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FIBER CONDITIONING PROCESS AND APPARATUS.

APPLICATION FILED NOV. 14, 1917.

1,401,376. Patented Dec. 27, 1921.

Fig. 1.

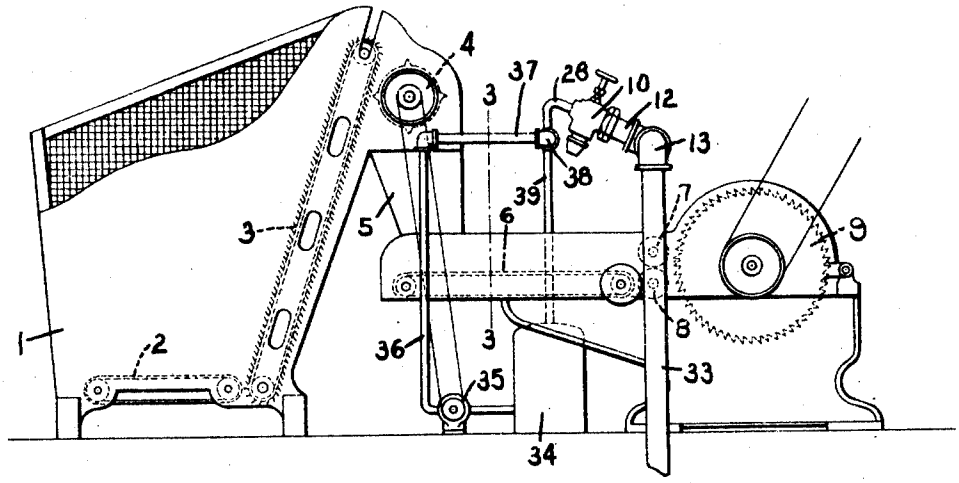


Fig. 2.

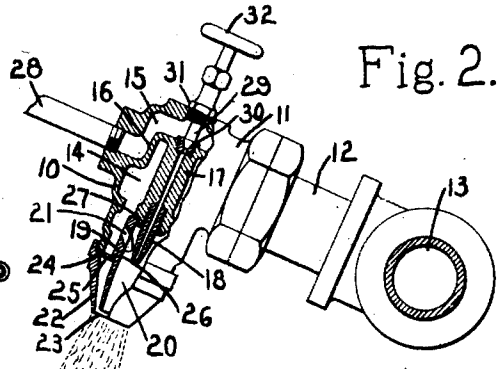
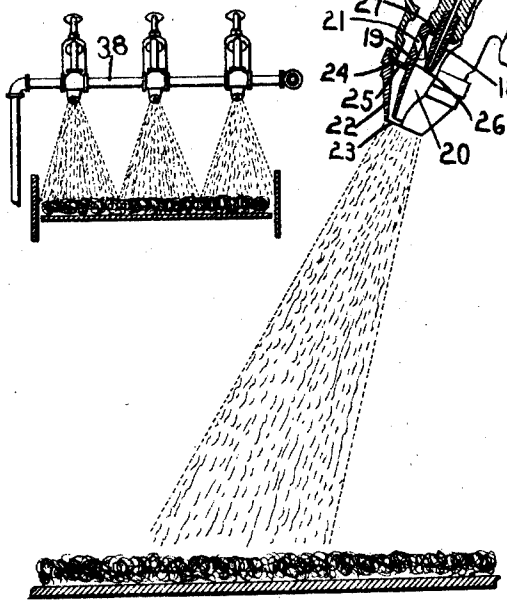


Fig. 3.



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UNITED STATES PATENT OFFICE.

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FIBER-CONDITIONING PROCESS AND APPARATUS.

1,401,376. Specification of Letters Patent. Patented Dec. 27, 1921.

Application filed November 14, 1917. Serial No. 202,090.

To all whom it may concern:

Be it known that I, ALBERT W. THOMPSON, a citizen of the United States, and resident of Lowell, county of Middlesex, State of Massachusetts, have invented an improvement in Fiber-Conditioning Processes and Apparatus, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in processes and apparatus for supplying moisture in the form of water, oil, emulsion and other fluid to fibrous absorbent materials. More particularly the present invention relates to a process and apparatus for restoring normal regain, that is the moisture naturally retained in the fibers, in overdried cotton, wool, or other textile fibers during their manufacture into textiles.

