April 12, 1960 W. ROSENBAUM 2,932,092

LOW TEMPERATURE WEB DRIER

Filed May 28, 1956 3 Sheets-Sheet 1

FIG.1

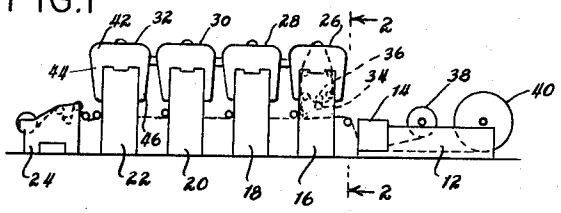


FIG.2

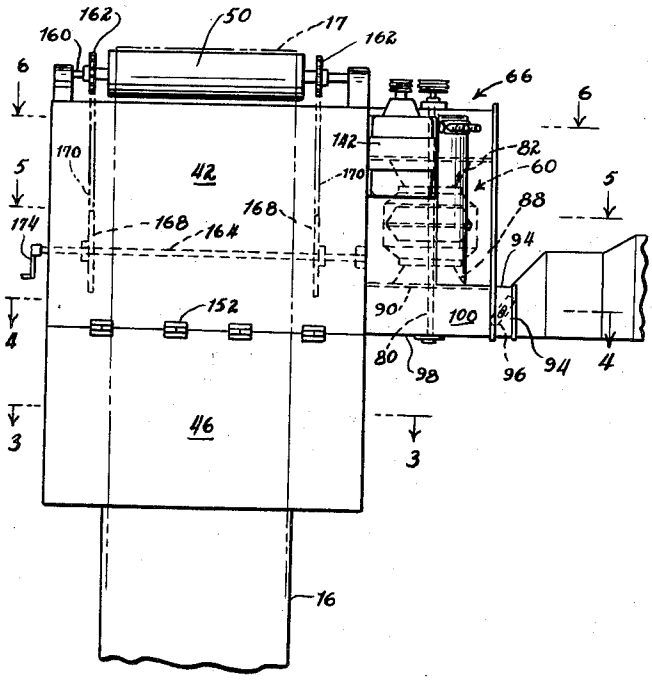


FIG.3

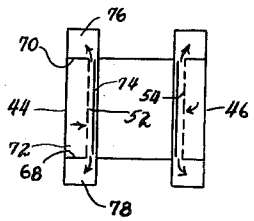


FIG.4

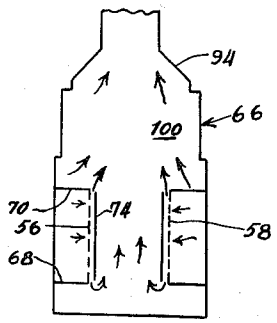


FIG.5

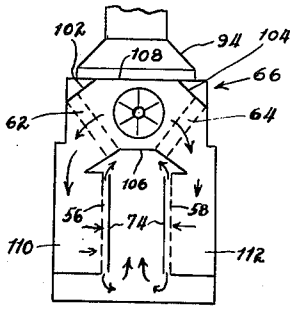
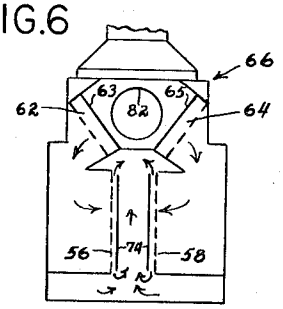


