

Dec. 30, 1941.

F. L. BOCK

2,267,713

COOLING DEVICE

Filed Feb. 21, 1940

2 Sheets-Sheet 1

FIG. 1.

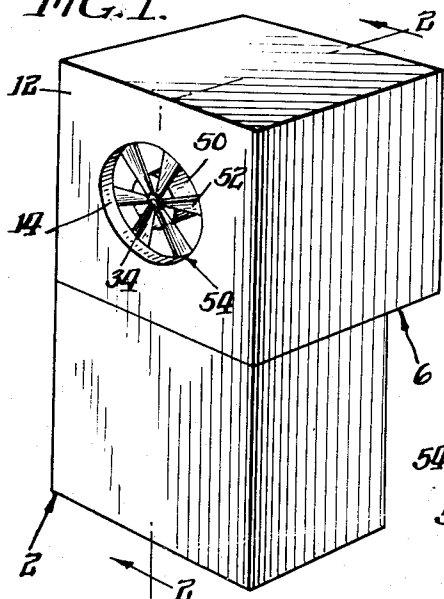


FIG. 2.

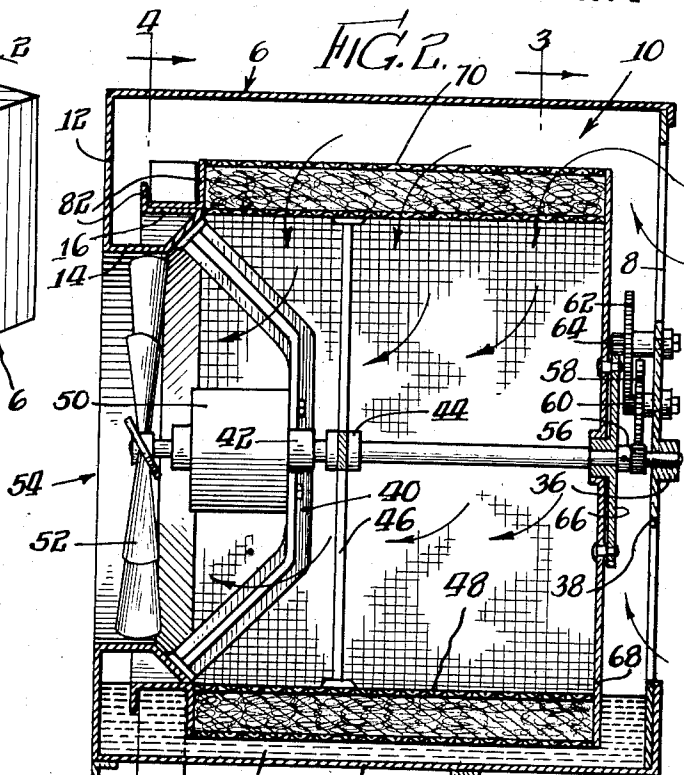
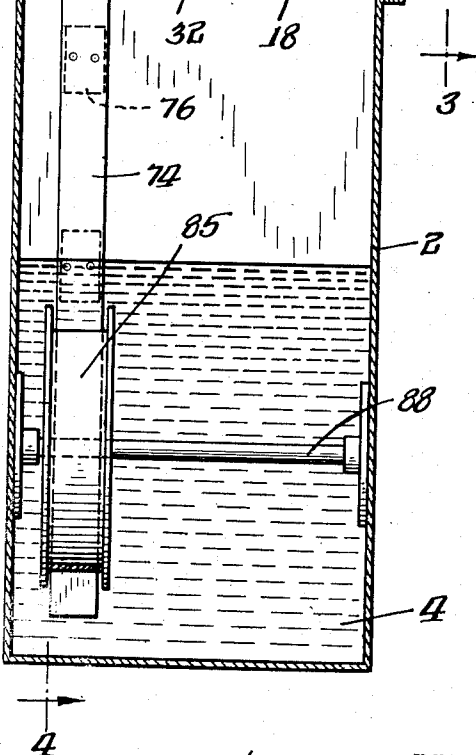
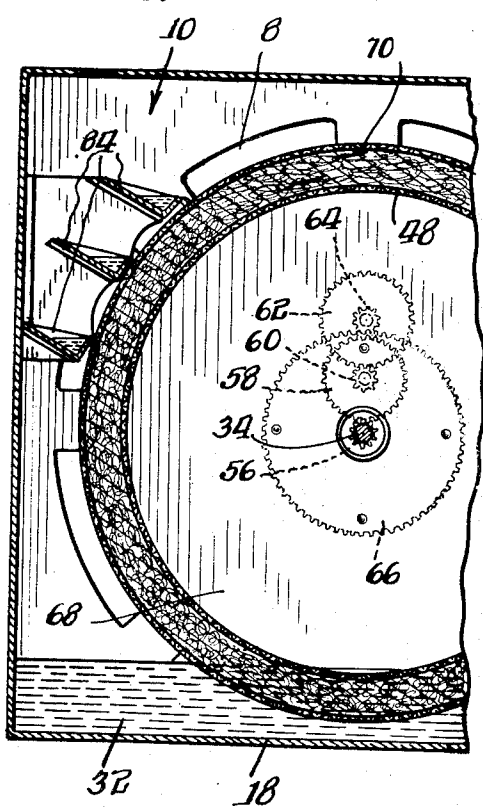


