

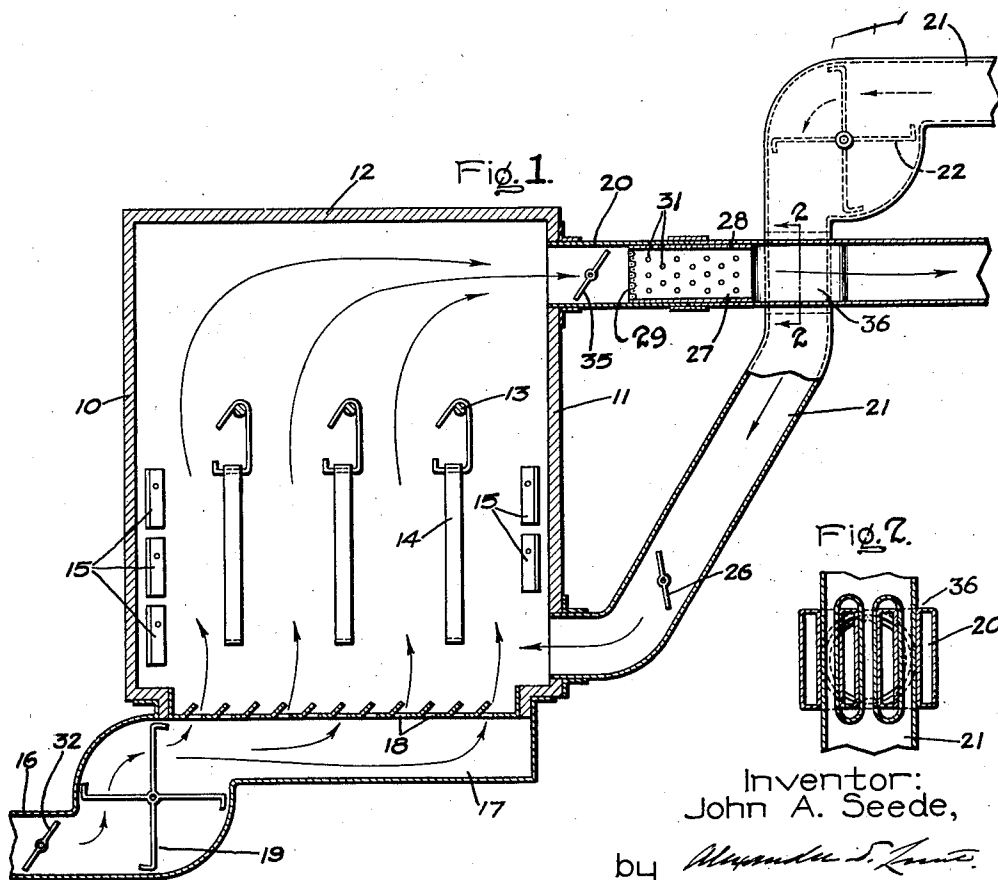
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J. A. SEEDE

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JAPANNING OVEN

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UNITED STATES PATENT OFFICE

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JAPANNING OVEN

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My invention relates to ovens, especially to japanning ovens and the like, such as used in the baking of articles coated with japan, enamel and the like, and has for its object the provision of simple, reliable and efficient means for utilizing the combustible solvent vapors escaping from such an oven.

More specifically the object of the invention is to provide an oven in which the heat generated by the usual heating means is supplemented by the combustion of the heated solvent bearing gases leaving the oven.

Up until the present time, practically all continuous core plate enameling ovens have been heated by oil and the solvent flashes into flame within a few feet of the oven opening. This has obvious advantages from the standpoint of heat conservation since the combustible solvent in the heated gases, by being burned furnishes heat which would otherwise be wasted, but there are disadvantages, such as unequal heating resulting in a coating that is defective, due to under firing or over firing. Experiments indicate that heating electrically without burning of the solvent in the oven gives a coating that is superior in every way but this method is more costly.

Other types of japanning ovens are so constructed that the solvent laden heated air does not burn in the oven but is conducted away from the oven and exhausted to atmosphere. In these ovens it is desirable to maintain the temperature just below that at which the heated solvent bearing air will ignite. It is to this latter type of oven that this invention relates.

In accordance with my invention I have provided means whereby the combustible solvent in the gases escaping from the oven is burned, and the heat of such combustion is then transferred to the interior of the oven.

For a more complete understanding of my invention reference should be had to the accompanying drawing in which Fig. 1 is a sectional elevation of an oven embodying my invention, and Fig. 2 is an enlarged sectional view taken along the line 2—2 of Fig. 1.

Referring to the drawing, in one form of my invention I provide an oven structure

comprising side and top walls 10, 11 and 12. Cross bars 13 in the oven act as supports for the articles 14 to be coated, the articles, as shown, being hung on the bars 13. Suitable electrical heating elements 15, which may be of any type desired, are mounted in the oven. A fresh air inlet pipe 16 leads to a manifold 17 preferably at the base of the oven, and the bottom wall of the oven contains apertures 18 through which the fresh air passes into the oven. A rotary blower 19 and a regulating damper 32 are preferably located in the intake passage 16 for the fresh air. Preferably located near the top of the oven is an outlet flue 20 through which the heated combustible gases pass from the oven. An auxiliary air intake 21 is shown connected to the oven at a point near the bottom thereof. Located in the auxiliary air intake 21 is a rotary blower 22 and a regulating damper 26. An electrical igniting device 27 for the gases is shown mounted in the outlet flue 20 preferably in close proximity to the oven. A suitable regulating valve or damper 35 controls the passage of the combustible products through the outlet flue 20.