The principal object of the invention is to provide means for effecting a better distribution of the fluid throughout the material and a more rapid absorption thereof thereby producing such a homogeneous combination that the material can be worked more rapidly with the quantity of the moistening fluid reduced to a minimum.

Another object of the invention is to provide means by which the moistening of the fibrous material may be accomplished during the performance of other operations upon the material whereby, time, labor and floor space will be economized.

I am aware that heretofore various means have been utilized for applying moisture to absorbent material for the purpose of restoring natural regain or for moistening to facilitate manufacture, the most common of which consists of spreading a layer of material such as wool, cotton or the like upon a factory floor and sprinkling it down with water, oil, emulsion or other fluid necessary to the proper conditioning of the material, then spreading a second layer over the first and repeating the operation, continuing this procedure until a suitable pile is formed, then permitting the pile to remain a sufficient length of time to enable the textile material to absorb uniformly the fluid applied thereto.

Another well known process consists in sprinkling fine streams of the moistening fluid upon the surface of the material in process of manufacture but this results in an uneven saturation and the excess fluid supplied in this manner often fouls the parts of the machine causing waste of the fluid and interference with production by reason of the delay caused by the frequent cleaning of the machines.

Another method is to supply fluid under pressure to a moving mass of material through sprinkling heads. This also results in uneven and variable distribution of the moisture since any attempt to vary the amount of fluid supplied changes the pressure and therefore affects both the fineness of the spray and the area of its distribution. Furthermore little or no force is given to the particles discharged from the spray so that the moistening is superficial and slow absorption results.

Another method consists in producing spray by rotary brushes or cylinders revolving in contact with a moistening fluid and throwing globules of the fluid upon the mass of material. The moisture thus applied to the material, while relatively well distributed, is merely deposited superficially so that absorption is relatively slow, furthermore the devices for thus supplying the moisture are necessarily complex and have many moving parts to wear and deteriorate.

The present invention provides a means for producing a spray consisting of globules of the moistening fluid of the desired quality and fineness required by the material to be moistened and in projecting the globules upon the mass with sufficient force to cause them to penetrate thoroughly into the material with uniformity over a constant area so that absorption of the moisture thus supplied will be rapid and uniform.

My invention further contemplates the regulation of the rate at which the fluid is supplied with accuracy and without varying the quality and fineness or the force with which the globules are projected into the material.

Other objects and features of the invention will more fully appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

A preferred embodiment of the invention is illustrated herein as applied to wool carried by the moving apron of a mixing picker,

although it will be understood that the invention may be applied to any other kind of textile fibers and may also be utilized in connection with any usual machines used in textile industries in which it is necessary or desirable to maintain a predetermined amount of moisture in the material being operated upon.

In the drawings;

Figure 1 is a side elevation of a mixing picker with a feeding mechanism of the usual type delivering textile fibers, such as wool, to the apron which leads to the picker, showing my invention applied thereto,

Fig. 2 is a view partly in section of a preferred form of nozzle for projecting the fluid upon the textile material, and,

Fig. 3 is a vertical sectional view on lines 3—3 Fig. 1.

Fibrous material, particularly that from which the natural moisture has been evaporated or otherwise removed require a predetermined, uniform, and thorough degree of impregnation with a suitable quantity of moistening fluid to prepare it properly for the various treatments to which it is subjected during the course of the manufacture into textile goods.

In supplying moisture to such fibrous material in accordance with my invention, certain requirements exist, the principal of which may be stated as follows:

(*a*) The fluid supply should not be atomized to an extent which will cause dissipation or vaporization since if this occurs the moistening fluid will be lost and only a partial impregnation effected.

(*b*) The particles of moistening fluid should be of sufficient size to insure immediate adhesion to any surface with which they contact and of sufficient mass to acquire an appreciable velocity and momentum under the action of an impelling force to insure actual penetration into the mass.

(*c*) A constant and uniform spray of a predetermined quality should be projected constantly upon a definite area of a mass of material moving at a constant speed, the quantity and rate of the fluid supplied being at all times under the control of suitable adjusting means so that the quantity of moistening fluid may be correlated to the requirements of the material. A typical mechanism for accomplishing this result which is illustrated in the accompanying drawings comprises a set or battery of spray units located over the apron of the mixing picker to which fibrous material, such as wool, is supplied by a suitable feeding device. The feeding device shown herein comprises a hopper 1 having at its bottom a traveling endless carrier 2 which constantly forces the material in the hopper against an elevator 3 comprising an endless apron provided with a toothed surface such as card clothing or the like. The material is discharged from the elevator 3 in a sheet-like mass by a suitable rotating doffer 4 and falls through a chute 5 upon the apron 6 of a mixing picker.

