

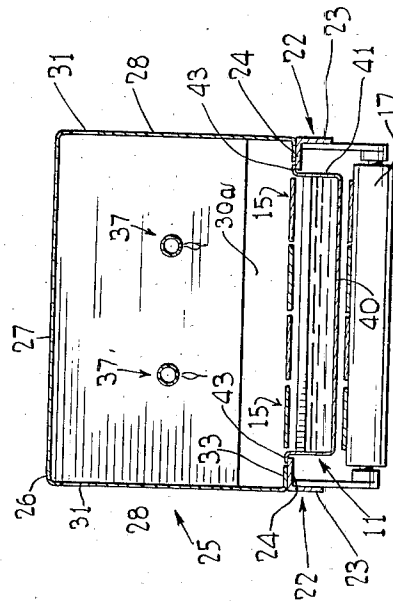
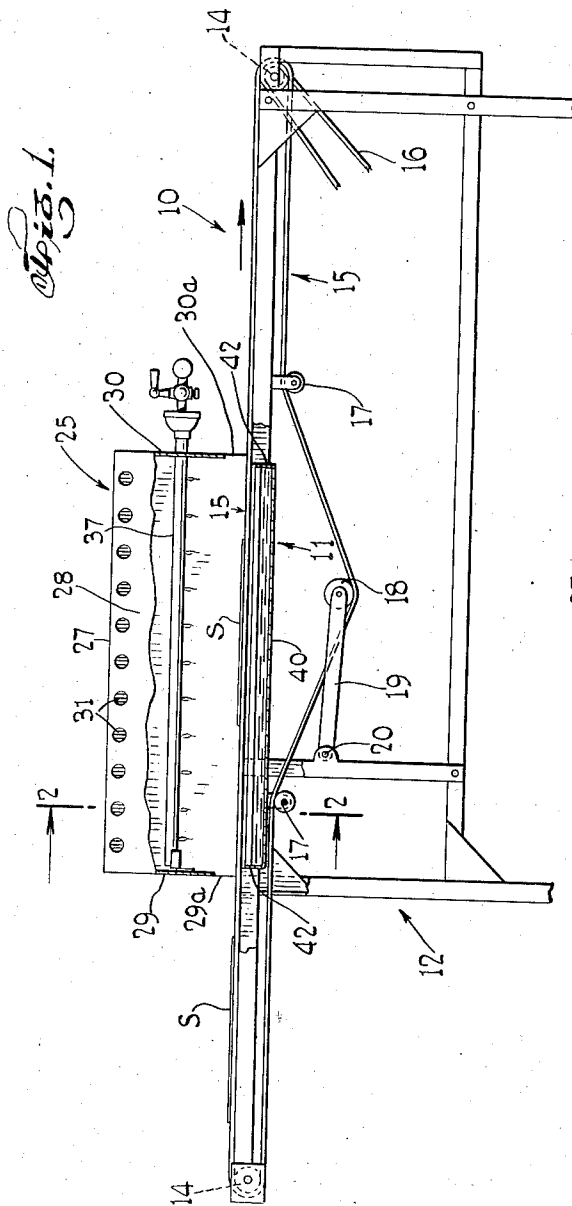
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APPARATUS FOR DRYING OR HEATING PRINTED OR ENGRAVED SHEETS

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APPARATUS FOR DRYING OR HEATING
PRINTED OR ENGRAVED SHEETS

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9 Claims. (Cl. 34—72)

This invention relates to apparatus for drying or heating printed or engraved sheets. It is particularly directed to improvements in drying machines used for drying engraved stationery. Machines of the type used for heating raised printing are known in the trade as "Thermograph machine" or "Virkotype machine," and the like machines.

In the case of the drying machine used for drying engraved stationery, the paper travels on a conveyor belt through an oven heated either by gas or electricity, and then out the other side where it is stacked preparatory to delivering it to the customer.

In the case of the Thermograph machine, the stationery is printed and then some powdered rosin is placed on top of the printed lettering. The stationery is then placed on a moving conveyor belt and it passes through an oven. The heat in the oven swells the rosin, so that it can be felt with the fingers. Thereafter, the sheet passes out into a stack where it is removed and packed for delivery to the customer.

