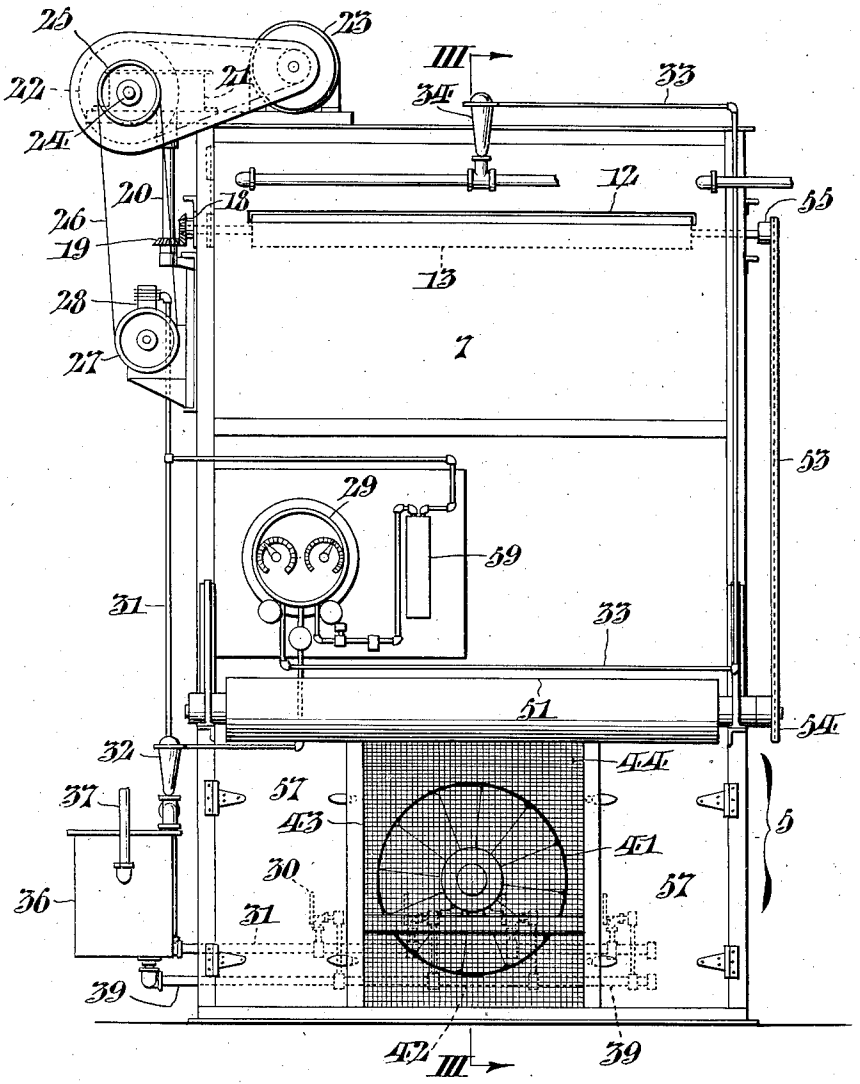
June 2, 1931. T. ALLSOP 1,807,580

COOLING AND CONDITIONING MACHINE

Filed Jan. 24, 1929 3 Sheets-Sheet 1

FIG. 1.



WITNESSES

Thomas W. Kerr Jr.

George M. Hirschkamp

INVENTOR:

