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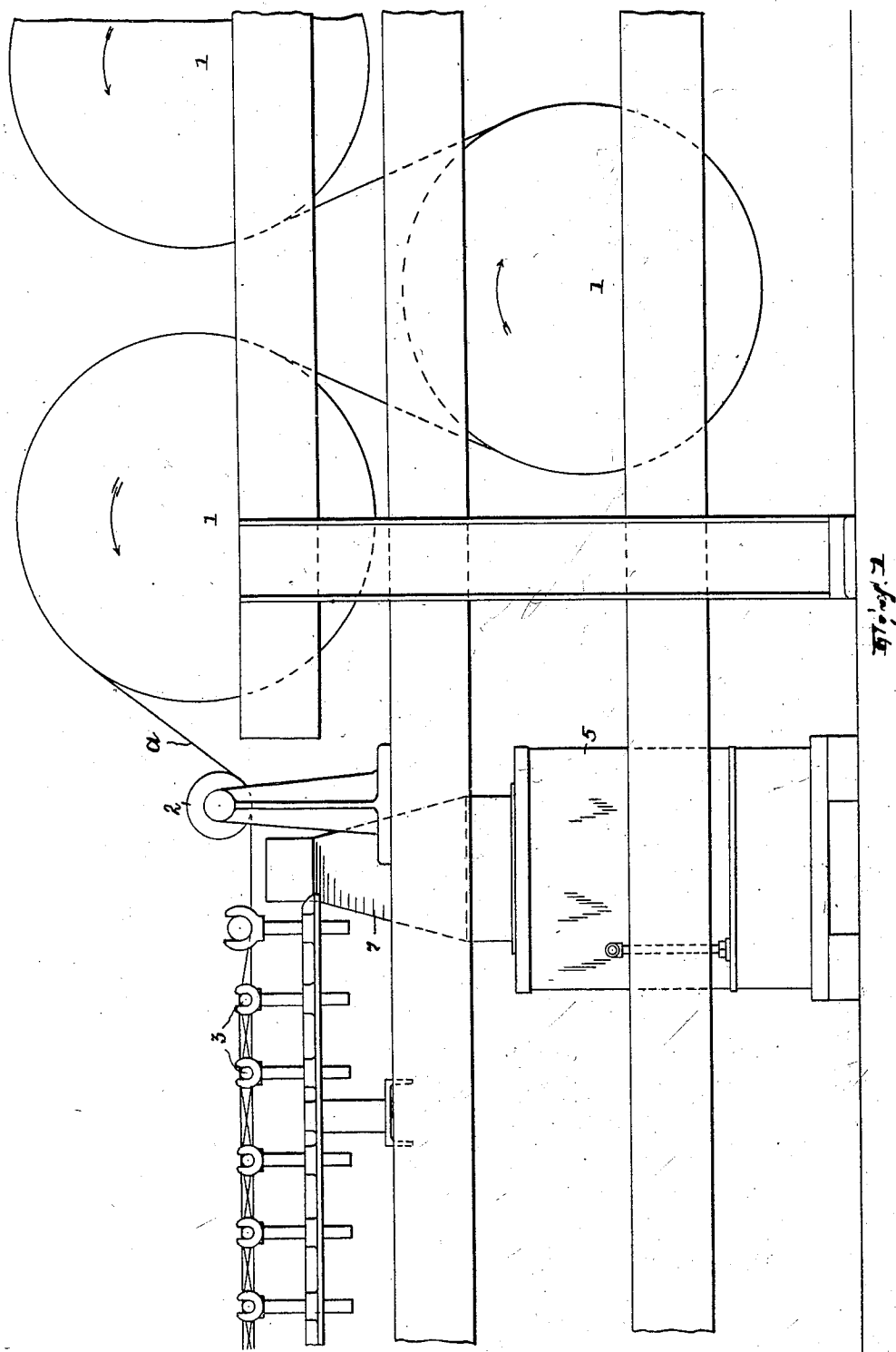
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2,114,449

