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COOLING SYSTEM FOR PROCESSED SHEETS AFTER COATING, DRYING, OR BAKING

Original Filed Jan. 9, 1935 2 Sheets-Sheet 1

Fig. 2.

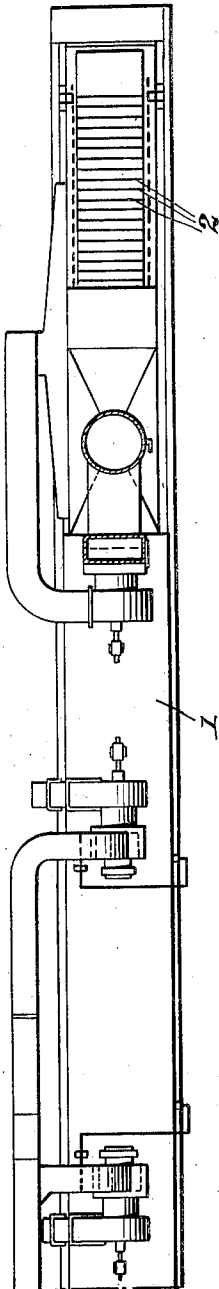
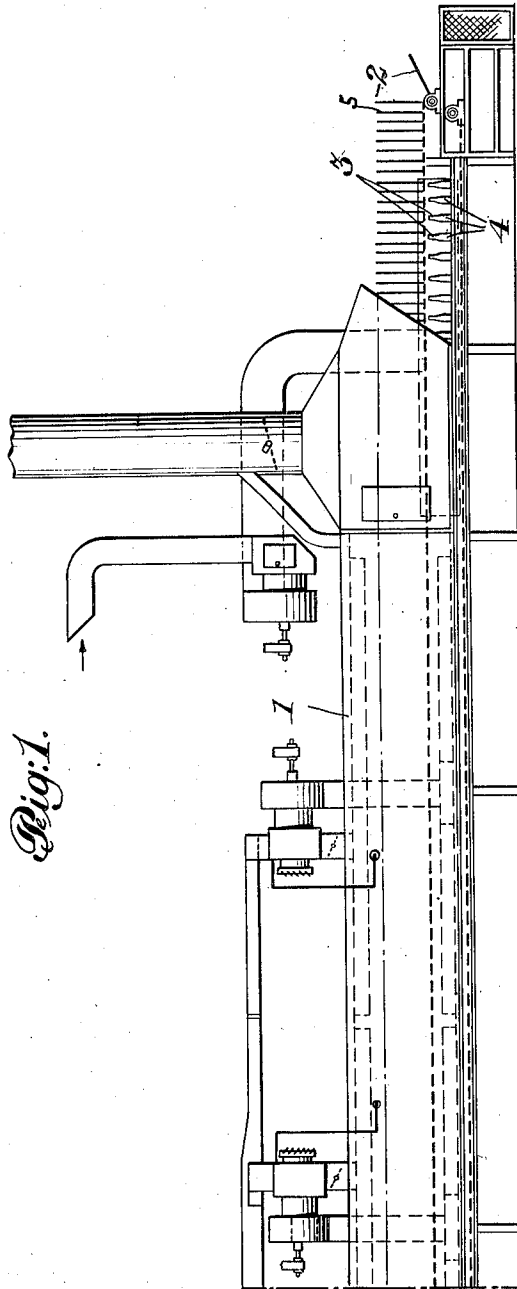


Fig. 1.



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COOLING SYSTEM FOR PROCESSED SHEETS
AFTER COATING, DRYING, OR BAKINGRalph Byron, New York, N. Y., assignor to J. O.
Ross Engineering Corporation, New York, N. Y.,
a corporation of New YorkOriginal application January 9, 1935, Serial No.
1,006. Divided and this application October 25,
1935, Serial No. 46,652

3 Claims. (Cl. 34-12)

This invention relates to a method and apparatus for the rapid cooling of metallic lithographic or other processed sheets after coating, drying, or baking.

5 This application is a division of application, Serial No. 1,006, filed January 9, 1935.

In many industries and particularly in the making of metal lithographic sheets where the metal is coated, each sheet must be dried or 10 baked and subsequently cooled in order to fix the coatings and to give a proper finish as well as to permit handling. It has generally been found desirable to convey individual sheets from the dryer or oven through the normal atmosphere 15 a sufficient distance to achieve the cooling. The sheets generally being in close proximity, difficulties are incurred in securing a uniform cooling throughout the sheet and a long cooling space and length of time must be utilized in order to achieve adequate cooling. Attempts 20 have been made to shorten both the time and length of exterior carriers by the utilization of disk fans and other devices to create a more rapid cooling by increased air flow and increased velocity of flow.

One of the objects of my invention is to provide a more rapid form of cooling for metal lithographic sheets or coated sheets of any material that have been subjected to a baking or drying, 30 which cooling is provided adjacent to issuance from the oven or dryer.

Still another object of this invention is to provide a more efficient means of cooling coated sheets whereby a uniform cooling throughout the 35 sheets takes place with the minimum use of power consumed to provide the cooling effect.