FIG.6



INVENTOR.
WERNER ROSENBAUM

BY James and Franklin

ATTORNEYS

April 12, 1960 W. ROSENBAUM 2,932,092

LOW TEMPERATURE WEB DRIER

Filed May 28, 1956 3 Sheets-Sheet 2

FIG.7

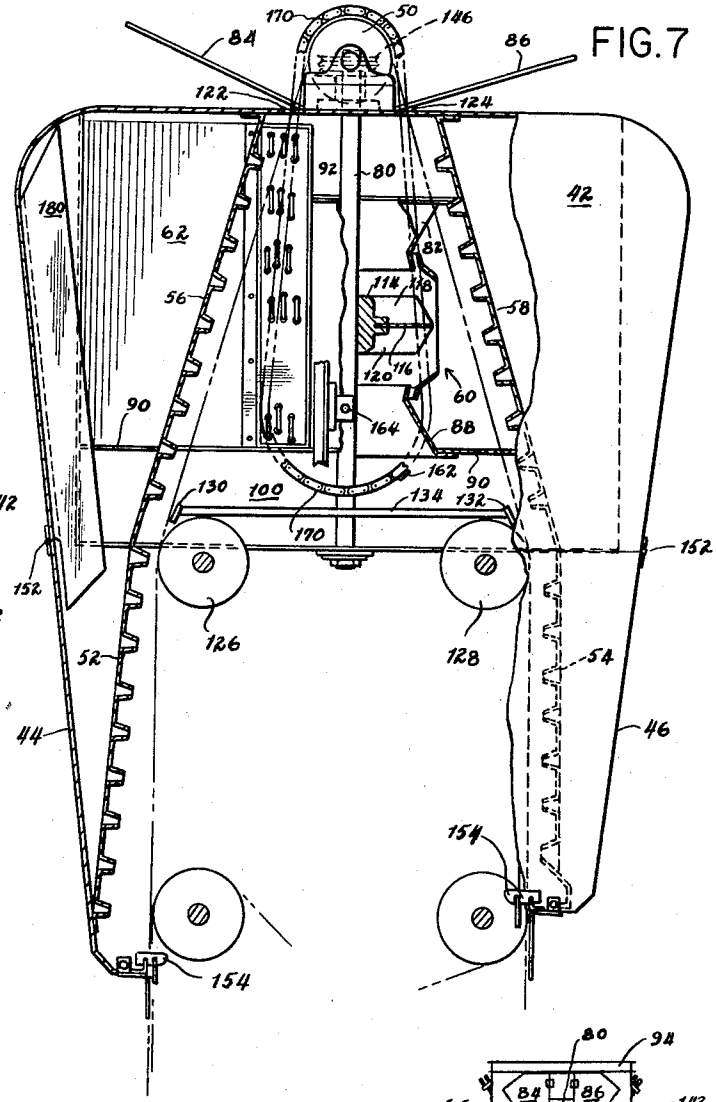


FIG.8

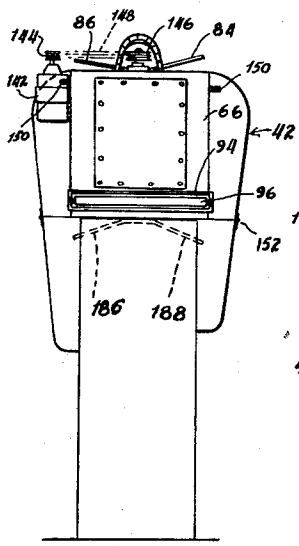


FIG.10

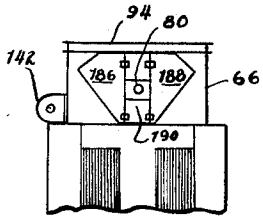
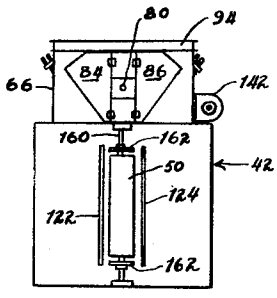


