Dec. 20, 1955 B. OFFEN 2,727,317

COOLING MECHANISM FOR WEB SUPPORTING ROLLERS OF DRYERS

Filed April 16, 1953 2 Sheets-Sheet 1

FIG. 1

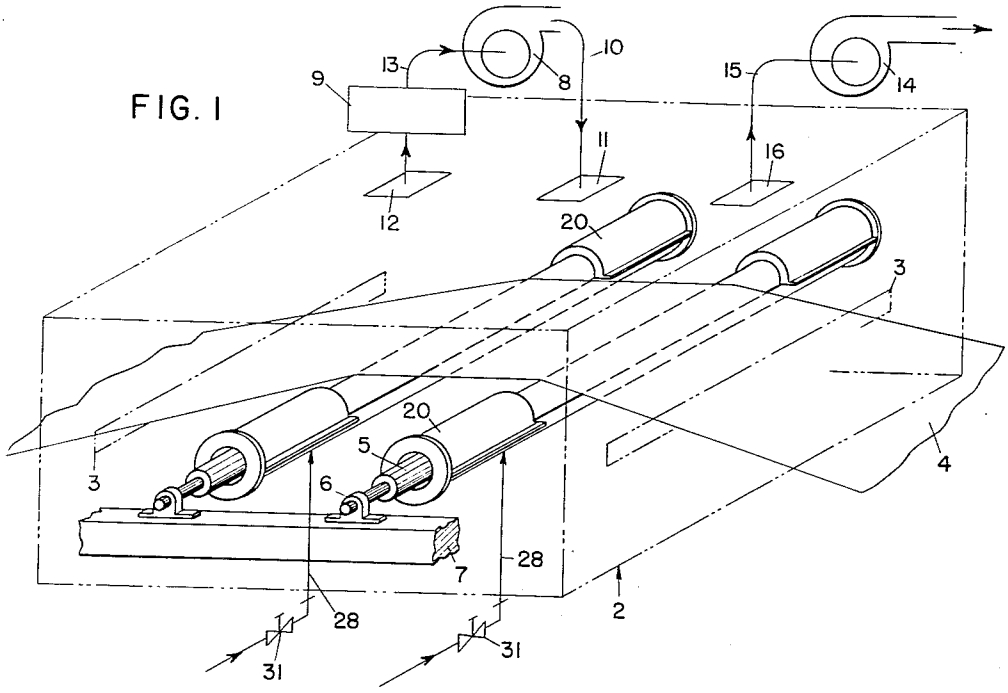
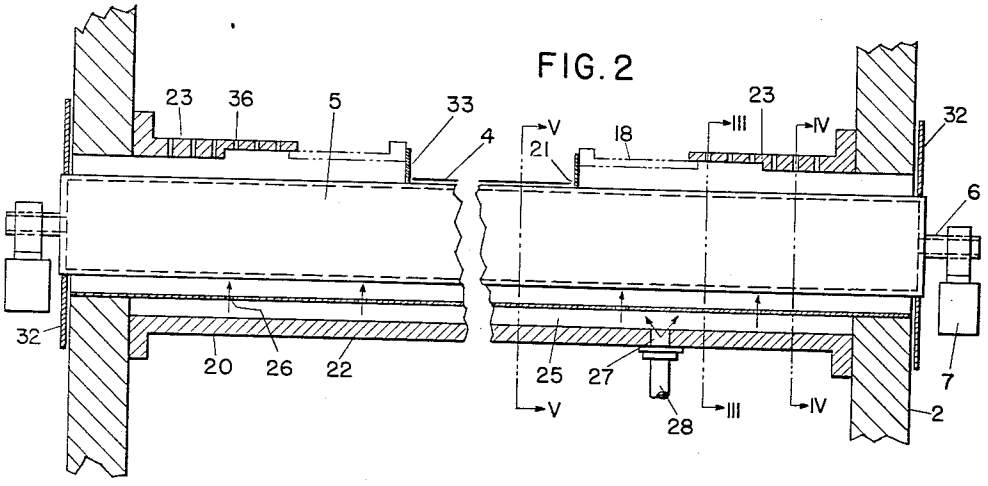


FIG. 2



INVENTOR.

