Dec. 30, 1924. 1,520,720

F. T. POWERS

PLATE BURNING OR DRYING APPARATUS

Filed March 6, 1922 2 Sheets-Sheet 1

Fig. 1.

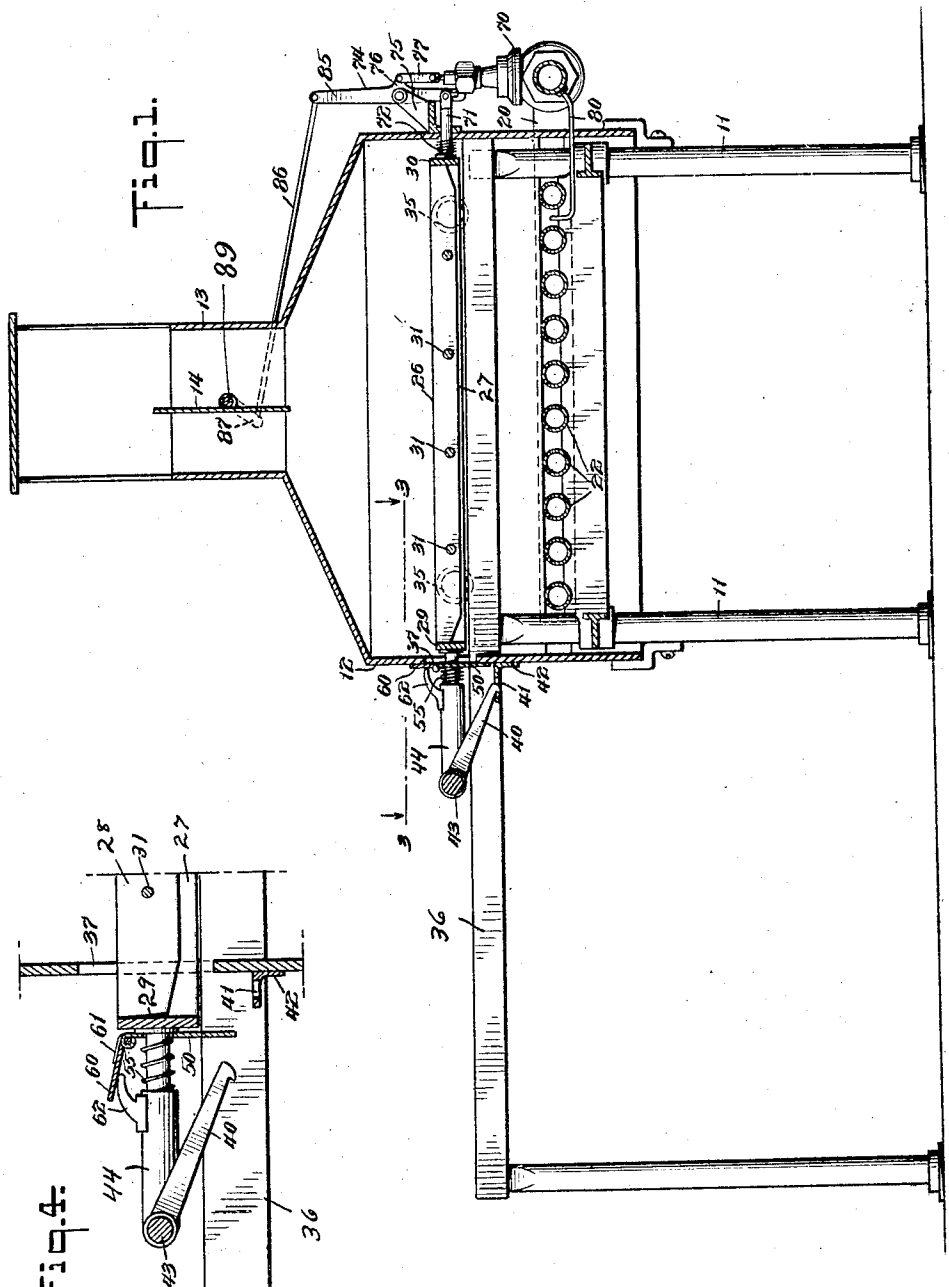


Fig. 4.

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Fig. 2.

