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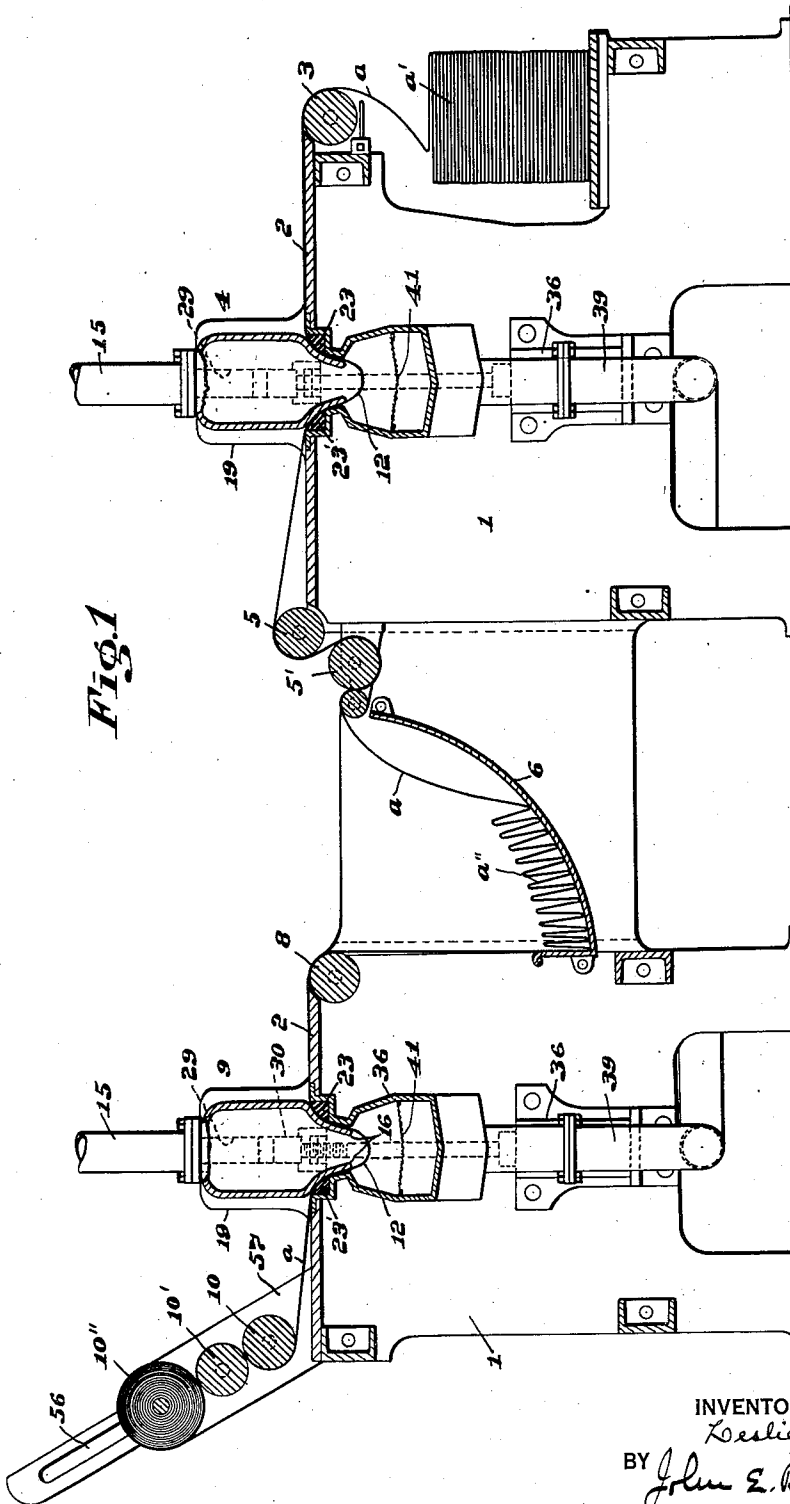
L. A. RUNTON