FIG. 3.



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FIG. 4.

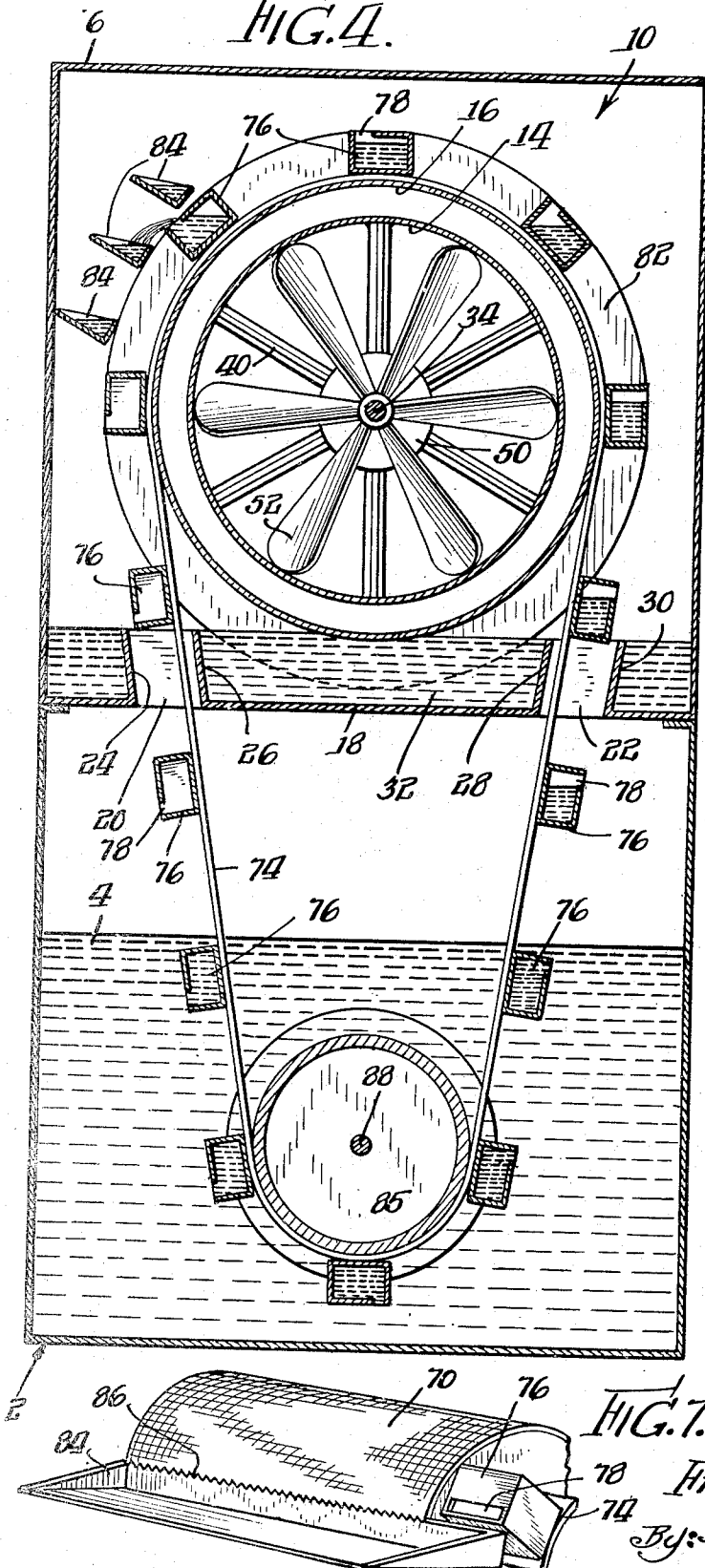


FIG. 5.

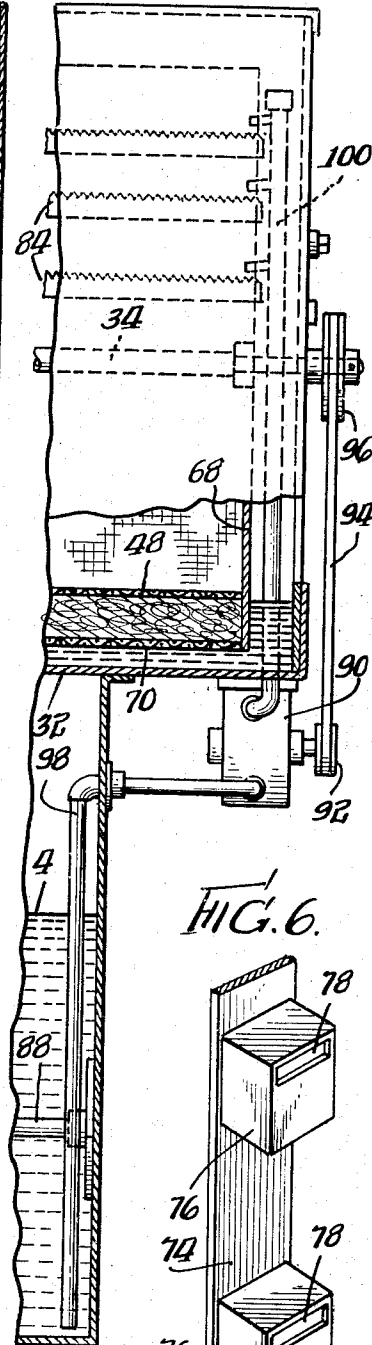


FIG. 6.

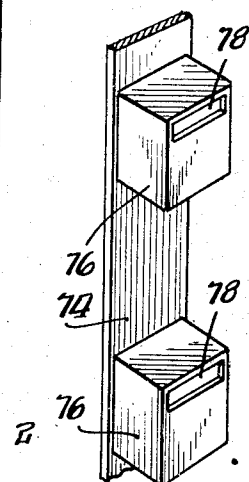
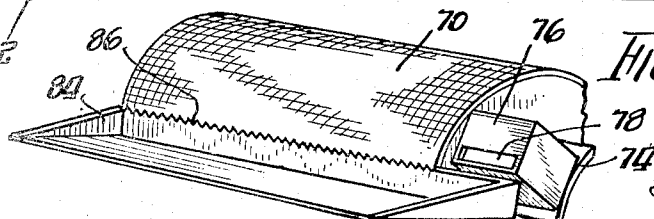


FIG. 7.



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## UNITED STATES PATENT OFFICE

2,267,713

## COOLING DEVICE

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Application February 21, 1940, Serial No. 320,081

5 Claims. (Cl. 261-29)

This invention relates to cooling devices for rooms, factories and other enclosed spaces.

Among the objects of the present invention are to provide a cheap, simple, efficient and compact device for not only cooling but also cleansing the air in an enclosed space.

