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HUMIDIFICATION CHAMBER

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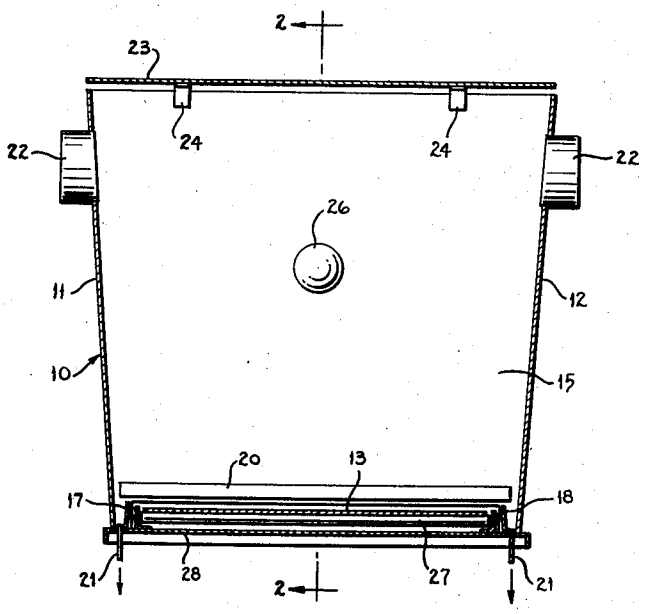


FIG. 1

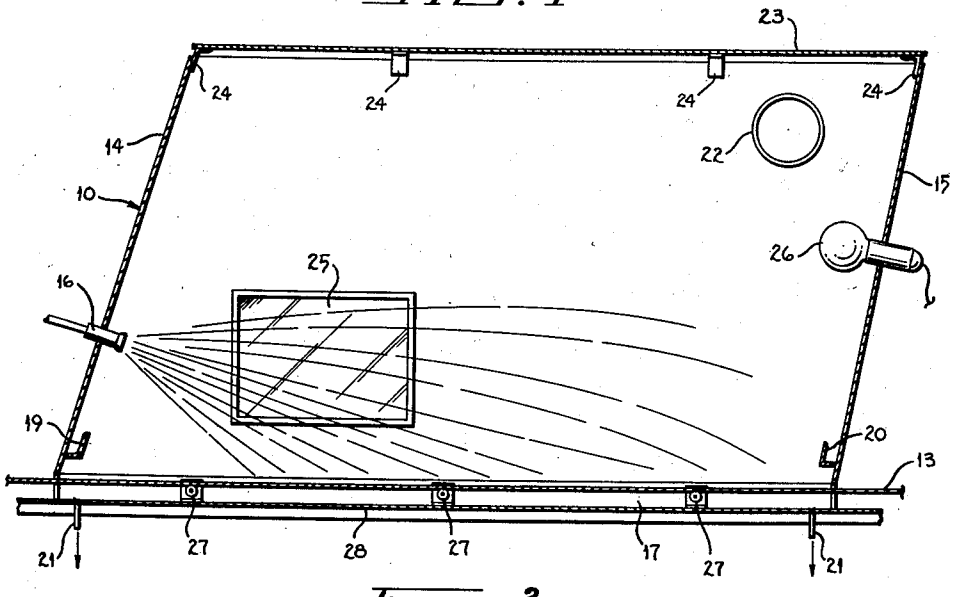


FIG. 2

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HUMIDIFICATION CHAMBER

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This invention relates to a humidification chamber used in conjunction with a conveyer belt.

There are several instances in which a layer of material disposed on an endless conveyer belt is treated with a liquid spray or mist. An illustration of such an operation is found in U. S. Patent 2,747,583, granted May 29, 1956, to W. G. Frankenburg and A. M. Gottscho, showing the production of a tobacco sheet by spreading a thin layer of an aqueous paste containing pulverized tobacco and a binding agent on the surface of an endless conveyer belt and by passing the layer of tobacco paste on the conveyer belt through drying chambers wherein the water is evaporated and the paste is converted into a continuous tobacco sheet. As shown in the Frankenburg and Gottscho patent, the tobacco sheet thus formed is then moistened or humidified by a fine water mist deposited on the tobacco sheet by a spray or fogging nozzle. In this illustrative instance as well as in other instances wherein a material deposited on a conveyer belt is to be sprayed, it is important that the spraying be carried out uniformly and without large liquid drops falling on any portion of the material that is being sprayed.

Where the moistening operation is carried out, as shown in the Frankenburg and Gottscho patent, without enclosing the area in which the fine mist is applied to the material on the conveyer belt, a large portion of the water mist is blown by air drafts away from the material to be moistened with the result that the material is not uniformly treated and the room in which the operation is conducted, in any event, becomes unduly humid to the discomfort of the operating personnel and to the detriment of the equipment because corrosion is promoted by a humid atmosphere. Chambers to confine the fine water mist to the desired work area on the conveyer belt have been proposed but none found satisfactory from the points of view of simplicity, cost and performance.