TREATING WARPS AND OTHER TEXTILE SHEETS

Filed Oct. 30, 1935

3 Sheets-Sheet 1



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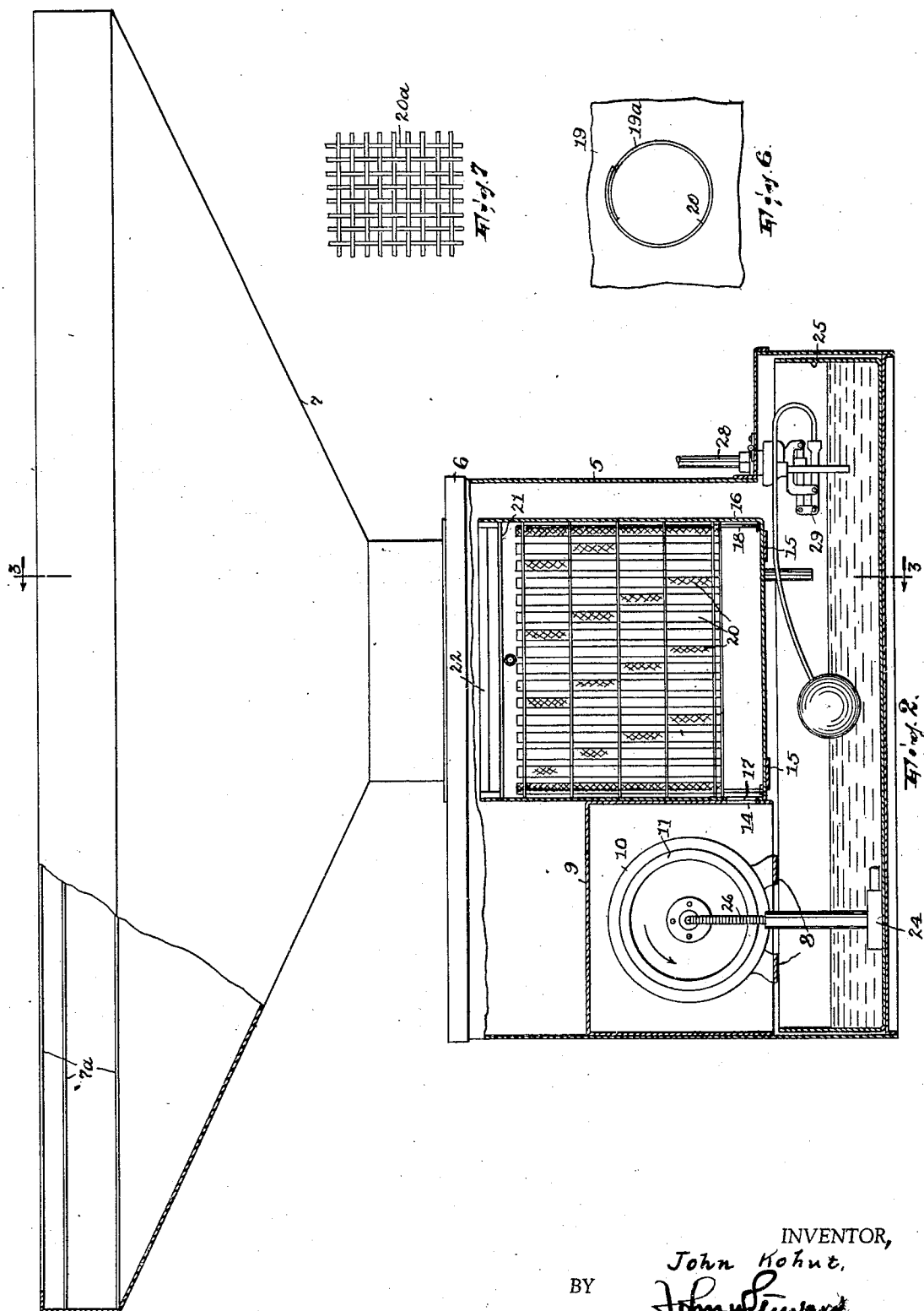
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