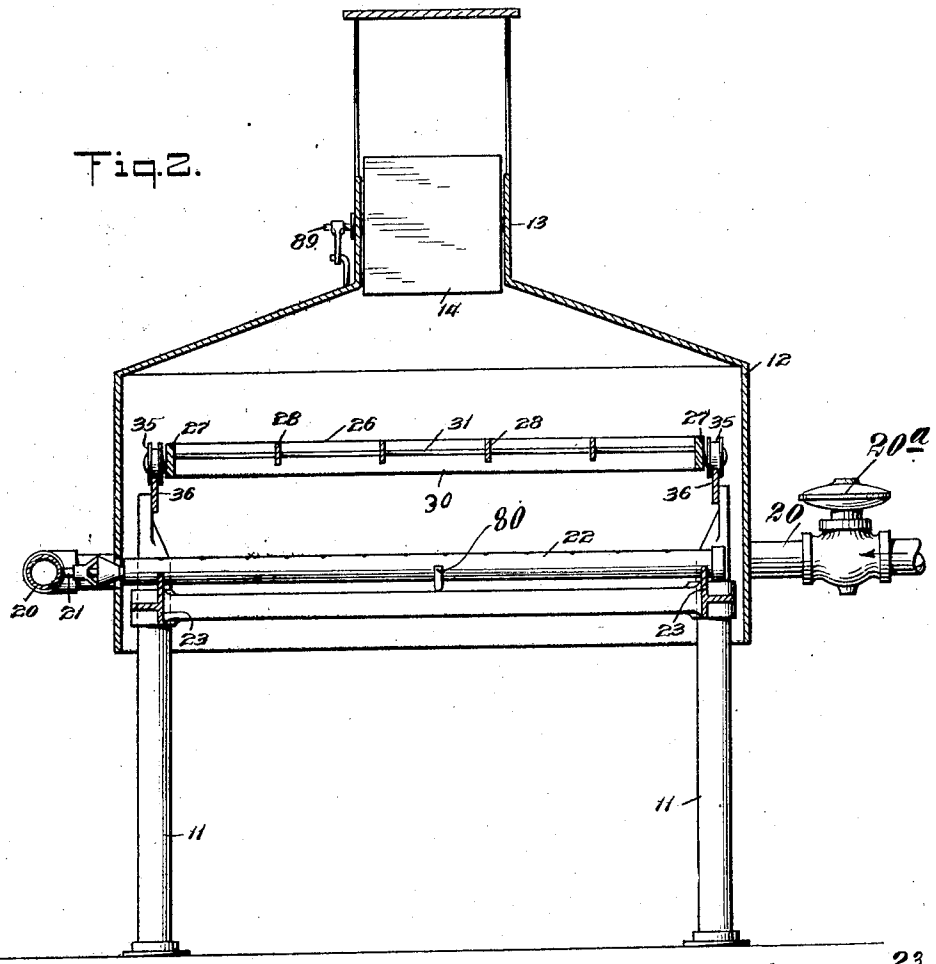
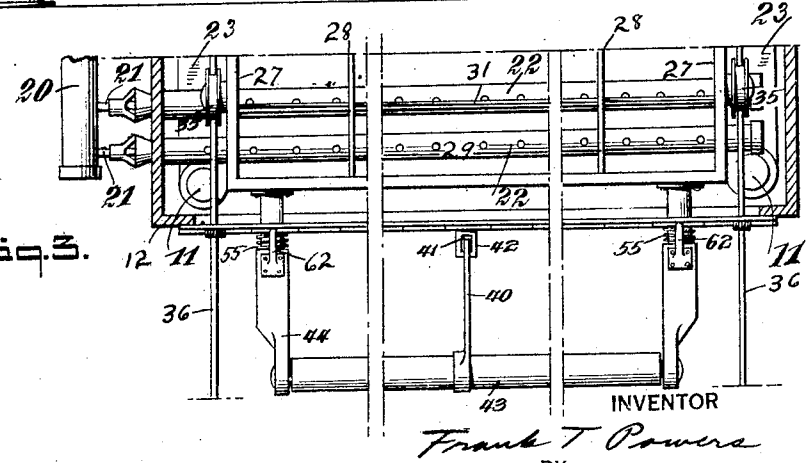


Fig. 3.



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BY

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UNITED STATES PATENT OFFICE.

FRANK T. POWERS, OF LITTLE NECK, NEW YORK.

PLATE BURNING OR DRYING APPARATUS.

Application filed March 6, 1922. Serial No. 541,618.