It has been found that when stationery or other sheets are put through the oven in the machines of the type described above, a large amount of moisture content of the paper is removed by action of the heat on the paper. The removal of the moisture content from the paper causes several difficulties which may be enumerated as follows:

1. The paper has a tendency to become brittle.
2. The paper tends to pull and cockle, and in many cases, is very much out of flat.
3. The drying of the paper tends to change the color of the sheet slightly from its natural color.
4. When paper which has been put through the oven of the type described above, is folded, it sometimes tends to fold in an uneven line due to lack of moisture in the paper, and difficulties are encountered in the folding machine if the paper is put through such a machine.

It is therefore an object of the present invention to obviate these difficulties by preventing the removal of moisture from the paper as it passes through the oven or heating device.

A further object of this invention is to provide a pan of water underneath the conveyor belt of the drying machine or the Thermograph machine just below the oven or heating chamber. The pan of water is placed directly beneath the conveyor belt, and in such position that the heat of the oven causes evaporation and prevents drying out of the moisture content of the sheet.

Still a further object of this invention is to

provide a highly improved economical and simple method of adding moisture to the oven or heating chamber of a drying machine or Thermograph machine, to prevent the reduction of moisture content in the paper during such operation.

A still further object of this invention is to provide a compact and durable device of the character described, which shall be relatively inexpensive to manufacture, and yet practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the combination of steps, features of construction, combinations of elements, and arrangement of parts which will be exemplified in the apparatus and method hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawing, in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a side elevational view of drying machine embodying the invention;

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1.

Referring now in detail to the drawing, 10 designates a drying machine used in the engraved stationery manufacturing industry, and provided with a water pan 11, in accordance with the present invention.

The machine 10 has hitherto been made without the water pan 11. Said machine comprises generally a stand 12 carrying at its ends a pair of pulleys 14. Over the pulleys 14 is a belt 15 which may be in spaced sections as illustrated in the drawing. One of the pulleys 14 is connected to a drive belt 16 which may be rotated by an electric motor, not shown.

Contacting the underside of the bottom part of the belt 15 are a pair of spaced horizontal idler rollers 17. On the portion of the belt between the rollers 17 is a weighted roller 18 mounted on links 19 pivoted, as at 20 to the stand. The weighted roller 18 keeps the belt 15 taut. The stand 12 comprises parallel, horizontal angular shaped side members 22 each having a downwardly extending vertical wall 23 and an inwardly extending, horizontal wall 24. Mounted on the side members 23 is the drying oven 25. The oven 25 comprises a casing 26 having a top wall 27, side walls 28 and end walls 29 and 30. The side walls 28 may be formed with ventilating openings 31. Extending inwardly from the lower ends

of the side walls 28 are flanges 33 contacting walls 24 of side members 22.

The width of the casing 26 is substantially the same as the width of the stand, as shown in Fig. 2 of the drawing. The length of the casing is considerably less than the length of the stand. Thus, engraved sheets S may be fed to one end of the belt, and as the belt moves in the direction of the arrow shown in Fig. 1, the sheets are moved through the drying oven. The walls 29 and 30 of the oven are open at their lower ends, the openings being designated by numerals 29a and 30a to permit the printed or engraved sheets to pass therethrough.

Extending into the oven, are a plurality of longitudinal, horizontal gas burners 37 to supply heat to the oven for drying the ink on the sheets S.

In prior machines, it has been found that a large amount of moisture content is removed from the paper by the action of the heat on the paper as the latter moves through the oven causing the paper to become brittle, go out of flat, change color and making it difficult to evenly fold the paper. Means is therefore provided to add moisture in the vicinity of the paper so as to prevent reduction of moisture content in the paper as it passes through the oven.

To this end, the water pan 11 is fixed on the stand below the oven 25. The water pan 11 has a length substantially equal to the length of the oven. It has a bottom wall 40, side walls 41 and end walls 42. The pan is relatively shallow and is located between the top and bottom portions of the belt 15. At the upper end of the side walls 41 are outwardly extending flanges 43 which may engage the top of walls 24 of the side members. The water pan is open at the top, so that moisture therefrom passes upwardly freely, between the sections of the belt 15. As shown in the drawing, there are spaced between the sections 15 of the belt, so as to permit moisture to rise from the pan into the oven. In use the water pan is filled with water which is heated by gas heaters 37.

A number of advantages result from the use of the water pan 11, which may be enumerated as follows:

1. Since the action of the oven heats the water in the pan and vaporizes the same, the humidity of the sheets passing through the oven is maintained at a higher point than if the water was not present.

2. As a result of the high humidity in the vicinity of the paper passing through the oven, the paper does not dry out as much if there were no moisture present in the oven chamber.

