A dampening fluid evaporator 70 for a lithographic printing press 10 which incorporates an elongated transverse-flow blower 80 which is mounted to be driven by a roller 45 in the inking system 20 through a system of pulleys 92, 96 and a belt 100. The speed of the fan in the blower 80 which delivers air for evaporating dampening fluid from the surface of the roller 45 is controlled by the speed of rotation of the roller 45.
DESCRIPTION

DAMPENING FLUID EVAPORATOR

TECHNICAL FIELD

The invention relates to lithographic printing presses and more particularly concerns a roller driven fan for evaporating dampening fluid which infiltrates the ink train during the lithographic printing process.

BACKGROUND OF THE INVENTION

The inevitable infiltration by dampening fluid into the ink train system of lithographic printing presses is well known in the art. The presence of dampening fluid in the ink train adversely affects both image quality and color consistency. Previous attempts to eliminate dampening fluid from the ink train of lithographic printing presses have proved costly, complex, and generally involve elaborate plumbing networks which pipe air from air compressors, to air jet manifolds or nozzles which direct streams of air to impinge against inker rollers to evaporate excess dampening fluid. Typical systems are disclosed in U.S. Patent No. 4,524,689 entitled "DEHYDRATION APPARATUS FOR PRINTING PRESS INKING SYSTEM" and U.S. Patent No. 4,452,139 entitled "DAMPENING FLUID EVAPORATOR AND METHOD".

The use of air compressor units for delivering pressurized air to jet manifolds or nozzles within the printing press is expensive in terms of power consumption, floor space, and plumbing costs. Further, air bars and manifolds sometimes limit access to the rollers in the press. Since it is desirable to control such evaporative systems in conjunction with the operation of the ink train to prevent excessive drying of the rollers when the press is momentarily stopped or otherwise not applying ink to the printing plate through the inking rollers; compressors must be either manually turned off during periods of roller inactivity or the cost and complexity of the evaporative system must be increased further by the incorporation of automatic power or pneumatic relays.

SUMMARY OF THE INVENTION

A primary object of the invention is to provide a method and apparatus for easily and inexpensively evaporating excess dampening fluid from the ink train of a lithographic printing press. The apparatus disclosed herein comprises an elongated transverse-flow fan impeller positioned to blow air on rollers in an ink train for evaporating dampening fluid. The evaporative system operates in conjunction with the ink train and automatically discontinues operation when the inker rollers are momentarily stopped.

The improved method of evaporating liquid from the surface of a roller generally comprises the steps of mounting a transflow blower for rotation about a longitudinal axis which is spaced from and parallel to an axis about which the roller in the lithographic printing press rotates; rotating the roller; and driving the fan through a pulley and belt drive such that rotation of the roller imparts force to drive the fan such that the speed of rotation of the fan changes when the speed of rotation of the roller changes.

The dampening fluid evaporator includes a blower mounted adjacent a roller in a lithographic printing press to deliver air toward the surface of the roller to evaporate dampening fluid from the surface of the roller.

The blower is driven by a drive member operably connected to the roller; a driven member operably connected to the blower; and an elongated flexible drive member driven by the drive member on the roller for imparting force to drive the blower.

The blower has a plurality of blades, each of the blades having a tip and a heel mounted between end shrouds such that the tip of each blade points in the direction of rotation and such that the heel of each blade is positioned circumferentially rearly of the blade tip to form forwardly curved blades to draw and deliver air substantially tangentially of the impeller of the blower.

In accordance with the invention there is provided a method of evaporating dampening fluid from the surface of a roller in an ink train, incorporating an elongated fan positioned adjacent a roller and coupled to the roller such that rotation of the roller imparts force to drive the fan. The fan speed is controlled by the speed of rotation of the roller and requires no external source of power.

BRIEF DESCRIPTION OF THE DRAWINGS

Drawings of the preferred embodiment of the invention are annexed hereto so that the invention may be better and more fully understood, in which:

Figure 1 is a schematic illustration of a lithographic printing press showing an end view of the dampening fluid evaporator assembly;

Figure 2 is a rear elevational view of the dampening fluid evaporator assembly;

Figure 3 is a top plan view of the dampening fluid evaporator assembly;

Figure 4 is a cross-sectional view taken along line 4-4 of Figure 3; and

Figure 5 is an enlarged cross-sectional view of a blade.

Numerical references are employed to designate like parts throughout the various figures of the drawing.

