July 3, 1951 J. DUNGLER 2,559,413

BLOWING NOZZLES OF DRYING OR OTHER MACHINES

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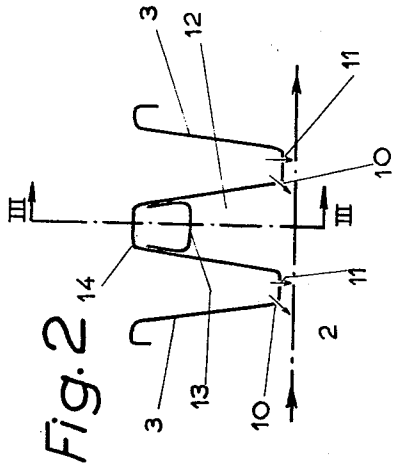


Fig. 2

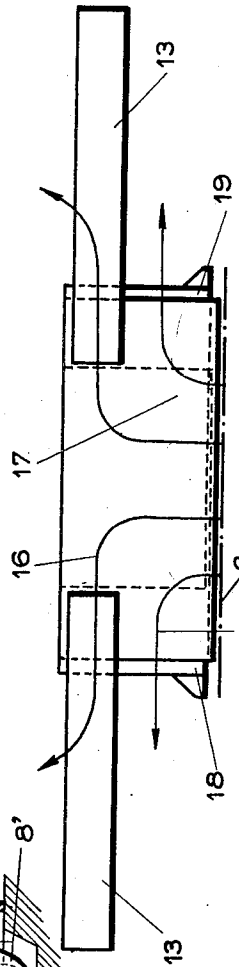


Fig. 4

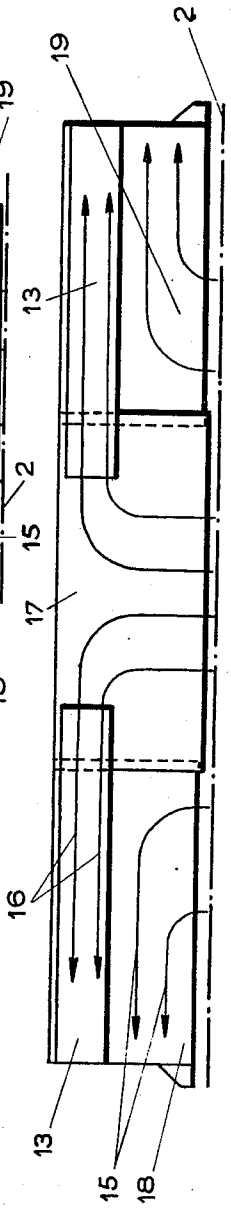


Fig. 3

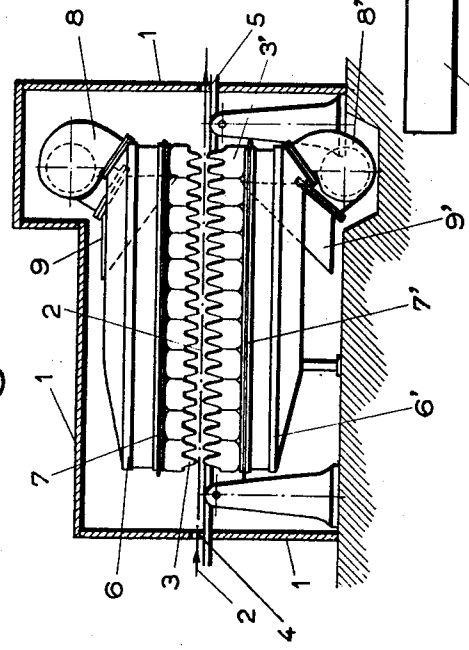


Fig. 1

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BLOWING NOZZLES OF DRYING OR OTHER MACHINES

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6 Claims. (Cl. 34—156)

1

The present invention refers to improved arrangements of blowing nozzles and exhaust channels or passageways which are used in drying or other machines for treating textile products, cloths or other textile materials, paper, or other cellulose products in strips, or in sheets. According to the invention the nozzles are adapted to produce a series of pressure zones at the points where the treating fluid, such as hot air, is impinged on the product under treatment and, between said zones, a series of reduced pressure zones through which the fluid escapes through an exhaust after it has acted on the product to be treated.

It has been found that the operation of such nozzles is unsatisfactory when the width of the sheet material to be treated is great, owing to the fact that, for each half of the width of the sheet material treated, all the moist air coming from said material has always to follow the same outflow or exhaust passage. This has the effect of damming the streams of air directed from the central portion of the treated sheet material, which have the longest path to travel and are influenced by the streams of air coming from the marginal portions of the sheet material. In this manner, the drying is less efficient at the centre of the sheet material than at the edges or marginal portions of same.

The object of the invention is to provide means ensuring avoidance of this drawback and, with this end in view, the exhaust channels or passageways are characterized by partitions arranged in the reduced pressure zones or outflow zones which are established within the spaces between the blowing nozzles, so as to subdivide each outflow space and to form seperate and independent outflow channels for the streams of moist air coming from the various parts of the width of the treated sheet material.