2,242,144

APPARATUS FOR DRYING POROUS TEXTILE MATERIAL

Filed Oct. 23, 1937

3 Sheets-Sheet 1



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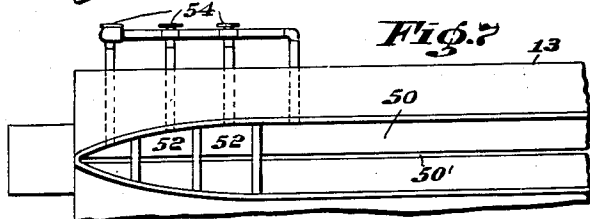
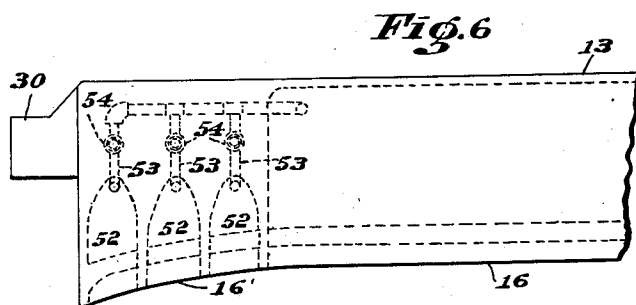
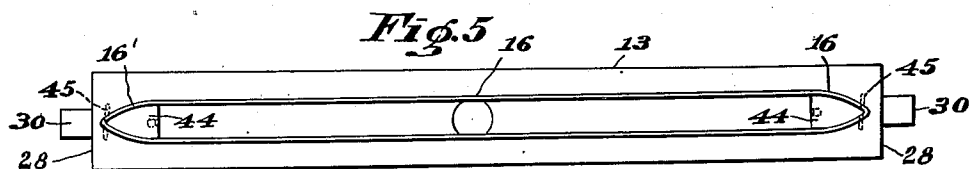
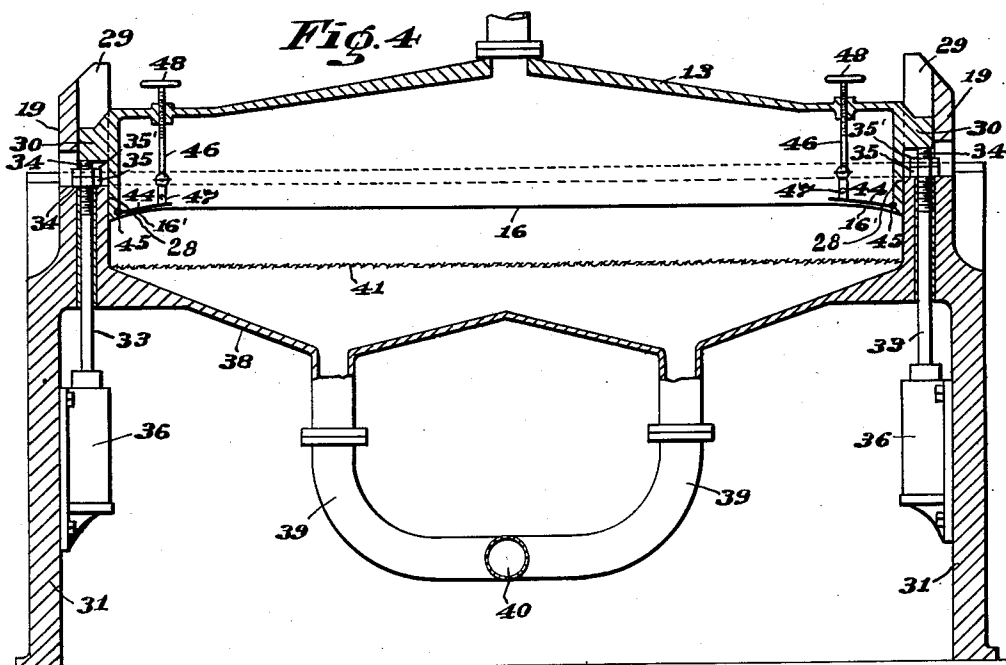
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## UNITED STATES PATENT OFFICE

2,242,144

APPARATUS FOR DRYING POROUS  
TEXTILE MATERIAL

Leslie A. Runton, Andover, Mass.

Application October 23, 1937, Serial No. 170,627

10 Claims. (Cl. 34-160)

This application is a continuation in part of my application filed June 11, 1936, Serial No. 84,695.

The invention relates to the drying of porous textile material while in motion and is designed to be used where the material is being dried in the continuous web.

The object of the invention is efficiency and economy in drying, coupled with speed, and without injury to the material being processed.