Bernard Offen

BY Hamilton, atty

Dec. 20, 1955 B. OFFEN 2,727,317

COOLING MECHANISM FOR WEB SUPPORTING ROLLERS OF DRYERS

Filed April 16, 1953 2 Sheets-Sheet 2

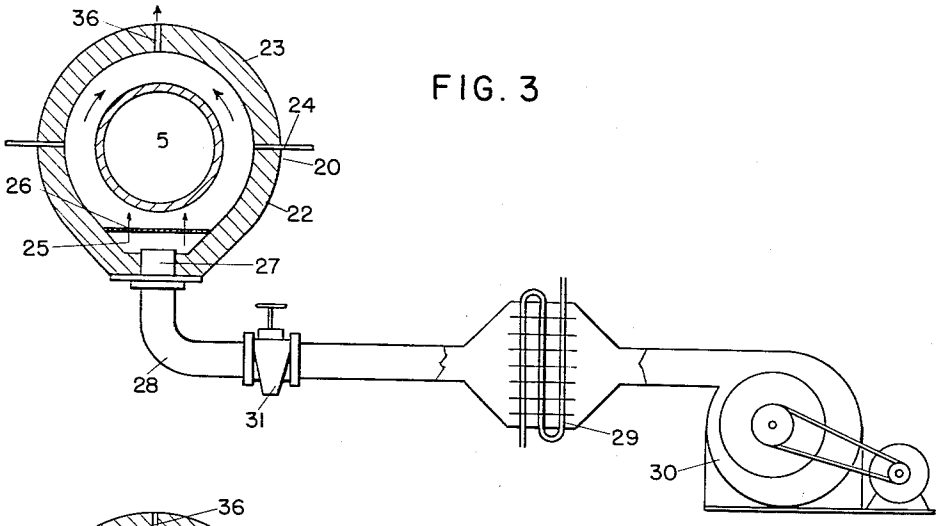


FIG. 3

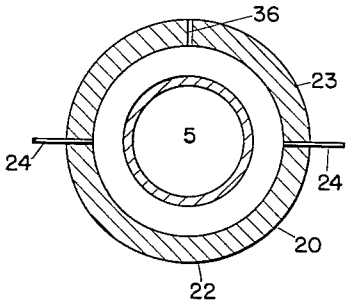


FIG. 4

FIG. 5

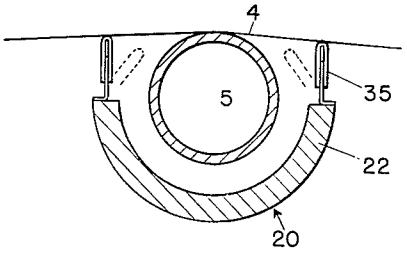
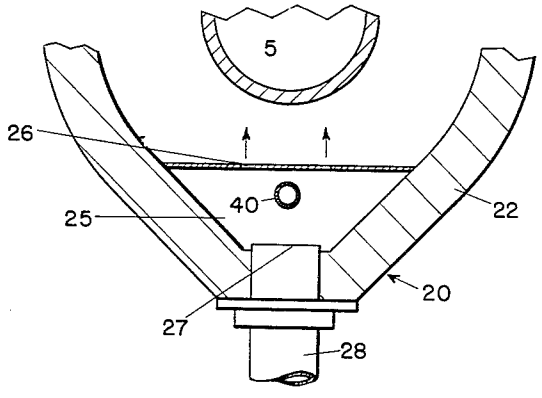


FIG. 6



INVENTOR.
Bernard Offen
BY
Herman Seid, atty.

United States Patent Office 2,727,317
Patented Dec. 20, 1955

2,727,317

COOLING MECHANISM FOR WEB SUPPORTING ROLLERS OF DRYERS

Bernard Offen, Chicago, Ill.

Application April 16, 1953, Serial No. 349,255

13 Claims. (Cl. 34—155)

This invention relates to dryers for drying webs and, more particularly to a dryer containing web supporting rollers having means for cooling at least the greater portion of the exterior surfaces of the rollers.