The apron 6 delivers the mass or sheet of textile fibers to feed rolls 7 and 8 which present it to the teeth of the picker cylinder 9 by which the fibrous masses are broken up and prepared for subsequent operations.

The sheet or mass of material which is delivered by the feeder to the apron 6 of the picker comprises a loosely associated mass of fibers into which globules of a moistening fluid may be deeply projected by a suitable impelling means such as compressed air or other gaseous fluid under pressure so that it is possible to moisten the entire mass quickly and uniformly throughout as it progresses toward the picker cylinder.

A preferred mechanism for forming and projecting globules of a moistening liquid upon and into the fibrous material comprises a nozzle substantially like that disclosed in my Patent No. 965,963 granted August 2, 1910 for improvements in burners for fuel oil, the nozzle comprising a substantially hollow cylindrical casing 10 closed at one end and open at the other, said casing having a lateral tubular extension 11 providing a nipple by means of which it may be connected by a pipe 12 to a suitable conduit 13 for supplying compressed air or other gaseous fluid under pressure.

The casing 10 is divided into two compartments, the principal of which is the air compartment 14, the other compartment being in effect a conduit 15 for supplying the moistening fluid to the nozzle. The wall 16 which separates these compartments is provided with a central cylindrical extension 17 having an axial duct leading from the conduit 15. The outer or discharge end of the cylindrical member 17 is provided with a nozzle tip 18 which extends substantially to the end of the opening of the casing 10.

The nozzle tip 18 is surrounded by a tubular member 19 which forms an atomizing chamber 20. Obliquely or tangentially disposed passageways 21 lead through the wall of the tubular member 19 and serve to permit the gaseous fluid under pressure to flow from the chamber 14 into the atomizing chamber 20. These inlets terminate slightly back of the end of the nozzle tip 18 and by reason of their tangential arrangement cause the gaseous fluid under pressure, when introduced into the atomizing chamber, to assume a rotary or whirling motion therein of relatively high velocity which breaks up and pulverizes particles of fluid introduced through the nozzle tip 18.

The rotative effect upon the jet issuing from the atomizing chamber 20 tends to expand it into conical form with a wide angle of divergence. Means are therefore

preferably provided for surrounding this jet with an envelop of the fluid under pressure which will serve to restrict and condense the action of the jet aforesaid. This is accomplished in the present form of nozzle by providing a conical cap 22 with a discharge opening 23 of slightly larger diameter than the discharge opening of the tubular member 19 and extending slightly beyond it. The cap 22 preferably is screwed upon the end of the casing 10 and clamps between itself and the casing an annular diaphragm 24 which is provided with an annular row of apertures 25. The diaphragm 24 engages a shoulder 26 on the tubular member 19 and serves to clamp its inner end against the shoulder 27 on the end of the cylindrical member 17.

The liquid is introduced through a tube 28 from a suitable supply into the chamber 15. From this chamber a regulated stream of the liquid flows through the tip 18 into the atomizing chamber. The amount of fluid thus supplied to the atomizing chamber may be regulated in any suitable manner as by a needle valve 29 engaging a valve seat 30 seated in the end of a cylindrical member 17, the stem of said needle valve being screw threaded through a bushing or gland 31 located in the closed end of the casing. A suitable hand wheel 22 may be provided for operating the needle valve.

By reason of the construction aforesaid the liquid supplied through the nozzle tip 18 is broken up by the rotative action of the fluid under pressure within the atomizing chamber 20 and is impelled therefrom in the form of globules of an appreciable mass which are driven at a considerable velocity. The fluid under pressure passing through the apertures 25 of the diaphragm 24 surrounds the jet issuing from the atomizing chamber with an envelop of gaseous fluid under pressure which serves the double purpose of restricting the globule projecting jet to a predetermined conoidal form and also of loosening up the fibers against which the jet is projected so that the globules may penetrate more deeply into it.