Especially it is the object of the invention to provide an apparatus by which the material may be dried without such stretching as will necessitate a subsequent shrinking of the material.

For convenience in expression, the apparatus will be described as though water was the element to be extracted from the material in process, although the apparatus pertains to the extraction of other liquids than water.

The invention contemplates the extraction, or at least the initial extraction of water from the web, not by evaporation, but by blowing the particles of water from the web, or material in process, and this preferably under a condition where the surface tension of the water, or its tendency to tenaciously cling to the material, is materially lessened. The particles of water are blown from the web by passing an air blast through the web of sufficient intensity to act with a disrupting effect on the water and tear it from the web. To effect this result according to known practices has necessitated the employment of a nozzle having a relatively small mouth opening else the demand upon the air pressure generating means is too excessive and costly. With a small nozzle opening, however, and with a moving web, the jet of air would be applied to a very small portion of the web, and for a relatively short time. This might necessitate repeated applications of jets through a plurality of units, which would add to the expense. A further difficulty arises from the fact that if the jet is applied directly to the plane surface of the web, even though the nozzle be brought into close proximity to the web, all the air will not pass through the web for there will be a tendency to lateral displacement and loss of air. These difficulties are overcome by an apparatus which operates to introduce the air into a loop in the web. In fact the loop can be, and, at least in part, is made by the applied jet of air with the effect that the loop in the web will form a chamber which may be converted into a compression chamber for air introduced into it, and the air will be directed to pass through the web forming a wall of this

chamber. Even though the fold be a relatively small loop, the surface area of the web through which the air is passing will be a relatively large area as compared with the area covered by the jet if applied directly to the web and if no loop was made. Apparatus will be shown by which the effect just described may be obtained to the best advantage, and which includes, also, means by which the chamber in the loop will be converted into a compression chamber and so sealed that the introduced air cannot escape from the chamber excepting through the web forming a wall of the chamber. It will be understood that the loop is being continuously formed as the web moves, and every portion of the web will be subjected to the air blast for a relatively long interval of time even though the web is moving at a fairly fast rate of speed.

In order that the air may act with a disrupting effect on the water and tear it from the web it must be enabled to pass through the web with a high velocity. Unless provision be made, assuming available forces are employed to impel the air, the air resistance on the reverse side of the web, or that surrounding the loop, would impede the passage of air through the web, and so lower its velocity. To compensate for this a vacuum chamber is provided within which the loop is contained and the apparatus will show this chamber and the way in which the chamber is kept sealed to maintain a partial vacuum in it under conditions of a running web passing through the chamber.

The apparatus can best be seen and understood by reference to the drawings in which

Fig. 1 is a plan of the machine partly in section and part in side elevations.

Fig. 2 is a cross section of the nozzle and lining later to be referred to.

Fig. 3 is the same as Fig. 2 but shows a slightly different type of nozzle.

Fig. 4 is a view partly in cross section and partly in front elevation of the nozzle, combined lining and vacuum chamber and parts incidental thereto.

Fig. 5 is a plan of the nozzle looked at from beneath its mouth end.

Fig. 6 is a side elevation of the nozzle employed with the higher air pressures and interior parts incidental thereto, and,

Fig. 7 is a plan of the nozzle shown in Fig. 6 looked at from beneath its mouth end.

In order to obtain a general idea of the apparatus reference is first made to Fig. 1, where the apparatus as a whole is shown diagrammatically.

Here 1 represents a frame supporting a table 2, or a set of table sections 2 successively arranged, over which the fabric  $a$  passes, or is drawn, from a pile  $a^1$  of the fabric lying in front of the first of the table sections. From the pile  $a^1$  the fabric passes upwardly around an idler 3 mounted on the frame, thence over the face of the first table where the fabric is subjected to the influence of the drying unit 4, which later will be described in detail. The fabric is drawn over the table by, or through, this unit by a set of draw rolls 5, 5<sup>1</sup> mechanically driven. From these rolls the fabric, if not then completely dried, passes downwardly into a trough or holder 6, on which the fabric loosely lies in folded pile  $a''$ , under no tension. From the pile  $a^2$  the fabric passes upwardly over an idler 8 on the frame, and thence over a second table, or table section, where it is subjected to the influence of another drying unit 9 substantially like the first unit 4, but this second unit may be either another water repellent unit, or an evaporating unit, the only difference being the difference in the temperature of air applied to the web. The fabric is drawn from the pile  $a^2$  over the face of the second table through the unit 9 by a set of draw rolls 10, 10<sup>1</sup> mechanically driven. If the unit 9 is the last drying unit then the fabric immediately passes from the rolls 10, 10<sup>1</sup> to a takeup roll 10<sup>11</sup> on which the fabric is wound.