The chief object of the present invention is to provide a dryer for printed or coated webs containing a web supporting roller having means for removing heat from the exterior surface of the roller.

An object of the present invention is to provide a web supporting roller for use in dryers for printed or coated webs which includes means for cooling at least the greater portion of the exterior surface of the roller to a temperature below the temperature of the air within the dryer.

A further object is to provide a web supporting roller for use in dryers for printed or coated webs surrounded by an enclosure forming an air chamber about the roller while permitting the roller to support the web, cooled air being passed into the chamber to form a blanket of cooled air about the greater portion of the exterior surface of the roller thereby maintaining the roller at a desired temperature below the temperature maintained in the dryer. Other objects of the invention will be readily perceived from the following description.

This invention relates to a dryer for drying webs comprising, in combination an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller placed in the enclosure, a second enclosure about the roller having an opening therein to permit the web to rest on the roller during its passage through the dryer, and means for cooling the exterior surface of the roller.

This invention further relates to a web supporting roller having an enclosure thereabout, the enclosure having an opening therein to permit the web to rest on the roller, said enclosure maintaining a blanket of cooled air adjacent at least the greater portion of the exterior surface of the roller to cool the same.

This invention further relates to a method of cooling a web supporting roller disposed in a heated enclosure in which the steps consist in surrounding the greater portion of the exterior surface of the roller with a blanket of cooled air and continually replenishing the cooled air while permitting leakage of the cooled air into the heated enclosure as a web is drawn over the roller.

The attached drawings illustrate a preferred embodiment of the invention, in which:

Figure 1 is an isometric view of a dryer for printed or coated webs containing the web supporting roller of the persent invention;

Figure 2 is a sectional view of a web supporting roller provided with cooling mechanism for the exterior surface of the roller;

Figure 3 is a sectional view taken on the line III—III of Figure 2;

Figure 4 is a sectional view taken on the line IV—IV of Figure 2;

Figure 5 is a sectional view taken on the line V—V of Figure 2; and

Figure 6 is a sectional view of a modification of the invention.

Referring to the attached drawings, there is shown a dryer for printed or coated webs including an enclosure 2 forming a drying chamber provided with openings 3 in its walls to permit passage of a web 4 to be dried through the chamber. Web supporting rollers 5 extend across the drying chamber, the web 4 resting on the rollers during its passage through the chamber. Preferably, rollers 5 are hollow, for a purpose hereinafter explained, and are free idling, thus eliminating mechanical drives. Bearings 6 of the rollers 5 extend through the walls of the enclosure 2 and are supported by frames 7 mounted on the walls of the enclosure.

A fan 8 is provided to supply heated air to enclosure 2, fan 8 passing the air through a heating member 9 and duct 10 to an inlet 11 in the enclosure. Fan 8 withdraws air from the enclosure through outlet 12 and duct 13, thereby continuously recirculating heated air within the enclosure to dry the coated or printed web.

If desired, an exhaust fan 14 may be provided, connected by duct 15 to an outlet 16 of enclosure 2 to withdraw fumes and air from the enclosure.

Enclosures 20 are provided, supported by the walls of the enclosure 2 and surrounding each of the rollers 5. Each enclosure 20 contains an opening 21 which permits the web 4 to rest upon roller 5 during its passage through the drying chamber. The enclosure may be in the general form of a cylinder or tube surrounding roller 5 and includes a semi-circular base member 22 extending longitudinally of the roller. Spaced, semi-circular end members 23 cooperate with member 22 to form the cylinder or tube. Seals 24 are placed between members 23 and member 22, the members 23 being attached to member 22 by suitable means such as bolts (not shown). If desired, hinged connections may be employed. Preferably, end members 23 are telescopic as shown at 18 in Figure 2 to permit suitable adjustment of length thereby varying the width of the web opening 21 to accommodate various web sizes.

