

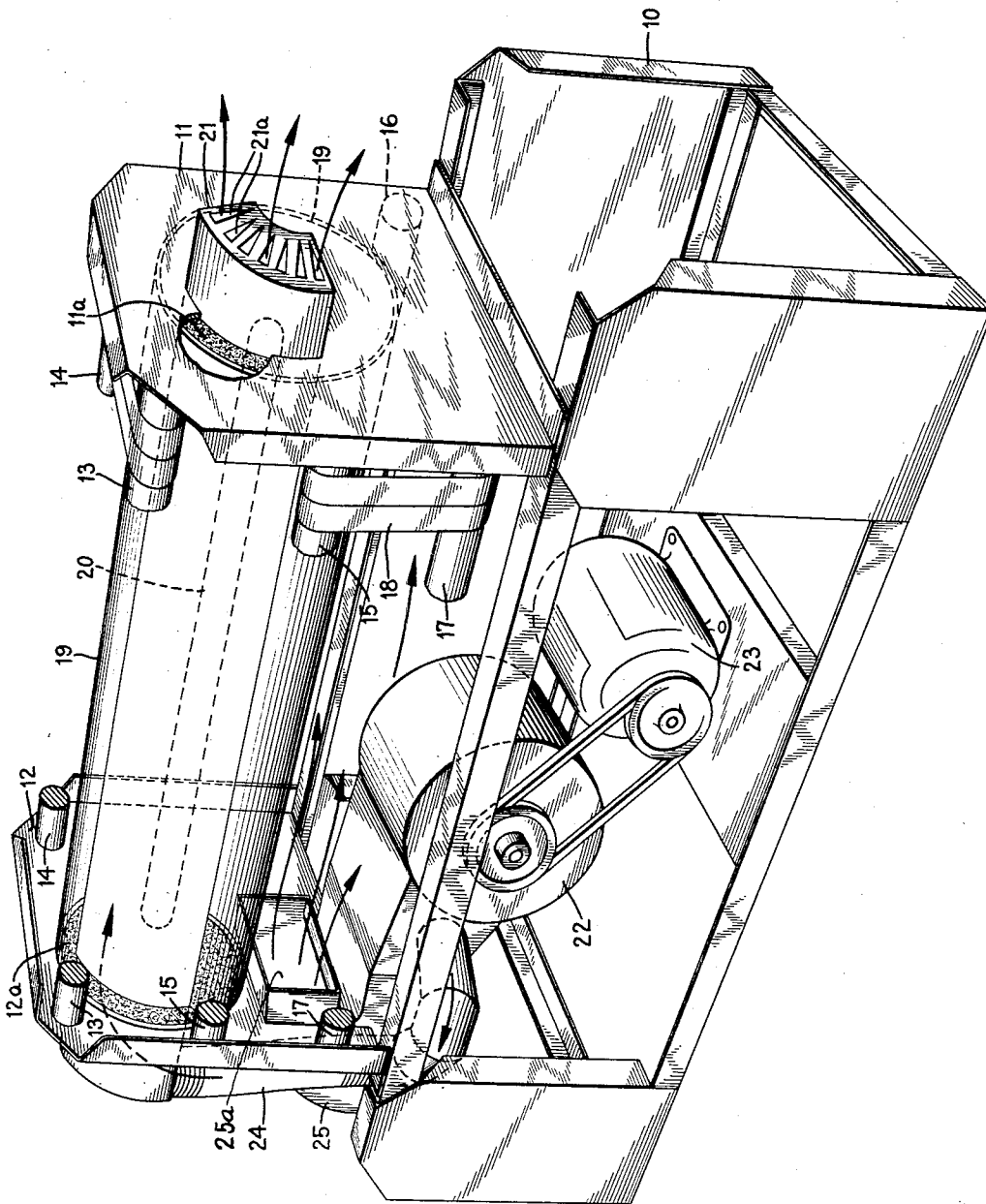
June 13, 1944.

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2,351,339

COOLING SYSTEM FOR PHOTO-PRINTING MECHANISMS

Filed Sept. 3, 1942



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UNITED STATES PATENT OFFICE

2,351,339

COOLING SYSTEM FOR PHOTOPRINTING
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Application September 3, 1942, Serial No. 457,138

4 Claims. (Cl. 95—77.5)

This invention relates to improvements in printing machines and relates more particularly to an improved cooling system for use in rotary photo-printing mechanisms.

