EXPOSURE ASSEMBLY FOR LIGHT SENSITIVE DIAZO-TYPE COPY PAPER

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Filed Oct. 4, 1967. Ser. No. 27,759

Int. Cl. G03b 27/10, 27/52

U.S. Cl. 355—110

ABSTRACT OF THE DISCLOSURE

An apparatus for air cooling fluorescent lamps in diazo-type printing and developing machines. The cooling device consists of a hollow, aperture tubular member with a plurality of elongated lamps placed parallel and in a surrounding relation with the tubular members. Air-cooling apparatus is connected to the tubular member so as to cool the lamps. A coaxial, transparent cylinder surrounds the lamps and upon which the exposure is made.

This invention relates to a printing and developing apparatus and, more particularly, to an improved light exposure assembly for sensitizing light sensitive copy paper.

In the printing and developing technology, particularly as applied to the processing of light sensitive diazo-type copy material or paper, an essential factor in obtaining satisfactory copy prints is the efficiency and effectiveness of the lighting assembly. The proper amount of light generated by the light or exposure assembly in sensitizing the diazo-type copy paper will determine, to a large degree, the quality of the subsequently developed copy paper. One of the problems encountered during the exposure of light sensitive diazo-type copy paper is due to variations in exposure light intensities caused by temperature increases in the apparatus. These deleterious temperature rises result from the heat generated by the exposure lamps, which are usually constituted of closely arranged clusters of fluorescent lamps. Generally, the degree or amount of light produced by a fluorescent lamp is dependent upon the vapor pressure within the lamps. As the temperature of the fluorescent lamp increases, a marked effect is noticeable on the fluorescent layer on the inner surface of the lamp wall. In effect, the light "conversion-efficiency" of the lamp is lowered, thereby corresponding affecting the useful printing or exposure light. In view of the foregoing problems, it has been found that by passing a properly circulated cooling air stream about the fluorescent lamps, a controlled temperature range may be attained whereby the printing and exposure cycles are maintained in a satisfactory operating condition.

In order to obviate the foregoing and other disadvantages encountered in the prior art, the present invention provides for an improved and novel fluorescent lamp exposure assembly for light sensitive diazo-type copy papers.

The novel exposure assembly incorporates a cooling air arrangement whereby a controlled and predetermined flow of air is maintained about the fluorescent lamps. This cooling air flow is achieved by positioning a plurality of fluorescent lamps about a hollow tube, which may serve as a light reflector, and wherein the tube has a plurality of air holes in axial and radial registry with the lamps. A suitable air suction blower may be attached to one end of the tube, thus creating a condition of reduced air pressure in the interior of the tube. Consequently, a flow of air will be created, whereby a stream of air will be drawn past the lamps into the tube.

Accordingly, it is a primary object of the present invention to provide an improved and novel fluorescent lamp exposure assembly for developing apparatuses which incorporates cooling means for the fluorescent lamps.

Another object of the present invention is to provide an exposure assembly for sensitizing light sensitive diazo-type copy paper, including a tube member about which the lamps are clustered and, including cooling air circulating means associated with the tube member for controlling the lamp temperatures.

These and other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings in which:

FIG. 1 is a cross-sectional elevational view of an exposure assembly according to the present invention; and

FIG. 2 is a sectional view along line 2—2 in FIG. 1.

Referring now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, FIGS. 1 and 2 illustrate a light exposure assembly for light sensitive copy paper, which is generally designated as 10. In essence, the exposure assembly 10 includes a transparent printing cylinder 12, usually formed of a heat-resistant glass or similar refractory material. The cylinder 12 is mounted between end walls 14 and 16 which may constitute frame portions of a printing and developing apparatus. End walls 14 and 16 include circular openings 18 and 20 which are coaxial and concentrically aligned with transparent cylinder 12.

Disposed concentrically within printing cylinder 12 is an elongate hollow tube member 22 which extends through cylinder 12 so as to protrude outwardly of circular openings 18 and 20. One end of tube member 22 may be sealed off by a flange or end plate 24. The other or distal end of tube member 22 is in turn connected to the inlet of a suitable air suction pump or blower 26.