Thomas Allsop,

BY Fally & Paul

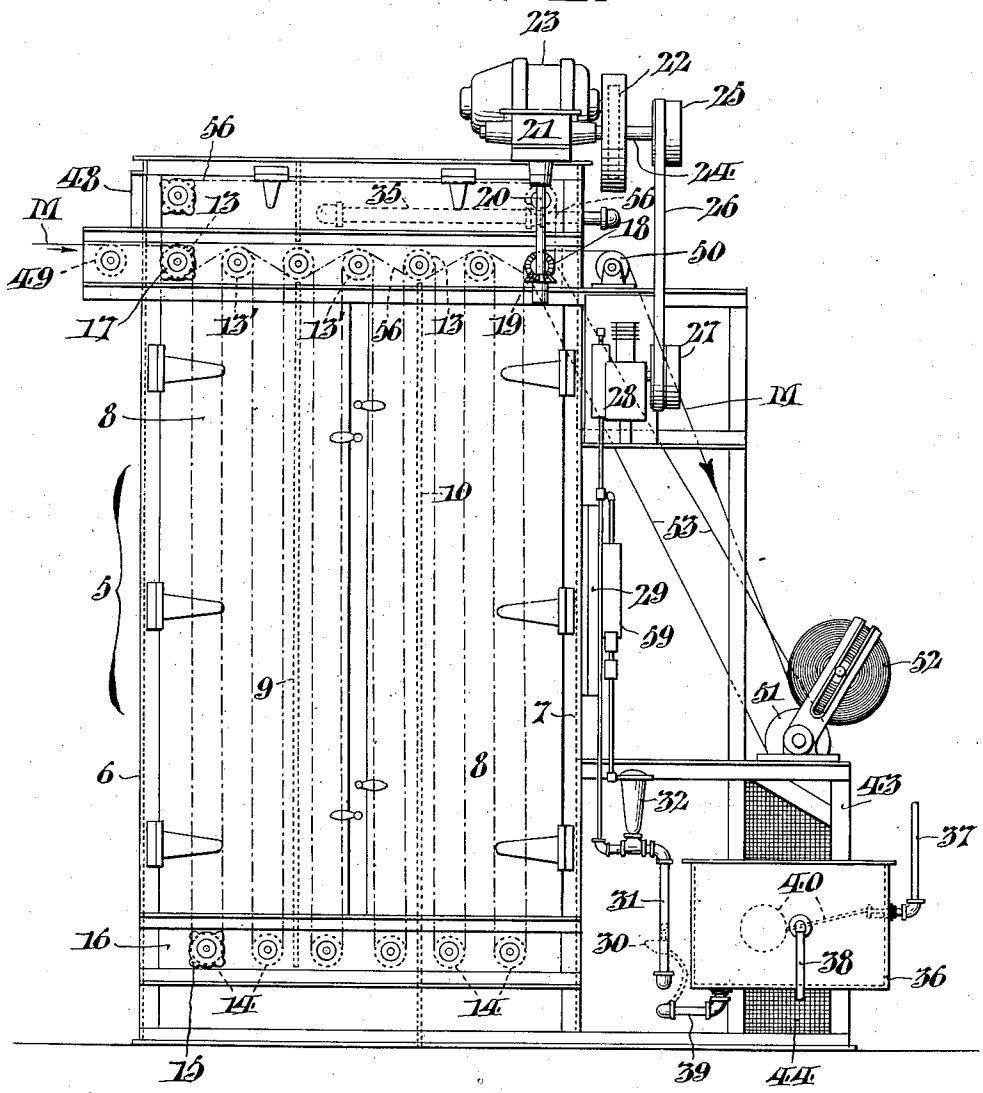
ATTORNEYS.

June 2, 1931. T. ALLSOP 1,807,580

COOLING AND CONDITIONING MACHINE

Filed Jan. 24, 1929 3 Sheets-Sheet 2

FIG. II.



WITNESSES

Thomas W. Kerr, Jr.

George M. Hirshberg

INVENTOR:

