Oct. 30, 1945. M. E. HANSON 2,388,226

WEB DRIER

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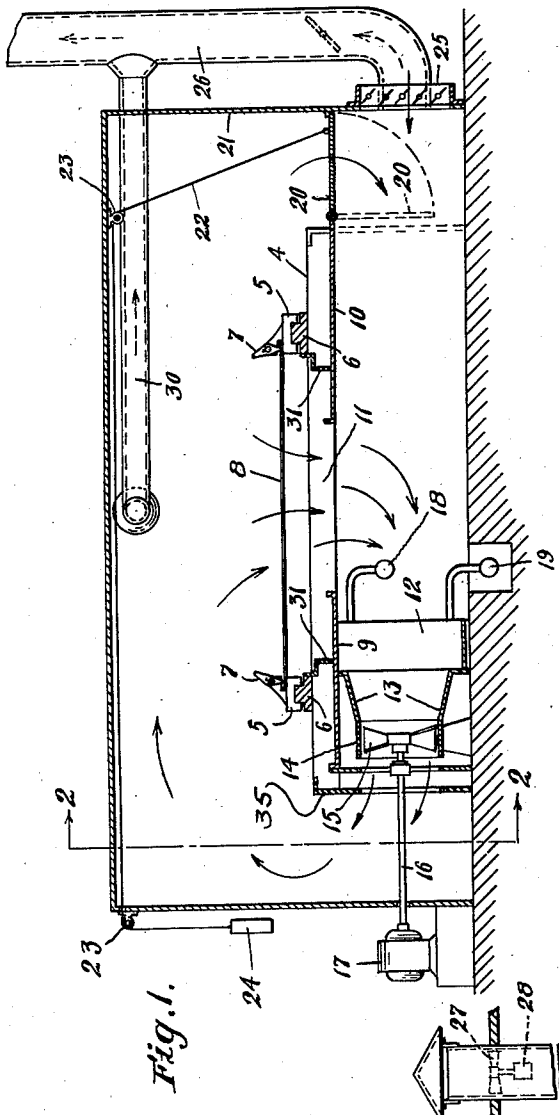


Fig. 1.

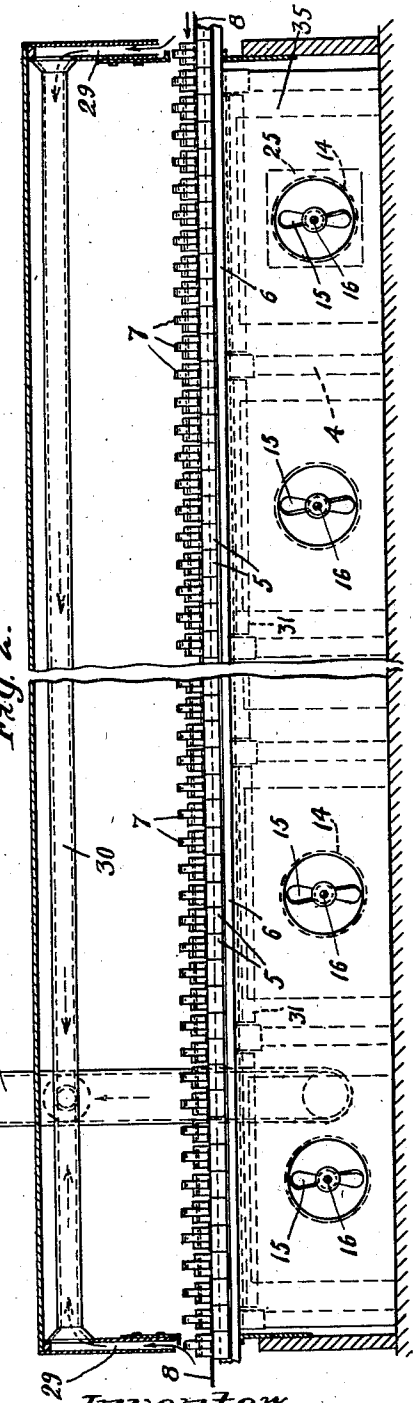


Fig. 2.

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WEB DRIER

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10 Claims. (Cl. 34—158)

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

The usual tenter frame driers for drying cloth employ nozzles located above and below the cloth and which blow the drying air against the cloth. This requires a large amount of duct work and a large number of nozzles. Furthermore, the drying is uneven since the drying action is more effective under the nozzles than between them. To compensate for the uneven drying, it has been the practice to force very large volumes of air through the nozzles.

In a drier embodying this invention no nozzles nor associated ducts are used and instead of blowing the drying air against the cloth, it is drawn through by suction from a plurality of fan-heater units located underneath the tenter frames. The fan-heater units are compact and relatively inexpensive and any desired number may be placed alongside each other to make up a drier of any desired size or length. Their use results in a lower, less expensive drier house and in a saving in fan horsepower and steam.

An object of the invention is to improve the drying of cloth in tenter frame driers.

Other objects of the invention are to simplify tenter frame driers and to reduce their installation cost and operating expense.

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

Fig. 1 is a cross section through a tenter frame 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 9 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 9 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 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 are connected to the steam supply header 18 and to the condensate return header 19.

The baffle walls 10 have pivoted to their outer ends, the dampers 20 which in fully closed position contact the side wall 21 of the drier house 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 are adjusted to compensate for different thicknesses and weights of cloth by by-passing drying air around the cloth.

