June 19, 1945. M. E. HANSON 2,378,703

WEB DRIER

Filed May 15, 1943

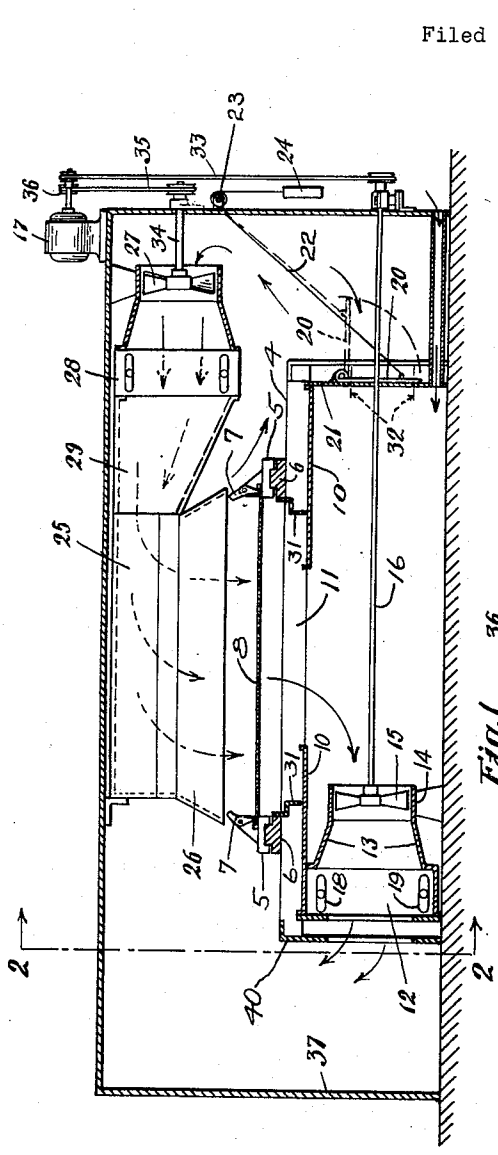


Fig. 1.

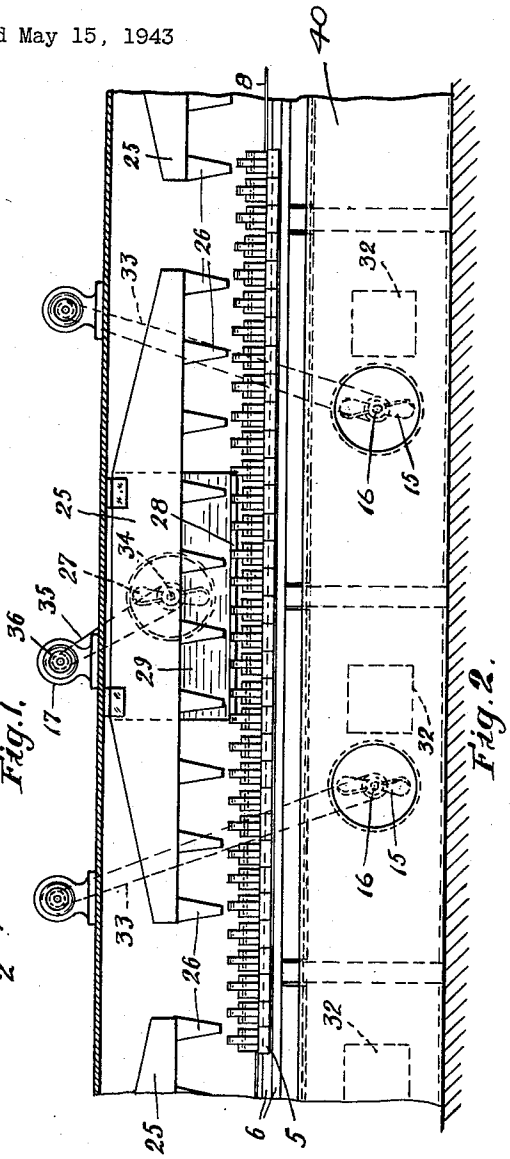


Fig. 2.

