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DRYING APPARATUS
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2,306,019

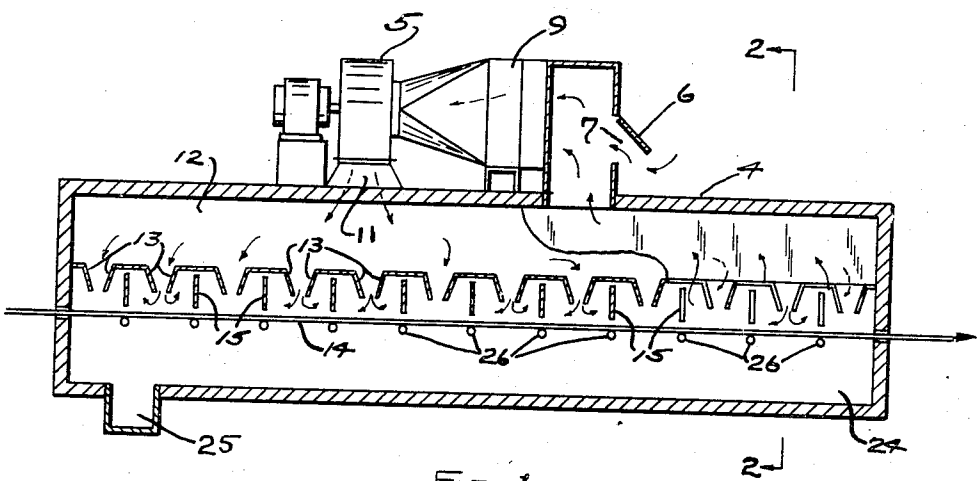


Fig-1

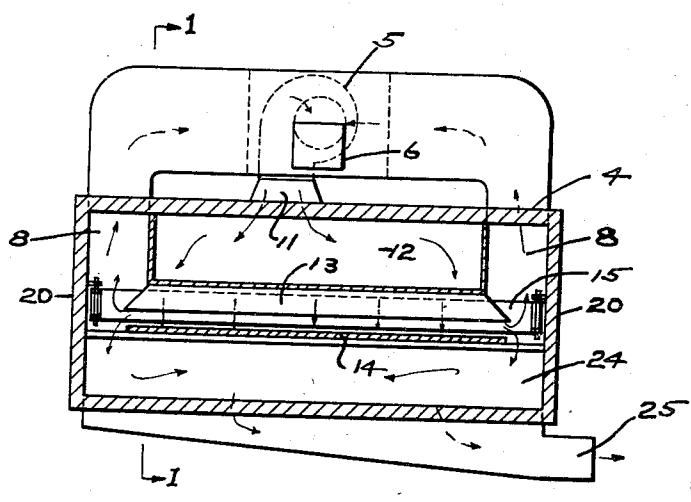


Fig-2

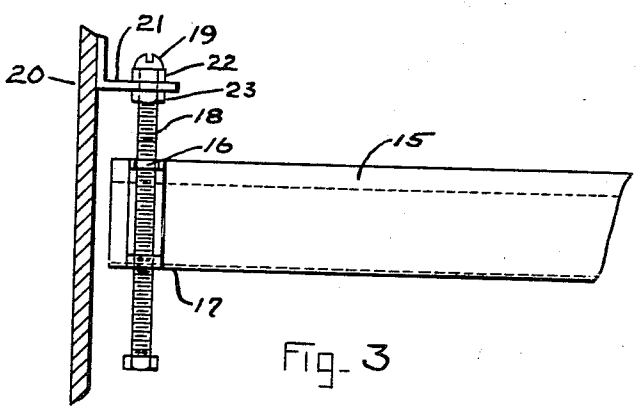


Fig-3

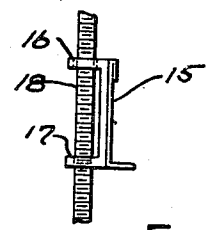


Fig.4

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DRYING APPARATUS

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3 Claims. (Cl. 34-160)

This invention relates to drying apparatus and relates more particularly to dryers using heated air for drying web material such as fabric, paper and the like.

It is the practice to pass sheet or web material such as paper or cloth through a dryer; to blow heated air upon the surface of the web, and to recirculate for reasons of economy, the air back through the heater and blower. In the past, however, a great deal of the heated air escaped with the web leaving the dryer.

The present invention provides a compact, highly efficient dryer from which a minimum of heat escapes.

A feature of the invention resides in providing nozzles with slots extending cross-wise the web to be dried and in providing plates extending at right angles to the web, between and beyond the nozzles, and in close proximity to the web. The plates effectively scrape off the air which ordinarily adheres due to surface tension, to the moving web and which ordinarily escapes from the dryer. The plates also provide passages for conducting the air back to the blower and heater where it is mixed with fresh air and applied again to the web. The plates also in cooperation with the nozzles provide turbulence in air flow thus expediting the drying action through breaking up the insulating air film which heretofore has adhered to the moving web.

Another feature of the invention resides in arranging a blower and air heater upon the casing of an insulated web drying chamber and in supplying heated air near the center of the chamber and withdrawing recirculated air at the nozzle ends.

An object of the invention is to improve the efficiency of web dryers.

Another object of the invention is to conserve the heated air used in a web dryer.

Another object of the invention is to reduce the space required for web dryers.