DESCRIPTION OF A PREFERRED EMBODIMENT

A dampening fluid evaporator, generally desig-
nated by the numeral 70, is illustrated in Figure 1 of
the drawing to evaporate excess dampening fluid
from rollers in an inker system generally designated
by the numeral 20 in a printing press.

The printing press, generally designated by the
numeral 10, is of conventional design and comprises
a plate cylinder 12 having a printing lithographic plate
13 mounted on the surface thereof in rolling
engagement with a blanket cylinder 14 rotatably
supported between press side frames 15 and 16.

Inker 20 is of conventional design and comprises
resilient surfaced inker form rollers 21, 22, 23 and 24
which apply ink and dampening fluid to the surface of
lithographic printing plate 13. An equalizer roller 25 is
in rolling engagement with the last ink form roller 24.
Vibrator rollers 28, 30 and 32 oscillate longitudinally
relative to form rollers 21, 22, 23 and 24 for
distributing ink onto the surface of the rollers and to
evaporate excess dampening fluid from
from the surface of ink distribution roller 45 to prevent
accumulation of excessive quantities of dampening
fluid on the surfaces of the train of rollers in inker 20.

As best illustrated in Figures 1 and 3 of the
drawing, ink distribution roller 45 has journals 44 and
46 formed on opposite ends thereof which are
rotatably supported in bearings 17 and 18 on press
designed by the numeral 80.

The blower is a single speed unit designed
to provide the transverse flow of air. The
incorporated herein by reference in its entirety, a
fan assembly in a housing 71 having end

bearings 76 and 77, and an impeller generally
designated by the numeral 80.

The fan incorporated into the evaporator 70 is commercially available from Dayton Electric Manu-
ufacturing Co. of Chicago, Illinois and is generally
referred to as a "Dayton" transflow blower Model
4C874. The blower is a single speed unit designed
for heating, cooling, exhausting, ventilating and
drying applications. The blowers are conventionally
driven by a shaded-pole motor with automatic-reset
thermal protection. Dayton form 552814, which is
incorporated herein by reference in its entirety,
contains a description and specifications of the
blower. The transverse-flow fan illustrated in Figures
2-4 advantageously causes the air to pass through the
blades 79 twice, entering substantially tangen-
tially through the tip, passing across the impeller 80
and out the other side. The fan housing 71 is
designed to provide the transverse flow of air. The
end shrouds 72 and 73 have no inlet holes. It should
be appreciated that since the fan impeller 80 does not
depend upon flow of air in an axial direction, the
blade length and tip diameter ratios are limited only
non-image areas on the surface of printing plate 13
while ink is transferred to image areas on printing
plate 13. Some of the dampening fluid applied
to printing plate 13 is transferred to the subsequent
form rollers 22, 23 and 24 while a portion of the film
of dampening fluid which remains on the first form
roller 21 is transferred over roller 30 to other rollers
in the inking system 20.

Dampening fluid evaporator 70 is preferably
maintained on the surface of printing plate 13 while
ink is transferred to image areas on printing
press 10 without departing from the scope and spirit of the invention.

Referring now to Figures 2, 3 and 4 of the drawing,
dampening fluid evaporator 70 comprises an elong-
ated fan assembly in a housing 71 having end
shrouds 72 and 73, tail shafts 75a and 75b, end
bearings 76 and 77, and an impeller generally
designated by the numeral 80.

The fan incorporated into the evaporator 70 is commercially available from Dayton Electric Manufactur-
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2-4 advantageously causes the air to pass through the
blades 79 twice, entering substantially tangen-
tially through the tip, passing across the impeller 80
and out the other side. The fan housing 71 is
designed to provide the transverse flow of air. The
end shrouds 72 and 73 have no inlet holes. It should
be appreciated that since the fan impeller 80 does not
depend upon flow of air in an axial direction, the
blade length and tip diameter ratios are limited only
by structural considerations. Thus, the impeller 80 having an outside diameter of approximately 2.5 inches and a length for example, 38 inches provides a substantially uniform flow of air along the length of the impeller 80.

Impeller 80 comprises spaced circular retaining end plates 81 and 84, stabilizing plates 82 and 83, and a plurality of fan blades 79, each fan blade 79 having a heel 85, a curved central body portion 86, and a tip 87.