A plurality of radially outwardly extending flanges 28 are positioned about and attached to the external circumferential surface of tube member 22 so as to form spots or mounting brackets for a plurality of fluorescent lamps 30. Lamps 30 are spaced about a large peripheral portion of tube member 22 and are so positioned as to extend longitudinally thereof throughout the length of transparent printing cylinder 12. Suitable electrical connections (not shown) may be provided in flanges 29 to facilitate lighting of the fluorescent lamps 30.

Hollow tube member 22 includes a plurality of apertures 32 whereby the interior thereof is placed in air circulating communication with the outer surface or surroundings. Preferably, the apertures 32 are positioned in proximity to or beneath each of the fluorescent lamps 30 and should be spaced along the length of the lamps.

During operation of the exposure assembly 10, a diazo-type copy paper which is to be sensitized by exposure to light is conveyed past transparent printing cylinder 12 by a suitable conveyor belt 34, the latter of which is entrained about rollers 36 and 38. At this time the fluorescent lights 30 are electrically activated through suitable switch means (not shown) actuated by passage of the copy paper. Concurrently, in order to control the temperature of the rapidly heating fluorescent lamps 30, air suction blower 26 will draw air into tube member 22 from externally thereof through apertures 32. This, in effect, will circulate air throughout the annular air space or chamber 40 between tube member 22 and transparent printing cylinder 12, and thereby maintain the temperature of the rapidly heating fluorescent lamps 30 into tube member 22 through the aperture 32. Since the annular air chamber 40 is in communication with the cooler air surrounding exposure assembly 10, a constant stream of cooling air is drawn past fluorescent lamps 30 into the tube member 22.

From the foregoing it becomes readily apparent that by controlling the air flow past the fluorescent lamps 30,
temperatures of the exposure assembly 10 may be maintained at a desired printing efficiency level. The air flow will also serve to maintain surrounding assembly components at lower operating temperatures, thereby preventing possible heat damage to painted or enamelled apparatus elements.

The construction of hollow tube member 22 also facilitates its use as a light reflector for fluorescent lamps 30. For example, the tube member 22 may be formed from a metal with a high reflective efficiency for the actinic radiation used in diazo machines. It is known that a metal such as pure aluminum has this property. Additionally, the tube member provides a “backbone” or support for the cluster of fluorescent lamps 30, which may thus be installed as an integral unit in the exposure assembly 10.

It should also be understood that the foregoing relates to only a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. In an apparatus for exposing light sensitive copy paper to light, an exposure assembly comprising:
   a pair of spaced end wall members, each of said wall members having at least one circular opening,
   a transparent cylinder extending between said wall members in coaxial alignment with said openings,
   a hollow tubular member disposed concentrically within said transparent cylinder and projecting exteriorly of said end wall members, said tubular member and said transparent cylinder forming an annular air chamber,
   a plurality of elongate lamps coextensive with said tubular member being positioned exteriorly thereof in peripherally spaced relationship within said air chamber,
   said tubular member including a plurality of apertures extending therethrough, and
   means communicating with the interior of said tubular member adapted to convey a flow of air from said air chamber into said tubular member so as to circulate a cooling air stream about said lamps.

2. An apparatus as defined in claim 1 wherein said plurality of apertures extending through said tubular member are in radial and axial alignment with each of said elongate lamps, whereby each of said lamps is positioned in the path of circulating air flow.

3. An apparatus as defined in claim 1 wherein said hollow tubular member is closed at one end, and said means communicating with the interior thereof comprises an air suction blower attached to the distal end of said tubular member.

4. An apparatus as defined in claim 1 wherein said hollow tubular member includes radially extending flange portions, said flange portions being axially spaced longitudinally of said tubular member so as to form mounting supports for said elongate lamps.

5. An apparatus as defined in claim 1 wherein said tubular member is formed essentially of metal so as to provide a light reflecting surface for said lamps.

6. An apparatus as defined in claim 5 wherein said metal is constituted essentially of aluminum.

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U.S. Cl. X.R.
240—47; 353—57, 61