Printing mechanisms of the type referred to above include a glass cylinder within which is mounted a lighting unit so that light may be projected through a tracing or other material on the surface of the cylinder and onto a sensitized paper which is in close contact with the surface of the tracing or other material. The paper and tracing are maintained in close contact by means of a plurality of belts that pass around the exterior surface of the cylinder. The belts are driven to cause the cylinder to rotate thereby permitting the tracings or other material and the sensitized paper to be fed between the belts and the cylinder and discharged therefrom.

With the type of lighting elements used in such printing devices, a considerable amount of heat is given off which heats the cylinder and the belts to such an extent that the sensitized paper may be damaged during its passage through the device.

Many different systems for cooling the cylinders have been suggested in the prior art, but all of these systems have had certain undesirable characteristics. For example, it has been suggested that air may be directed through the interior of the cylinder or against the surface of the cylinder in order to remove heat therefrom.

In those systems utilizing, for example, mercury vapor lamps for illuminating the cylinder, the use of a cooling current of air is objectionable for the reason that the cooling air has a tendency to reduce the temperature of the lamp. Inasmuch as such lamps are most efficient at relatively high operating temperatures, the cooling of the lamp reduces its efficiency and if the lamp is cooled unequally throughout its length, unequal illumination of the cylinder and unequal exposure of the paper on the exterior thereof may result.

In those systems involving cooling by means of air blasts directed against the exterior of the cylinder, insufficient cooling is always the result. The reason for this is that the heat is removed by the air blast from only a relatively small area of the cylinder as compared with the total area of the cylinder that is heated by exposure to the light. Moreover, there is a tendency for the belts that pass around the cylinder to maintain the cylinder at high temperature. The belts become heated by exposure to the radiant heat of the light source and by absorption of heat from the cylinder. Inasmuch as the belts are poor heat conductors and poor radiators, they retain the absorbed and radiated heat and transfer it back to the cylinder.

An object of the present invention is to pro-

vide a cooling system whereby heat can be removed from the interior of the printing cylinder without decreasing the temperature of the lamp objectionably.

Another object of the invention is to provide a cooling system for the interior of a printing cylinder which will maintain the temperature within the cylinder uniform.

A further object of the invention is to provide a system whereby the interior of the cylinder is cooled without deposition of dust and dirt on the cylinder and whereby the bands in engagement with the cylinder are cooled to prevent overheating of the sensitized paper.

Yet another object of the invention is to provide a cooling system as aforesaid wherein the structure is such that the ends of the cylinder can be effectively sealed, thereby preventing the escape of ozone.

A further object of the invention is to provide a cooling system of the character above set forth wherein a portion of the cooling mechanism serves as a light shield for predetermined portions of the cylinder.

In accordance with the present invention, I have provided a printing machine of the character described above including a cooling system in the form of a heat exchanging element disposed within the cylinder through which air may be blown to absorb air from the interior of the cylinder. With this arrangement the ends of the cylinder may be closed completely so that dust and dirt cannot enter the cylinder and cannot be deposited on the interior thereof.

In addition, the cooling system may include means for directing a current of air between the flights of the belts that engage the cylinder so that a maximum amount of heat may be dissipated from the belts.

For a better understanding of the present invention, reference may be had to the accompanying drawing in which the single figure is a perspective view of a typical form of device embodying the present invention, partly broken away to show details thereof.

The form of the device chosen for purposes of illustration may include a base member 10 having end pieces 11 and 12 mounted thereon in which are rotatably mounted a plurality of rollers 13, 14, 15, 16 and 17 for receiving a plurality of endless textile bands or belts 18. These belts are looped about the rollers to support for rotation a transparent cylinder 19 formed of glass or other transparent material. One or more of the rollers 13 to 17 may be driven in order to impart motion to the bands and to rotate the cylinder 19.

Within the cylinder 19 and extending substantially axially thereof is a light source such as, for example, a mercury vapor lamp or tube

20 which serves to illuminate the cylinder and the tracing and sensitized paper that are passed between the bands 18 and the cylinder 19.

In order to remove the heat generated by operation of the lamp 20 from the cylinder 19, in accordance with the present invention, I have mounted within the cylinder an elongated hollow member 21 which extends between and through the end pieces 11 and 12 and is supported therein. The member 21, hereinafter referred to as the heat exchanger, is preferably arranged so that its lateral edge portions are substantially in alignment with the rollers 13 and 15. Inasmuch as exposure of the sensitized paper does not take place in the area between the rollers 13 and 15, the shadow cast by the heat exchanger 21 is not objectionable. The heat exchanger 21 preferably is formed of metal or other heat-conductive material and, as illustrated, may be arcuate in cross-section so as to fit between the cylinder 19 and the lamp 20 while having a large surface area for absorption of heat.