An air chamber 25 extends longitudinally of base member 22 adjacent roller 5. Openings 26 are formed in chamber 25 to distribute air from the chamber adjacent the roller for the full length of the enclosure. An inlet 27 is provided in the chamber 25, inlet 27 being connected by a duct 28 to a cooling coil 29 of any desired type and a fan 30. Fan 30 forwards air through coil 29 to cool the same to a desired degree and through duct 28 to the inlet 27 of chamber 25, the cooled air being discharged from the chamber through openings 26 adjacent the exterior surface of the roller. If desired, a valve or damper 31 may be placed in duct 28 to regulate air pressure in chamber 25.

Seals 32 are provided without the walls of enclosure 2 to seal enclosure 20 thus preventing air leaking from enclosure 20 into the room in which the dryer is placed. Seals 33 are supported by the inner edges of end members 23 adjacent the web opening 21 to prevent air from enclosure 20 blowing on web 4 during its passage over roller 5.

It is preferred to enclose the roller at the place where the web passes over the roller. For this purpose, seal members 35 are provided, such members extending longitudinally of roller 5 and being mounted on base member 22 of enclosure 20. Members 35 preferably are adjustable longitudinally and laterally to vary the space between the enclosure and the web 4 as well as to provide variable spacing between the edge of the enclosure and the web.

Preferably, openings 36 are provided in end members 23 of enclosure 20 to effect release of air from the enclosure, such released air passing into the dryer enclosure 2. If desired, enclosure 20 may be insulated to aid in assuring that roller 5 is not heated excessively by heated air in the dryer enclosure 2.

If desired, a heating or cooling medium may be passed through the hollow roller 5 to provide desired control of the roller temperature.

The enclosure 20 aids in cooling the exterior surface of roller 5 by insulating or partially isolating the roller from the heated air within the dryer enclosure as well as by providing a cooled air discharge adjacent the exterior surface of the roller.

Under some circumstances, it may be desired to heat the roller and in such case suitable heating means may be substituted for the cooling coil. If desired, the cooling coil or heating means may be thermostatically controlled thus providing desired air temperature in accordance with requirements.

Considering the operation of the device, heated air is passed into dryer enclosure 2 and a printed or coated web to be dried is passed through the drying chamber resting on web supporting rollers 5 during its passage through the roller. Air at a desired temperature is supplied to chamber 25 of each enclosure 20, being discharged through openings 26 therein adjacent the exterior surface of the roller in effect maintaining a blanket of air at a temperature below the air temperature of dryer enclosure 2 surrounding the greater portion of roller 5. Fan 30 continually replenishes the cooled air supplied to enclosure 20 to replace air leaking from enclosure 20 into the dryer enclosure 2 as a web is drawn over the roller.

In Figure 6, I have illustrated a modification of the invention. The structure shown is similar to the structure shown in Figure 2 except that a cooling coil 40 is placed in chamber 25 to cool air therein. Air is supplied to chamber 25 in this embodiment as previously described.

The present invention provides ready and economical means for cooling a web supporting roller. Usually, no additional cooling means need be supplied thus eliminating the use of chilled water to cool the roller and mechanical drives for the supporting roller permitting a free idling roller to be employed. The roller is isolated. By isolating the roller, flow of heat to the roller is restricted thus reducing the cooling requirements and in most installations eliminating the need of chilling water.

The present invention provides a dryer for coated or chilled webs which is economical in initial costs and in operating costs since the cooling capacity required for the web supporting rollers is greatly reduced. The cooling enclosures for the rollers are adjustable to accommodate various sizes of webs thus eliminating shutdowns when it is desired to shift use of the dryer from one web width to a second web width.

While I have described the preferred embodiments of the invention, it will be understood the invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In a dryer for drying webs, the combination of an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller disposed in the enclosure, a cylinder about the roller extending longitudinally thereof, said cylinder forming an air chamber about the roller and having an opening therein to permit the web to rest on the roller during its passage through the dryer and means for passing cooled air into the air chamber about the roller and permitting the cooled air after passage over the roller surface to leak into the heated enclosure.