3. As a result of the use of the water pan, the paper comes out of the oven flatter and with less curl or buckle.

4. As a result of the use of the water pan, the paper comes out of the oven with exactly the same color as it entered without any discoloration.

5. Since the water is a reflector of the heat waves, the use of the pan of water under the conveyor belt greatly assists in the effectiveness of the oven chamber, as far as heating is concerned. The rays of heat travelling downwardly are reflected back to the underside of the stationery and, consequently less gas is used for the drying operation in the case of engraved stationery or for heating operation in the case of "Thermography."

6. Due to the fact that the water beneath the conveyor belt is a reflector for heat waves, the effect of this water underneath the conveyor belt is to distribute heat evenly on the underside of

the sheet as well as on the top side of the sheet, thereby preventing the sheet of paper from curling due to action of heat on one side only, as when the water pan is not used.

Although the drawing shows a drying machine to illustrate the invention, it will be understood that the invention is equally applicable to a Thermograph machine, a dominant feature of the invention being the application of a water pan beneath the oven and beneath the conveyor belt to supply additional moisture to the oven during the drying or heating operation.

Furthermore electric heating means or other heating means may be substituted for the gas heaters 37.

The water pan or other water supply means may be disposed within the oven or in any position adjacent thereto, so that moisture therefrom will be supplied to the oven in the vicinity of the paper passing therethrough.

It will thus be seen that there is provided an apparatus and method in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a drying machine, a work receiving conveyor belt having passages therethrough, an oven over the belt, means to feed the conveyor belt through the oven, a heater located above the conveyor belt, a water pan within the oven and adjacent to and beneath the work carrying run of said belt, said water pan being opened at the top, said oven having inlets for fresh air and outlets for vitiated air.

2. In apparatus of the character described, a work receiving conveyor belt having passages therethrough, an oven comprising a casing over the belt, means to feed the conveyor belt through the oven, heating means within the oven and above the belt, and a water pan within the oven and adjacent to and beneath the belt, the length of the water pan being substantially equal to the length of the oven casing, said casing being provided with means to admit and discharge air.

3. In combination, a stand, a pair of pulleys supported by said stand, a sectional belt over the pulleys, an oven supported on said stand and over said belt, means to feed said belt through said oven, a heater over the upper run of said belt, and a water pan located between the top and bottom runs of said belt and adjacent the top run, said casing being provided with means to admit and discharge air.

4. In combination, a work receiving belt, a casing over the belt, a gas heater in the casing and above the upper run of the belt directing heat downward onto the belt, and a water pan located between the upper and lower runs of said belt and adjacent the top run.

5. In a drying machine, a work receiving conveyor belt having passages therethrough, a casing over said belt, means to feed the conveyor belt through the casing, a heater in the casing and above the upper run of the belt directing radiant rays downwardly onto the belt, and a water pan beneath and adjacent to the upper run of said

belt, said water pan being open at the top, said casing being provided with means to admit and discharge air.

6. In a drying machine, a work receiving conveyor belt, a casing over said belt, means to feed the conveyor belt through the casing, a heater in the casing and above the upper run of the belt directing radiant rays downwardly onto the belt, and a water pan beneath and adjacent to the upper run of said belt, said water pan being open at the top, said belt comprising spaced sections, said casing being provided with means to admit and discharge air.

7. In a drying machine, a work receiving conveyor belt, a casing over said belt, means to feed the conveyor belt through the casing, a heater in the casing and above the upper run of the belt directing radiant rays downwardly onto the belt, and a water pan beneath and adjacent to the upper run of said belt, said water pan being open at the top, said belt comprising spaced sections, the length of said water pan being substantially equal to the length of the casing, said casing being provided with means to admit and discharge air.

8. In a drying machine, a work receiving conveyor belt, a casing over said belt, means to feed the conveyor belt through the casing, a heater in the casing and above the upper run of the belt directing radiant rays downwardly onto the belt, and a water pan beneath and adjacent to the upper run of said belt, said water pan being open at the top, said belt comprising spaced sections, the length of said water pan being substantially equal to the length of the casing, said casing having inlets for fresh air and outlets for vitiated air.

9. In a drying machine, a work receiving conveyor belt, a casing over said belt, means to feed the conveyor belt through the casing, a heater in the casing and above the upper run of the belt directing radiant rays downwardly onto the belt, and a water pan beneath and adjacent to the upper run of said belt, said water pan being open at the top, said belt comprising spaced sections, the length of said water pan being substantially equal to the length of the casing, said casing having inlets for fresh air and outlets for vitiated air, said casing being open at the bottom.

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