ABSTRACT OF THE DISCLOSURE

This invention relates generally to improvements in a burn-in unit for photoengraving plates, and more particularly to improvements in the heating of the plates and in the control and dissipation of heat for more effective yet cooler operation.

Another important object is realized by the structural arrangement of a plate-supporting means in the tank, and heating means above and in heat-sensitive relation to the plate-supporting means, the tank being open at the bottom to prevent an excessive heat build-up. This absence of stored heat makes it possible to burn-in the top without overheating the bottom of the plate, and thereby aids in the retention of certain desired qualities found in metal plates prior to burning; qualities often destroyed heretofore by excessive burn-in. It is now possible to burn-in the top without changing the color of the back coating.

An important object is attained in that the plate-supporting means include a rack having a plurality of rods extending transversely of the tank top. Other advantages are provided by an inner ledge at opposite sides of the tank just below the open tank top, the rods of the rack extending between and seating on the opposed ledges.

An important object is provided by mounting the heating means in the tank lid so that the heating means is brought into position over the plate-supporting means at the tank top when the lid is closed.

Another important object is afforded by the provision of a panel having one side hingedly mounted to the lid and having another side detachably mounted to the lid, and by the mounting of the heating means to the panel, the panel hingedly dropping down when released for servicing of the heating means when the lid is raised.

Yet another important object is achieved by a tank wall construction that prevents excessive wall heating, the wall incorporating a system for circulation of cooling air.

An important object is to provide a burn-in unit that is simple and durable in construction, economical to manufacture and assemble, highly efficient in operation, and which can be readily utilized by anyone with little or no instruction.

The foregoing and numerous other objects and advantages of the invention will more clearly appear from the following detailed description of a preferred embodiment, particularly when considered in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of the burn-in unit, with the lid raised; FIG. 2 is a reduced perspective view, showing the lid closed, and FIG. 3 is a cross sectional view as seen in a vertical plane passed centrally through the front and back of the unit.

Referring now by characters of reference to the drawings, the substantially square tank includes a peripheral wall generally indicated by 10 and consisting of a front wall 11, and opposed rear wall 12, and the opposed side walls 13. The peripheral tank wall 10 defines a central heating chamber 14. The tank is open at the bottom to place the heating chamber 14 in communication with the atmosphere in order to preclude excessive heat build-up, as will be apparent upon later description of parts and function.

The tank is supported by four vertical legs 15, one leg 15 being attached to each of the opposed side walls 13 near the front wall 11, while a pair of such legs 15 are attached to the rear wall 12 adjacent each of the side walls 13. The legs 15 hold the open bottom of the tank off of the supporting surface, such as a floor, in order to allow a free passage or flow of atmospheric air to the heating chamber 14 through the open tank bottom.

A control box 16 is carried by the front wall 11. Each of the walls 11-13 inclusive forming the peripheral tank wall 10 includes an outer wall portion 20 and an inner wall portion 21 with a space 22 therebetween. The inner and outer wall portions 20 and 21 are interconnected by partition 23 at the bottom of the tank to enclose the space 22, and are interconnected by partition 24 near the top of the tank just below the upper portion 23.

The inner wall portion 21 is provided with a plurality of regularly spaced air ports 25, constituting an upper opening, arranged in a horizontal row immediately below the upper partition 24. This row of ports 25 extends around the periphery of the tank and communicates the heating chamber 14 directly with the internal space 22 between the outer and inner wall portions 20 and 21 respectively.

The inner wall portion 21 of each wall is provided with a plurality of regularly spaced air ports 26, constituting a lower opening, arranged in a horizontal row immediately adjacent the bottom of the tank. This row of air ports 26 extends peripherally about the tank and communicates the heating chamber 14 directly with the internal wall space 22 between the outer and inner wall portions 20 and 21.

Between the outer and inner wall portions 20 and 21...
of each of the tank walls 11–13, there is disposed a baffle 27 directly opposite the upper air ports 25. The baffle 27 serves to direct the air flow moving upwardly in the space 23 from the lower air ports 26 directly through the upper air ports 25 and into the uppermost portion of the heating chamber 14. Mounted on the top of the uppermost partition 24 is an angle strip 30 forming an internal ledge immediately below the open top of the tank.

A rack referred to generally at 31 and constituting a plate-supporting means, consists of a plurality of rod extenders between the front and rear walls 11 and 12 and seating on the opposed ledges formed by angle strips 30. This rack 31 supports the plate at the top of the tank. The upper air ports 25 communicate with the chamber 14 immediately below the rack 31, and consequently below the plate supported on such rack.