Accordingly, a principal object of this invention is to provide a humidification or spray chamber for use with a conveyer belt which is of very simple construction and low cost and which in operation is trouble-free.

Other objects and advantages of this invention will be apparent from the description which follows and which will be facilitated by reference to the accompanying drawing of which:

Figure 1 is a sectional elevation of an illustrative humidification chamber, the section being taken transversely with respect to the length of the conveyer belt over which the chamber is disposed; and

Figure 2 is a sectional elevation of the same illustrative chamber, taken along the line 2—2 of Figure 1.

The humidification or fogging chamber **10** comprises four sides. Side walls **11** and **12** disposed along the opposite edges of conveyer belt **13** are slightly inclined with respect to the vertical direction so that the upper edges of sides **11** and **12** are further apart than their lower edges. End walls **14** and **15** are joined to sides **11** and **12** to form the fogging chamber **10**. A spray or fogging nozzle **16** is attached to end wall **14** approximately over the center line of conveyer belt **13**. Like sides **11** and **12**, end wall **15** is inclined at least a few degrees with respect to the vertical direction so that the inner surface of wall **15** is inclined inwardly when viewed from its upper edge.

The liquid spray issuing from nozzle **16**, while directed toward the surface of conveyer belt **13**, will inevitably also moisten the walls of chamber **10**, particularly sides **11** and **12** and end **15**. The liquid collecting on these walls will drain toward the bottom deges thereof without any liquid drops falling from these walls onto the conveyer belt **13** because of the slight inward inclination of the inner surfaces of these walls. Drops of liquid falling from any part of chamber **10** onto the material disposed on the conveyer belt are very undesirable because such liquid drops will stain or otherwise damage the material.

End wall **14** is not exposed to the impingement of the liquid spray as are the other three walls of chamber **10** because nozzle **16** is aimed in a direction away from wall **14**. Consequently, the inclination, if any, of end **14** is relatively unimportant and, as shown in Figure 2, may even have its inner surface inclined in a direction opposite to that of the other three walls.

Liquid draining down the inner surfaces of the walls of chamber **10** is collected in troughs **17** and **18** disposed along the bottom edges of sides **11** and **12**, respectively, while troughs **19** and **20** are similarly positioned along the lower edges of ends **14** and **15**, respectively. End troughs **19** and **20** are positioned above the surface of conveyer belt **13** as well as above side troughs **17** and **18**. As shown in Figure 2, end trough **20** extends over the full width of conveyer belt **13** and the opposite ends of trough **20** are open so that liquid may drain therefrom into the lower side troughs **17** and **18** disposed on the opposite sides of conveyer belt **13**. While little or no liquid will ordinarily accumulate on the inner surface of end wall **14**, trough **19** is attached thereto as a precaution and its construction is substantially identical with that of trough **20** so that liquid may drain from the opposite ends of trough **19** into the lower side troughs **17** and **18**. Each of troughs **17** and **18** is provided with one or more drain taps **21**. In Figure 2, trough **17** is shown provided with drain taps **21** at approximately the opposite ends thereof. While the ends of troughs **19** and **20** are open so that liquid may run out at these points, the ends of side troughs **17** and **18** are closed and the liquid accumulating in these troughs is drained entirely through drain taps **21**.

An important feature of the humidification chamber **10** is the controlled aeration or ventilation thereof. For this purpose, the upper portion of chamber **10** is provided with at least one port **22** in the vicinity of the end of the chamber opposite that holding spray nozzle **16**. In the embodiment shown in the drawing, chamber **10** is provided with two ports **22** in the opposite sides **11** and **12**. Ports **22** are then connected by suitable ducts (not shown) to a suction fan or blower which will exhaust air and entrained mist from chamber **10** to any desired point, usually outside the building in which conveyer belt **13** is installed. The top or ceiling **23** of chamber **10** is positioned so as to help achieve the controlled ventilation of this chamber.

For this purpose, the edges of ceiling **23** are slightly spaced from the upper edges of walls **11**, **12**, **14** and **15**. Brackets **24** support ceiling **23** in this spaced relationship to the walls of chamber **10**. By maintaining a narrow slit or longitudinal space along the edges of ceiling **23**, the exhaust fan drawing air from ports **22** induces a flow of air to enter chamber **10** substantially along the inner surface of ceiling **23**. The layer of air flowing rapidly along the inner surface of ceiling **23** prevents stray mist particles from impinging on the inner surface of ceiling **23**. In the absence of this protective air shield, stray

mist particles impinge on the inner surface of ceiling **23** to the extent that liquid accumulates thereon and droplets then fall off onto the material disposed on conveyer belt **13**. As previously stated, such droplets are highly undesirable since they are damaging to the material carried on conveyer belt **13**.