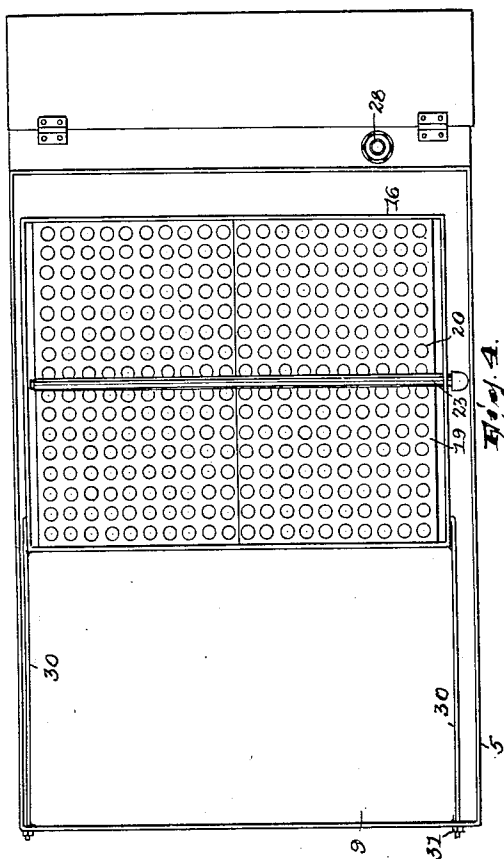
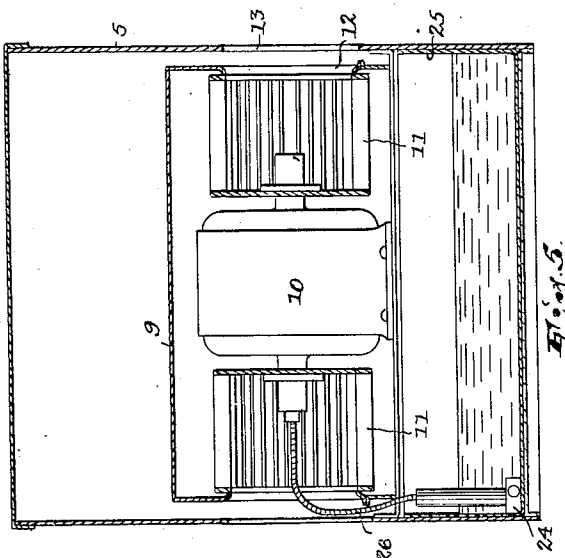
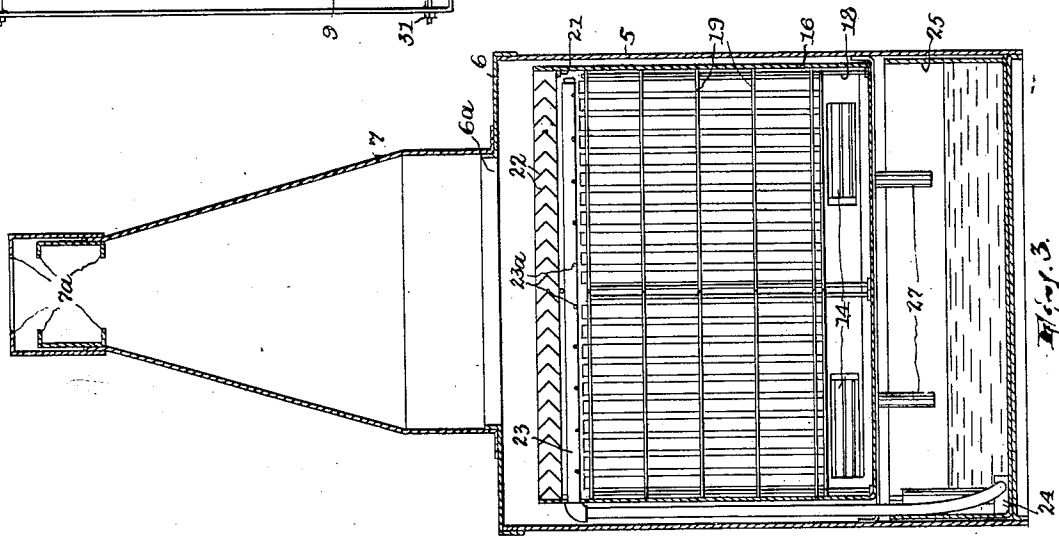
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TREATING WARPS AND OTHER TEXTILE SHEETS