FIG.9



INVENTOR.
WERNER ROSENBAUM
BY James and Franklin
ATTORNEYS

April 12, 1960 W. ROSENBAUM 2,932,092

LOW TEMPERATURE WEB DRIER

Filed May 28, 1956 3 Sheets-Sheet 3

FIG. 11

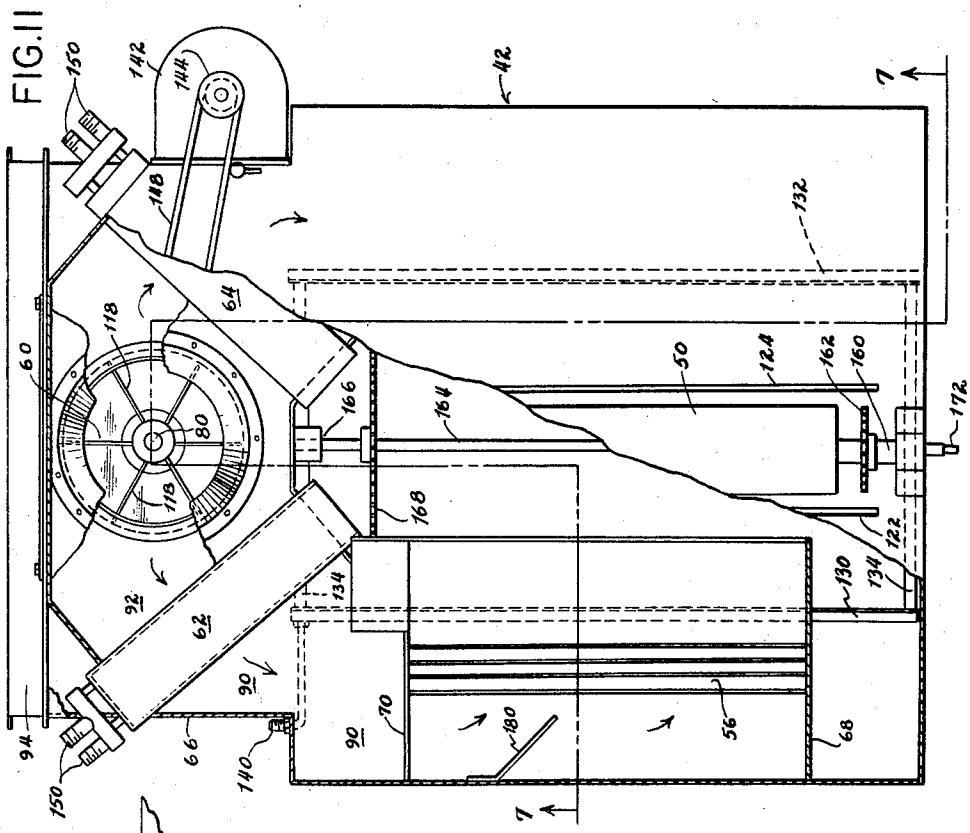


FIG. 12

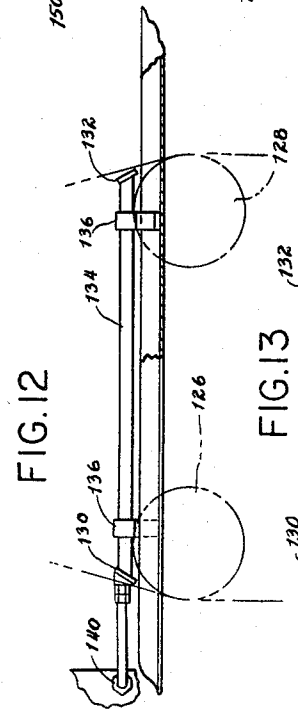


FIG. 13

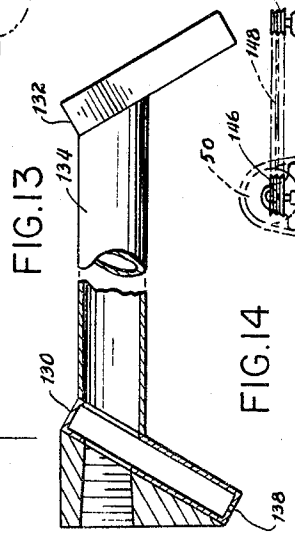
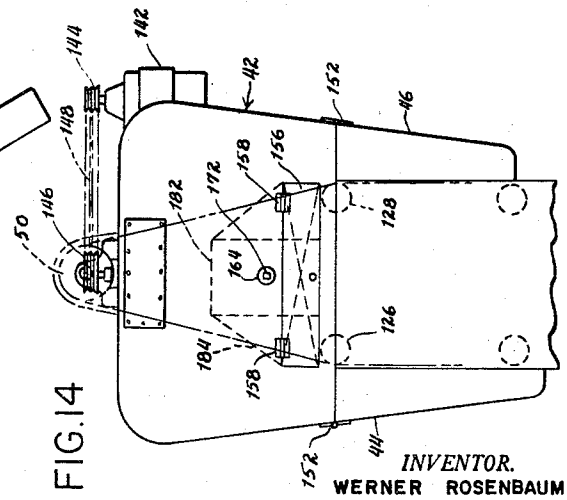


FIG. 14



INVENTOR.
WERNER ROSENBAUM

BY James and Franklin

ATTORNEYS

United States Patent Office 2,932,092 Patented Apr. 12, 1960

2,932,092

LOW TEMPERATURE WEB DRIER

Werner Rosenbaum, New York, N.Y., assignor to Champlain Company, Inc., Bloomfield, N.J., a corporation of New York

Application May 28, 1956, Serial No. 587,743

6 Claims. (Cl. 34—159)

This invention relates to driers for webs, especially for multi-color printing, and more particularly for a rapidly moving printed web which is to be dried rapidly but at low temperature.

The primary object of my invention is to generally improve driers for a moving web. A more particular object is to provide a drier which will operate effectively and rapidly at low temperatures. Such a drier may have advantages with any web material, but is of particular advantage with webs which may be injured if subjected to too high a temperature. One example is a wax laminated foil, which will delaminate if raised to too high a temperature. Another example is a web made of a plastics material such as polyethylene which will stretch excessively if overheated.

In accordance with the present invention the desired rapid drying action is obtained at a reduced temperature by substantially increasing the quantity of fresh air used for drying. The fresh air has none of the solvent being evaporated from the web. Recirculated or used air is already loaded with some solvent, and thus the relative humidity of the solvent is necessarily higher for the used air, therefore fresh air will provide maximum drying ability at any specified temperature. Accordingly, one object of the present invention is to provide a drier which will dependably introduce a predetermined large quantity of fresh air for mixture with some used or recirculated air.

Another object of the invention is to provide an increased area of web which is subjected to drying action within the drier. This might be done by spacing the printing units further apart along the print line, but that is undesirable because of the resulting increased floor space requirement. It would also be possible to raise the height of the drier hood above the printing press, but that too is undesirable because of limitations in ceiling height. Accordingly, a further object of the present invention is to increase the web area being dried without increasing the spacing of the printing units, and without raising the height of the drier.