Thomas Allsop,

BY Galey & Paul

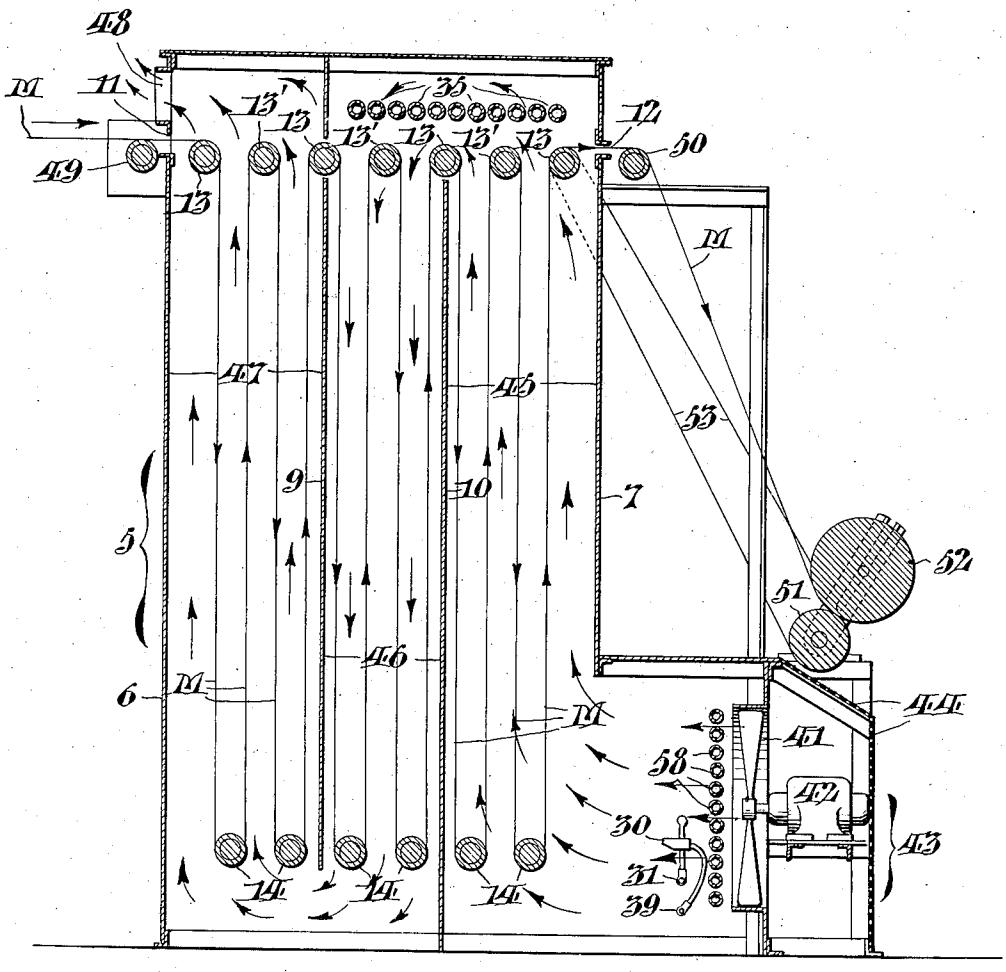
ATTORNEYS.

June 2, 1931. T. ALLSOP 1,807,580

COOLING AND CONDITIONING MACHINE

Filed Jan. 24, 1929 3 Sheets-Sheet 3

FIG. III.



WITNESSES

Thomas W. Kerr, Jr.

George M. Middaugh

INVENTOR:

Thomas Allsop,

BY Fraley & Paul

ATTORNEYS.

Patented June 2, 1931 1,807,580

UNITED STATES PATENT OFFICE

THOMAS ALLSOP, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE PHILADELPHIA DRYING MACHINERY COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

COOLING AND CONDITIONING MACHINE

Application filed January 24, 1929. Serial No. 334,843.

This invention relates to machines adapted to the conditioning of certain kinds of materials which require a necessary degree of moisture as a prerequisite for storage and shipment. Under normal conditions, all animal and vegetable fibres contain a certain amount of moisture which varies with the nature of such fibres, atmospheric conditions, air temperatures, and so forth. During the processing of such fibres, the moisture content is invariably reduced below normal, on account of the high temperatures prevailing in dryers, presses, and other finishing machines; and, in order that finished products may possess the essentials of uniform color, weight, dimensions, "feel" and strength, it is highly important it be thoroughly cooled and the normal or prerequisite degree of moisture restored.

A general object of this invention is to provide a novel method of and means for conditioning fibrous materials in which the temperature and humidity conditions are under absolute control, whereby uniform results are assured at all times, irrespective of surrounding or varying exterior conditions.

Another object is the provision of an improved type of equipment or machine in which the cooling medium is adapted to cool the material treated rapidly, so that the dry fibres quickly absorb moisture, with the result that a properly tempered, uniformly conditioned product is discharged from the equipment.