As best shown in Figures 3 and 4 of the drawing, fan blades 79 are perpendicularly disposed relative to press side frames 15 and 16 and are secured between retaining plates 81 and 84 in circular fashion relative to retaining plates 81 and 84 such that fan blades 79 are symmetrically disposed at equidistant intervals along the periphery of retaining plates 81 and 84 forming a cylindrical impeller 80. Fan blades 79 are angularly disposed between retaining plates 81 and 84 such that as impeller 80 is rotated, the tip 87 of each fan blade 79 serves as a leading edge of the fan blades 79 and the heel 85 serves as a trailing edge of fan blade 79 relative to the direction of rotation. Fan blades 79 are provided with a shallow forward curved central body portion 86 which points both tip 87 and heel 85 in the direction of rotation of the impeller 80. Stabilizing plates 82 and 83 are positioned between and at equidistant intervals from retaining plates 81 and 84. Fan blades 79 extend longitudinally through corresponding slots (not shown) in stabilizing plates 82 and 83. Stabilizer plates 82 and 83 are essentially "washer shaped", having a circular configuration of equal diameter as retaining plates 81 and 84, substantially flat surfaces disposed perpendicularly to fan blades 79, and a central bore there-through.

Retaining plates 81 and 84 are secured to shafts 75a and 75b which extend through bearings 76 and 77, respectively along a central axis 74 for permitting rotation of impeller 80 around central axis 74. End bearing 77 is secured to the end shroud 73 of housing 71. End bearing 76 is secured to the end shroud 72 of housing 71. End shroud 72 has an aperture 78 aligned with a central axis 74 for permitting the tail shaft 75a extending through end bearing 76 to extend longitudinally through aperture 78 to the outside of housing 71. Pulley 98 is secured to tail shaft 75a by key 98.

As best shown in Figures 1, 3 and 4, housing 71 comprises a cover shield 101, and a directional member 104 positioned in spaced apart relation around impeller 80 and secured between end shrouds 72 and 73. Cover shield 101, directional member 104, and end shields 72 and 73 substantially enclose impeller 80 and cause air to be channeled through the openings therebetween, said openings serving as air intake vent 88 and blower port 93.

Cover shield 101 having a curved rear portion 108 and a substantially straight front portion 109 is axially positioned above and adjacent to impeller 80 such that the curved rear portion 108 is positioned in eccentric alignment around impeller 80 and the front portion 109 extends away from impeller 80 and directing air to impinge on ink distribution roller 45. The eccentric alignment of the curved rear portion 108 of cover shield 101 and impeller 80 forms a progressively expanding air acceleration chamber 59 between cover shield 101 and impeller 80 extending from the rear of impeller 80 and tapering outwardly to blower port 93.

Directional member 104 comprises an angular channel having an upper fin 105 and a lower fin 106 and is positioned between impeller 80 and ink distribution roller 45. Directional member 104 is perpendicularly aligned relative to side frames 15 and 16 and secured at its ends to end shrouds 72 and 73. Upper fin 105 of directional member 104 is aligned in parallel spaced apart relation to front portion 109 of cover shield 101, the space therebetween forming blower port 93 for directing air from impeller 80 to impinge against ink distribution roller 45. Lower fin 106 is angularly inclined relative to upper fin 105.

End shrouds 72 and 73 enclose the ends of evaporator 70, the lower portion of each having a pair of outwardly extending anchor lugs 61. Mounting plates 107 extend perpendicular relative to axis 74, spanning the distance between the corresponding anchor lugs 61 and secured to the bottom of evaporator 70 by means of bolts 99 extending through anchor lugs 61. Similarly, the curved portion 108 of cover shield 101 and lower fin 106 of directional member 104 are positioned on opposite sides of impeller 80, the space therebetween and beneath impeller 80 forming air intake vent 98.

U-clamps 67 and 68 are positioned around a tubular cross member 69 in printing press 10 and secured to evaporator 70 by means of bolts 99 extending through anchor lugs 61 and mounting plate 107 grippingly engaging tubular cross member 69 between clamps 67 and 68 and mounting plate 107 for securing evaporator 70 in printing press 10. Tubular cross member 69 is a convention structural component in printing press 10 and is disposed in perpendicular relation to side frames 15 and 16. It will of course be appreciated that evaporator 70 may be secured within printing press 10 in a variety of ways, (i.e., by brackets mounted on side frames 15 and 16) depending upon the structural configuration of the particular printing press 10.