To all whom it may concern:

Be it known that I, FRANK T. POWERS, a citizen of the United States, and resident of Little Neck, in the county of Queens and State of New York, have invented certain new and useful Improvements in Plate Burning or Drying Apparatus, of which the following is a specification.

This invention relates to burning, heating or drying apparatus, and is intended for use in any art where articles are to be subjected to heat within a heating chamber or furnace, and where it is desirable to conserve the heat within the chamber when the articles are removed. Thus, for instance, the invention is particularly desirable in the heating of the sensitized printing plates in the process of photo-reproduction.

One object of this invention is to provide a tray or platform movable into and out of the heating chamber and on which the articles to be heated may be arranged when the tray or platform is outside of the heating chamber. The tray may then be moved into the chamber, preferably through an opening in the wall, which opening is provided with efficient closure means automatically brought into position when the tray is inserted in the chamber or furnace, to prevent escape of heat through the opening.

A further object is the provision of means whereby the insertion of the article-carrying platform to the furnace will automatically turn on the supply of fuel, while the movement of the carrier outwardly from said furnace will automatically shut off the supply of fuel. An economical consumption of fuel is thus obtained.

Still another object is the provision of means whereby the insertion of the carrier into the furnace opens the furnace flue for exhaust gases and the outward movement of the carrier closes the flue, thus preventing rapid cooling of the furnace.

By means of my improved construction it is no longer necessary for the operator to continually watch his plate and to stop the heating when the proper temperature is secured. With my heater, the operator places his plate on the tray, pushes it into the furnace for eight seconds, fifteen seconds, or two minutes, as the operation may require. For instance, in the heating of a plate after powdering, the plate is introduced into the furnace for eight seconds. At the end of that time the operator does not have to inspect his plate; he knows the work has been done and not underdone or overdone. In the case of burning enamel, he will leave the plate in the proper length of time, as determined by experience, say two minutes, and he knows then that the enamel is properly burned in.

Other features and advantages will be apparent from a consideration of the construction and operation of a preferred embodiment.

In the accompanying drawings:—

Fig. 1 is a vertical section through one form of my device, said section being taken on a plane parallel to the line of movement of the article-carrying platform.

Fig. 2 is a vertical section on a plane at right angles to the line of movement of the platform.

Fig. 3 is a section taken substantially on the line 3—3 of Fig. 1, and

Fig. 4 is an enlarged detail of the latch for holding the platform within the furnace and the means for closing the opening through which the platform is inserted in the furnace. The latch and closure means are shown in Fig. 1 in operating position, and in Fig. 4 in non-operating position.

In the construction shown the body of the furnace is supported by standards 11, and includes a hood 12 having the usual exhaust gas flue 13, the latter being preferably provided with a damper 14 operable to open or closed position. The furnace may be heated by any suitable source of heat. In the present form I employ gas which is delivered from a supply-pipe 20 to a plurality of branches 21, each branch acting as an air injector to supply air and gas to a corresponding burner-tube 22 within the furnace. The tubes 22 are supported preferably upon cross-bars 23 fixed upon the standards 11. The burner-tubes are so perforated and so positioned within the furnace as to produce a uniform distribution of heat in a plane above and parallel to the plane of said burners.

To make the furnace uniform in its operation there is preferably placed a gas pressure regulator 20^a in the gas supply line, so that regardless of the fluctuations of the pressure on the city mains or other source of gas supply, the pressure at the burners will always be uniform.

Where articles, such as the printing-plates used in the process of photo-reproduction,

are to be burned or dried, and particularly where a large number of articles are to be heated at the same time, it is desirable to arrange the articles outside of the furnace in the relative positions they are to occupy therein. For this purpose there is provided a tray, carriage or article-carrying platform 26 which may be of any suitable construction but is here shown in the form of a rack having side-bars 27 and intermediate bars 28 positioned in end bars 29 and 30. Between the end bars are rods 31 which may extend through openings in the bars 28. The number and spacing of the intermediate bars and tie-rods are, of course, determined by the size of the articles to be carried by the platform. As a convenient means whereby the platform may be inserted into the furnace the platform is provided with rollers 35 movable along supports or rails 36 which may be mounted on the standards 11. The rails 36 extend from outside the furnace to the interior thereof, so that after the articles have been arranged upon the platform outside of the furnace, the platform may be moved into the furnace through an opening 37 therein until the platform is wholly within the furnace. For holding the rack or platform within the furnace there is provided a pivoted latch 40 adapted to engage in a slot 41 in a bracket 42 fixed to the wall of the furnace. The rack or tray is provided with a handle for pulling or pushing it along the track. This handle is shown as including a member 43 rotatably mounted in brackets 44 connected to the platform. The latch 40 is preferably rigid with the handle member 43 so that the operator may readily operate the latch by rotating the handle member 43 slightly before he lets go of it on inserting the platform, or when he grasps it to pull out the platform.