Other objects and associated features of this invention will, later on, be brought out and described.

In the accompanying drawings and detailed explanation thereof, there is set forth a convenient equipment adapted to the fundamentals of my invention. As, however, this invention is capable of embodiment in other and varied constructional forms than that shown, it is to be understood the drawings and description are only illustrative and not of a necessarily limiting character, other than as expressed by the subjoined claims.

In the drawings:

Fig. I is an end elevation of a cooling and conditioning equipment embodying the present invention.

Fig. II is a side view, looking toward the right hand of the preceding illustration; and,

Fig. III is a vertical section, taken approximately on the plane indicated by the arrows III—III in Fig. I.

Referring more in detail to the drawings, my novel cooling and conditioning equipment or machine comprises an enclosure or housing comprehensively designated 5, with front and back sheet metal walls 6, 7, respectively; and hinged doors 8 at the sides thereof. This enclosure 5 is subdivided by partitions 9, 10, that define a sinuous course through the machine for the material M being treated, in its passage from the entry orifice 11 to the exit orifice 12, as later on explained.

Conveniently located in the enclosure or housing 5 are a series of upper and lower rollers 13, 14, respectively, about which the material M is trained; the lower series 14 being idlers having their journals rotating in ball bearings, one of which is indicated at 15 in Fig. II, suitably encased between the inner wall of the enclosure 5 and a covering plate 16. The upper series of rolls 13 are similarly journaled in ball bearings 17 and are alternately driven to convey the material M, with every other one 13′ an idler, with a loose ball-bearing sprocket (not shown) on its axis which rotates in a reverse direction to that of said idler.

The upper series of rolls 13 are rotated by means of bevel gears 18, 19, the latter of which is on a vertical shaft 20 driven by a worm couple in the box 21, that receives power by way of a silent chain drive 22 from an appropriate motor 23, mounted on top of the enclosure 5.

Secured on the outer end of the worm couple shaft 24 is a pulley 25, which is coordinated by a belt drive 26—for example—to the tight and loose pulleys 27, of a suitable air compressor 28. The air from the compressor 28 is employed to operate a suitable control instrumentality 29, as well as supplying the atomizer nozzles 30, by way of a connection 31 and diaphragm valve 32; and, in addition thereto, by way of a conduit 33, and

diaphragm valve 34, to a heater coil bank 35 located transversely in the upper region of the enclosure 5, over the rear partition 10, and the purpose whereof will be later on explained.

To ensure the requisite humid condition within the enclosure 5, I employ a water-box or tank 36 having service and overflow connections 37, 38, and a supply conduit 39 to the atomizer nozzles 30; whereas the proper level of liquid in said tank is regulated by means of a conventional float-device 40, in an obvious manner. The humidified air is blown through the enclosure or housing 5, in the direction of the arrows, by means of a vertically rotating fan 41, which is direct connected to—and driven by—a motor 42, located in an appropriately screened compartment 43 at the rear of the equipment. Particular attention is here directed to the fact that atmospheric air entering the compartment 43, by way of its screening 44, is not re-circulated about the enclosures 5 but follows a sinuous or undulating course, first upwardly through the compartment 45, Fig. III, over the top of the partition 10 and about the coil bank 35, thence downwards through the compartment 46 intermediate the partitions 9, 10; and again upwardly by way of the compartment 47—set apart by the partition 9 and front wall 6—to exhaust orifice 48.

Material M enters the enclosure or housing 5, over a feed roll 49, by way of the entry orifice 11 which is conveniently located immediately below the exhaust orifice 48, and passes therethrough over an undulatory course defined by the rolls 13, 14, as indicated by the arrows applied at intervals thereon; finally emerging from the exit orifice 12. As the cooled and conditioned material M emerges from the enclosure 5 it passes over an idler roll 50 in a downward direction to a suitable take-up or draft roller 51 for formation into a bolt 52; or delivery to a calendering mechanism, not shown. Incidentally, the take-up or draft roller 51 is conveniently driven by a chain drive 53 trained about sprockets 54, 55, Fig. I; the latter of which is secured to one end of the initial driven roll of the series 13, 13', while said series are coordinated for concurrent rotation by a chain drive, indicated by the dotted line 56 in Fig. II.