Another object of the invention resides in providing a simple humidifying and air cooling machine which utilizes the evaporation of water as a cooling medium and wherein the machine is provided with a rotating drum or cylinder of fibrous material adapted to be wet by the water, and wherein means is provided to afford a thorough and uniform wetting or soaking of the fibrous mat through which the air to be cooled and treated passes with a minimum of resistance, and wherein the water to be evaporated is stored within or supplied to the machine and is utilized without drainage or wastage, and wherein, in one specific embodiment, the water is circulated from a storage tank to the rotating mat and wetting pan by means of buckets operating on a revolving belt, and wherein these buckets are adapted to wet the rotating mat at the driest portion of the cycle of movement of the mat, and wherein the water is dumped into serrated-edged troughs from the revolving buckets, which water overflows the serrated edges of the troughs onto the mat to wet the same.

A further object of the invention resides in providing a device wherein a single force or power operates the fan, the rotating mat and the water level controlling apparatus, specifically, the revolving buckets.

These and other objects of the invention will be apparent from a perusal of the following specification when taken in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of a simple type of apparatus involving the invention;

Figure 2 is a vertical sectional view taken on the line 2-2 of Figure 1;

Figure 3 is a vertical sectional view taken on the line 3-3 of Figure 2;

Figure 4 is a vertical sectional view taken on the line 4-4 of Figure 2;

Figure 5 is a modified form showing an ordinary type of pump used instead of the rotating buckets;

Figure 6 is a detail perspective view of the conveyor; and

Figure 7 is a fragmentary perspective view of a serrated trough and a rotating drum.

Referring now to the drawings in detail, the invention comprises a main casing 2 adapted to

hold a quantity of water 4. On the main or lower casing 2 there is superimposed an upper casing 6, which is open at opposite ends. End 8 is an inlet end through which air passes from the enclosed space in which the cooler is situated into interior 10 of the upper enclosure 6. At its opposite side a wall 12 of the enclosure is bent downwardly and then inwardly as at 14 to provide a central opening in which is disposed a fan hereinafter referred to. Edge 16 of the metal forming the front wall 12 of the upper housing is bent inwardly as indicated in Figure 2. Bottom wall 18 of the upper housing is formed with two openings 20 and 22 by means of upturned or flanged portions 24, 26, 28 and 30, providing openings through which a conveyor, hereinafter referred to, passes, and also providing water retaining pans 32 in which a relatively large drum, hereinafter referred to, is adapted to revolve.

A shaft 34 is mounted centrally of the upper housing 6 and has a bearing 36 in central opening 38 of the rear wall 8. The front end of the shaft 34 has a bearing in a spider 40 the outer ends of which are bent forwardly and engage the inturned wall portions 14. A front bearing 42 of the shaft 34 is mounted in the spider. The shaft has a collar 44 affixed thereto, which collar carries a drum spider 46 which is fastened to an inner screen 48 of the rotatable drum.

A motor 50 is mounted on the front end of the shaft 34 for driving a fan 52, which on rotation serves to draw air through the rear opening 8 of the housing, thence through the rotating screen of the drum and thence out front opening 54 of the housing. The rear end of the shaft 34 is provided with a small pinion 56, which in turn drives another pinion 58, which latter member drives pinion 60 driving larger pinion 62, which in turn drives a smaller pinion 64, and the latter drives a large gear 66 fastened to rear wall 68 of the drum, whereby the drum is revolved at a relatively slow speed by the motor 50, which drives the fan 52 at a relatively high speed.

The outer wall of the drum is formed as a screen 70, which in conjunction with the screen 48 of the drum forms a circular space therebetween within which is confined a mat of fibrous material, which may be wood shavings or excelsior. It is thus seen that the excelsior or other fibrous material is confined between two circular screen walls through which the air may be drawn by the fan 52, the air passing through the wet mat of fibrous material.

Adjacent the front of the cylindrical drum there is a looped conveyor 74 which carries at spaced intervals thereon a series of buckets 76, each bucket having a slot 78 adjacent its front bottom wall arranged so that as each bucket passes downwardly and into the water 4 in the casing 2 the bucket will thence travel upwardly, being full of water, and will carry the quantity of water in the bottom of the bucket upwardly over the periphery of the cylindrical drum. The conveyor 74 is made of a flat band of any desired material which is adapted to run in a pulley 82 forming an integral part of the front end of the cylindrical drum.