In prior practice the air in the drier was recirculated by a fan. A part of the air was withdrawn by a duct system kept under suction (or under a pressure lower than that in the drier), and the withdrawn air was replaced by the admission of fresh air at a fresh air inlet. Suitable means such as dampers were employed to regulate the amount of exhaust, as an attempted measure of the ratio of fresh to used air. However, such a system is most uncertain in result. One may safely assume that the exhausted air is replaced by fresh air, but because some of the fresh air can be drawn into the exhaust duct, there is no way of assuring uniformity of the saturation of air circulating within the drier itself. A further object of the present invention is to overcome this difficulty, and to effectively prevent the fresh air from reaching the exhaust duct, thereby insuring that the latter receives solely used air.

In its passage through the drier the web runs on metal rollers. These are subjected to the temperature within the drier. During operation the web moves over the rollers too rapidly to reach the roller temperature, but on stoppage of the press the web remains stationary on the

rollers, and may be excessively heated thereby. A suitable interlock may instantly shut off the drier fan, but the metal rollers will retain heat for some time. Still another object of the present invention is to overcome this difficulty.

To accomplish the foregoing objects, and other more specific objects which will hereinafter appear, my invention resides in the drier elements, and their relation one to another, as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings, in which:

Fig. 1 represents a multi-color printing press line with driers;

Fig. 2 is an elevation of one of the driers, looking in the direction of the arrows 2—2 in Fig. 1;

Fig. 3 is a schematic horizontal section through the drier, taken approximately in the plane of the line 3—3 of Fig. 2;

Fig. 4 is a similar horizontal section through the drier, taken approximately in the plane of the line 4—4 of Fig. 2;

Fig. 5 is a similar horizontal section through the drier, taken approximately in the plane of the line 5—5 of Fig. 2;

Fig. 6 is a similar horizontal section through the drier, taken approximately in the plane of the line 6—6 of Fig. 2;

Fig. 7 is a vertical section taken approximately in the plane of the stepped line 7—7 of Fig. 11;

Fig. 8 is a rear elevation of the drier with the exhaust duct removed;

Fig. 9 is a plan view of the drier with the drive belt and pulley of the fan removed;

Fig. 10 is a bottom view of the fan enclosure;

Fig. 11 is a partially sectioned plan view of the drier, drawn to larger scale;

Fig. 12 is a detail showing cooling nozzles used temporarily when the web is stopped;

Fig. 13 shows the nozzles to larger scale; and

Fig. 14 is a front elevation of the drier.

Referring to the drawing, and more particularly to Fig. 1 a web to be printed is supplied from a web holder 12 from which the web is drawn by a suitable pull unit 14 and supplied to gravure multi color printing press units 16, 18, 20 and 22. The web is taken up in a suitable take-up unit 24, although it may equally well go to a punch press or/and slitting and cutting means and a stacker for sheets. The printing units are provided with individual driers indicated at 26, 28, 30 and 32. The printing action is performed between a gravure cylinder 34 and an impression roll 36, following which the web feeds upwardly and then downwardly through the drier and thence on to the next printing unit 18. The roll support 12 is preferably arranged to hold two rolls 38 and 40 in order to facilitate changing quickly from an exhausted paper roll to a new paper roll.

In Fig. 1 it will be noted that each drier comprises an inverted U-shaped hood disposed around the top of the press and having a top portion 42 (see the last drier) above the press, and leg portions 44 and 46 along the sides of the press. Heretofore the top portion 42 was employed as a housing for a circulating fan and for heat exchangers which were disposed directly over the printing press.

Referring now to Fig. 7 of the drawing, I provide a top roller 50 at the top of the drier, and nozzle plates for directing heated air against the web are provided not only in the leg portions 44 and 46, as shown at 52 and 54, but also in the top portion 42, with the nozzle plates preferably sloping toward one another and toward the top roller 50, as shown at 56 and 58.

Referring now to Figs. 2 and 11 of the drawing, the

fan, generally designated **60**, and the heat exchangers **62** and **64** (Fig. 11) are housed in an enclosure **66** which is mounted at one side of the top portion **42** of the drier and offset from the printing press line. This enables the entire height of the hood to be utilized for nozzle plates, as shown in Fig. 7, thus providing additional cooling area on the web without increasing the overall height of the drier.

