright wall means,
- (1) said wall means defining a feed opening at the top of said shaft and a discharge opening at the bottom of said shaft,
- (2) said wall means including a plurality of vertically spaced pairs of gas pervious wall portions, each pervious wall portion including a plurality of spaced rod members,

- (3) the wall portions of each pair being arranged on a common level and on opposite sides of said shaft;
- (b) first conduit means communicating with one wall portion of a first one of said pairs;
- (c) second conduit means communicating with the other wall portion of said first pair and with a first wall portion of a second pair of said pervious wall portions;
- (d) third conduit means communicating with the other wall portion of said second pair and with said first conduit means, whereby said first, second, and third conduit means and said first and second pairs of wall portions define a closed circuit for the flow of a heating gas through said shaft on two levels,
- (1) said first and third conduit means jointly including a box member and a horizontally extending partition dividing the space in said box member into two compartments respectively communicating with said one wall portion of said first pair and said other wall portion of said second pair;
- (e) first blower means connecting said compartments for circulating said heating gas in said closed circuit;
- (f) heating means arranged in one of said compartments for heating said gas in said circuit;
- (g) fourth conduit means communicating with one wall portion of a third pair of pervious wall portions downwardly spaced from said first and second pairs;
- (h) fifth conduit means communicating with the other wall portion of said third pair and with one wall portion of a fourth pair of said pervious wall portions upwardly spaced from said first and second pairs;
- (i) sixth conduit means communicating with the other wall portion of said fourth pair of wall portion, whereby said fourth, fifth, and sixth conduit means and said third and fourth pairs of wall portions define a path for a cooling and pre-heating gas passing through said shaft on two spaced levels, at least one of said fourth and sixth conduit means being open to the atmosphere;
- (j) second blower means for actuating movement of said cooling and pre-heating gas in said path from said fourth to said sixth conduit means; and
- (k) feed means including a pair of feed rolls for feeding fibers to said feed opening.

References Cited by the Examiner

UNITED STATES PATENTS

2,090,352	8/1937	Herrmann	34—23
2,222,809	11/1940	Curran	34—86
2,575,839	11/1951	Rainard	28—72
2,598,000	5/1952	Knopp et al.	34—23
2,733,122	1/1956	Herele et al.	28—72

FOREIGN PATENTS

582,012 1946 Great Britain.

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