Referring now to Figures 3 and 4, there are disposed within the space 10 of the upper casing a plurality of relatively stationary hoppers 84, which are inclined as shown and arranged so as to receive water from the buckets carried by the conveyor 74, whereby as each bucket comes over the top of the cylindrical drum and starts to descend it will dump through the slot 78 the water in the bucket into the hoppers 84. The front edge of each hopper is serrated, as shown at 86 in Figure 7, and this serrated edge extends entirely across the outer wall 70 of the periphery of the cylindrical drum, the three hoppers being arranged so that the water, when dumped therein, will slowly be distributed across the face of the rotating drum, whereby to saturate the mat of fibrous material confined between the two screen surfaces 48 and 70, and particularly at the point which is the driest part of the cycle of movement of the drum. Water which overflows either the drum or the buckets will drop down into the pan 32 and will be retained therein. In this way the fibrous material between the two cylindrical surfaces 48 and 70 will rotate in the body of water in the pan 32, which will constitute the primary wetting source for the fibrous material, and so also will the serrated buckets or hoppers 84 constitute a central wetting medium for thoroughly and equally distributing the water across the entire surface of the drum. In addition, it will be noted that the buckets 76 will constitute means for maintaining the water level in the upper receiving pan 32. The speed of travel of the drum is adjusted so as to keep pace with the rate of evaporation of the water, whereby constantly to replenish the water, thereby maintaining the water level in the upper pan constant. The lower reach of the conveyor 74 passes around a flanged pulley 85 on a shaft 88 having bearings in the lower portion of casing 2.

If desired, the conveyor 74 and buckets 76 may be disposed of and in lieu thereof the construction shown in Figure 5 may be utilized wherein a simple type of pump 90 may be used, this pump being driven by means of a pulley 92 and belt 94 from a wheel 96 driven off the shaft 34 for pumping water from inlet pipe 98 upwardly through the pump and thence upwardly to the hoppers 84, the outer end of the outlet pipe 100 just overlying the hoppers 84 so as to keep them filled, whereby the overflow will take place across the serrated front edges of these hoppers and onto the rotating screen.

If desired, the lower pulley for the belt may be weighted to the shaft and the bearings for the shaft 88 may be mounted in take-up slides, whereby to produce a tension on the belt 74 and thereby increase the traction on the driving pulley 82. In this manner the power motor 50 not only drives the fan but likewise slowly

revolves the cylindrical drum, which, in turn, through the integral driving pulley 82, drives the belt 74 for moving the buckets 76, this arrangement being shown in Figures 2 and 4.

Changes may be made in the form, construction and arrangement of the various parts without departing from the spirit or scope of the invention or sacrificing any of its attendant advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A room cooling and humidifying mechanism comprising a pair of superimposed casings, the lower casing forming a tank for holding a quantity of water, the upper casing forming on its bottom a relatively shallow pan, the said bottom of the upper casing having a pair of openings therein, a shaft in the upper casing and a shaft in the lower casing, a cylindrical drum on the shaft in the upper casing, said drum having a pulley formed integrally therewith, the periphery of said drum comprising spaced apart foraminated wall portions enclosing a loose mat of fibrous material, a fan disposed on one end of the shaft on which said drum is mounted, means for rotating said shaft to drive said fan, means connecting a speed reducing gearing connecting said shaft and drum for driving said drum at a relatively low speed, the peripheral wall of said drum passing through the body of water in the upper casing, an endless conveyor passing over the pulley on the upper drum and around the pulley on the shaft in the lower drum, a plurality of spaced apart buckets mounted along said endless belt, each of said buckets having an opening therein through which said buckets may be filled as they pass through the body of water in said lower tank and through which the buckets may discharge the water as they pass over the pulley on the drum in the upper casing, and a hopper disposed adjacent the path of travel of the buckets on the upper pulley, said hopper being adapted to receive the water from each bucket as it passes about said upper pulley, said hopper having a front edge extending across the peripheral surface of the drum, whereby to distribute the water and pour it onto the drum during rotation of the drum.