Before referring to the structure of the individual units it will first be observed that the fabric in passing over the table, or table sections, dips in and out of an opening 11 therein by a loop 12 in the fabric. The opening 11 in the table, or table sections, which contains the loop in the fabric is generally rectangular in form, of some appreciable width, and in length more than the width of the widest fabric that is dried on the machine. In fact the opening 11 is of a length and width sufficiently large to receive an air discharge nozzle 13 which forms a part of each individual drying unit. The opening 11 is, also, preferably so sized as to receive the top end portion of a socket 14 for the mouth end portion of the nozzle and which socket is preferably so made as to provide a lining for the opening.

While retaining the same general form for the drying of all fabrics the nozzle 13 varies in some details, dependent upon the kind of fabric being dried. When used for drying the thinner more open fabrics it has one form, and for drying the thicker or more dense fabrics it has a slightly different form. Reference will first be made to the nozzle as one used for drying the thinner more open fabrics. The body of the nozzle lies above the table or table section with which the nozzle is associated. The lower end portion, or mouth end, of the nozzle, preferably made relatively contracted, extends through and below the opening 11 in the table, or table section, the loop 12 in the fabric which dips into and out of the opening, passing around the open or mouth end of the nozzle.

Compressed air is delivered to the nozzle from any suitable turbine blower or air compressor (not shown) by way of a pipe 15 which connects with the nozzle. This pipe delivering compressed air to the nozzle preferably passes through any suitable device (not shown) for heating the air and this heating device, if used, should preferably be one that may be controlled so that any determinate degree of heat may be given air delivered to the nozzle. Compressed air thus delivered to the nozzle will be discharged through its mouth

and through the loop 12 in the fabric as it passes by and over the mouth of the nozzle. The loop 12 in the fabric is formed by the nozzle although the pressure of the compressed air against the fabric tends to intensify the loop by bellying the fabric. In this connection it will be explained that the lips 16, 16<sup>1</sup> framing the nozzle mouth, and over which the fabric web passes, have a relatively wide separation. For drying the more open fabrics reliance is preferably made upon air turbines for obtaining air compression in the nozzle, an air pressure of three pounds being obtainable therein with economy. For such pressure the lips are separated to form a mouth opening about three inches in width except at its ends where the mouth is contracted. By reason of the loop initially made in the web and by reason of the widely separated mouth lips a chamber 17 is made adjacent the mouth of the nozzle and into this chamber the nozzle discharges. This chamber is one which lends itself to sealing and conversion into a compression chamber in order that the full force of the air may be availed of or, in other words, that all the air will be directed to pass through the fabric and not be dissipated. The sealing of the chamber includes especially the sealing of its ends along the selvage edge portions of the fabric web. While the mouth lips themselves, over which the web is being tightly drawn, form seals to prevent the escape of air from the sides of the chamber between web and lips, yet further provision is made to prevent escape of air at these points as will later be explained.

For sealing the ends of the chamber a normal characteristic residing in the fabric is availed of to form the seals, namely, that the side or selvage edges of the fabric are more closely woven and less stretchable than is the body of the fabric between these ends. Accordingly the arrangement is such that the selvage edges of the fabric, which are the parts most closely woven and less stretchable, will draw harder against the lips at the mouth ends than does the body of the fabric against the lips between the mouth ends. To this end those portions 16<sup>1</sup>, 16<sup>1</sup>, of the lips at the mouth ends against which the selvage edges of the fabric have bearing, are gradually longitudinally deepened with relation to the table top, thus imparting a general concavity to the nozzle mouth as shown in Fig. 4. It is to compensate for this general concavity of its mouth that the nozzle is made generally boat-shaped in order that the fabric may properly draw over the lips of its mouth, and at the same time the selvage edges of the fabric have a relatively tighter draw against the lips at the ends of the mouth than does the body of the fabric against the lips between their ends.