As will be readily apparent from the description of the preferred embodiment heretofore discussed, rotation of impeller 80 draws air through air intake vent 88, passes air through an air acceleration chamber 59, and exhausts air through blower port 93 to impinge against ink distribution roller 45 for evaporating excess dampening fluid from the inking system 20 of printing press 10. The method and operation of the dampening fluid evaporator described and illustrated in conjunction with the drawing is believed to be readily understandable by those skilled in the art. Dampening fluid is evaporated from the surface of a roller 45 in inking system 20 by positioning a fan 80 adjacent roller 45 and providing appropriate drive means 90 coupling roller 45 and fan 80 such that the rotation of roller 45 imparts force to drive fan 80 causing air to impinge against roller 45 for evaporating dampening fluid on the surface of roller 45. According to a preferred
embodiment of the present invention, a transflow blower 80 is mounted in a printing press 10, parallel and adjacent to ink distribution roller 45 and driven by a flexible belt mounted around a drive pulley secured to roller 45, and a driven pulley secured to transflow blower 80.

Although a preferred embodiment of the invention has been described herein those skilled in the art will also appreciate that various substitutions and modifications may be made to the specific arrangement described without departing from the scope and spirit of the invention as recited in the appended claims.

Claims

1. A method of evaporating liquid from the surface of a roller comprising the steps of: providing a fan adjacent a roller in a lithographic printing press; rotating the roller; and coupling the fan such that rotation of the roller imparts force to drive the fan such that the speed of rotation of the fan changes when the speed of rotation of the roller changes.

2. A method according to Claim 1, the step of coupling the fan such that rotation of the roller imparts force to drive the fan comprising: providing a drive pulley to rotate with the roller; providing a driven pulley to rotate with the fan; and mounting a belt on the drive pulley and the driven pulley such that the belt imparts force to the driven pulley for rotating the fan.

3. A method according to Claim 1 or Claim 2, the step of providing a fan comprising the steps of: mounting a transflow blower for rotation about a longitudinal axis which is spaced from and parallel to an axis about which the roller in the lithographic printing press rotates.

4. A dampening fluid evaporator for a lithographic printing press comprising: an elongated transflow blower having a longitudinal axis; means to mount said transflow blower adjacent a roller in a lithographic printing press; and drive means to rotate said fan to deliver air toward the surface of the roller to evaporate dampening fluid from the surface of the roller.

5. A dampening fluid evaporator for a lithographic printing press according to Claim 4, said drive means to rotate said transflow blower comprising: a drive member operably connected to said roller; a driven member operably connected to said fan; and elongated flexible drive means driven by said drive member for imparting force to said driven member.

6. A dampening fluid evaporator for a lithographic printing press according to Claim 5, said drive member and said driven member comprising: pulleys, and wherein said elongated flexible drive means comprises a drive belt.

7. A dampening fluid evaporator for a lithographic printing press according to any one of Claims 4 to 6, said means mounting said transflow blow adjacent a roller in a lithographic printing press comprising: a blower housing; means rotatably securing said transflow blower to said blower housing; and means to mount said blower housing in a printing press.

8. A dampening fluid evaporator for a lithographic printing press according to Claim 7, said means mounting said blower housing comprising a mounting plate and means to secure said mounting plate relative to an inker side frame.

9. A dampening fluid evaporator according to any one of Claims 4 to 8, said drive means comprising: an electric motor.

10. An inker for applying ink to a printing plate in a lithographic printing press comprising: a pair of press side frames; a plate cylinder rotatably secured between said side frames; a printing plate secured to said plate cylinder; a plurality of form rollers rotatably secured between said side frames and positioned to apply ink to said printing plate; a plurality of vibrator rollers rotatably secured between said side frames and mounted in rolling engagement with said form rollers; at least one ink distributor roller rotatably mounted between said side frames and in rolling relation with at least one of vibrator roller; a transflow blower mounted for rotation about a longitudinal axis between said side frames; and drive means rotating said transflow blower for delivering air to evaporate liquid carried on the surface of said distributor roller.

11. An inker for applying ink to a printing plate in a lithographic printing press according to Claim 10, said drive means comprising: an electric motor.

12. An inker for applying ink to a printing plate in a lithographic printing press according to Claim 10 or Claim 11, said transfer blower comprising: a blower housing having an inlet passage and an outlet passage formed therein; and a fan in said blower housing constructed and arranged to draw air from adjacent said roller surface into said blower housing and to dispense a stream of diffused air to impinge against the roller surface for evaporating liquid from the surface of the roller.

13. A printing press according to Claim 12, with the addition of: U-clamps secured to said blower housing to support said blower to the printing press.

14. A printing press according to any one of Claims 10 to 13, said transfer blower comprising: a plurality of blades, each of said blades having a tip and a heel; a pair of solid end shrouds; means mounting said blades between said end shrouds such that the tip of each blade points in the direction of rotation and such that the heel of each blade is positioned circumferentially rearly of said blade tip to form forwardly curved blades.