To close the opening 37 after the platform has been inserted into the furnace in order to prevent the escape of heat therethrough, there is provided a closure member 50, slidably mounted upon the brackets or end members 44 of the platform handle. The closure-member 50 is normally pressed toward the platform by springs 55 on each member 44. When the platform is inserted in the furnace, the closure 50 will contact with the side of the furnace to close the opening 37 before the platform reaches its innermost position. Further inward movement of the platform to the position where the latch 40 engages the retainer 42 will compress springs 55 and hold the closure-member firmly against the furnace wall.

The closure-member 50 is larger than the opening 37 to overlap the edges, and of course the opening 37 is larger than the platform 26 and articles on the latter. Thus the closure extends upwardly above the plates or other articles. To prevent this upper edge from interfering with the removal of the articles from the portion of the platform adjacent to the closure member, I provide means whereby that portion of the closure member which extends above the platform may be lowered when the platform is drawn out of the furnace. As shown, the portion 60 of the closure-member which extends above the platform is hinged to the main body of the closure-member, and is normally pressed outwardly and downwardly as by a spring 61. A finger 62 carried by one or both end members 44 of the handle acts as a stop for the hinged portion 60, so that when the platform is moved in and the body of the closure engages the wall of the furnace, further movement of the platform, handle and finger forces the portion 60 upwardly to closing position against the furnace wall. The portion 60 will be held in its upward position as long as the latch 40 engages in the slot 41. Upon release of said latch the initial outward movement of the platforms permits the main closure to remain in place by the action of the springs 55 while sliding on members 44, but the upper section 60 will drop down by the action of the spring 61 as springs 55 do not act on it. This action is automatic and provides easy and unobstructed access to the articles on the platform the instant the platform is withdrawn.

My invention provides means whereby the movement of the platform controls the supply of fuel, so that said supply of fuel is turned on when the platform is properly positioned within the furnace, and turned off as soon as the platform is moved outwardly from the furnace. Thus efficiency is secured and fuel is conserved by generating heat only when necessary. For this purpose the inner or rear bar 30 of the platform is adapted to operate a valve 70 which controls the supply of fuel to the burners 22. The operating means shown includes a plunger member 71 normally pressed inwardly by a spring 72 into the path of movement of the platform and adapted to be engaged by the inner side 30 of the platform, so that when the latter moves to final position within the furnace it presses said plunger outwardly against the action of the spring 72. The plunger 71 may be connected to the valve 70 in any suitable manner, but preferably the outer end is connected to one arm of a bell crank lever 74 pivotally mounted on a bracket 75 on the furnace. The other arm 76 of the lever is connected to the valve stem by a link 77 so that the outward movement of the plunger 71 will move the arm 76 of the bell-crank 74 and the link 77 upwardly. This will open the valve 70 to admit fuel to the burners. It will be apparent that as soon as the platform is moved outwardly the

spring 72 will return the parts to original position and cut off the fuel supply. In order that the burners may be lighted when the supply of fuel is turned on, a pilot light 80 may be provided, said light being fed from the supply side of the valve 70, so as to be unaffected by the opening and closing of the valve.

To further increase the efficiency of operation of the furnace, I prevent rapid cooling thereof after the supply of fuel is turned off. This is accomplished by closing the damper in the flue when the platform is drawn outwardly from the furnace, and automatically opening the damper when the platform is inserted in the furnace. Preferably the same plunger 71 which operates the valve 70 operates the damper 14. The connection here shown includes a link 86 attached to a third arm 85 of the bell-crank lever 74 and to one end of a crank arm 87 fixed to a shaft 89 journaled in the flue 13 and upon which the damper 14 is mounted. Thus, movement of the plunger 71 outwardly or inwardly, depending upon the position of the platform, will rotate the damper in one direction or the other to open or close it.