The tendency of the air pressure in the compression chamber discharging through the fabric tends to belly the fabric in relation to the mouth of the nozzle. This force, while tending to make the fabric tightly hug the lips, may so distend the fabric, especially if it is highly stretchable, that air might escape between the lips and fabric and not pass through the fabric. Air so escaping would pass to the atmosphere by way of the paths taken by the fabric as it dips down from outside the table top to cross the nozzle mouth and thence returns to the table top. These paths lie between the nozzle and the socket 14 into which the mouth portion of the socket extends. The nozzle may be so adjusted as to make these paths substantially equal to the thickness of the

fabric, the cloth itself forming to a certain extent seals for preventing the escape of air. More positive seals are provided, however, as will be later explained.

The socket 14 has a generally rectangular structure like the opening 11 lined by it and below which it extends. The socket comprises sides 18 and ends 19. The sides 18 have a general downward inclination substantially like the lower contracted end portion of the nozzle. Along their top edges the sides are provided with flanges 20 which fit within slots 21 in the table top and lie substantially flush therewith. Below these flanges the sides are formed to provide openings or shelves 22 within which are contained pads 23, 23<sup>1</sup> made preferably of sponge rubber, each presenting a rounding fore edge 24 over which the fabric passes. The nozzle is so disposed within the opening 11 that spaces 25, 26, will be left between the sides of the socket and the sides of the nozzle. It is through these spaces that the fabric passes as its fold dips down to pass across the nozzle mouth and thence return upwardly to the table top. In these spaces are located spring clips 27 which are secured to the socket and bear with tension against the fabric as it passes along the paths 25, 26. These clips by their bearing against the fabric hold it in fairly tight contact against the sides of the nozzle and thereby provide seals to prevent the passage to the atmosphere of any air which might escape between the fabric and the lips of the nozzle mouth as the fabric passes over these lips.

The ends 19 of the socket 14 are vertically disposed and extend above and below the table. The ends 28 of the nozzle fit snugly against these ends of the socket and are slidable up and down thereon in order that the nozzle may move in or out with relation to the opening in the table and interior walls of the socket. In order that the nozzle may have accuracy in its up and down movement, and when in operative position accurately positioned with relation to the socket to leave the paths 25, 26 above referred to, a keyway 29 is formed in each end 19 of the socket and keys 30 on the ends of the nozzle are slidable in these keyways. In order to provide a rigid support for the socket and means for moving the nozzle up and down and maintaining it in any adjusted position, the ends 19 of the socket are provided with offset downward extensions 31 which are mounted upon the floor or base on which the machine is mounted.

For moving the nozzle up and down and maintaining it in adjusted position with relation to the socket tappet rods 33 are passed upwardly through the ends of the socket to enter the keyways therein and bear against the bottom ends of the keys 30 on the ends of the nozzle. Slots 34 are cut in the socket through which the tappet rods pass and located in these slots, threaded upon the rods, are nuts 35, 35<sup>1</sup> of which 35<sup>1</sup> are locking nuts. The nuts 35 normally rest upon the bottoms of the slots 34, and through adjustment of the nuts determine the gravity position of the nozzle. The slots 34 are of some considerable depth which permits of the nozzle being raised by the raising of the tappet rods. The tappet rods are raised by hydraulic rams 36 mounted upon the extensions 31 to the socket.

Attached to the socket 14 and preferably cast integral with it is a vacuum chamber 38 which makes unitary closed connection with the socket and in which the loop 12 in the fabric is con-

tained as it passes by the mouth of the nozzle. The vacuum assists in the discharge of air through the fabric through lessening of the pressure and assists in carrying off the discharged water or vapor. The vacuum is created in the vacuum chamber through conduits 39 connecting therewith and which have a common pipe connection 40 with any suitable vacuum forming apparatus, or pump (not shown), for extracting air from the vacuum chamber and forming a partial vacuum therein. A screen 41 is preferably placed within the vacuum chamber for screening the air extracted by the vacuum creating apparatus.