According to another feature of the invention, the separate outflow or exhaust channels are arranged in superposed relation to each other and are of different lengths, said channels being so arranged that the shortest channel which is associated with the marginal portion is located in the lowest position, whereas the longest channel which is associated with the central portion of the treated strip is located in the highest position.

According to another feature of the invention, the partitions are formed by flat metal sheets which are arranged between the nozzles and are directly fixed by welding to the outer side walls of said nozzles.

2

According to a further feature of the invention, the partitions are formed by metal sheets of channel shape which are open at the upper part and are so arranged as to form closed passages in co-operation with the outer walls of the nozzles.

According to a still further feature of the invention, in the case of nozzles which are adjustable according to the width of the sheet material to be treated, the channels are stationary, only the nozzles being adapted to slide.

Other features and advantages of the invention will moreover become apparent from the ensuing description, reference being made to the accompanying drawing in which:

Fig. 1 is a general arrangement view, in transverse section and in side elevation, of a drier provided with blowing nozzles constructed according to the invention;

Fig. 2 is a transverse section of two consecutive nozzles, showing the partitioning of the reduced pressure zone between the nozzles;

Fig. 3 is a section along the line III—III of Fig. 2, of a telescopic nozzle according to the applicant's U. S. patent application Ser. No. 762,776, filed July 22, 1947, now Patent No. 2,495,163, equipped with the improvement according to the invention, and

Fig. 4 shows the nozzle of Fig. 3 reduced to its minimum length so as to correspond to the minimum width of the product to be treated.

In the drawing the walls of the insulating chamber 1 enclose the drier which comprises two batteries of blowers operating independently of one another, one being located above the plane of the sheet product 2 to be treated, cloth for example, and the other below.

Each battery comprises a set of blowing nozzles 3 and 3' which are arranged inside the chamber 1, transversely to the direction of travel of the cloth 2, opposite one another and a short distance apart, so as to provide a passage wide enough for the cloth 2 which enters at 4 and comes out at 5 of the chamber and moves continuously in absolutely open width, the orifices of said blowing nozzles, which extend over the entire width of the cloth 2, opening toward and being positioned in the immediate vicinity of said cloth so as to act directly on same.

6 and 6' are chambers within which at 7—7' are placed air heaters from which to respective nozzles 3 and 3' hot and compressed air is supplied which is delivered by fans 8 and 8' from suction funnels 9 and 9' opening into the chamber 1.

Hereinafter, in order not to confuse the description reference will only be made to the upper row of nozzles 3, it being of course understood that the improvements which will be described also apply to the lower row of nozzles 3'.

Each nozzle 3 is provided with a set of blowing orifices 10 and 11 which are formed by preferably milled slits or by sets of holes bored along lines extending parallel to the width of the cloth 2, as described and illustrated in the applicant's U. S. patent application Ser. No. 752,243, filed April 30, 1947, now Patent No. 2,492,974.

The air ejected through the orifices by the blowing action of the fan 8, after becoming charged with moisture by contact with the cloth 2, streams through the exhaust channel 12 which is formed between the outer side walls of the adjacent nozzles 3 and which forms the reduced pressure zone subjected to the sucking action of the fan 8. As hereinbefore explained, the outflow of the streams of air coming from the central portion of the cloth 2 may be hindered by the streams of air coming from the marginal portions which form a damper. This drawback is eliminated, according to the invention, by providing, on either side of the middle of the width of the cloth, in each of the reduced pressure zones 12, a channel 13 which is so arranged as to form a closed passage in co-operation with the connecting wall portion 14 between the nozzles 3.

Each lateral channel 13 subdivides the outflow or exhaust space 12 and thus two separate and independent outflow passages are provided, one for the air streams 15 coming from the marginal portions of the cloth 2, and the other for the air streams 16 coming from the central portion of said cloth 2, the air streams 16 directed through the upper passage formed by the channel 13 and the portion or upper end wall 14 of the nozzle, whereas the air streams 15 escape through the lower part of the exhaust space 12. In this manner, the outflow of the air streams 16 coming from the central portion of the cloth 2 is independent of the outflow of the air streams 15 and cannot therefore be hindered or dammed by them.

Figs. 3 and 4 show the application of the invention to a telescopic nozzle arrangement according to U. S. Patent No. 2,495,163, dated January 17, 1950. This nozzle arrangement comprises a stationary central channel portion 17 cooperating with two telescopic side or extensible channel portions 18 and 19, the position of which relatively to the stationary central channel portion 17 can be adjusted so as to adapt the total width of the nozzle to suit the width of the cloth 2 to be treated.

In a nozzle of this construction, the partitioning lateral channels 13 provided on either side of the middle of the nozzle are stationary, only the extensible channel portions 18 and 19 of the nozzle being adapted to slide.