From the present illustrated embodiment, it will be seen that the drying or "burning" heat is created in substantially a plane of equal intensity, the pipes or tubes 22 being in a plane and each being provided with a relatively large number of flame orifices. In practice, if desired, the number of flame orifices could be relatively much more numerous and also much smaller than as shown in the present drawings. By reason of this feature of the invention, the heat is radiated with practically a uniform effect for any plane substantially parallel to the plane of the flame orifices.

It will further be clear from the drawings that the photo-mechanical plates are presented in such a plane substantially parallel to the plane of the flame orifices, and thus the effect of the radiated heat is uniform on all parts of the photo-mechanical plates, as just explained. The distance between the plane of the plates and that of the heat source may obviously be varied, but in practice may be selected at a distance such as will give best results, as deduced from experience, in speed of drying, degree of temperature most advisable, as well as considering other factors which may enter into the practical work.

From the foregoing it will be seen that the movement of the platform or carrier into the chamber opens the flue, turns on the gas, and closes the opening through which the carrier was inserted, and the reverse operations are accomplished by the removal of the carrier. In addition, the withdrawal of the carrier drops a part of the closure downwardly so that the articles may be more readily picked up, and the handle by means of which the platform is moved also operates the retaining or releasing catch.

From Figs. 1 and 2 of the drawings it will be seen that above the carriage 26 for the photo-mechanical plate there is free space for the intensely heated air to contact with, and chemically act upon, the printing surface of the plate thereby effecting the chemical change in that surface which is essential in the further preparation of the plate for printing, or more usually for making matrix sheets or wax molds for stereotyping or electrotyping. This step usually called "burning", consists in carbonizing the colloidal coating in which the design is defined on the surface of the plate, the design thereby being transformed into a hard, vitreous "enamel" which is extremely acid-resistant. This enamel not only preserves the design during further etching of the plate, but constitutes the permanent printing surface of the plate.

There is provided a continuous flow of the intensely heated air on to the printing surface of the plate. The hood or housing 12 has the upper or top part thereof upwardly and inwardly inclined, while the centrally-located flue 13 is of relatively small area. This constitutes an embodiment of means for directing and preferably reverberating the intensely heated air on to the printing surface of the plate with its coating of enamel, which is to be "burnt in" or carbonized, as just described.

One of the main objects of the invention is to bring intense heat to the printing surface of a previously chemically treated plate for photo-engraving purposes, intense heat within the shortest possible time. As the plate is positioned with the printing surface up to avoid injury, the heat is created conveniently below the plates and passes upwardly around the edges thereof, and due to the free space above the plate or plates and the sloping top of the housing, it is directed, and preferably reverberated on to the colloid coating constituting or covering the design or picture, and which it is necessary to carbonize to make it acid-resistant. This invention produces and applies this intense heat necessary for carbonization in a very even and rapid manner.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A print heater including a furnace, a support extending from outside of said furnace to the interior thereof, and a reticulated print carrier mounted upon said support for movement thereon into and out of said furnace.

2. A print heater including a furnace, rails extending from outside of said furnace

to the interior thereof, a print carrier mounted upon said rails for movement thereon into and out of said furnace and a series of parallel gas burner tubes directly beneath the path of movement of said carriers.

3. The combination with a furnace, of a platform mounted for movement into and out of said furnace, a handle on said platform for moving it into and out of the furnace, and means mounted on said handle for locking said platform against movement when positioned within said furnace.

4. The combination with a furnace, of a platform mounted for movement into and out of said furnace, a handle on said platform for moving it, and means mounted upon said handle for locking said platform against movement when positioned within said furnace, said locking means being pivoted on said handle.

5. The combination with a furnace, of a platform mounted for movement into and out of said furnace, a handle-bar rotatably mounted on said platform whereby said platform may be moved, and a latch mounted upon said handle-bar for locking said platform against movement when positioned within said furnace, said latch being operable to effective or ineffective position through rotation of said handle-bar.

6. A print heater including a furnace having an opening, a print carrier mounted for movement into and out of said furnace through said opening, and means carried by said print carrier and resiliently connected thereto for closing said opening when said carrier is positioned within said furnace.

7. The combination with a furnace having an opening, of a platform mounted for movement into and out of said furnace through said opening, a plate carried by said platform for closing said opening when said platform is positioned within said furnace and connections between said plate and said carrier for permitting further inward movement of said carriers after said plate reaches closing position.

