

Sept. 30, 1941.

M. NIERSBACH
FILM DRYING MACHINE

2,257,394

Filed May 6, 1940

2 Sheets-Sheet 1

Fig. 1-

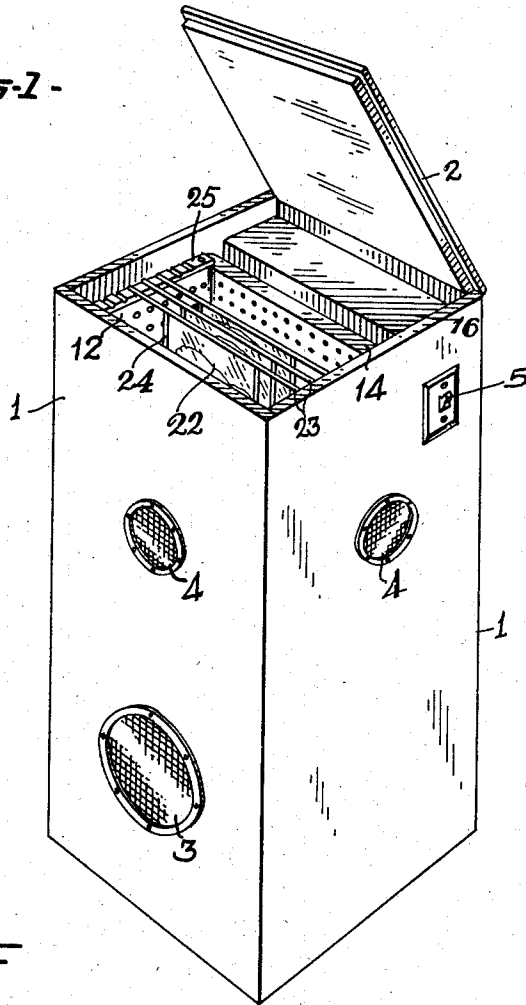
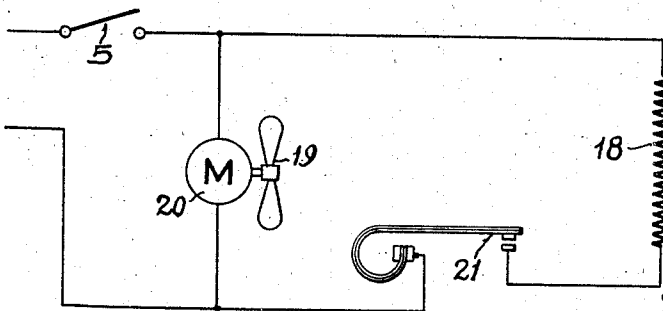