In Fig. 2 it will be seen that the drier resembles the construction heretofore used in that the hood is wider than the printing press **16** (and the web **17** being handled thereby), or, as seen in Fig. 11, the hood is wider than the nozzle plate **56**. The hood has partitions **68** and **70** at the side edges of the nozzle plates to divide the hood into unused or hot air passages or plenum chambers outside the nozzle plates between the partitions, and used air passages within or between the nozzle plates and also alongside the nozzle plates. This will be explained in greater detail later, but as a preliminary example, in Fig. 3, which is a horizontal section through the leg portions **44** and **46** of the drier, the partitions **68** and **70** confine heated air to the space or plenum chamber **72** where it is directed through the nozzle plate **52** against the web **74**. The used air then flows laterally into the side portions **76** and **78** of the leg, where it can rise upwardly for recirculation or exhaust.

Referring now to Figs. 2 and 7 of the drawing, I employ a double-ended or double inlet fan **60**, the shaft **80** of which is disposed vertically. One inlet, the upper inlet **82**, is connected for fresh air intake exclusively, and this is provided through the top of the offset enclosure **66** through raised hinged doors indicated at **84** and **86** in Figs. 7, 8 and 9. The other fan inlet indicated at **88** (Fig. 2) is connected to the used air passages of the hood and thus receives air which has already passed through the nozzle plates. The heat exchangers **62** and **64** (Fig. 11) are disposed between the fan outlet and the hot air passages or plenum chambers leading to the nozzle plates, and there are suitable partitions, primarily horizontal partitions **90** and **92** disposed adjacent the bottom of the heat exchangers to insure that the fan discharge can go only to and through the heat exchangers and thence solely to the nozzle plates. There is also an exhaust duct **94** (Figs. 2, 4 and 5) which communicates with the used air passages of the hood, and which preferably includes a damper **96** (Figs. 2 and 8). The bottom fan inlet **88** is connected to the horizontal partition **90**, which is disposed somewhat higher than the bottom **98** of the enclosure **66**. The exhaust duct **94** communicates with the resulting bottom region of the enclosure below the horizontal partition **90**.

Referring now to Fig. 4, which is a horizontal section taken through the bottom portion of the enclosure **66**, it will be seen that the vertical partitions **68** and **70** confine the heated air to the plenum chambers and nozzle plates **56** and **58**, but that the used air is free to flow to the bottom portion **100** of the enclosure **66** and thence to the duct **94**. It is also free to rise upward through the bottom inlet **88** (not shown in Fig. 4) of the fan.

In Fig. 5, which is a horizontal section above the partition **90**, through the fan rotor, it will be seen that the fan is located in a six-sided prismatic region defined by the heat exchangers **62** and **64**, vertical walls **102**, **104** and **106**, and the outer wall **108** of the offset enclosure **66**. Thus the fan discharge has nowhere to go except through the heat exchangers **62** and **64**, and thence to the hot air passages or plenum chambers **110** and **112** outside the nozzle plates **56** and **58**. The air leaving the heat exchangers is partly fresh air, and partly used air which has been reheated. For convenience this description differentiates between "hot air" passages and "used air" passages, in the sense that hot air has been heated preparatory to use on the web, and has not yet been used for that purpose since its last heating, whereas used air is air which has already been directed against the web and will either be exhausted, or, if reused, will first be reheated before being ready for reuse.

Fig. 6 is a horizontal section taken near the top of the offset enclosure **66**, and shows the top fan inlet at **82**. Here again the six-sided polygonal outline divides the upright fan from the heat exchangers. The latter are blocked at **63** and **65**, that is, their inner faces, to prevent return flow. In the region of Figs. 5 and 6 the used air may flow between the webs **74** within the nozzle plates **56** and **58** toward the fan compartment, but then flows downward to the bottom of the offset enclosure **66**, that is, to the region **100** shown in Figs. 2, 4 and 7.

In general, the arrangement is such that fresh air cannot reach the exhaust duct **94** without first passing through the upper fan inlet **82**, the fan **60**, and thence through the heat exchangers **62** and **64**, and then through the nozzle plates where it is directed against the web. Differently expressed, the arrangement precludes fresh air from bypassing the heat exchangers and the nozzle plates. Conversely, the used air leaving the nozzle plates and web cannot gain access to the upper fan inlet **82**. It can reach either the lower fan inlet **88** or the exhaust duct **94**. The amount of air exhausted may be controlled by suitable means, including the damper **96**, and a remote exhaust fan, not shown. The exhausted air is necessarily replaced by fresh air, but the fresh air can enter only at the top fan inlet. Thus the system as a whole definitely fixes the ratio of fresh air to used air, in the hot air mixture, and permits this ratio to be made quite large, say 50% or more.

Referring to Fig. 7 of the drawing, the fan rotor comprises a hub **114** carrying an annular plate **116** acting as a divider between upper blades **118** and lower blades **120**. In the present case the fan is perfectly symmetrical, and the plate **116** divides the rotor into two equal halves, so that in effect the fan may be considered to be two similar fans disposed back to back. The upper fan handles fresh air exclusively, and the lower fan handles recirculated or used air exclusively. It is believed that the dividing plate **116** is not essential, and that the operation would be substantially the same even without the plate **116**, reliance then being had on the symmetrical construction to produce substantially the same result. However, the plate **116** is anyway desired for structural reasons, and it does help to more definitely fiix the divided action of the double-ended fan.