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1 Claim. (Cl. 28—28)

Before a warp is installed in the loom it is usual to "size" it so as to lay the fibers of its threads and retain them in compact state in passing through the reed and harness of the loom. The warp is run from a supply thereof to and wound on a beam and in transit first has the (liquid) size applied thereto and then is subjected to some medium to dry the size on the threads, as a series of rotating heated drums.

In treating rayon or other synthetic yarns in this way great care and a high grade of skill have to be exercised to insure against, on the one hand, the sized warp undergoing winding before the size has properly dried, which would mean the adhesion together of its component threads and consequent trouble in the weaving operation, and, on the other hand, the drying to such an extent that the sized threads would lack that softness and suppleness which is very desirable in the weaving operation and which characterizes the actual threads in their natural state or before being sized. In short, the rate of speed of travel of the yarn and the degree of temperature have to be regulated with reference to each other and also with reference to the size and quality of the threads, the number of threads in the particular warp and other conditions.

According to this invention the warp is run from the supply thereof to and formed into a wound mass and in transit first has the size applied thereto and then passes the drying medium, all as usual. But at a point between the drying medium and wound mass it is subjected to a blast of fluid comprising a gas and a liquid existing in the gas in a state of molecular suspension and it is also cooled. The result is that the moisture of which the actual threads are deprived by the drying medium is re-supplied thereto and the sized threads have the softness and suppleness which characterized the threads before the sizing treatment; further, in view of the cooling, the size is not only set when it reaches the wound mass but there is no storing up of heat in such mass such as inevitably occurs as warp sizing is usually accomplished, it being noted that such storing of heat in the wound mass is recognized as a very material factor in drying out the actual threads in the treatment as usually practiced and so causing the sized product to lack the required softness and suppleness.

My invention makes it possible not only to produce a sized warp which has the requisite softness and suppleness but to carry on the treatment at a very considerably faster rate than here-

tofore, thus correspondingly increasing production.

Referring to the accompanying drawings, which show an apparatus by which my invention may be accomplished,

Fig. 1 is a side elevation of so much of a warp sizing machine embodying the invention as is herein pertinent;

Fig. 2 is an elevation viewed from the left in Fig. 1 with the sub-structure largely in section in a vertical plane just inward of the left-hand walls of shell 5 and chamber 9 in that figure;

Fig. 3 is a section on line 3—3, Fig. 2;

Fig. 4 is a plan with the nozzle superstructure, cover 6 and grid 21; removed;

Fig. 5 is a vertical section in the plane of the motor axis, with the motor in elevation;

Fig. 6 is a plan, partly diagrammatic, of a detail of one of the humidifying structures; and

Fig. 7 is a magnified view of a fragment of one of the foraminous tubes of such structures.

The warp *a*, after passing the size-applying means (not shown), extends around the drums 1, rotated according to the arrows, under a guide 2, past lease-rods 3 and so to the suitably rotated beam 4 on which it is wound, so much being in accordance with the usual construction well known to those skilled in the art.

A sheet metal rectangular housing 5 rests on the floor and has a cover 6 provided with an outlet 6a and supporting the lower end portion of a nozzle-like structure 7 whose upper end portion is in plan long and narrow and discharges upwardly, its longer dimension being extended across the warp and preferably so as to reach beyond both margins thereof. Its upper end or mouth is under and horizontal (and hence parallel with) and close to the warp, and for a purpose to appear it has baffles 7a at its mouth and in spaced planes below the same and projecting inwardly from its two long sides, so as to restrict somewhat the passage through the nozzle.

Supported by braces 8 connecting those sides of the housing which extend transversely of the warp and contained in the housing is a rectangular shell 9. This shell contains a motor 10 whose armature shaft is equipped with two blowers 11, one each side of the motor. Axially of the motor and blowers the shell is provided at both sides with intake apertures 12 open to the atmosphere through corresponding apertures 13 in the housing. In the relatively interior one of its other two sides and near the bottom thereof said shell has discharge apertures 14.

Within the housing and supported by braces 15 is a rectangular chamber 16 which adjoins the shell and has apertures 17 communicating with apertures 14. Within and approximately filling this chamber is the humidifying unit, here formed in two sections of identical form, thus: Each unit comprises several vertical rods 18 arranged in rectangular relation, as at the corners of the sections, and a series of horizontal equally spaced walls 19 which are penetrated by and may be soldered to the rods. The rods extend somewhat below the lowest wall and so afford feet which rest on the bottom of the chamber. The several walls are all formed with relatively small holes 19a (Fig. 6), such being the same in number and similarly positioned in all the walls, or so that a hole in any one wall is vertically aligned with corresponding holes in the other walls. Each of the aligned holes in the several walls receives a foraminous tube 20. To form each tube I take a rectangular strip of fine-mesh wire netting 20a (much finer than is shown in Fig. 7) and roll it so that its long edges lap each other as shown in Fig. 6 and then enter it into the aligned holes, its consequent effort to expand securing it in position. At the bottom ends the tubes may be flush with the lowest wall, but at the top they upstand therefrom somewhat. The construction is such that the unit, or in this example each section thereof, may be removed intact by lifting it from the chamber.