2. In a device of the class described, the combination of a pair of superimposed casings, the lower casing forming a tank for a pool of water, a shaft in said tank, a pulley on said shaft, the upper casing having its bottom formed as a shallow pan adapted to hold a quantity of water, said pan having a pair of openings therein, a shaft in the upper casing, a cylindrical drum on said shaft, the peripheral surfaces of the drum being foraminated and carrying a loose mass of fibrous material adapted to rotate in the shallow pool of water in the upper casing and to be saturated thereby, a fan on the upper shaft, a motor on said shaft for operating said shaft, a speed reducing gearing mechanism connecting said fan with said drum, whereby slowly to revolve the drum, a pulley mounted on said drum in line with the first mentioned pulley, a belt passing over said pulley, said belt carrying a plurality of spaced buckets, each of said buckets having an opening and each bucket being constructed and arranged to receive a quantity of liquid through the opening as the buckets pass through the water in the lower tank and whereby to convey said water upwardly and over the upper pulley, and a trough-like member disposed adjacent the

path of travel of each of said buckets and adapted to have the water from each bucket dumped thereinto, said trough-like member extending across the path of travel of the periphery of the drum, whereby to distribute the water uniformly along the entire width of said drum onto said fibrous material.

3. In a device of the class described, the combination of a pair of superimposed casings, the lower casing forming a tank for a pool of water, a shaft in said tank, a pulley on said shaft, the upper casing having its bottom formed as a shallow pan adapted to hold a quantity of water, said pan having a pair of openings therein, a shaft in the upper casing, a cylindrical drum on said shaft, the peripheral surfaces of the drum being foraminated and carrying a loose mass of fibrous material adapted to rotate in the shallow pool of water in the upper casing and to be saturated thereby, a fan on the upper shaft, a motor on said shaft for operating said shaft, a speed reducing gearing mechanism connecting said fan with said drum, whereby slowly to revolve the drum, a pulley mounted on said drum in line with the first mentioned pulley, a belt passing over said pulley, said belt carrying a plurality of spaced buckets, each of said buckets having an opening and each bucket being constructed and arranged to receive a quantity of liquid through the opening as the buckets pass through the water in the lower tank and whereby to convey said water upwardly and over the upper pulley, and a trough-like member disposed adjacent the path of travel of each of said buckets and adapted to have the water from each bucket dumped thereinto, said trough-like member extending across the path of travel of the periphery of the drum, whereby to distribute the water uniformly along the entire width of said drum onto said fibrous material, the forward edge of said hopper being serrated.

4. In a device of the class described, the combination of a lower casing and an upper casing, the lower casing forming a tank for a pool of water, the upper casing having a cylindrical drum rotatably mounted therein, the bottom of said upper casing forming a relatively shallow container for a pool of water, the periphery of said drum being open and carrying thereon a

blanket of loosely matted fibrous material adapted to be submerged in the water in said upper casing upon rotation of the drum, said casing having an opening in one end and another opening in the opposite end, a fan disposed in said second mentioned opening for drawing air through the opposite opening and thence through the periphery of the drum out of the other casing, power means for driving said fan and for driving said drum at a relatively slower speed, and driving means actuated by the rotation of said drum for driving a pump, said pump having an inlet extending downwardly into said lower tank and submerged in the water of the lower tank and having a discharge conduit extending upwardly and adapted to discharge onto the upper peripheral portion of the drum as the drum rotates, whereby to keep the fibrous mat of said drum saturated with water.

5. In a device of the class described, the combination of a pair of superimposed casings, the lower casing forming a tank for a pool of water, a shaft in said tank, a pulley on said shaft, the upper casing having its bottom formed as a shallow pan adapted to hold a quantity of water, said pan having a pair of openings therein, a shaft in the upper casing, a cylindrical drum on said shaft, the peripheral surfaces of the drum being foraminated and carrying a loose mass of fibrous material adapted to rotate in the shallow pool of water in the upper casing and to be saturated thereby, a fan on the upper shaft, a motor on said shaft for operating said shaft, a speed reducing gearing mechanism connecting said fan with said drum, whereby slowly to revolve the drum, pumping means connected in driving relationship with said shafts, said pumping means being adapted to receive water from said lower casing and to raise it to a relatively elevated point in said upper casing, and a trough-like member disposed in said upper casing and adapted to have water from said pump delivered there-to, said trough-like member extending across the path of travel of the periphery of the drum whereby to distribute water uniformly along the entire width of said drum onto said fibrous material.

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