The controlled ventilation of chamber **10** so as to avoid the collection of mist on the bottom of ceiling **23** and the resulting dropping of liquid therefrom may be readily achieved by the quantity of air drawn through ports **22** by the exhaust blower and/or by adjusting the spacing between ceiling **23** and the upper edges of walls **11**, **12**, **14** and **15**. For this purpose, brackets **24** may be made adjustable so as to vary the spacing along the edges of ceiling **23**. The number and position of exhaust ports **22** may also be varied to provide the desired flow of air along the bottom of ceiling **23** and thus prevent the accumulation of liquid thereon.

In the humidification chamber shown in the drawing, side **11** is provided with a door **25**, which may conveniently be plate glass or a clear plastic sheet, so that it may be opened to make adjustments of the spray nozzle **16** and may be used to observe the operation. A light fixture **26** is attached to end **15** to illuminate chamber **10** and facilitate observation of the operation through the glass or plastic door **25**.

In effect, conveyer belt **13** is the floor of fogging chamber **10**. When in operation, belt **13** moves over a plurality of idler rolls **27** spaced along and supported by base frame **28** of the conveyor structure. End walls **14** and **15** of chamber **10** are cut away along their lower edges so as to clear belt **13** and the layer of material deposited thereon. Belt **13** may be made to move either concurrent or countercurrent with respect to the general direction of the liquid spray from nozzle **16**.

As a specific example of the invention, for a stainless steel belt 46 inches wide used in producing a tobacco sheet as described in the aforesaid Frankenburg and Gottscho patent, the humidification chamber is approximately 12 feet long and 4 feet high. The end walls of the humidification chamber are about 53 inches wide along their lower edges where they straddle the steel belt and are about 65 inches wide along their upper edges. The ceiling is fastened to the walls of the humidification chamber to provide a half- inch vent along its four edges. An exhaust port 10 inches in diameter is cut out of each of the two side walls of the chamber near the end wall opposite the spray nozzle. The exhaust ports which are opposite one another have their uppermost edges approximately 6 inches below the upper edges of the side walls. Ducts connected to the two exhaust ports extend to a manifold connected to the suction side of an exhaust blower. The fogging nozzle is fastened to the end wall remote from the exhaust ports at a point in this end wall which is about 15 inches above the center line of the conveyer belt.

Various modifications of the invention will be obvious

to those skilled in the art and, accordingly, such modifications conforming to the spirit of the invention are to be considered within the scope of the appended claims.

What is claimed is:

1. The combination of a conveyer belt and a humidification chamber disposed over said belt, which comprises two side walls positioned along the opposite edges of said belt, two end walls extending transversely with respect to the length of said belt, a ceiling held with its edges in spaced relation to the upper edges of said side walls and said end walls, means for humidifying the space over said belt and within said chamber formed by said side walls, said end walls and said ceiling, and means for exhausting the atmosphere from within said chamber at a level in the upper portion of said chamber but below the upper edges of said side walls and said end walls.

2. The combination of claim 1 wherein said side walls are disposed with their upper edges further apart than their lower edges, and each of said side walls and said end walls is provided with a trough near its lower edge to intercept the flow of liquid draining down its inner surface.

3. The combination of a conveyer belt and a humidification chamber disposed over said belt, which comprises two side walls positioned along the opposite edges of said belt, two end walls disposed crosswise to said belt and joined to said side walls, a ceiling held with its edges in spaced relation to the upper edges of said side walls and said end walls, a spray nozzle disposed above said belt near one of said end walls and directed to spray into said chamber formed by said side walls, said end walls and said ceiling, and exhaust ports disposed near the other of said end walls in the upper portions of said side walls but spaced from the upper edges of said side walls.

4. The combination of claim 3 wherein each of said end walls is provided with an open-ended trough near its lower edge to divert liquid draining down its inner surface away from the surface of said belt, and each of said side walls is provided with a trough near its lower edge but disposed below said open-ended troughs to catch the flow of liquid therefrom.

5. In a spray chamber having four walls and a ceiling, the improvement of means for preventing the impingement of spray droplets on said ceiling which comprises narrow vents disposed contiguous to the edges of said ceiling, and air exhausting means arranged to draw air from within said chamber at a level below said vents.

References Cited in the file of this patent

UNITED STATES PATENTS

844,583	Dixon	Feb. 19, 1907
2,104,036	Harris	Jan. 4, 1938
2,767,717	Schlossmacher	Oct. 23, 1956

FOREIGN PATENTS

461,532	Canada	Dec. 6, 1949