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Patented June 19, 1945 2,378,703

UNITED STATES PATENT OFFICE

2,378,703

WEB DRIER

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Application May 15, 1943, Serial No. 487,164

4 Claims. (Cl. 34—158)

This invention relates to web driers and relates more particularly to tenter frame, cloth driers.

In the usual tenter frame, cloth driers, the moist cloth is carried by pairs of conveyors through the driers and is exposed while in the drier to blasts of drying air directed against both the upper and under sides. This not only requires a large number of ducts and nozzles above and below the cloth which prevent ready access to the cloth but also require expensive structural supports and large drier houses.

This invention provides drying air projected under pressure through nozzles against the upper side of the cloth and provides suction at the under side of the cloth so that drying air is drawn through the cloth for more thorough drying. The amount of apparatus and the space required for same, is less than for the prior driers and the drying is more effective. A drier embodying this invention is particularly suitable for heavy cloth and cloth having heavy piles.

Objects of the invention are to improve the drying of cloth in tenter frame driers and to reduce the amount of apparatus required.

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

Fig. 1 is a cross-section through a drier embodying this invention, and.

Fig. 2 is a sectional view taken along the lines 2—2 of Fig. 1.

The usual parallel chains 5 resting upon the usual guide rails 6 are employed. These chains have the usual clips 7 for engaging the outer edges of the cloth web 8. The rails 6 are movable towards and from each other on the base 4 for accommodating different cloth widths. The chains travel continuously through the drier, bringing the moist cloth in at one end and carrying the dry cloth out the opposite end.

The baffle walls 10 and 10 extend under the conveyor and are spaced apart to provide a central opening 11 for the passage of air drawn through the cloth.

The steam heaters 12 are placed under the walls 10 and are connected by the ducts 13 with the shrouds 14 of the propeller fans 15. The fans 15 are rotated through the shafts 16 and belts 33 by the electric motors 17 which are placed outside the building so as to be out of the heated air.

The heaters 12 preferably are made up of a plurality of finned tubes and have the headers 18 and the condensate return headers 19.

The vertical baffle walls 21 extend to the floor of the drier across the outer ends of the baffle walls 10 and have pivoted thereto, the dampers 20 which in fully closed position close the by-pass openings 32 in the walls 21 as illustrated by the full lines of Fig. 1. In the full open position illustrated by the dashed lines of Fig. 1, the dampers permit air drawn by the fans 15 to by-pass the cloth 8. The dampers are connected by the wire or cord 22 which runs over the pulleys 23, to the balance weights 24. As will be explained, the dampers may be adjusted to assume positions permitting the by-passing of volumes of air around the cloth for compensating for different weights and thicknesses of cloth.

The rails 6 have attached thereto the plates 31 which extend therebeneath and which contact the baffle walls 9 and 10. These plates form air seals as the rails are moved to accommodate different widths of cloth, and prevent air from being drawn by the fans 15, between the rails 6 and the walls 9 and 10 in a path by-passing the cloth.

The air ducts 25 each extend over two of the A frames as illustrated by Fig. 2 and have the nozzles 26 which project drying air upon the upper surface of the cloth. Drying air for the nozzles is supplied by the fans 27 through the heaters 28 which in turn are connected by the ducts 29 to the ducts 25. The heaters 28 are similar to the heaters 12 previously described.

The fans 27 are rotated through the shafts 34 and the belts 35 by the electric motors 36 which are placed outside the drier building and on the roof thereof as are the motors 17.

In operation the nozzles 26 project heated air upon the upper surface of the cloth and the fans 15 draw a portion of this air through the cloth. The air discharged from the heaters 12 is recirculated in the spaces between the heaters and the adjacent side wall 37 of the drier and over the cloth and a portion of this air passes into the inlets of the fans 27. Another portion of this air passes through the cloth. The air from the fans 27 after passing through the heaters 28, the ducts 25 and 29 and the nozzles 26 is moved through the cloth into the inlets of the fans 15. The fans 15 and 27 are seen to be in series in the recirculation of the drying air.

The usual selvedge nozzles may be used with the nozzles 26 for drying the edges of the cloth.

As is customary sufficient air is exhausted from the drier and sufficient make-up air is drawn into the drier for maintaining sufficiently low humidities in the drying air for proper drying.