Fig. 5-



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2 Sheets-Sheet 2

Fig. 2-

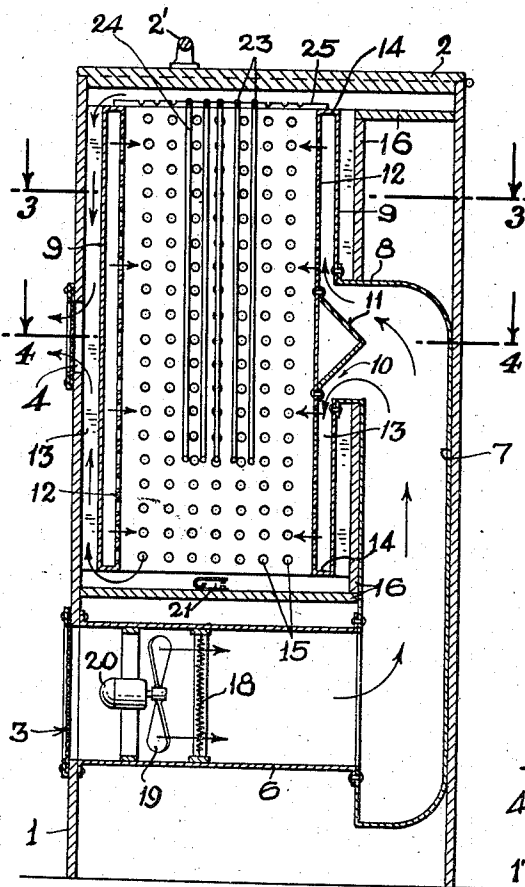


Fig. 3-

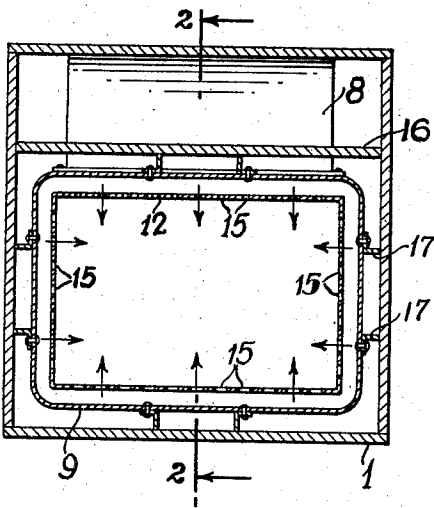
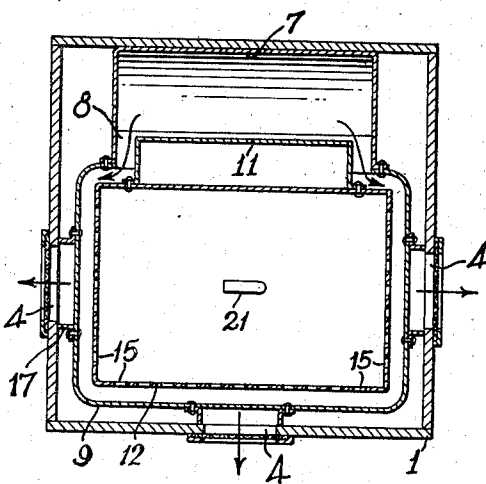


Fig. 4-



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UNITED STATES PATENT OFFICE

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FILM DRYING MACHINE

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3 Claims. (Cl. 34-233)

This invention relates to improvements in film drying machines, and more particularly to apparatus having a novel construction capable of rapidly drying developed film or photographic plates without danger of damaging the same.

An object of my invention is to provide an improved film drying machine embodying novel means for directing currents of heated air into and through an enclosure having developed photographic film suspended therein, whereby the excess moisture retained after developing of the film may be rapidly extracted.

Another object of my invention is to provide an improved machine of the character described, having novel thermostatic means for controlling the temperature of the moving air directed upon the film which is being treated, whereby damage from excessive heat may be eliminated.

Other and further objects of my invention will be pointed out hereinafter, or will be indicated in the appended claims, or will be obvious to one skilled in the art upon an understanding of the present disclosure. For the purpose of this application I have elected to show herein certain forms and details of a film drying machine representative of my invention. It is to be understood, however, that the embodiment of my invention herein shown and described is for the purpose of illustration only, and that therefore it is not to be regarded as exhaustive of the variations of the invention; nor is it to be given an interpretation such as might have the effect of limiting the claims short of the true and most comprehensive scope of the invention in the art.

In the accompanying drawings:

Fig. 1 is a perspective view of a film drying machine embodying my invention.

Fig. 2 is a vertical sectional view of the same;

Fig. 3 is a sectional view taken on the line 3-3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4-4 of Fig. 2; and

Fig. 5 is a wiring diagram of the electrical circuit constituting a part of my invention.

Referring to the drawings, the numeral 1 designates a suitably shaped and proportioned cabinet having a hinged lid 2, an air inlet opening 3 in its front side, and air outlet openings 4 in its front and lateral walls. The lid is preferably provided with a suitable handle 2' for opening and closing the same, and if desired, means of the customary kind may be used to prevent the lid from being swung in an upward direction beyond a certain position. Mounted on a side of the cabinet 1 is an electrical switch 5 for

opening and closing the circuit leading from a source of electrical energy to a fan, a heating unit and a thermostat.

Extending rearwardly from the air inlet opening 3 is an air duct 6 having its rear end connected to an upwardly disposed air duct 7 which is provided at its upper end with a discharge manifold 8. The manifold 8 is suitably secured at its discharge end to the rear wall of an outer enclosure 9, preferably of rectangular cross sectional shape. Air from the manifold is discharged into the outer enclosure through an elongated horizontal slot or opening 10 provided in its rear wall, and an angular deflector 11 supported on the rear wall of an inner enclosure 12 is positioned within the said opening in such a manner that the air discharged from the manifold is horizontally divided as it passes into the outer enclosure, and is thereby directed upwardly and downwardly as indicated by the arrows in Fig. 2.

The inner enclosure 12 is of approximately the same height as the outer enclosure 9 and their cross sectional shapes are preferably the same, but the inner enclosure is somewhat smaller with respect to its lateral dimensions than the outer enclosure. The inner and outer enclosures are concentrically positioned with respect to each other, thereby providing a four-sided intervening air space or channel 13 between the walls of the two enclosures. The space 13 is closed at its upper and lower ends by rectangular members 14 secured to the upper and lower ends of the inner and outer enclosures. The walls of the inner enclosure are provided with perforations 15 of varying size for the passage from the intervening space 13 of air into the said inner enclosure. The upper and lower ends of the inner enclosure are open so as to permit the air entering the same to freely circulate throughout its interior and thereafter pass from the said open ends into the area of the cabinet located outside the outer enclosure, from whence it escapes through the discharge openings 4. The perforations 15 in the walls of the inner enclosure 12 are graduated in size so as to cause air under pressure to enter at all four sides. The smallest of the perforations are located in the rear wall; the largest of the perforations are located in the front wall; and the medium size perforations are located in the intervening side walls. Thus by having the perforations of the various walls increase in size from the rear to the front in proportion to the decrease in the pressure of the air as the front area of the space 13 is approached, the air pres-

sure of the air entering the enclosure 12 at its four sides is substantially uniform.