A lid indicated generally by 33 is adapted to close the open top of the tank. The lid 33 is of an inverted box-like structure having a top wall 34 and a peripheral wall 35. The lid 33 is attached to the rear wall 12 of the tank by a hinge 36. In addition, a toggle 37 interconnects the side walls 13 of the tank to the lid 33, the toggles 37 serving to hold the lid 33 selectively in a raised position as is indicated in FIG. 1. As is usual, the toggle 37 can be folded to permit the lid 33 to move downwardly to its closed position over the tank as is illustrated in FIG. 2. A portion 38 is carried by the lid 33 and extends beyond the hinge 36, thereby creating a moment that facilitates the lifting of the lid 33. A handle 41 is fixed to the front of the lid 33 which can be advantageously gripped by the operator for raising and lowering the lid 33.

Carried within the lid 33 is a panel 42, one end of panel 42 being attached to the rear portion of lid wall 35 by hinge 43 and the opposite end of the panel 42 being detachably secured to the front portion of the lid wall 35 by a pair of nut and bolt connections 44. The heating means is carried by the panel 42, the heating means consisting of a plurality of quartz line infrared heat tubes 45 located within the lid 33.

When the lid 33 is moved to the closed position, as is illustrated in FIG. 3, the heating means provided by the heat tubes 45 are brought down into operative overlying relation to the plate-supporting means 31, and more particularly are brought into temperature-sensitive relation to the upper surface of a plate supported on the rack 31. To service the heat tubes 45, the lid 33 is raised to the position shown in FIG. 1. Depending on the size of the machine, some of the heat tubes 45, especially those near the front of the machine, are too high for easy access. To relieve this awkwardness, the nut and bolt connections 44 are detached to release the panel 42 so that the panel 42 carrying the heat tubes 45 can be hingedly dropped from the lid 33 about its hinge connection 43, the panel 42 and its associated heat tubes 45 being moved to a lowered position independently of the raised position of the lid 33 so that access can be had easily to the heat tubes 45 for replacement of such tubes, if necessary.

It is thought that the usage and functional advantages of the burn-in unit have become fully apparent from the foregoing detailed description of parts, but for completeness of disclosure, the usage will be briefly described. It will be assumed that a plate has been coated with a metal plate sensitizer, has been exposed and the light-hardened image has been developed. It is now desirable to improve the acid-resisting qualities of the light-hardened image by burning-in.

The plate is placed on the rack 31 with the image side up. The lid 33 is closed, which automatically brings the heat tubes 45 into appropriate temperature-sensitive relation over the top surface of the plate. The heat tubes 45 are energized for a predetermined period to burn-in the image. The quartzline infrared heat tubes 45 heat quickly and require no heat up period. The bottom of the tank and of the heat chamber is open to prevent an excessive heat build-up. Excess side wall heating is precluded by the circulation of cooling air from the atmosphere into the bottom of the tank, through the lower air ports 26 and into the wall space 22, and subsequently into the chamber 14 through the upper air ports 25 immediately below the rack 31. The baffles 27 direct this cooling air flow outwardly through the upper air ports 25. This absence of stored heat within the tank makes it possible to burn-in the top of the plate without overheating the bottom, thereby aiding in the retention of the qualities which are often destroyed by excessive burn-in. It is possible, in view of this quick-heating action by tubes 45 and in view of the absence of excess heat within the chamber 14, to burn-in the top of the plate without changing the color of the back coating.

After the predetermined heating period, the tubes 45 are deenergized and the lid 33 is raised. The burn-in plate is now conditioned for powderless etching. It will be important to note that when the lid 33 is raised and the tubes 45 are deenergized, any heat in the chamber 14 and in the wall space 22 is quickly dissipated. With this unit there is no need to maintain any heat level within the tank when the unit is not being actually used for a burning-in action.

Although the invention has been described by making detailed reference to a single preferred embodiment, such detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

I claim as my invention:

1. A burn-in unit for photoengraving plates, comprising:
   (a) a tank having an open top,
   (b) plate-supporting means at the top of the tank,
   (c) a lid for the tank top,
   (d) a panel located within the lid, the panel having one side hingedly mounted to the lid and having another side detachably connected to the lid, and
   (e) heating means carried by the panel and overlying the plate-supporting means when the lid is closed,
   (f) the panel hingedly dropping down upon detachment of the said other side from the lid for servicing of the heating means when the lid is raised.

2. A burn-in unit for photoengraving plates, comprising:
   (a) a tank including a peripheral wall defining a heat chamber,
   (b) the wall having an outer wall portion and an inner wall portion with a space therebetween,
   (c) the inner wall portion being provided with an opening at the top of the tank which places the space in communication with the heat chamber, and
   (d) means at the bottom of the tank in communication with the space for circulating air upwardly between the inner and outer wall portions and back into the heat chamber through the top opening,
   (e) the tank being open at the top,
   (f) a plate-supporting means at the top of the tank,
   (g) a lid for the tank top, and
   (h) heating means carried within the lid and overlying the plate-supporting means when the lid is closed,
   (i) the tank being open at the bottom to prevent an excessive heat build-up in the chamber.