Other objects of the invention will be apparent from the following description taken with the drawing.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is an elevation view partially in section of a dryer embodying this invention, with section taken along lines 1-1 of Fig. 2;

Fig. 2 is a sectional view along the lines 2-2 of Fig. 1;

Fig. 3 is an enlarged view of the plate adjusting mechanism of Fig. 2, and

Fig. 4 is an end view of the plate and adjusting screw of Fig. 2.

The blower 5 and the heating chamber 9 are mounted on the upper side of the casing 4 and serve to supply heated air therein. The blower 5 draws fresh air past the damper 6 through the inlet 7, and recirculated air from the recirculated air chambers 8, moves the mixed air through the heating chamber 9, and discharges it through the outlet 11 into the plenum space 12 above the lips 13, forming nozzles, for projecting the heated air at high velocity against the web 14.

The plates 15 extend cross-wise the dryer between the nozzle discharge slots formed by the adjacent nozzle lips 13, and extend, as shown by Fig. 2, beyond the web 14 and the nozzles on each side thereof, and cross-wise the bases of the recirculated air chambers 8. The web 14 moves through the dryer on the rollers 26, as shown by Fig. 1.

The plates 15 may be raised and lowered as shown by Figs. 3 and 4. The plates 15 have the extensions 16 and 17 which are apertured to receive the bolts 18, either one or both of the apertures being tapped to receive the threads on the bolts. The upper end of each bolt 18 is attached to the machine screw 19. Each side 20 of the dryer has attached thereto, the flanges 21 which are apertured to receive the bolts 18. The washers 22 space the heads of the screws 19 from the flanges 21, and the nuts 23 are soldered to the bolts 18 so as to revolve therewith below the flanges 21. By revolving the heads of the screws 19 with a screw driver, the position of the plates may be adjusted to suit any particular installation or operating condition.

The drying air projected through the nozzles tends to adhere to the web 14 and not only forms an insulating film adhering to the web but is carried by the web from the dryer. The plates 15 extending close to the web 14 scrape off, so to speak, the air film tending to adhere to the web and guide the air so collected, and the other air between the nozzles, into the recirculated air chambers 8 at each side of the dryer.

Other functions of the plates 15 are that they cause air turbulence in addition to that caused by the nozzles, providing the effect of additional nozzles without requiring additional air; they equalize the drying effect of the air by guiding it across the web so that no part of the web dries before another part, and add to the efficiency and compactness of the unit by cutting down air and heat losses.

While it is preferred that the plates 15 extend

substantially at right angles to the web 14 for convenience in raising and lowering the plates, it is apparent that they could be tilted through angles less than right angles to the plane of the walls without destroying their effectiveness in scraping the film of stagnant air from the web.

Also while it is preferred for purposes of economy that the drying air be recirculated through the heater with the passages 8 acting as recirculated air passages for conducting air leaving the web, to the heater, it is apparent that the passages 8 are really exhaust passages and could be used as such without recirculation.

A portion of the air leaving the web passes into the exhaust chamber 24 below the web and out the exhaust passage 25 to the atmosphere. This volume of exhaust air is, of course, equal, less such slight leaks as may occur, to the volume of fresh make-up air entering through the inlet 7.

While one embodiment of the invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as many departures therefrom may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A dryer comprising a casing, a plenum chamber in said casing, means for supplying heated air into said chamber, means for supporting a moving web in its travel through said dryer, means including a plurality of nozzles each extending cross-wise said dryer and communicating with said chamber and converging towards said supporting means for supplying high velocity, heated air upon the web, means forming an exhaust passage in said casing at one transverse side of said dryer, and transverse plates extending cross-wise said dryer between adjacent nozzles and extending beyond the tips thereof adjacent the web, in planes intersecting the plane of the web, and extending to said passage, for preventing air discharged from the nozzles from adhering to the moving web and for guiding the air deflected from the web into said passage, said nozzles and plates extending along substantially the entire path of travel of the web through said casing.

2. A dryer comprising a casing, a plenum chamber in said casing, means for supplying heated air into said chamber, means for supporting a

moving web in its travel through said dryer, means including a plurality of nozzles each extending cross-wise said dryer and communicating with said chamber and converging towards said supporting means for supplying high velocity, heated air upon the web, means forming exhaust air passages in said casing at the transverse sides of said dryer, and transverse plates extending crosswise said dryer between adjacent nozzles and extending beyond the tips thereof adjacent the web, in planes intersecting the plane of the web, and extending to said passages, for preventing air discharged from the nozzles from adhering to the moving web and for guiding the air deflected from the web into said passages, said nozzles and plates extending along substantially the entire path of travel of the web through said casing.

3. A dryer comprising a drying chamber for receiving a moving web to be dried, means for supporting a web for movement through said chamber, a plurality of nozzles spaced longitudinally and each extending crosswise said chamber above said means for projecting drying air upon the web, air moving and heating apparatus supported upon said chamber, a plenum chamber extending longitudinally of said chamber above said nozzles and connecting therewith, the transverse sides of said plenum chamber being spaced from the opposite side walls of said drying chamber for forming air recirculation passages, means for supplying heated air from said apparatus into said plenum chamber, means including substantially vertical ducts extending outside said chambers to the ceiling of said drying chamber in alignment with said passages and connecting therewith for recirculating air therefrom into said apparatus, transverse plates extending crosswise said drying chamber to said passages and between said nozzles and extending beyond the tips of said nozzles towards the web, in planes intersecting the plane of the web, and serving to prevent air discharged from the nozzles from adhering to the web and for guiding the air deflected from the web into said passages and said ducts, and a duct above said ceiling, connecting with said ducts and said apparatus, for supplying air recirculated from said drying chamber to said apparatus.

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