Attention is herein directed to the fact that the nozzles 30 of the humidifying means are of the siphon type, and, therefore, will not overflow or "flood" should anything untoward occur in connection with the supply of atomizer air from the compressor 28.

Doors 57—Fig. I—are provided in connection with the screened compartment 43, for convenience of access to examine or adjust the humidifying nozzles 30; while a cold water coil bank 58—Fig. III—is arranged in parallelism with the fan 41, for cooling the entrant air when the equipment is not "conditioning" material. Attention is also drawn to the fact that the heater coil bank 35, hereinbefore referred to, functions to establish and maintain uniformity of temperature in the humidified air flowing through the machine 5; and to this end it is coordinated with a suitable drip well 59 to separate the entrained water in the compressed air so that it does not get into the instrument 29.

From the foregoing it is thought my invention will be well understood, but it is deemed advisable to briefly refer to one or two of the objectionable features of prevailing practice which it is designed to overcome. When cloth, for example, is delivered from conventional drying apparatus, it is usually hot and over-dried; and being folded or "bolted" it absorbs moisture more rapidly at the edges, but extremely slow towards the center, with resultant irregularity of shade incident to uneven oxidation. Again, materials such as woolen goods, cotton materials, yarns, silk and rayon are usually merchandized on a "regain" basis, and hence it is most essential the same should possess a predetermined uniform amount of regain moisture. Such desiderata is absolutely ensured by my improved equipment incident to circulating and distributing a relatively large volume of properly cooled, highly saturated or humidified air uniformly over and throughout the material M as it progresses through the enclosure 5; said air being under positive control both as regards humidity and temperature by the instrumentality 29, aforesaid. Furthermore, it will be likewise apparent that once the control instrumentality 29 is adjusted and "set" to meet a predetermined condition desired, uniform results are assured, both as to cooling and conditioning of the material M at all times, irrespective of atmospheric conditions prevailing outside of the enclosure 5. In short, by introducing the cool highly humidified air at the delivery or exit end of the enclosure 5, and flowing same sinuously up and down over the material M in a reverse direction to that which such material is progressed, said air cools the material rapidly, while the dry fibres thereof quickly absorb the moisture, with consequent delivery of a uniformly conditioned product from the exit orifice 12.

Finally it is to be expressly understood that the equipment illustrated, and described somewhat in detail, is purely examplary, except insofar as restricted by the following claims.

Having thus described my invention, I claim:—

1. In a material cooling and conditioning equipment, the combination of an enclosure subdivided to define a tortuous course for the material treated, means inducing a flow of humidified atmospheric air through said en-

closure in a direction alternatingly counter to and following that traveled by the material, heater means in the leading sections of the tortuous course with cooling means at the entrance for atmospheric air, and means automatically controlling the humidity and temperature conditions in the enclosure at a predetermined state irrespective of exterior atmospheric variations.

2. In a material cooling and conditioning equipment, the combination of an enclosure subdivided to define a sinuous course, means for continuously progressing material over said course in paralleling flights, means inducing a flow of atmospheric air through the enclosure over the course aforesaid in a direction alternatingly counter to and following that traveled by the material, means including an air compressor for injecting atomized moisture on the pressure side into the inflowing air, and means automatically controlling the humidity and temperature of the flow through the enclosure at a predetermined condition irrespective of exterior atmospheric changes.

3. In a material cooling and conditioning equipment, the combination of an enclosure subdivided to define a sinuous course, means for continuously progressing material over said course in paralleling flights, means inducing and directing a flow of atmospheric air through the enclosure over the course aforesaid in a direction alternatingly counter to and following that traveled by the material, means including an air compressor for injecting atomized moisture on the pressure side into the inflowing air, means automatically controlling the humidity and temperature of the flowing air at a predetermined condition irrespective of exterior atmospheric changes, and means whereby the inflowing air may be maintained at a definite cool degree when the equipment is not being used for conditioning purposes.