Mounted in the base 10 of the device is a blower or fan 22 which is driven by means of a motor 23 to supply air through a conduit 24 to one end of the heat exchanger 21. The other end of the heat exchanger 21 is provided with a plurality of openings 21a through which the heated air is discharged from the heat exchanger 21.

The construction described above has the advantage that air, containing dust, is not blown into the interior of the cylinder and, therefore, dust or other objectionable material cannot be deposited on the interior of the cylinder or the exterior of the lamp. However, a substantial cooling effect is obtained because the rotation of the cylinder 19 directs air over the heat exchanger which cools the air in the cylinder 19. If desired, the ends of the cylinder may be sealed by means of disk-like pads 11a and 12a, formed of felt or other material that is fixed to the end members 11 and 12 and extend into the ends of the cylinder thereby preventing escape of ozone and excluding dust or dirt therefrom.

A further feature of the invention is that the heat exchanger is mounted in such position that it serves as a light shield for the portion of the cylinder not covered by the band and thus prevents the escape of light from the cylinder, serving to reflect such light on to the printing portions of the cylinder.

In order to cool the belts 18 of the device, air may be directed between the flights of the belts 18 in contact with the cylinder 19 and the flights of the belts 18 engaging the rollers 14, 17 and 16 which are spaced from the cylinder. As shown in the drawing, the fan housing 22 may be provided with a duct 25 which extends beneath the lower flight of the belts 18 and then is turned upwardly and inwardly to form an outlet 25a that discharges air between the lowermost flights of the belts and the flights that support the cylinder 19. Such an arrangement makes for increased cooling efficiency inasmuch as the air is constrained to flow through the space between the belts and, therefore, acts most effectively to remove heat therefrom. If desired, suitable deflecting baffles may be mounted between the belts in order to divert some of the air upwardly behind the cylinder and thus into contact with a greater area of the belts.

From the foregoing description of a typical form of my invention, it will be understood that I have provided a simplified but highly efficient system for cooling printing devices of the cylin-

der type. It will be understood, of course, that the device is susceptible to considerable modification in the size and/or shape of the heat exchanger, and the cylinder, in the arrangement of the belts, and in the type of blower and the kind of light source used without departing from the invention.

Therefore, the form of the device disclosed herein should be regarded as illustrative only and not as limiting the scope of the following claims.

I claim:

1. In a photo-printing device having a rotatable transparent cylinder and a source of light within said cylinder; the combination therewith of means for substantially sealing the ends of said cylinder, a heat exchanging device interposed between said light source and a portion of said cylinder and projecting through said sealing means, said heat exchanger comprising an elongated hollow member sealed from the interior of said cylinder, means for supporting said heat exchanger in fixed position, and means for delivering a current of cooling fluid through said hollow member to withdraw heat from the interior of said cylinder.

2. In a photo-printing device having a rotatable transparent cylinder, a source of light within said cylinder and at least one belt passing partially around said cylinder and leaving exposed an area extending longitudinally of said cylinder; the combination therewith, of a narrow, elongated hollow heat exchanging member interposed bodily between said source of light and said exposed area of said cylinder and closely adjacent to the latter and sealed from the interior of said cylinder, and means for delivering a current of cooling fluid through said hollow member to withdraw heat from the interior of said cylinder.

3. In a photo-printing device having a rotatable transparent cylinder, a source of light within and substantially coaxial with said cylinder and at least one belt passing partially around said cylinder and leaving exposed an area extending longitudinally of said cylinder; the combination therewith, of means frictionally engaging and sealing the ends of said cylinder, an elongated hollow heat exchanging member fixedly interposed between said source of light and said exposed area of said cylinder, sealed from the interior of said cylinder and extending through said means for sealing the ends of said cylinder, a blower connected to one end of said hollow member for delivering cooling air into said hollow member, and means at the other end of said hollow member, forming openings for escape of air heated by passage through said hollow member.

4. In a photo-printing device having a rotatable transparent cylinder, a source of light within said cylinder, and at least one belt passing partially around said cylinder and leaving exposed an area extending longitudinally of said cylinder; the combination therewith of an elongated hollow heat exchanging member interposed between said source of light and the exposed area of said cylinder and sealed from the interior of said cylinder, members engaging the ends of said heat exchanging member and supporting the latter in fixed position, means on said members for substantially sealing the ends of said cylinder, and means for delivering a current of cooling fluid through said heat exchanging member to withdraw heat from the interior of said cylinder.

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