Still another object of this invention is to provide a cooling means that will adequately and properly cool coated sheets in as compact a space 40 as possible.

Referring to the drawings:

Figure 1 is a view in elevation showing a part of one end of a dryer with the cooling device embodying the principles of my invention.

45 Figure 2 is a plan view of Figure 1.

Figure 3 is a plan view of a bank of chilling nozzles.

Figure 4 is a view of Figure 3 along the lines 4, 4, looking in the direction of the arrows showing the cross sectional construction of the nozzles.

50 Figure 5 is a view along the line 5, 5, of Figure 3, looking in the direction of the arrows.

As the metallic sheets issue from the dryer, they are warm and in most cases cannot be readily 55 handled or stacked due to their tacky condition

or softness of the coating. The sheets are closely spaced and it is essential to uniformly chill the plates to prevent distortion and to improve the surface of the coating as well as to cool them for handling.

In carrying out my invention, I propose upon 5 issuance from the dryer 1 to pass the plates 2 over a bank or series of specially constructed nozzles 3 which emit a thin ribbon of air co-extensive of the width of the metallic sheets. This 10 thin stream of high velocity air passes upwardly between the sheets and draws the surrounding atmospheric air with the stream or ribbon thereby surrounding the sheet or plate 2 with a moving body of relatively large volume. The 15 sheets or plates 2 themselves assist by functioning as stacks and the heat given off increases the natural stack effect. In addition, there is a gradation of velocities.

The specific structures of the nozzles 3, are 20 novel in that their design is based upon aerodynamic principles. The nozzles 3 extend from header 9 the width of the metallic sheets 2 in the form of stream line pipes 4 which emit a thin ribbon of air between the metallic sheets carried 25 by the wickets or fingerbars 5. The streamline pipes 4 are shaped internally and externally to avoid friction, eddying and other losses, in order that a relatively small amount of pressure air of high velocity will motivate a large volume 30 of room air to travel between the metallic sheets. A large amount of the room air is drawn from below and around streamline pipes 4. As the metallic sheet passes above each nozzle 3, a high velocity stream of the cooling air causes a complete scavenging of the space between the sheets 35 2 and rapidly removes all entrained warm air and substitutes cold air which in turn picks up the heat from the sheets. Thus, the great volume of moving air combined with the intermittent 40 velocity ribbons gives the most economical method of rapidly and uniformly cooling the sheets to give a proper finish and enable handling after drying. This method of high velocity ribbon cooling is adapted to other uses besides the chilling 45 of metal lithographic plates and various modifications may be made in connection with the details of my invention and still fall within the scope thereof. The streamline pipes 4 are shaped in a pear or teardrop contour 6, having 50 a restricted opening 7. The internal walls 8 converge to form the least resistance to the outlet of the high velocity air whereby the velocity may be maintained with the least frictional losses.

The plenum or pressure air is preferably cooled and conditioned to regulate the relative humidity therein and the temperature thereof. Such cooling and temperature humidity regulation can be
5 done in any of the well known ways for cooling and conditioning air. The rate of cooling of the sheets 2 is proportional to the temperature of the cooling medium and the volume of cooling
10 medium passing over the sheets 2. This is true in the case of uniform distribution. By my invention, I provide for uniform distribution in that the streamline pipes 4 extend the width of the sheets and are uniformly spaced with respect to the length of the cooling area.

15 With my invention, actual tests show that the nozzles 3 themselves require less than one-fifth of the air utilized, the balance being motivated by this air. In other words, the volume of the cooling medium passing over the sheets is more
20 than five times the required pressure air thereby increasing the cooling effect with increased efficiency.

What I claim is:

25 1. In a cooling device for cooling metallic plates, a carrier for said plates, a plurality of pipes formed with uniformly curved sides below said carrier, restricted, elongated openings in said pipes, means for supplying said pipes with high
30 pressure cold air, said pipes spaced apart and shaped to form stream line passages therebetween to permit room air to be drawn up between said pipes and to be motivated across the surfaces of the plates by the high pressure cold air emitted from said openings in said pipes.

35 2. The combination in a machine of the type

defined having means for supporting in uniformly spaced relationship a plurality of plates to be cooled and moving the same along a predetermined path, of an air blast device designed to co-
5 operate with the plates on said supporting means to produce a stack effect, said device having a series of uniformly spaced apart nozzles extending the width of the plates, and restricted mouths registering with the spaces between the plates,
10 said nozzles having symmetrically curved sides forming streamline passages therebetween, and a source of cool air supply connected with the nozzles and effective to eject air between the plates and draw a relatively larger quantity of room air into said spaces.

15 3. The combination in a machine of the type defined having means for supporting in uniformly spaced relationship a plurality of plates to be cooled and moving the same along a predetermined path, of an air blast device designed to
20 cooperate with the heated plates to produce a stack effect in the spaces between the plates, said device comprising a series of nozzles extending the width of said plates and having curved sides forming streamline passages between the nozzles
25 and connected with a system of cool air supply under pressure and operative to draw a relatively large quantity of room air into an intermixture injected into the spaces between the plates,
30 whereby the spaces between the plates are alternately subjected to high velocity thin scavenging air streams and low velocity relatively thick induced air streams.

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