The top roller **50** is disposed above the top of the drier hood. This is done even though it necessitates the provision of slots at **122** and **124** (Fig. 9) for passage of the web to the roller **50**. Putting the roller outside the hood slightly increases the nozzle area, but the main reason for elevating the roller is to let it run cool instead of hot. During operation the web travels at high speed and is in contact with the roller only momentarily, but if the press is stopped for any reason the web remains in contact with the roller, and a hot roller will tend to injure a web which must be kept at low temperature.

The next lower guide rollers **126** and **128** (Fig. 7) are necessarily inside the hood, and become hot. To avoid difficulty in the event of shutdown I provide compressed air nozzles, indicated at **130** and **132** and connected by a cross pipe indicated at **134**. These blow cold air for a short time between the web and the roller, and thus serve to separate the web from the roller, as well as to cool both. The nozzles **130** and **132** are shown in greater detail in Figs. 12 and 13. They are rectangular in section, and preferably are connected at both ends by cross pipes **134**, which serve also to mount the nozzles in position, as by means of brackets **136** secured to the walls of the hood. The bottom edge of each nozzle is provided with small spaced perforations **138**. The nozzles and connecting pipes form a rectangle, as will be seen in Fig. 11, with an outside connection at **140**.

to a compressed air supply which ordinarily is available in a printing plant. The air pressure may be, say, 80 lbs. per square inch. The compressed air is used for only a few minutes immediately on shutdown of the press for any reason, and it is not used during operation of the press. There is an electrical interlock, not shown, whereby shutting down of the press automatically opens a solenoid operated air valve to supply the compressed air for a predetermined time period, and when the time runs out the valve is automatically closed. An interlock also shuts off the fan **60**.

Referring now to Figs. 11 and 14, the fan motor is indicated at **142**. It is mounted with its shaft parallel to the fan shaft, and the two are operatively connected, as, for example, by a V belt and pulley drive. In the present case there is a double V pulley **144** on the motor and a double V pulley **146** at the upper end of the fan shaft, these being connected by V belts **148**, (omitted in Figs. 2 and 9).

Pipe connections for the heat exchangers are provided outside the fan enclosure, indicated at **150** in Fig. 11.

The leg portions **44** and **46** (Figs. 7 and 14) of the hood are hinged to the top portion **42** of the hood at **152**. They may be swung outwardly after releasing latches **154** (Fig. 7), thereby facilitating the threading of a web through the drier. This threading operation is aided by the access door **156** (Fig. 14) hinged at **158**, which is located at the ends of the rollers **126**, **128**. The top roller **50** would still provide some difficulty because of its height, and to facilitate threading the web I provide a sprocket chain mechanism next described.

The top roller **50** (Fig. 11) turns freely on a stationary shaft **160**. On the same shaft **160** sprocket wheels **162** (Fig. 9) are mounted, one at each end of roller **50**, and also are freely rotatable on the stationary shaft **160**. Within the hood directly below the roller **50** a shaft **164** (Figs. 2, 7 and 11) is mounted in bearings secured at the sides of the hood itself. One of these bearings is shown at **166** in Fig. 11, and it will be seen that shaft **164** does not pass through the fan enclosure. Shaft **164** carries sprocket wheels **168** which, in the present case, are substantially larger in diameter than the top sprocket wheels **162**. Chains **170** (Fig. 7) run about the sprocket wheels and carry the ends of a threading bar **162** which extends parallel to the shaft **164**. The bar **162** is provided with means to grip the end of a new web. Shaft **164** projects out of the hood at one end, and has a squared end **172** (Figs. 11 and 14) to receive an operating crank. This crank is schematically indicated at **174** in Fig. 2, and by passing the end of a web over roller **128** (Fig. 7), and securing it to bar **162**, the crank and chain system may be used to carry the web up and around the top roller **50** and then down to a point near the roller **126**, where the end of the web may be detached from the bar and passed around roller **126**. The legs **44** and **46** of the hood are turned up at this time to facilitate handling the web.

The sloping surface indicated at **180** in Figs. 7 and 11 is merely a deflecting vane to help guide the heated air leaving the exchanger **62** against the nozzle plate **56**. A similar deflector is provided on the opposite side of the hood.

The connection to the exhaust duct system of the printing plant is made at the rectangular opening **94** previously mentioned, the said opening being shown in Fig. 8, and being disposed approximately opposite the access door **156** shown in Fig. 14. A rectangular duct connection is provided at this point, as shown at **94** in Figs. 2, 8 and 11, and the damper **96** is located at this point. In most cases the duct itself will be more nearly square in section, as indicated in dotted lines at **182** in Fig. 14. A sloping part **184** may provide the transition from the rectangular opening to the square duct, and this transition is indicated in Fig. 2.