8. The combination with a furnace having an opening, of a platform mounted for movement into and out of said furnace through said opening, a plate carried by said platform for closing said opening when said platform is positioned within said furnace, said plate having a portion thereof extending upwardly above said platform and hinged to the main body of said plate, and means for holding said portion in raised position when said platform is positioned within said furnace.

9. The combination with a furnace having an opening, of a platform mounted for movement into and out of said furnace through said opening, a plate carried by said platform for closing said opening when said platform is positioned within said furnace, and having a portion thereof extending upwardly above said platform, said upwardly extending portion being hinged to the main body of said plate, means for holding said portion in raised position when said platform is positioned within said furnace, and means for rendering said last-named means ineffective to permit lowering of said portion when said platform is drawn outwardly from said furnace.

10. The combination with a furnace having an opening, of a platform mounted for movement into and out of said furnace through said opening, a plate carried by said platform for closing said opening when said platform is positioned within said furnace, said plate having a portion thereof extending upwardly above said platform, said upwardly extending portion being hinged to the main body of the plate, and a finger for pressing against said portion to hold said portion in raised position when said platform is positioned within the furnace.

11. The combination with a furnace having an opening, of a platform mounted for movement into and out of said furnace through said opening, a plate carried by said platform for closing said opening when said platform is positioned within said furnace, said plate having a portion thereof hinged to the main body of the plate, said plate being slidably mounted in respect to said platform, a member pressing against said portion to hold said portion in raised position when said platform is positioned within said furnace, and a spring for moving said plate away from said member to permit said portion to be lowered when said platform is drawn outwardly from said furnace.

12. In combination, a furnace having a source of fuel supply, a platform mounted for movement into and out of said furnace, and means operated by the movement of said platform for controlling said fuel supply.

13. In combination, a furnace having a source of fuel supply, a platform mounted for movement into and out of said furnace, and means operated by said platform when the latter is positioned within said furnace for turning on the supply of fuel.

14. In combination, a furnace having a source of fuel supply, an article carrier mounted for movement into and out of said furnace, fuel-controlling means whereby the supply of fuel to said furnace may be turned on or shut off, said carrier when positioned within said furnace operating said fuel-controlling means to turn on the supply of fuel, and means whereby said fuel-controlling means is operated to shut off the sup-

ply of fuel when the carrier is drawn outwardly from said furnace.

15. In combination, a furnace having a source of fuel supply, a platform mounted for movement into and out of said furnace, a valve for controlling the supply of fuel to said furnace, means for operating said valve, said platform when positioned within said furnace operating said means to open the valve and turn on the supply of fuel, and means whereby said valve-operating means is operated to close the valve and shut off the supply of fuel when said platform is drawn outwardly from said furnace.

16. In combination, a furnace having a source of fuel supply, a platform mounted for movement into and out of said furnace, a valve for controlling the supply of fuel to said furnace, means for operating said valve, a spring normally pressing said valve-operating means to hold said valve closed to shut off the supply of fuel, said platform when positioned within said furnace operating said valve operating means against the action of said spring to open the valve and turn on the supply of fuel, said spring operating to close the valve when the platform is drawn outwardly from the furnace.

17. In combination, a furnace having a source of fuel supply, an article carrier mounted for movement into and out of said furnace, a valve for controlling the supply of fuel to said furnace, means for operating said valve, said means including a link extending into said furnace, a spring normally pressing said link inwardly to maintain said valve closed to shut off the fuel supply, said carrier when positioned within said furnace engaging said link to press it outwardly against the action of said spring to open the valve and turn on the supply of fuel, said spring restoring said link to close the valve when the carrier is drawn outwardly from said furnace.

18. In combination, a furnace having a source of fuel supply and fuel burning means, a platform mounted for movement into and out of said furnace, a valve for controlling the supply of fuel to said furnace, means for operating said valve, said platform when positioned within the furnace operating said last-named means to open the valve, means whereby said valve-operating means is operated to close the valve when the platform is drawn outwardly from said furnace, a pilot-light fed from the source of fuel supply on the supply side of the valve, said light being positioned adjacent the fuel-burning means and being unaffected by the operation of the valve, said light serving to ignite the fuel when the valve is opened.

19. In combination, a furnace having a flue, a damper in said flue operable to open or closed position, a source of fuel supply for said furnace, a platform mounted for movement into and out of said furnace, and means operated by said platform when the latter is positioned within the furnace for turning on the supply of fuel and operating said damper to open position.