The igniting device 27 consists of a tube 28 at the oven end of which is located a gauze screen 29, made of a suitable material such as a metal. Suitably mounted in and extending across this tubular member 28 are a plurality of electric resistance elements 31 arranged in staggered formation, and which are connected to a suitable source of electricity, not shown. These electrical resistance elements may consist of filaments of nichrome and they are preferably heated to incandescence, i. e. a temperature of about 700 or 800 degrees C. Obviously any suitable igniting means may be used. This igniting device is somewhat similar in principle to the Davey mine lamp, since in each instance the substance undergoing combustion is retained by gauze screens in a manner such that the flame will not pass out into a surrounding atmosphere where it might cause an explosion or burning to take place.

As shown, the conduits 20 and 21 are in heat exchange relation. The two conduits are interwoven, the juncture forming the re-

cuperator 36. Preferably, the recuperator 36 will be positioned comparatively close to the ignition device.

The operation of the oven is as follows: Assuming that the electric heaters 15 are energized, the members 31 heated to incandescence from any suitable source of electricity, and the blowers 19 and 22 are rotated, a fresh supply of air will be forced through the apertures 18 into the lower part of the oven, and this air being heated by the heating elements 15 passes around the articles 14 to be coated. As soon as the oven has reached a predetermined temperature the regulating means 32 is moved to partly close the intake 16, and the regulating devices 35 and 26 are moved to partly open the outlet flue 20 and the auxiliary air intake 21 respectively. The heated air in passing around the articles 14 becomes substantially charged with combustible solvent from the surfaces of these articles. This combustible gas is passed through the gauze 29 and over and about the incandescent filaments 31. The combustible gas which has already been heated somewhat in the oven, in passing into the ignition device and coming into contact with the filaments 31, is ignited thereby and combustion of the gas occurs immediately. It will be understood that the flame is prevented from passing into the oven by the gauze 29 and thus explosions of the gas in the oven are avoided. The products of combustion are exhausted through the flue 20.

The incoming fresh air being forced by blower 22, passes through the conduit 21 into the oven, and as this air passes the recuperator 36 it is heated to a considerable degree by the hot products passing through the conduit 20. The heat of this air passing into the oven augments the heat from the heating elements 15 and as a result the current to these elements may be reduced. By regulation of the dampers 26 and 32 the proportions of fresh air and the heated air passing into the oven can be varied to any desired degree.

The location of the ignition device 27 adjacent the outlet of the oven is an important feature of my invention because the combustible gases are burned immediately upon passing from the oven. By this arrangement the combustible gases are changed at once into a fixed gas and thus the clogging of the flue by deposits of soot, pitch, condensed solvent, etc., and the fires often resulting as a consequence of these deposits are avoided.

While I have described my invention as embodied in concrete form and operating in a specific manner in accordance with the provisions of the patent statutes, it should be understood that I do not limit my invention thereto, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of

my invention, the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. The combination with an oven, of heating means within said oven, an air inlet for said oven, an outlet flue for conducting heated gases away from said oven, means including an igniting device for producing combustion of said gases in said outlet flue, an auxiliary air intake for said oven and means including a heat exchange device whereby heat produced by said combustion is returned to said oven through said auxiliary air inlet.

2. The combination with an oven, of heating means therefor, an air intake for said oven, an auxiliary air intake for said oven, an outlet flue for conducting heated gases away from said oven, and means including an ignition device and heat exchange means, whereby heat of the gases in said outlet flue is returned to said oven through said auxiliary air intake.

3. The combination with an oven, of heating means within said oven, an air intake for said oven, an outlet flue for conducting heated gases away from said oven, said outlet flue containing an ignition device, an auxiliary air intake for said oven, and heat exchange means interconnecting said outlet flue and said auxiliary air intake whereby heat of the gases in said outlet flue is returned to said oven through said auxiliary air intake.

4. In combination with a japanning oven, or the like, heating means therefor, a main air intake for said oven, an auxiliary air intake for said oven, an outlet flue for conducting heated gases away from said oven, heat exchange means interconnecting said outlet flue and said auxiliary air intake and an ignition device located in said outlet flue and between said oven and said heat exchange means, whereby volatile constituents of said heated gases are ignited and burned, heat generated by said burning being transferred to said oven through said heat exchange means and said auxiliary air intake.

5. The combination with an oven, of electric heating means within said oven, an outlet flue for said oven, an ignition device comprising an electrically heated element in said outlet flue adjacent the outlet of said oven whereby the gases escaping from said oven are ignited and burned immediately upon passing from the oven, an air intake for said oven and heat exchange means interconnecting said outlet flue and said air intake whereby the heat of the gases in said outlet flue is returned to said oven through said air intake.

6. The combination with an oven, of heating means within said oven, an outlet flue for said oven, an ignition device in said flue adjacent the outlet of said oven whereby the gases escaping from the oven are ignited and burned immediately upon passing from the oven, a screen at one side of said ignition de-

vice between said device and said oven, an
air intake for said oven and heat exchange
means between said outlet flue and said air
intake whereby heat generated by the burn-
ing gases in said outlet flue is transferred to
5 said oven through said heat exchange means
and said auxiliary air intake.

In witness whereof, I have hereunto set
my hand this 30th day of December, 1927.

JOHN A. SEEDE.

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