The drier has the fresh air inlet 25 and the exhaust air outlet stack 26. The stack 26 has the fan 27 driven by the motor 28 mounted therein and this fan serves to exhaust moist air from the drier and to draw in fresh, make-up air.

The air lock chambers 29 at the two ends of the drier are connected by the air lock exhaust duct 30 to the exhaust stack 26. With the fan 27 in the stack 26 operating, outside air is drawn into the air lock chamber 29 through the openings in its two ends where the cloth enters and leaves, and this prevents the escape of drying air through these openings.

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.

In operation, the fans 15 draw air through the cloth 8 as indicated by the arrows of Fig. 1. The heaters 12 heat this air which is continuously recirculated through the cloth and heaters. As is customary sufficient air is exhausted through the stack 26 and sufficient make-up air is drawn into the drier through the inlet 25 for maintaining sufficiently low humidities in the air for proper drying.

The fans 15 provide pressure above the cloth and on the upper sides of the dampers and provide suction under the cloth and on the undersides of the dampers. 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 sufficient air around the cloth to provide less differences in pressure between the upper and the lower sides of the cloth.

The wall 35 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.

Other structural advantages are that savings in heavy and expensive sheet metal are accomplished of eliminating the ducts and nozzles usually employed in web driers; the drier house may be lower and smaller than prior equivalent drier houses; the heavy supporting structures for the usual overhead ducts and nozzles are eliminated, and the weight and amount of apparatus required, is less.

Functional advantages of this invention are that all areas of the cloth are continuously acted upon during its passage through the drier. The drying is more effective since the drying air is drawn completely through the cloth. With the prior systems using nozzles, the cloth was acted upon only under the nozzles with so much space between the nozzles that the drying between them was much less effective. Lower air pressures are required resulting in decreased power costs. Complete access to the cloth surface is gained for inspection and regulation purposes. Both sides of the cloth are accessible.

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 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, and means forming an air passage including said web, the space between said baffles, said heater and said fan in series, said fan recirculating air through said passage.

2. In a tenter frame, web drier having a 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, and means forming an air passage including said web, the space between said baffles, said heater and said fan in series, said fan recirculating air through said passage, and air sealing plates attached to said rails and contacting said baffles for preventing the escape of air from said passage between said rails and baffles.

3. In a tenter frame, web drier having a 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, and means forming an air passage including said web, the space between said baffles, said heater and said fan in series, said fan recirculating air through said passage, 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 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, and means forming an air passage including said web, the space between said baffles, said heater and said fan in series, said fan recirculating air through said passage, air sealing plates attached to said rails and contacting said baffles for preventing the escape of air from said passage between said rails and baffles, and means including adjustable damper means providing a by-pass around said web for a portion of the recirculated air.

5. In a tenter frame, web drier having a 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, and means forming an air passage including said web, the space between said baffles, said heater and said fan in series, said fan recirculating air through said passage, and means including a counter-balanced damper providing a by-pass around said web for a portion of the recirculated air.

6. In a tenter frame, web drier having a 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, and means forming an air passage including said web, the space between said baffles, said heater and said fan in series, said fan recirculating air through said passage, air sealing plates attached to said rails and contacting said baffles for preventing the escape of air from said passage between said rails and baffles, and means including a counter-balanced damper providing a by-pass around said web for a portion of the recirculated air.

7. 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, said base being spaced from said side walls, the combination of a pair of spaced, substantially horizontal baffles spaced from said side walls under said base, an air heater under one of said baffles, a fan under said one of said baffles, means forming a recirculated air passage including said web, the space between said baffles, said heater, said fan, the space between one of said side walls and said base, and the space between said roof and said web, means forming a passage between said base and the other of said walls for a portion of the recirculated air in a path by-

passing said web, a damper in said last mentioned passage, and means forming an air seal between said rails and baffles.

8. 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, said base being spaced from said side walls, the combination of a pair of spaced, substantially horizontal baffles spaced from said side walls under said base, an air heater under one of said baffles, a fan under said one of said baffles, means forming a recirculated air passage including said web, the space between said baffles, said heater, said fan, the space between one of said side walls and said base, and the space between said roof and said web, means forming a passage between said base and the other of said walls for a portion of the recirculated air in a path by-passing said web, a counterbalanced damper in said last mentioned passage, and means forming an air seal between said rails and baffles.

9. In a tenter frame, web drier having spaced conveyors for carrying a web to be dried through the drier, having rails for supporting the conveyors and having a base for slidably supporting the rails, said base being spaced from the side walls of said drier, 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, said fan recirculating air through said web, the space between said baffles, through said heater, the space between one of said side walls and said base, and the space between the roof of said drier and said web, means forming a passage between said base and the other of said walls for a portion of the recirculated air in a path by-passing said web, a damper in said passage, and air sealing plates attached to said rails and contacting said baffles.

10. In a tenter frame, web drier having spaced conveyors for carrying a web to be dried through the drier, having rails for supporting the conveyors and having a base for slidably supporting the rails, said base being spaced from the side walls of said drier, 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, said fan recirculating air through said web, the space between said baffles, through said heater, the space between one of said side walls and said base, and the space between the roof of said drier and said web, means forming a passage between said base and the other of said walls for a portion of the recirculated air in a path by-passing said web, a counter-balanced damper in said passage, and air sealing plates attached to said rails and contacting said baffles.

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