In the use of nozzles of this character for the purpose of moistening textile fibers or other similar material a battery of such nozzles is superposed above the conveyer which carries the material to be treated. As illustrated in the present drawing three such nozzles are shown, in Fig. 3, as discharging simultaneously upon the fibrous material carried by the apron 16 of the mixing picker. The jets from these nozzles are delivered at an angle to the plane of movement of the conveyer, and in opposition to the direction of movement thereof. By thus positioning the nozzles a greater loosening effect upon the fibers is obtained.

The gaseous fluid under pressure, preferably compressed air, is supplied to the conduit 13 which leads to the nozzle, by the pipe 33 leading from an air compressor, a blower, or other suitable means for supplying the gaseous fluid under pressure as above disclosed.

The liquid may be supplied directly to the nozzle by gravity but preferably is supplied through means such as a continuous loop which will provide a continuous circulation of the fluid with suitable feed branches leading to the nozzles, particularly if the fluid is an emulsion of which the ingredients are likely to separate if allowed to stand in a quiescent state.

In the illustrative embodiment of the invention shown herein the liquid is contained in a tank 34 from which it is drawn by a rotary pump 35 and discharged through pipes 36, 37 into a conduit 38 which communicates through the branch pipes 28 with all of the nozzles. The conduit 38 discharges the surplus of liquid through a return pipe 39 into the tank 34 thus maintaining a continuous circulation of the fluid while supplying all the nozzles with it.

It will be understood that various other embodiments of the invention may be made within the spirit and scope of the following claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. The process of moistening a mass of fibrous absorbent material which consists in forcibly projecting globules of a moistening liquid impelled by a gaseous fluid under pressure into a moving mass of said material.

2. The process of moistening textile fibers which consists in forcibly projecting globules of a moistening liquid into a mass of said textile fibers by means of a whirling jet of gaseous fluid under pressure.

3. The process of moistening textile fibers which consists in forcibly projecting globules of a moistening liquid into a moving mass of textile fibers by means of a jet of gaseous fluid, said jet being surrounded by an envelop of gaseous material also projected under pressure whereby the envelop of gaseous fluid will agitate said fibers and will concentrate the liquid carrying jet and cause the same to penetrate deeply into the mass.

4. The process of moistening textile fibers which consists in forcibly projecting globules of a moistening liquid into a moving mass of textile fibers by means of a whirling jet of gaseous fluid, said jet being surrounded by an envelop of gaseous fluid also projected under pressure whereby the envelop of gaseous fluid will agitate said fibers and will concentrate the fluid carrying jet and cause the same to penetrate deeply into

the mass, the quantity of fluid and the quality of globules being correlated to the character of the material treated.

5. In an apparatus for moistening fibrous absorbent material comprising means for progressively advancing the material, means for projecting liquid in the form of globules having an appreciable mass into the moving material by means of a jet of gaseous fluid under pressure, and means for surrounding said jet with an envelop of gaseous fluid projected under pressure whereby the jet will be condensed and deeper penetration of the globules into the material produced.

6. In an apparatus for moistening textile material comprising a conveyer adapted progressively to move forward a mass of said material, mechanism having means for producing a jet of gaseous fluid under pressure directly across the path of said material, means for supplying a liquid centrally to said jet and means for regulating the liquid supplied to said jet.

7. In an apparatus for moistening textile material comprising a conveyer adapted progressively to move forward a mass of said material, mechanism having means for producing a jet of gaseous fluid under pressure directly across the path of said material, means for supplying a liquid centrally to said jet and means for producing an envelop of fluid under pressure surrounding said jet adapted to condense said jet to a predetermined area of distribution and to cause deeper penetration of the globules of liquid into the material.

8. In an apparatus for moistening textile material comprising a conveyer adapted progressively to move forward a mass of said material, mechanism having a central jet and a surrounding chamber provided with obliquely disposed passageways leading through the walls of said chamber slightly back of the end of said mechanism, means for supplying a liquid to said jet, means for regulating the same, means for supplying a fluid under pressure to said surrounding chamber and means for regulating the same whereby a whirling spray from said jet will be produced and means for producing an annular inclosing envelop of fluid under pressure around said jet adapted to condense said jet to a predetermined area of distribution and to cause a deeper penetration into the material of the globules of liquid produced by said whirling jet.

In testimony whereof, I have signed my name to this specification.

ALBERT W. THOMPSON.