3. A burn-in unit for photoengraving plates, comprising:
   (a) a tank including a peripheral wall defining a heat chamber,
   (b) the tank being open at the top,
   (c) a plate-supporting means at the top of the tank,
   (d) the tank wall including an outer wall portion and an inner wall portion with a space therebetween,
   (e) the inner wall being provided with an upper opening at the top of the tank yet below the plate-sup-
porting means which places the space in communication with the heat chamber, (f) the inner wall portion being provided with a lower opening at the bottom of the tank placing the space in communication with the heat chamber for circulating air from the heat chamber through the lower opening, and thence upwardly in the space between the inner and outer wall portions and back into the heat chamber through the upper opening, (g) the tank being open at the bottom to prevent an excessive heat build up in the chamber.

4. A burn-in unit for photoengraving plates, comprising:
(a) a tank having a peripheral wall defining a heat chamber, (b) the tank having an open top, (c) a plate-supporting means at the top of the tank, (d) the tank wall including an outer wall portion and an inner wall portion with a space therebetween, (e) the inner wall portion being provided with an upper opening at the top of the tank yet below the plate-supporting means which places the space in communication with the heat chamber, and (f) means at the bottom of the tank in communication with the space for introducing air into the space between the outer and inner wall portions, (g) a baffle between the outer and inner wall portions and adjacent the upper opening, the baffle directing the upwardly flowing air in the space out through the upper opening into the heat chamber, (h) a lid for the tank top, and (i) heating means carried within the lid and overlying the plate-supporting means when the lid is closed, (j) the tank being open at the bottom to prevent an excessive heat build up in the chamber.

5. A burn-in unit for photoengraving plates, comprising:
(a) a tank including a peripheral wall defining a heat chamber, (b) the tank wall having an outer wall portion and an inner wall portion with a space therebetween, (c) the inner wall portion being provided with an upper opening at the top of the tank which places the space in communication with the heat chamber, (d) the inner wall portion being provided with a lower opening at the bottom of the tank which places the space in communication with the heat chamber, (e) a baffle between the wall portions and adjacent the upper opening, the baffle directing the upwardly flowing air in the space outwardly through the upper opening and into the heat chamber, the cooler air entering the space from the bottom of the tank through the lower opening, (f) the tank having an open top, (g) a plate-supporting means at the top of the tank, (h) a lid for the tank top, and (i) heating means carried within the lid and overlying the plate-supporting means when the lid is closed, (j) the tank being open at the bottom to prevent a heat build up in the chamber and to permit air to flow from outside the tank upwardly through the open bottom and into the chamber and thence into the lower opening of the inner wall portion.

6. A burn-in unit for photoengraving plates, comprising:
(a) a tank including a peripheral wall defining a heat chamber, (b) the tank having an open top, (c) the tank wall including an outer wall portion and an inner wall portion, (d) the inner wall portion terminating short of the tank top to provide an internal ledge, (e) a plate-supporting means at the tank top above the ledge, (f) a lid for the tank top, and (g) heating means carried within the lid and overlying the plate-supporting means when the lid is closed, (h) the tank being open at the bottom to prevent an excessive heat build up in the chamber.

7. A burn-in unit for photoengraving plates, comprising:
(a) a tank including a peripheral wall, (b) the tank having an open top, (c) the tank wall including an outer wall portion and an inner wall portion, the inner wall portion terminating short of the tank top to provide an internal ledge, (d) a plate-supporting means including a rack retained within the tank and seating on the ledge, the rack including a plurality of rods extending transversely of the tank top, (e) a lid for the tank top, and (f) heating means carried within the lid and overlying the plate when the lid is closed, (g) the tank being open at the bottom to prevent an excessive heat build up in the chamber.

8. A burn-in unit for photoengraving plates, comprising:
(a) a tank including a peripheral wall defining a heat chamber, (b) the tank having an open top, (c) the side wall including an outer wall and an inner wall with a space therebetween, the inner wall portion terminating short of the tank top to provide an internal ledge, (d) a plate-supporting means including a rack retained within the chamber adjacent the tank top, the rack including a plurality of rods extending transversely and seating on the ledge, (e) the inner wall portion being provided with an upper opening at the top of the tank yet below the plate-supporting means, (f) the inner wall portion being provided with a lower opening at the bottom of the tank, (g) the upper and lower openings placing the space in communication with the heat chamber for circulating air through the lower opening into the space and thence upwardly through the upper opening and into the heat chamber, (h) a lid for the tank top, and (i) heating means carried within the lid and overlying the rack when the lid is closed, (j) the tank being open at the bottom to prevent an excessive heat build up in the chamber.

References Cited
UNIVERSITY STATES PATENTS
3,239,651 3/1966 Silberman ------- 219—388
FOREIGN PATENTS
672,096 10/1963 Canada.
520,675 3/1955 Italy.
RICHARD M. WOOD, Primary Examiner.
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