2. In a dryer for drying webs, the combination of an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller disposed in the enclosure, an enclosure about the roller having an opening therein to permit the web to rest on the roller during its passage through the dryer, means for cooling the exterior surface of the roller, said cooling means including a chamber placed adjacent the roller within the second enclosure and extending longitudinally of the roller, means for supplying air to the chamber, and means for distributing air from the chamber longitudinally of the roller.

3. A dryer according to claim 2 including means for cooling air to a desired temperature.

4. A dryer according to claim 3 in which the cooling means comprise a cooling coil placed within the chamber.

5. In a dryer for drying webs, the combination of an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller placed in the enclosure, a cylinder about the roller extending longitudinally thereof, said cylinder forming an air chamber about the roller and having an opening therein to permit the web to rest on the roller during its passage through the dryer, said cylinder including a semi-circular base portion extending longitudinally of the roller forming an air chamber, spaced semi-circular end portions adapted to cooperate with the base portion to form an enclosure, seal members between the end portions and base portion and fastening means attaching said end portions to said base portion.

6. In a dryer for drying webs, the combination of an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller disposed in the enclosure, a cylinder about the roller extending longitudinally thereof, said cylinder forming an air chamber about the roller and having an opening therein to permit the web to rest on the roller during its passage through the dryer, said cylinder including a semi-circular base portion extending longitudinally of the roller forming an air chamber and spaced semi-circular end portions adapted to cooperate with the base portion to form an enclosure, and adjustable members extending between the end portions to close the space between the under side of a web and the end portions.

7. In a dryer for drying webs, the combination of an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller disposed in the enclosure, a cylinder about the roller extending longitudinally thereof, said cylinder forming an air chamber about the roller and having an opening therein to permit the web to rest on the roller during its passage through the dryer, said cylinder including a semi-circular base portion extending longitudinally of the roller forming an air chamber and spaced semi-circular end portions adapted to cooperate with the base portion to form an enclosure and seals placed at the inner edges of said end portions to prevent air blowing on the web from said end portions.

8. A dryer according to claim 7 in which the end portions include an opening to release the air into the dryer enclosure.

9. In a dryer for drying webs, the combination of an enclosure, means for supplying a heating medium to the enclosure to dry the web, at least one web supporting roller disposed in the enclosure, an enclosure about the roller having an opening therein, to permit the web to rest on the roller during its passage through the dryer, and means for passing cooled air into the roller enclosure over at least portions of the roller and for permitting the cooled air after passage over the roller to leak from the roller enclosure to the heated enclosure.

10. In combination with a web supporting roller, an enclosure surrounding the roller, having an opening therein to permit the web to rest on the roller, an air chamber formed in the lower portion of said enclosure, means in said air chamber to distribute cooled air longitudinally of the roller, said enclosure maintaining a

blanket of cooled air adjacent at least the greater portion of the exterior surface of the roller to cool the same, and a cooling coil placed within the chamber to cool air therein.

11. In combination with a web supporting roller, a cylindrical enclosure surrounding the roller, said enclosure having an opening therein to permit a web to rest on the roller, said enclosure including a semi-circular base portion extending longitudinally of the roller, and semi-circular end portions cooperating with the base portion to form the enclosure, seal members between the end portions and the base portion, and fastening means to attach said end portions to the base portion.

12. In combination with a web supporting roller, a cylindrical enclosure surrounding the roller, said enclosure having an opening therein to permit a web to rest on the roller, said enclosure including a semi-circular base portion extending longitudinally of the

roller, and semi-circular end portions cooperating with the base portion to form the enclosure, adjustable members extending between the end portions to close the space between the underside of a web and said end portions, and including seal members at the inner edges of said end portions to prevent air blowing on the web.

13. A device according to claim 12 in which openings are provided in the end portions to release air from the enclosure into the dryer enclosure.

References Cited in the file of this patent

UNITED STATES PATENTS

737,571	Bray	Sept. 1, 1903
1,370,332	McKibben	Mar. 1, 1921
1,413,786	Robertson	Apr. 25, 1922
1,714,261	Egan et al.	May 21, 1929
2,318,511	McAllister	May 4, 1943
2,400,325	Winslow	May 14, 1946