In the operation of the unit thus far described the fabric from the pile  $a^1$  passes around the idler 3 and thence over the pad 23 down through the path 25 between the socket and the side of the nozzle, and there receives the pressure of the seal forming clip 27. Thence the fabric passes over the mouth of the nozzle where it is subjected to the influence of air discharging from the air compression chamber 17 through the fabric. The discharging air blowing against the fabric will tend to belly it out substantially as shown in Fig. 2, thus creating a relatively large area continuously being subjected to the influence of the air in the running web. After passing by the mouth of the nozzle the fabric passes upwardly by way of the path 26 between the socket and side of the nozzle where it receives the pressure of the seal forming clip 27, and thence upwardly around the pad 23<sup>1</sup> and into the set of draw rolls 5, 5<sup>1</sup>. The seals thus obtained in the paths 25, 26, which prevent escape of compressed air to the atmosphere also assist in maintaining the vacuum in the vacuum chamber. The pads 23, 23<sup>1</sup>, over which the fabric passes also assist in maintaining the vacuum.

Fabrics of various widths may be passed through the machine for the nozzle mouth is made sufficiently wide to take the widest fabrics. When fabrics of lesser width than the total length of the mouth are run through the machine, then the ends of the nozzle mouth must be closed beyond the selvedge edges of the fabric. To provide for this the ends 16, 16<sup>1</sup>, of the mouth lips over which the selvedge edges of the fabric pass are each provided with a plate 44 which is contained in the mouth ends to lie flush with the adjacent surfaces of the lip and these plates are opened in greater or less extent to accommodate different widths of fabric. Each of the plates is made of flexible steel and the outer end of the plate is fixed at the point 45. The plates are of sufficient length to accommodate all widths of fabric and their normal position is one of closure. When the widest fabrics are being run then the plates are sprung by lifting to expose the full length of the mouth, or at least a nozzle mouth opening equal to the width of the fabric. When narrower fabrics are being run the plates will be opened in commensurate amount, depending upon the width of the fabric. The lifting of the plates in amount commensurate with the width of the fabric run is by means of a rod 46 having connection with the end of the plate through a swivel block 47. The rod extends upwardly through the head of the nozzle and is threaded to turn therein. The rod is turned by a handle 48 on its end.

When employed for drying heavy tightly woven fabrics the nozzle is made substantially the same as before described with some exceptions. In view of the heavy pressure maintained in the

nozzle from 15 to 20 pounds per square inch by air compressors, the mouth of the nozzle is made of lesser width, preferably about 1 inch, and the nozzle at a point adjacent the mouth inwardly removed therefrom is provided with a diaphragm 50 having a longitudinal slot 50<sup>1</sup> therein of preferably  $\frac{1}{8}$  of an inch. An air compression chamber 51 is thus formed within the mouth beyond the diaphragm and air compressed within this chamber passes through the fabric as it passes by the mouth of the nozzle.

To provide for different widths of fabric the ends of the nozzle mouth are closed by a different means from that previously described for the lesser nozzle pressures. Here the nozzle at points adjacent the end portions 16, 16<sup>1</sup> of the mouth lips over which the selvage passes are provided with a series of flat individual cells 52 which open into the mouth ends. Compressed air delivered to the main chamber of the nozzle cannot enter these cells but each cell receives its own charge of compressed air by way of a pipe connection 53 extending from the air compressor to connect with the cell and having in it a shutoff valve 54. Compressed air will be delivered to one or more of these cells dependent upon the width of the fabric.

With the higher air pressures the paths 25, 26 followed by the fabric in its passage between the nozzle and socket 14 are preferably provided with additional seals 27<sup>1</sup>, 27<sup>1</sup>. These seals are like the seals 27, 27 but are fixed to the nozzle and press against the walls of the socket the combined seals imparting a slightly circuitous path to the fabric along the paths 25, 26, and further assisting in the sealing of the vacuum chamber.

The tendency is for the water to cling to the web by its own surface tension, and as the surface tension of water is reduced by increase in temperature hot air is preferably used to create the blast to which the web is subjected, instead of cold air. The air, however, should not be so hot as to cause ebullition of the water, as this would be apt to injure the web, especially dyed web.

A plurality, or battery of water ejecting units may be employed, arranged to follow one another in relatively close sequence. With silks and rayons, in which the water lies only on the surface of the fibre, and not within the fibre, one water expelling unit is sufficient. The same is true of relatively thin fabrics, even though there is some water within the fibre itself, for in such cases surface water will be expelled, and the protracted application of air in the one unit will, also, be sufficient to extract water within the fibre. In this connection the partial vacuum will assist in extracting the water from within the fibre when the surface water has been ejected.