20. In combination, a furnace having a flue, a damper in said flue operable to open or closed position, a source of fuel supply for said furnace, a platform mounted for movement into and out of said furnace, fuel-controlling means whereby the supply of fuel to said furnace may be turned on or shut off, said platform when positioned within the furnace operating said fuel-controlling means to turn on the supply of fuel and operating said damper to open position, and means whereby said fuel-controlling means is operated to shut off the supply of fuel and said damper is operated to closed position when the platform is drawn outwardly from the furnace.

21. In combination, a furnace having a flue, a damper in said flue operable to open or closed position, a source of fuel supply for said furnace, a platform mounted for movement into and out of said furnace, a valve for controlling the supply of fuel to said furnace, a bell-crank having a plurality of arms, means for operating said valve connected to one of said arms, means for operating said damper connected to a second arm, a link connected to a third arm, a spring normally pressing said link in a direction to close said valve and said damper, said platform when positioned within said furnace pressing said link against the action of said spring to rotate said bell-crank in a direction to open said valve, and said damper, said spring operating to close the valve and the damper when the platform is drawn outwardly from the furnace.

22. A print heater, including a heating chamber, having a horizontal slot in one wall and an exhaust flue in the top, a series of horizontal burner tubes within the chamber below said slot, a pair of rails above the burners and extending to the exterior of the chamber, a skeleton platform adapted to support prints to be heated and movable along said rails through said slot, and means for closing said slot, turning on gas to said burners, and opening said flue upon the inward movement of said platform to final position.

23. An apparatus for burning photo-mechanical printing plates including in combination means for creating heat in a substantial plane of practically uniform intensity and means for presenting one or more photo-mechanical printing plates with the etched surface thereof free from contact, in a plane substantially parallel to said heat plane and at a predetermined distance therefrom, and means for retaining the heat.

24. An apparatus for burning photo-me-

chanical printing plates including in combination means for creating heat in a substantial plane of practically uniform intensity and means for presenting one or more photo-mechanical printing plates with the etched surface thereof free from contact, in a plane substantially parallel to said heat plane and means for retaining the heat.

25. An apparatus for burning photo-mechanical printing plates including in combination means for creating heat in a substantial plane of practically uniform intensity and means for presenting one or more photo-mechanical printing plates with the etched surface thereof free from contact, in a plane substantially parallel to said heat plane, means for varying the intensity of the heat, and means for retaining the heat.

26. An apparatus for burning photo-mechanical printing plates including in combination a substantially closed heat retaining casing, means for supporting a plate or a plurality of plates while exposing the printing surface completely to the heat, and means for creating heat substantially in a plane of uniform intensity parallel to the plates and over an area practically equal to the support and for equally heating the plate or plates on all parts of the support.

27. An apparatus for burning photo-mechanical printing plates including in combination a substanially closed heat retaining casing, means for supporting a plate or a plurality of plates while exposing the printing surface completely to the heat, and means for creating heat substantially in a plane of uniform intensity parallel to, and at a predetermined distance from, the plates and over an area practically equal to the support and for equally heating the plate or plates on all parts of the support.

28. An apparatus for burning photo-mechanical printing plates including in combination means for supporting a photo-mechanical printing plate with its etched surface free from contact, and means for applying a uniform heat to the etched surface while so supported.

29. An apparatus for burning photo-mechanical printing plates including in combination means for supporting a photo-mechanical printing plate with its etched surface free from contact, and means for directing a traveling heated gas upon the etched surface to increase its acid-resisting properties.

30. An apparatus for burning photo-mechanical printing plates including in combination means for supporting a photo-mechanical printing plate with its etched surface free from contact, and means for highly heating a gas and directing it upon the etched surface of the plate to increase its acid-resistant properties.

31. An apparatus for burning photo-mechanical printing plates including in combination a support upon which a printing plate rests with its etched surface unobstructed, means for intensely heating gas and means for directing the intensely heated gas upon the unobstructed etched surface of the printing plate to burn the enamel thereon.

32. An apparatus for burning photo-mechanical printing plates including in combination a support upon which a printing plate rests upon its back with its etched surface upward and unobstructed, means for intensely heating gas and means for reverberating the intensely heated gas upon the unobstructed etched surface of the printing plate to burn the enamel thereon.

Signed at New York, in the county of New York and State of New York, this first day of March, A. D. 1922.

FRANK T. POWERS.