Sept. 24, 1968 C. S. MARTZ ET AL 3,403,243

RADIANT BURN-IN UNIT FOR PHOTOENGRAVING PLATES

Filed May 27, 1965 2 Sheets-Sheet 1

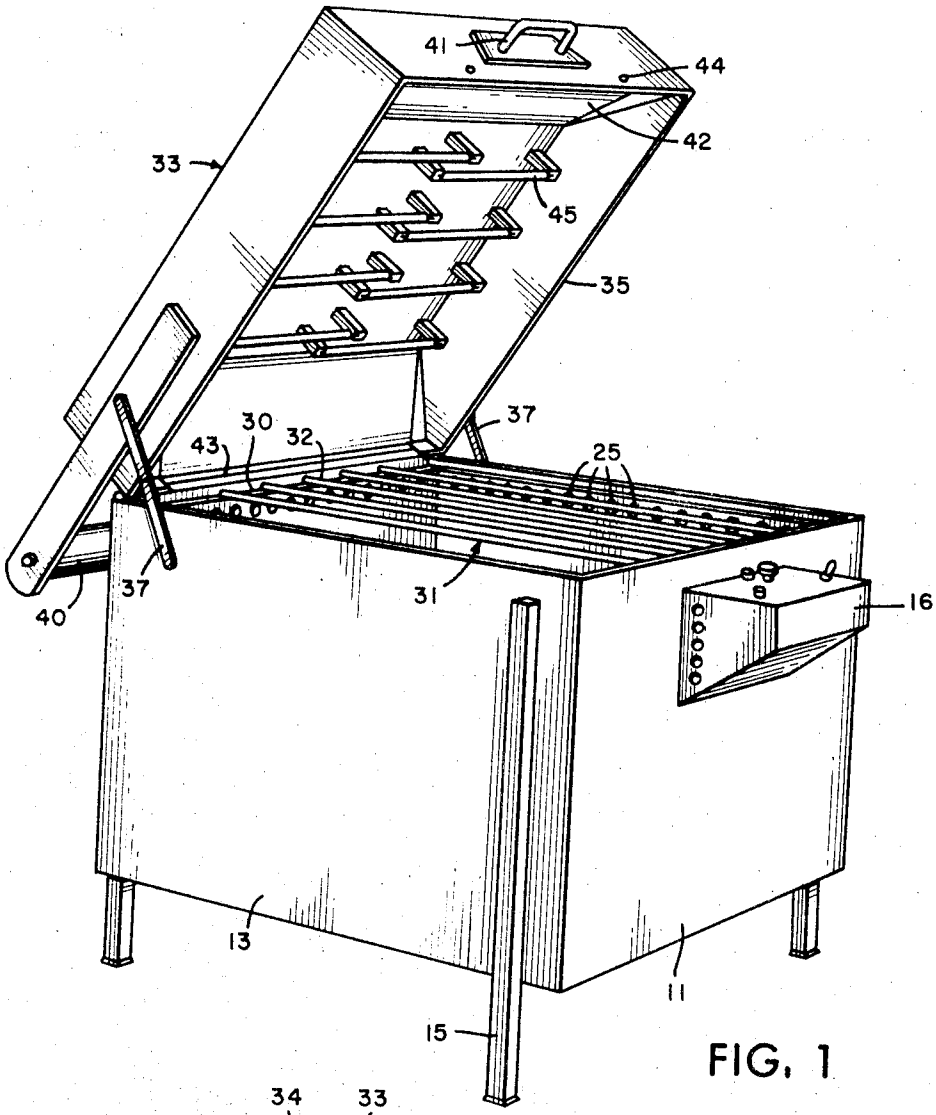


FIG. 1

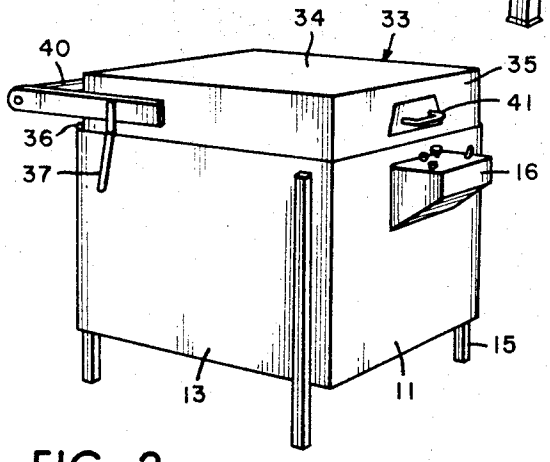


FIG. 2

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RADIANT BURN-IN UNIT FOR PHOTOENGRAVING PLATES

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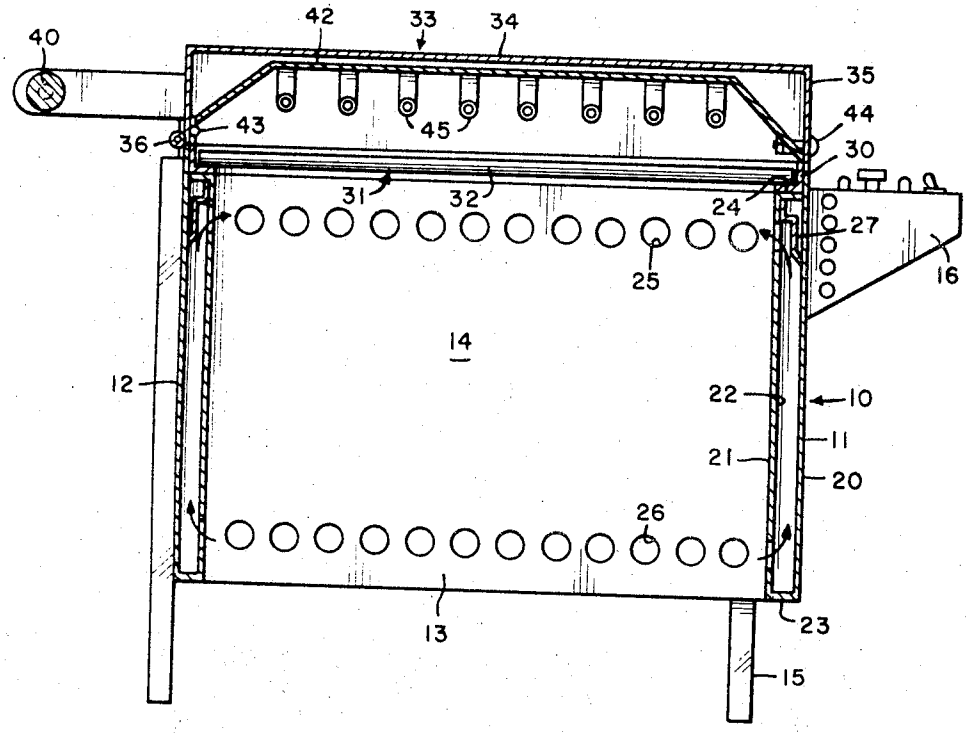


FIG. 3

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RADIANT BURN-IN UNIT FOR PHOTO-ENGRAVING PLATES

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8 Claims. (Cl. 219—411)

ABSTRACT OF THE DISCLOSURE

A radiant burn-in unit for photoengraving plates in which a quartz-tube-type radiant heat means is carried by a panel located in and detachably mounted to a lid for the tank. The panel can be detached from the lid and moved into a position for ready servicing of the heat means when the lid is raised. The tank wall includes an outer wall portion and an inner wall portion with a space therebetween. An upper opening is provided in the upper wall portion at the top of the tank below a plate-supporting means which places the space in communication with the heat chamber. A lower opening in the inner wall portion at the bottom of the tank places the space in communication with the heat chamber also for circulating air from the heat chamber through the lower opening, and then upwardly in the space between the inner and outer wall portions and back into the heat chamber through the upper opening.

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.

It is well known in the photoengraving field that all metal plate sensitizers, with only one or two exceptions, must be heated to 300 to 400 degrees Fahrenheit after development to improve the acid-resisting qualities of the light-hardened image prior to powderless etching. Through the years, burning-in has been done with open gas flames, gas and electric ovens and with hot liquids.

The present burn-in unit employs quartzline infrared heat tubes that heat quickly and have a long trouble-free life. Unlike a burn-in oven or a liquid tank, no heat-up period is required and it is not necessary to maintain a given heat throughout the work shift. With instant heat, no current is consumed when plates are not being burned-in. In warm weather, plant-cooling problems can be minimized when instant heat rather than maintained heat is used.

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.

Still another important object is attained in that the plate-supporting means includes a rack having a plurality of rods extending transversely of the tank top. Other advantages are provided by an internal 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 objective 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 objective 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 uppermost rim.

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 **22** 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 rods extending 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 counterbalance **40** is carried by the rear of 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 lid **33**, may be 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 aforegoing 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 found in meal plate prior to burning; 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 burned-in plate is now conditioned for powderless etching. It will be importantly noted 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.

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