The top of the chamber 16 is provided at opposite sides with interior ledges 21 and on these rests a grid including spaced louvers or vanes 22 which are V-shaped in cross-section and parallel, their convex sides all facing in the same direction.

The topmost wall 19 affords a distributing surface for the liquid (as water) with which the fluid (as air) impelled by the blowers is to be saturated. Arranged over this surface and in a plane cutting it centrally is arranged the horizontal discharge end portion of a pipe 23 which extends upwardly between the housing 5 and said chamber from a pump 24 arranged on the bottom of the housing, to wit, in a tank 25 for the liquid, such tank being arranged in the space of the housing below the braces 8 and 15. The rotor of this pump is driven by a flexible shaft 26 connected with the shaft of the motor and blowers so as to rotate therewith. By apertures 23a the pipe 23 is adapted to spray liquid over the surface of the topmost wall 19. The lowermost wall 19 may have drain-pipes 27 which discharge into the tank.

The liquid may be supplied to the tank through a pipe 28 subject to the control of a float valve 29.

To secure the shell 9 and chamber 16 against displacement on their supporting braces there may be two rods 30 which flank the shell on both sides and are attached each at one end to the chamber and at their other ends extend through the wall of the housing between which and the chamber the shell is arranged and are threaded and receive clamping nuts 31.

Operation.—When the system including the motor, blowers and pump is driven there is a flow of atmospheric air through shell 9 into chamber 16, up through the foraminous tubes 20 and thence through the nozzle to the warp (the baffles or louvers 22 dispersing the air at the outlet 6a and

the baffles 7a causing it to be distributed over the whole width of warp) and simultaneously there is a flow of water up through pipe 23 from the tank and onto the top wall 19, such water then tending to fall through the holes 19a in the several walls 19 until it returns to the tank. Due to the tubes 20 projecting somewhat above the topmost wall 19 and to the blasts of air upwardly passing therethrough the water tends to collect on the top wall, being distributed over substantially its entire surface. The water falling through the holes 19a works down each tube as a film and may incidentally collect somewhat on each of the several walls. The air passing up through the chamber 16 is not of course confined to the spaces of the tubes, but by some expansion and contraction penetrates the foraminous wall of each tube. In any event, as an incident of the film-condition of the water existing on the tubes taken with the rapid motion of the air and its effort to pass through the fine interstices of the tubes and hence through the water-film thereon the water becomes divided into molecular state and in that state charges the air. There is thus delivered a fluid which is quite humid or comprising a gas (air) having a liquid (water) existing only in molecular suspension. Further, the fluid thus delivered is quite cold as distinct from being merely cooler than the air in its original state, this being an incident of the appreciable evaporation which of course takes place with respect to the liquid in its stated minutely divided form.

The fluid delivered by the nozzle of course conveys its moisture to and deposits it on the warp and by absorption of such moisture the threads of the warp, otherwise left more or less deprived of moisture by the heat of the drums, retain that soft and supple state which characterized the threads before undergoing the sizing treatment, the absorption being enhanced because of the still heated condition of the sized warp. Since this fluid is cold the warp becomes wound into the wound mass not only without possibility of the size acting to cement the threads together but without conveying to such mass heat which, accumulating in the mass, would act therein to dry out the threads.

In addition to the method involved in the treatment of a warp according to this invention I claim also certain novel features of the apparatus shown in detail in Figs. 2 to 5.

Of course my invention may be applied to other fibrous textile sheets than sheets of warp.

It is not material whether the blast delivered by the nozzle is induced by a blower or as an incident of suction.

Having thus fully described my invention what I claim is:

The combination, with means to support a fibrous sheet while being advanced in an approximately horizontal plane, means to apply size to the sheet and means to heat the sized portion of the sheet, gas impelling means, means to humidify the gas, and means to deliver the humidified gas to the sized sheet posterior to the point of heating the same including a nozzle having a mouth elongated across the sheet and a baffle within the mouth also extending across the sheet.

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