A suitable supporting structure 16 is provided in the cabinet for maintaining the various parts of the device in their respective positions. The outer enclosure 9 is mounted on the supporting structure 16 and the walls of the cabinet 1 as by angle irons 17, and the inner enclosure 12 is held in place by the rectangular members 14 which are secured to the opposite ends of the said enclosures.

Mounted in the air duct 6 in front of an electric heating unit 18 is an electric fan 19 which is capable of drawing air into the said duct through the inlet opening 3 and propelling it past the heating unit with sufficient pressure to insure its reaching the interior of the inner enclosure 12 with an appreciable unspent force. A motor 20 for actuating the fan, the heating unit 18, and a thermostatically controlled switch 21 are electrically connected in the electric circuit which is controlled by the switch 5. When the circuit is closed by the switch 5, the motor 20 is energized and the fan causes a circulation of air through the ducts 6 and 7, through the intervening space 13, through the perforations 15 in the walls of the inner enclosure 12, through and out the open ends of the latter, and thence through the outlet openings 4 in the cabinet. The thermostatically controlled switch 21 is positioned directly beneath and in close proximity to the open lower end of the inner enclosure 12. When the air discharge through the inner enclosure reaches a certain high temperature, the thermostatically controlled switch automatically opens and thereby discontinues the flow of electrical energy to the heating unit 18, and when the air reaches a predetermined lower temperature the said switch automatically closes the circuit to the heating unit. Thus the temperature of the air circulated through the inner enclosure may be automatically controlled. The air, when subjected to heat generated by the heating unit 18, becomes sufficiently dry to readily absorb moisture. The dry and warm air, upon contacting the moist film, plates or sheets 22 suspended in the inner enclosure 12 by means of cross rods 23 and frames 24, readily dries the same. The cross rods 23 are preferably supported in spaced relationship by grooved members 25 positioned adjacent the open upper end of the inner enclosure 12. If preferred, the film, sheets or other material to be treated, may be suspended in the inner enclosure by any suitable means other than that herein described.

Having described my invention, what I claim is:

1. In apparatus of the kind described, an inner enclosure of rectangular cross sectional shape having a plurality of air inlet holes in each of its sides, and its top end open for the passage of air from its interior, the said inner enclosure having its walls positioned vertically, an outer enclosure of rectangular cross sectional shape having air inlet means in one of its sides, the said outer enclosure being positioned around the inner enclosure with its side walls in spaced relation to the side walls of the inner enclosure so as to provide an air channel encircling the inner enclosure, the said air channel being closed at its top and bottom, means for supporting material to be treated in the inner enclosure, an enclosing

cabinet within which the enclosures are housed, air inlet and air outlet means in the walls of the cabinet, closure means normally closing the upper end of the cabinet, an air duct leading from the air inlet of the cabinet to the air inlet means of the outer enclosure, a fan for discharging air under pressure through the air duct to the air channel, whereby air under pressure may be forced into the inner enclosure for the treatment of the material supported therein, an electric heater in the air duct for heating the air discharged therethrough, and a thermostatic control means positioned in the air circulating system and electrically connected in the circuit of the electric heater, whereby the flow of electrical energy to the heater may be automatically controlled in accordance with the temperature changes of the air circulated through the inner enclosure.

2. In apparatus of the kind described, an inner enclosure having at least one of its opposite ends open and its walls perforated to admit air to its interior, means for supporting material to be treated inside the inner enclosure, an outer enclosure disposed laterally around the inner enclosure and spaced therefrom to provide an air channel encircling the inner enclosure, the said air channel being closed at its opposite ends, an enclosing cabinet in which the enclosures are housed having air inlet and air outlet means, closure means in the cabinet located adjacent an open end of the inner enclosure, an air duct connecting the air inlet means of the cabinet with the air channel, air heating means in the air duct, and means in the air duct for forcing air under pressure into the air channel, whereby said air may be circulated through the interior of the inner enclosure to treat the material supported therein.

3. In apparatus of the kind described, an inner enclosure having its top end open and its walls perforated to admit air to its interior, means at the top of the inner enclosure for supporting material to be treated inside the enclosure, an outer enclosure disposed laterally around the inner enclosure and spaced therefrom to provide an air channel encircling the inner enclosure, the said air channel being closed at its upper and lower ends, an air enclosing cabinet in which the enclosures are housed having air inlet and air outlet means, and an opening in its upper side, a closure for the opening in the cabinet, an air duct connecting the air inlet means of the cabinet with the air channel, electrically operated means in the air duct for forcing air under pressure through the duct and into the air channel, whereby said air may be circulated through the interior of the inner enclosure to treat the material supported therein, an electrical heating element positioned in the air duct and connected in an electrical circuit, and an electrical thermostatic control means positioned in the air circulating system near the inner enclosure and connected in the circuit of the heating element, whereby the operation of the heating element may be automatically controlled to maintain the temperature of the air circulated through the inner enclosure at a substantially uniform temperature.

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