Fig. 3 shows the telescopic nozzle in the position corresponding to the greatest width, whereas Fig. 4 shows the same nozzle which has been reduced to its smallest width by pushing the extensible channel portions 18 and 19 into the stationary central portion 17. As can be seen in Fig. 4, the lateral channels 13 do not participate in the movement of the side portions 18 and 19, but remain stationary. In this construction, the channels 13 also form separate outflow passages for the air streams coming from the various parts of the cloth to be treated, the air streams 16 issuing from their outflow passage through the open upper part of each of the channels 13 in the position of the telescopic nozzle corresponding to a smaller width than the maximum width.

Of course, the embodiment hereinbefore described and illustrated in the drawing is only given by way of example and it is possible to modify in any suitable manner the shape, the nature, the arrangement and the mounting of its elements, without exceeding the scope of the invention. Thus the shapes of the nozzles and of the partitions may differ from those shown in the drawing. Furthermore, the outflow space may be subdivided into more than two separate passages if the width of the cloth to be treated requires it. In that case, the lengths of the partitions defining the separate outflow passages are staggered in such a manner that each passage is associated with a predetermined portion of the width of the cloth to be treated, the passage which is associated with the central portion of the cloth being located at the upper part of the outflow space.

It can thus be seen that there has been provided in accordance with this invention a drying or like machine for treating lengthy sheet material traveling through said machine; nozzle means for supplying treating fluid under pressure arranged to extend transversely to the travel of said material, and exhaust means provided intermediate each two adjacent nozzle means and forming a plurality of channel means superpositioned with respect to each other, said fluid being directed by said nozzle means for impingement on said material and passing subsequently through said exhaust means, said exhaust means dividing and guiding said fluid in independent and separate fluid streams, one of said fluid streams coming from the median portion of said material being directed through one of said channel means perpendicular to and away from said material and subsequently in transverse direction to the travel of said material, other fluid streams coming from the marginal portions of said material being diverted through other channel means and in transverse direction to said travel of said material.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a drying or like machine for treating lengthy sheet material traveling through said machine; nozzle means each including a plurality of openings for supplying a plurality of treating fluid streams under pressure and arranged to extend transversely to the travel of said material, and exhaust means provided intermediate each two openings of two neighboring nozzle means, said exhaust means including a plurality of channel means superpositioned with respect to each other, said fluid being directed by openings of said nozzle means for impingement on said material and passing subsequently through channel means of said exhaust means, said channel means being arranged to divide and guide said fluid in independent fluid streams of predetermined directions, one of said fluid streams coming from the median portion of said material being directed through one of said channel means perpendicular to and away from said material and subsequently in transverse direction to the travel of said material, other fluid streams coming from the marginal portions of said material being diverted through other chan-

nel means and in transverse direction to said travel of said material.

2. In a drying or like machine for treating lengthy sheet material traveling through said machine; nozzle means for supplying treating fluid under pressure arranged to extend transversely to the travel of said material, and exhaust means provided intermediate each two adjacent nozzle means and forming a plurality of channel means superpositioned with respect to each other, said fluid being directed by said nozzle means for impingement on said material and passing subsequently through said exhaust means, said exhaust means dividing and guiding said fluid in independent and separate fluid streams, one of said fluid streams coming from the median portion of said material being directed through one of said channel means perpendicular to and away from said material and subsequently in transverse direction to the travel of said material, other fluid streams coming from the marginal portions of said material being diverted through other channel means arranged to extend adjacent and below said one channel means and in transverse direction to said travel of said material.

3. In a drying or like machine for treating lengthy sheet material by means of treating fluid under pressure; exhaust means for said fluid, said exhaust means being defined by a central channel, lateral channels forming extensions of said central channel and extending beyond and from opposite sides of said central channel, and extensible channel means communicating with said central channel and arranged for movement in sideward direction to said central channel and substantially parallel to said lateral channels, to thereby permit flow of fluid streams through said extensible channels in substantially parallel direction to the fluid streams passing through said lateral channels.

4. In a drying or like machine for treating lengthy sheet material by means of a treating fluid impinged on said material under pressure and by means of nozzles extending transversely of said material; exhaust means for guiding said fluid coming from said material, said exhaust means being defined by a plurality of channel means arranged for relative movement to one another and positioned intermediate adjacent nozzles, said channel means being adapted to extend adjacent each other in one position of said channel means and above each other in another position of said channel means to thereby permit division of fluid streams through said channel means.

5. In a drying or like machine for treating lengthy sheet material by means of treating fluid under pressure and by means of nozzles extending transversely of said material; the combination of movable exhaust means, and fixedly arranged exhaust means for said fluid, both said exhaust means being arranged to extend transversely of said material when under treatment and between adjacent nozzles, said movable exhaust means being disposed for displacement in opposite directions with respect to and partly over said fixedly arranged exhaust means.

6. In a drying machine according to claim 5, wherein said movable exhaust means and said fixedly arranged exhaust means are of different lengths and arranged in superposed position, and respective means for guiding fluid from the middle of the material under treatment through a longer portion of one of said exhaust means than fluid from the margins of the material under treatment.

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