The fans 27 provide pressure above the cloth and on the upper sides of the dampers 20 and

the fans 15 provide suction under the cloth and on the undersides of the dampers. This tends to cause the cloth to sag depending upon the thickness and weave of the cloth. For light weight cloth, the air pressure upon its upper surface could be too great tending to stretch it. The dampers 20 in such cases would be adjusted to by-pass air around the cloth to provide less difference in pressure between the upper and the lower sides of the cloth.

The wall 40 extends the length of the drier and prevents the drying air from flowing around the sides of the units and into the inlets of the fans.

Fig. 2 illustrates a number of identical drying units embodying this invention placed alongside each other. It is believed to be apparent that any size drier that may be desired can be constructed using these units.

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 modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. In a tenter frame, web drier having a housing with side walls and a roof, said housing containing spaced conveyors for carrying a web to be dried through the drier, rails for supporting the conveyors and a base for slidably supporting the rails, the combination of a pair of spaced, substantially horizontal baffles under said base, means forming an air seal between said rails and baffles, an air heater under one of said baffles, a fan under said one of said baffles, air nozzles above said conveyors for blowing drying air on the web carried thereby, means including a fan and a heater above said conveyors for heating air and for supplying it under pressure into said nozzles, and means including said walls and roof forming an air passage between the outlet of said first mentioned fan and the inlet of said last mentioned fan, said first mentioned fan drawing the air issuing from said nozzles through said web, and through the space between said baffles and recirculating it through said first mentioned means, said fans acting in series to recirculate the drying air through said heaters and through said web.

2. In a tenter frame, web drier having a housing with side walls and a roof, said housing containing spaced conveyors for carrying a web to be dried through the drier, rails for supporting the conveyors and a base for slidably supporting the rails, the combination of a pair of spaced, substantially horizontal baffles under said base, an air heater under one of said baffles, a fan under said one of said baffles, air nozzles above said conveyors for blowing drying air on the web carried thereby, means including a fan and a heater above said conveyors for heating air and for supplying it under pressure into said nozzles, means including said walls and roof forming an air passage between the outlet of said first mentioned fan and the inlet of said last mentioned fan, said first mentioned fan drawing the air issuing from said nozzles through said web, and through the space between said baffles and recirculating it through said first mentioned means, said fans acting in series to recirculate the drying air through said heaters and through said web, and air sealing plates attached to said rails and contacting said baffles for preventing the air recirculated by said fans from by-passing said web.

3. In a tenter frame, web drier having a housing with side walls and a roof, said housing containing spaced conveyors for carrying a web to be dried through the drier, rails for supporting the conveyors and a base for slidably supporting the rails, the combination of a pair of spaced, substantially horizontal baffles under said base, means forming an air seal between said rails and baffles, an air heater under one of said baffles, a fan under said one of said baffles, air nozzles above said conveyors for blowing drying air on the web carried thereby, means including a fan and a heater above said conveyors for heating air and for supplying it under pressure into said nozzles, means including said walls and roof forming an air passage between the outlet of said first mentioned fan and the inlet of said last mentioned fan, said first mentioned fan drawing the air issuing from said nozzles through said web, and through the space between said baffles and recirculating it through said first mentioned means, said fans acting in series to recirculate the drying air through said heaters and through said web, and means including adjustable damper means providing a by-pass around said web for a portion of the recirculated air.

4. In a tenter frame, web drier having a housing with side walls and a roof, said housing containing spaced conveyors for carrying a web to be dried through the drier, rails for supporting the conveyors and a base for slidably supporting the rails, the combination of a pair of spaced, substantially horizontal baffles under said base, an air heater under one of said baffles, a fan under said one of said baffles, air nozzles above said conveyors for blowing drying air on the web carried thereby, means including a fan and a heater above said conveyors for heating air and for supplying it under pressure into said nozzles, means including said walls and roof forming an air passage between the outlet of said first mentioned fan and the inlet of said last mentioned fan, said first mentioned fan drawing the air issuing from said nozzles through said web, and through the space between said baffles and recirculating it through said first mentioned means, said fans acting in series to recirculate the drying air through said heaters and through said web, air sealing plates attached to said rails and contacting said baffles for preventing the air recirculated by said fans from by-passing said web, and means including adjustable damper means providing a by-pass around said web for a portion of the recirculated air.

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