The operating temperature of ordinary driers is about 170° F. The present drier operates efficiently at a drying temperature of only 130° F. Provision is also made for the supply of still more fresh air in the event that a still lower operating temperature is desired. This is done by the rather simple expedient of providing doors at the bottom of the fan enclosure, similar to the doors **84**, **86** previously described as located at the top of the fan enclosure. Fig. 10 is a bottom plan view of the fan enclosure, and it will be seen that the construction is substantially the same as that at the top shown in Fig. 9. There are doors **186** and **188** (Fig. 10) hinged along the edges of a stationary center part **190** which carries the lower bearing for the fan shaft **80**. These bottom doors, like the top doors, outline the polygonal shape of the fan enclosure, and when opened admit fresh air to the bottom fan inlet, thus adding to the fresh air normally admitted by the top doors to the top fan inlet. The open position of the bottom doors is indicated in broken lines in Fig. 8. In such case the ratio of fresh to used air is less positively determined, because the bottom fan inlet is in communication with the exhaust duct, but the ratio is more definite than in an ordinary drier because any indefiniteness applies to only a fraction of the fresh air instead of to all of it. Moreover, in all ordinary operating circumstances as now planned, the bottom doors remain closed, and adequate fresh air is available through the top doors alone.

The particular fan here illustrated is a Sturtevant double width double inlet design. The motor is an explosion-proof motor running at 3600 r.p.m., but the fan speed is reduced to 2100 r.p.m. The heat exchangers are four row exchangers, also made by Sturtevant. The damper in the exhaust duct is made by Parker Kalon, and turns on a horizontal shaft.

The nozzle plates have thirty-four nozzles, each extending across the width of the plate, and each having an opening of 0.165". The openings may be given a nozzle shape as explained in greater detail in Caulfield Patent 2,554,239 issued May 22, 1951.

It is believed that the construction and operation of my improved low-temperature drier, as well as the advantages thereof, will be apparent from the foregoing detailed description. The drier will take care of a printed web running at high web speed, although operating at a low temperature which is safe for webs sensitive to elevated temperature. This is done by the provision of an increased amount of fresh air, and by accurately and dependably maintaining a desired fresh air ratio. Moreover, the area subjected to drying is increased without, however, increasing the overall height of the drier, and without increasing the spacing between successive printing units.

It will be apparent that while I have shown and described my invention in a preferred form, changes may be made in the structure shown, without departing from the scope of the invention, as sought to be defined in the following claims. In the claims the term "hot air" refers to the air prior to its delivery to the web. The term "used air" refers to the air after its delivery to the web. This is done for convenience in having short simple terminology, although in fact the "hot air" includes some used air as well as fresh air, and the "used air" is still hot after delivery to the web, although not as hot as before delivery to the web.

I claim:

1. A drier for a gravure press, said drier comprising an inverted U-shaped hood disposed around the top of the press and having a top portion over the press and leg portions along the sides of the press, nozzle plates in the leg portions and in the top portion, said hood being wider than said nozzle plates and having partitions at the side edges of the nozzle plates to divide the hood into hot air plenum chambers outside the nozzle plates,

and used air passages within and alongside the nozzle plates, a fan inlet, means connecting said fan inlet to a fresh air intake exclusively, another fan inlet communicating with the used air passages, heat exchanger means disposed between the fan outlets and the hot air plenum chambers leading to the nozzle plates, and an exhaust duct communicating with the used air passages, the arrangement being such as to preclude fresh air from bypassing the heat exchanger means and nozzle plates.

2. A drier for a gravure press, said drier comprising an inverted U-shaped hood disposed around the top of the press and having a top portion over the press and leg portions along the sides of the press, nozzle plates in the leg portions and in the top portion, said hood being wider than said nozzle plates and having partitions at the side edges of the nozzle plates to divide the hood into hot air plenum chambers outside the nozzle plates, and used air passages within and alongside the nozzle plates, a double inlet fan, means connecting one of the fan inlets to a fresh air intake exclusively, the other of said inlets being connected to the used air passages for recirculating air which has already passed through the nozzle plates, a heat exchanger disposed between the fan outlet and the hot air plenum chambers leading to the nozzle plates, an exhaust duct communicating with the used air passages of the hood and incidentally with the second of said fan inlets, the arrangement being such as to preclude fresh air from by-passing the heat exchanger and nozzle plates.