4. In a material cooling and conditioning equipment, the combination of an enclosure subdivided by relatively staggered partitions to define a vertically-directed undulatory passage with entry and exit apertures for the material being treated proximate the upper region thereof, means for progressing the material through the undulatory passage in vertically paralleling flights, means inducing and directing atmospheric air into the enclosure at a low level for continuous flow through the passage aforesaid in a direction alternatingly counter to and following that traveled by the material and exhaust therefrom above the material entering level, means including an air compressor for injecting atomized moisture on the pressure side into the entering air, and means automatically controlling a predetermined degree of humidity and temperature throughout the enclosure irrespective of exterior atmospheric conditions.

5. In a material cooling and conditioning equipment, the combination of an enclosure subdivided by relatively staggered partitions to define an undulatory passage with entry and exit apertures for the material being treated proximate the upper region thereof, means comprising driven and idler rolls progressing material through the undulatory passage in paralleling flights, fan means located at a low level of the enclosure for inducing and directing a flow of atmospheric air continuously through the passage aforesaid in a counter-direction to that traveled by the material for exhaust above the material entering level, means including an air compressor for injecting atomized moisture into the entering air on the pressure side of the fan, and means automatically controlling a predetermined degree of humidity and temperature throughout the enclosure irrespective of exterior atmospheric conditions.

6. In a material cooling and conditioning equipment, the combination of an enclosure subdivided by relatively staggered partitions to define an undulatory passage with entry and exit apertures for the material being treated proximate the upper region thereof, means comprising driven and idler rolls progressing material through the undulatory passage in paralleling flights, fan means located at a low level of the enclosure for inducing and directing a flow of atmospheric air continuously through the passage aforesaid in a counter-direction to that traveled by the material for exhaust above the material entering level, water supplying siphonic nozzles with an associated air compressor for injecting atomized moisture into the entering air in advance of the fan, and means automatically controlling a predetermined degree of humidity and temperature throughout the enclosure irrespective of exterior atmospheric conditions.

7. In a material cooling and condition equipment, the combination of an enclosure subdivided by relatively staggered partitions to define an undulatory passage with entry and exit apertures for the material being treated proximate the upper region thereof, means comprising driven and idler rolls progressing material through the undulatory passage in paralleling flights, fan means located at a low level of the enclosure for inducing and directing a flow of atmospheric air continuously through the passage aforesaid in a counter-direction to that traveled by the material for exhaust above the material entering level, water supplying siphonic nozzles with an associated air compressor for injecting atomized moisture into the entering air in advance of the fan, a heater coil bank in the upper region of the enclosure over the leading sections of the undulatory passage,

and coordinate instrumentalities automatically controlling a predetermined degree of humidity and temperature in the enclosure irrespective of variations in the exterior surrounding atmospheric conditions.

8. In a material cooling and conditioning equipment, the combination of an enclosure subdivided by relatively staggered partitions to define an undulatory passage with entry and exit apertures for the material being treated proximate the upper region thereof, means comprising driven and idler rolls progressing material through the undulatory passage in paralleling flights, fan means located at a low level of the enclosure for inducing and directing a flow of atmospheric air continuously through the passage aforesaid in a counter-direction to that traveled by the material for exhaust above the material entering level, water supplying siphonic nozzles with an associated air compressor for injecting atomized moisture into the entering air in advance of the fan, a heater coil bank in the upper region of the enclosure over the leading sections of the undulatory passage, co-ordinate instrumentalities automatically maintaining a predetermined degree of humidity and temperature in the enclosure irrespective of exterior conditions, and a coil at the pressure side of the fan for cooling and maintaining the air flowing through said enclosure at a definite degree when the equipment is not jointly conditioning material.

9. The method of cooling and conditioning material which comprises progressing the material in sectionally-divided paralleling flights through an alternatingly counterflowing and following continuous current of uniformly-distributed highly-humidified air, maintaining said current of air under positive control as regards the degree of humidity and temperature, and retaining such current of air uninfluenced by exteriorly-surrounding atmospheric conditions.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 18th day of January, 1929.

THOMAS ALLSOP.