In the case of the more dense and thicker fabrics where a higher intensity of air pressure is demanded a plurality of water ejecting units are employed to completely expel surface water from the web. Even in such case some water still remains in the fibre itself, which must be extracted before the web is completely dried. For such fabrics one, or more, evaporating units are employed, which follow the water expelling unit, or units. The evaporating unit is substantially the same as the water expelling unit, the fold being formed in the web, and the air expelled through the web forming the wall of the fold in the presence of a surrounding partial vacuum, the same as before. High pressure air

is also preferably employed for evaporating purpose, or air that will pass through the fabric with high velocity, in order that it may exert more or less vacuum effect, upon the fibre to exert a more or less vacuum effect upon the fibre to extract the water from it. The partial vacuum surrounding the web through which the air is passing will also assist in extracting the water from within the fibre.

Any evaporating unit following the water expelling unit becomes immediately effective by reason of the fact that the web when it reaches the evaporating unit will have become sufficiently heated for effecting evaporation owing to the fact that heated air is, preferably, initially employed in the water expelling unit.

Very little surface water, if any, will be left on the web when it reaches the evaporating unit. Accordingly, a very much hotter air can be employed than if the web was full of surface water, which would cause ebullition, and damage the web. In practice it is preferred that the air used for evaporating purposes be raised to a temperature of at least 105° centigrade, as the higher temperatures will better operate to cause evaporation of the water within the fibre.

With some fabrics one water expelling unit is all that is necessary to dry the fabric if running at a normal rate of speed of about ten yards a minute; in other cases of fabric run at like speed a few water expelling units, coupled with an evaporating unit, or units, are necessary. If, however, the web is to be run at a much higher speed, then more units, either water expelling units, or both water expelling units and evaporating units, should be employed, the more units thus employed being necessitated only on account of the high speed desired.

The fabric is drawn over the face of the table through the processing unit, whether water expelling unit, or evaporating unit, either one, or both, as the case may be, by the friction drive rolls on each table, or table section. The fabric is drawn over the table from a slack pile so that the only drag upon the fabric is that occasioned by the blast of air, and the frictional drag of the fold over the mouth of the nozzle and by the seals. This throws no excessive strain upon the fabric, or no such strain as will tend to unduly stretch it, necessitating subsequent shrinking.

It is for the reason of avoiding any long pull of the fabric through a plurality of processing units that each unit is preferably provided with a set of friction drive rolls. These rolls, together with other drive rolls 10, 10<sup>1</sup>, are operated in any suitable manner.

After drying the fabric passes onto the windup roll 10<sup>11</sup>. This roll is arranged upon a shaft which turns within ways 56, formed in the interior sides of bracket forming arms 57, fixed to the frame. The windup roll 10<sup>11</sup> is turned by frictional contact with the roll 10<sup>1</sup> so that as its diameter increases, as the fabric winds upon it, the ends of its shaft will move along the ways in which they are contained so providing for the enlargement of the roll.

I claim:

1. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end and mouth of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form

a chamber into which air is discharged by discharge of air through said nozzle, means for preventing escape of air from the sides of said chamber and means for closing the ends of said chamber whereby said chamber is converted into a compression chamber for air compressed therein by discharge of air through said nozzle and the air thus confined and compressed in said chamber will be directed to pass through said web.

2. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form a chamber into which air is discharged by discharge of air through said nozzle, means for preventing escape of air from the sides of said chamber and means for closing the ends of said chamber whereby said chamber is converted into a compression chamber for air compressed therein by discharge of air through said nozzle and the air thus confined and compressed in said chamber will be directed to pass through said web, and a constricted opening within said nozzle smaller than the mouth of the nozzle through which the air is discharged from out of the body of the nozzle into said compression chamber.

3. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth framed by lips over which the web is drawn, the end portions of said lips framing the end portions of said mouth being longitudinally and progressively deepened, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said lips and end of the nozzle to form a chamber into which air is discharged by discharge of air through said nozzle and the selvedge edges of the fabric will draw harder against said end portions of the lips than does the body of the fabric against said lips between said end portions thereof thereby assisting in the closure of said chamber.

4. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form a chamber into which air is discharged by discharge of air through said nozzle, a socket for receiving said mouth end portion of the nozzle, means for relatively positioning said socket and nozzle to form spaces between said mouth end portion of the nozzle and said socket along which the web will pass in its passage to and from the mouth of said nozzle, seal forming means within said spaces between the nozzles and the socket for preventing escape of air from along the sides of said chamber and means for closing the ends of said chamber whereby said chamber is converted into a compression chamber for air compressed therein by discharge of air through said nozzle and the air thus confined and compressed in said chamber will be directed to pass through said web.

5. In apparatus for drying a moving web of textile material the combination comprising a

compressed air discharge nozzle having at the end thereof a mouth framed by lips over which the web is drawn, the end portions of said lips framing the end portions of said mouth being longitudinally and progressively deepened, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said lips and end of the nozzle to form a chamber within which air is discharged by discharge of air through said nozzle and the selvedge edges of the fabric will draw harder against said end portions of the lips than does the body of the fabric against said lips between said end portions thereof thereby assisting in the closure of said chamber, and means for closing the end portions of the nozzle mouth lying beyond the edges of the web whereby air passing through the nozzle will be discharged into said chamber.

6. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth framed by lips over which the web is drawn, the end portions of said lips framing the end portions of said mouth being longitudinally and progressively deepened, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will cooperate with said end of the nozzle to form a chamber into which air is discharged by discharge of air through said nozzle and the selvedge edges of the fabric will draw harder against said end portions of the lips than does the body of the fabric against said lips between said end portions thereof thereby assisting in the closure of said chamber, a socket for receiving said mouth end portion of the nozzle, means for relatively positioning said socket and nozzle to form spaces between said mouth end portion of the nozzle and said socket along which the web will pass in its passage to and from the mouth of said nozzle, and seal forming means within said spaces between the nozzle and the socket for preventing escape of air from along the sides of said chamber.

7. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form a chamber within which air is discharged by discharge of air through said nozzle, a socket for receiving said mouth end portion of the nozzle, means for relatively positioning said socket and nozzle to form spaces between said mouth end portion of the nozzle and said socket long which the web will pass in its passage to and from the mouth of said nozzle, means for closing the ends of said chamber whereby air confined and compressed therein will be directed to pass through said web, and a vacuum chamber open to that portion of the web passing over the mouth of said nozzle and in unitary closed connection with said socket.

8. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form a chamber within which air is discharged by discharge of air through said

nozzle, a socket for receiving said mouth end portion of the nozzle, means for relatively positioning said socket and nozzle to form spaces between said mouth end portion of the nozzle and said socket along which the web will pass in its passage to and from the mouth of said nozzle, means for closing the ends of said chamber whereby air confined and compressed therein will be directed to pass through said web, a vacuum chamber open to that portion of the web passing over the mouth of said nozzle and in unitary closed connection with said socket, and seal forming means within said spaces between the nozzle and the socket for preventing escape of air from along the sides of said chamber and for assisting in the sealing of said vacuum chamber.

9. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form a chamber within which air is discharged by discharge of air through said nozzle, a socket for receiving said mouth end portion of the nozzle, means for relatively positioning said socket and nozzle to form spaces between said mouth end portion of the nozzle and said socket along which the web will pass in its passage to and from the mouth of said nozzle, means for closing the ends of said chamber whereby air confined and compressed therein will

be directed to pass through said web, a vacuum chamber open to that portion of the web passing over the mouth of said nozzle and in unitary closed connection with said socket, and seal forming means within said spaces between the nozzle and the socket by which the web passing there-through will be made to yieldingly hug the walls of said nozzle and socket, respectively, for preventing the escape of air from along the sides of said chamber and for assisting in the sealing of said vacuum chamber.

10. In apparatus for drying a moving web of textile material the combination comprising a compressed air discharge nozzle having at the end thereof a mouth over which the web is drawn, means for supporting said web to loop over said end and mouth of the nozzle as the web is drawn whereby the apex of the loop will co-operate with said end of the nozzle to form a chamber into which air is discharged by discharge of air through said nozzle, means for preventing escape of air from the sides of said chamber, and means for closing the ends of said chamber whereby said chamber is converted into a compression chamber for air compressed therein by discharge of air through said nozzle and the air thus confined and compressed in said chamber will be directed to pass through said web, and means for closing the end portions of the nozzle mouth lying beyond the edges of the web whereby air passing through the nozzle will be discharged into said compression chamber.

LESLIE A. RUNTON.