3. A low temperature drier for a gravure press, said drier comprising an inverted U-shaped hood disposed around the top of the press and having a top portion over the press and leg portions along the sides of the press, nozzle plates in the leg portions and in the top portion, said hood being wider than said nozzle plates and having partitions at the side edges of the nozzle plates to divide the hood into hot air plenum chambers outside the nozzle plates, and used air passages within and alongside the nozzle plates, a symmetrical double inlet fan, means connecting one of the fan inlets to a fresh air intake exclusively, doors at said intake to regulate the amount of fresh air intake, the other of said inlets being connected to the used air passages for recirculating air which has already passed through the nozzle plates, one or more heat exchangers disposed between the fan outlet and the hot air plenum chambers leading to the nozzle plates, partitions in said hood directing the fan discharge to the hot air plenum chambers exclusively, an exhaust duct communicating with the used air passages of the hood and incidentally with the second of said fan inlets, a damper to regulate the exhaust air, the arrangement being such that fresh air cannot reach the exhaust duct without first passing through a heat exchanger and a nozzle plate.

4. A drier for a gravure press, said drier comprising an inverted U-shaped hood disposed around the top of the press and having a top portion over the press and leg portions along the sides of the press, a top web roller disposed near the top of the top portion, nozzle plates in the leg portions, and nozzle plates in the top portion leading to a top roller, said hood being wider than said nozzle plates and having partitions at the side edges of the nozzle plates to divide the hood into hot air plenum chambers outside the nozzle plates, and used air plenum chambers within and alongside the nozzle plates, a fan and heat exchanger enclosure mounted at one side of the top portion and offset from the printing press line so that the height of the hood may be utilized for nozzle plates, a first fan inlet connected to a wall of the enclosure, a second fan inlet communicating with the used air passages, heat exchanger means disposed between the fan outlets and the hot air plenum chambers of the hood, whereby the fan discharge is directed to the nozzle plates exclusively, and an exhaust duct communicating with the used air passages, the arrangement being such that fresh air cannot reach the exhaust duct without first passing through a heat exchanger means and a nozzle plate.

5. A drier for a gravure press, said drier comprising an inverted U-shaped hood disposed around the top of the press and having a top portion over the press and leg portions along the sides of the press, a top web roller disposed near the top of the top portion, nozzle plates in the leg portions, and nozzle plates in the top portion leading to the top roller, said hood being wider than said nozzle plates and having partitions at the side edges of the nozzle plates to divide the hood into hot air passages outside the nozzle plates, and used air passages within and alongside the nozzle plates, a fan and heat exchanger enclosure mounted at one side of the top portion and offset from the printing press line so that the entire height of the hood may be utilized for nozzle plates, a double inlet fan in said enclosure, means connecting one fan inlet to a wall of the enclosure for fresh air intake exclusively, means connecting the other inlet of said fan to a horizontal partition disposed somewhat higher than the bottom of said enclosure and the resulting bottom portion communicating with the used air passages, a heat exchanger in said enclosure between the fan outlet and the hot air passages of the hood, whereby the fan discharge is directed to the nozzle plates exclusively, and an exhaust duct communicating with the aforesaid bottom portion of the enclosure below said horizontal partition, the arrangement being such that fresh air cannot reach the exhaust duct without first passing through the fan and heat exchangers and nozzle plates.

6. A low temperature drier for a gravure press, said drier comprising an inverted U-shaped hood disposed around the top of the press and having a top portion over the press and leg portions along the sides of the press, a top web roller disposed above the top portion, nozzle plates in the leg portions, and nozzle plates in the top portion sloping toward one another and toward the top roller, said hood being wider than said nozzle plates and having partitions at the sides of the nozzle plates to divided the hood into hot air passages outside the nozzle plates, and used air passages within and alongside the nozzle plates, a fan and heat exchanger enclosure mounted at one side of the top portion and offset from the printing press line so that the entire height of the hood may be utilized for nozzle plates, a symmetrical double inlet fan with upright shaft in said enclosure, means connecting the top fan inlet to doors in the top wall of the enclosure for fresh air intake exclusively, means connecting the bottom inlet of said fan to a horizontal partition disposed somewhat higher than the bottom of said enclosure and the resulting bottom portion communicating with the used air passages, heat exchangers disposed vertically in said enclosure above said horizontal partition on each side of the fan between the fan outlet and the hot air passages of the hood, whereby the fan discharge is directed to the nozzle plates exclusively, an exhaust duct communicating with the aforesaid bottom portion of the enclosure below said horizontal partition, and damper means in said exhaust duct to regulate the exhaust air, the arrangement being such that fresh air cannot reach the exhaust duct without first passing through the fan and heat exchangers and nozzle plates.

References Cited in the file of this patent

UNITED STATES PATENTS

2,225,505	Offen	Dec. 17, 1940
2,228,030	Hanson	Jan. 7, 1941
2,328,078	Kugler	Aug. 31, 1943
2,333,220	Weiss	Nov. 2, 1943
2,554,239	Caulfield et al.	May 22, 1951

FOREIGN PATENTS

497,773	Great Britain	Dec. 28, 1938