J. C. GILLETTE.

VARNISH DRYING OVEN.

APPLICATION FILED JULY 22, 1912.

1,139,858. **Patented May 18, 1915.**

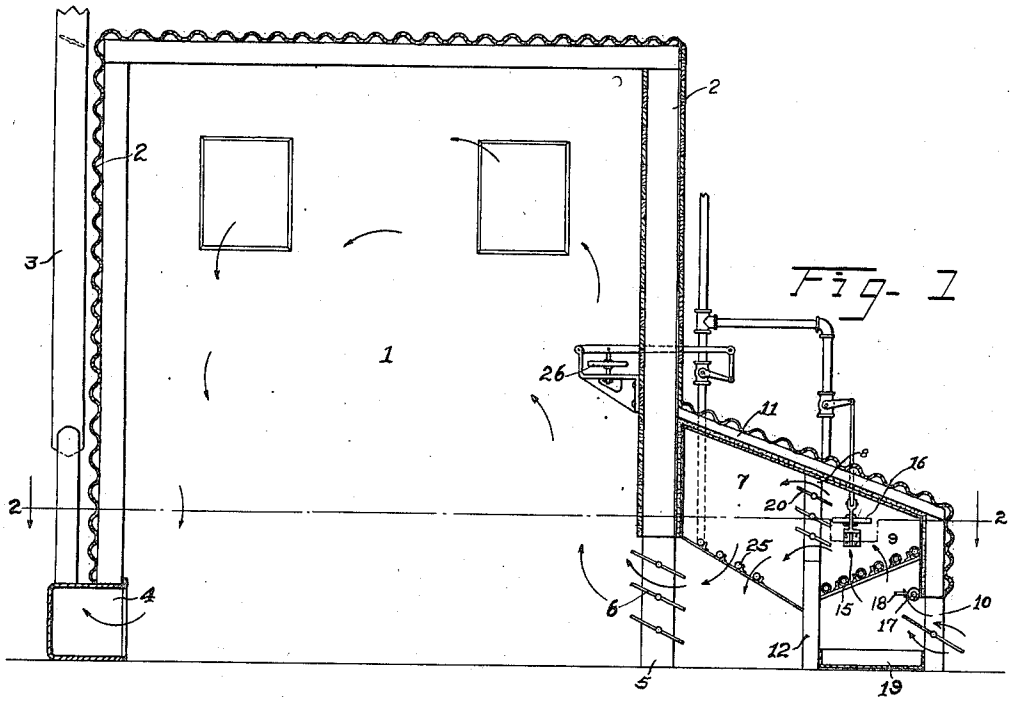


Fig. 1

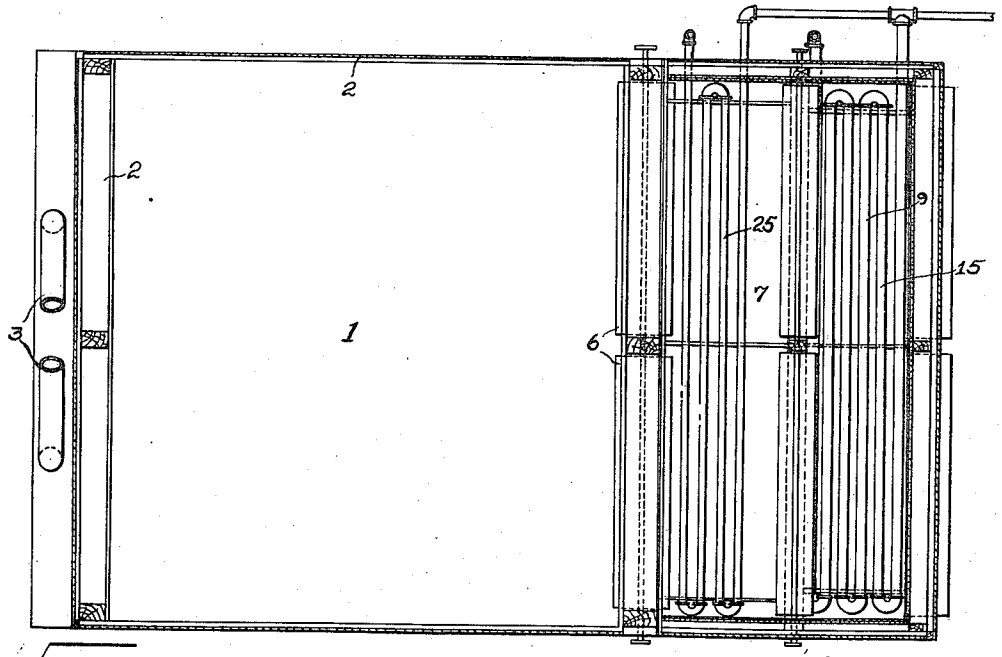


Fig. 2

Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN C. GILLETTE, OF LAKEWOOD, OHIO, ASSIGNOR TO THE GLIDDEN VARNISH COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

VARNISH-DRYING OVEN.

1,139,858. Specification of Letters Patent. Patented May 18, 1915.

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To all whom it may concern:

Be it known that I, JOHN C. GILLETTE, a citizen of the United States, residing at Lakewood, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Varnish-Drying Ovens, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to ovens or drying rooms for varnished articles and has for its object the provision of means for maintaining such ovens at a fixed condition of temperature and humidity.

As is well known, the drying of the varnish is more in the nature of an oxidation or hardening than it is of "drying", the amount of aqueous vapor evolved during such hardening being very small. This hardening does comprise the vaporization of small quantities of various essential oils though this action does not require that the surrounding atmosphere be absolutely moisture free. The operation of drying is hastened by increasing the temperature, as is the case with all chemical reactions, and the air surrounding the articles should be constantly renewed owing to the absorption of the oxygen therein as well as to avoid the saturation thereof by the few essential oils which are vaporized, none of which are very soluble in air. In case varnished woodwork such as furniture or cabinet work or particularly veneered wood such as pianos are being dried, it is essential that the proper degree of humidity be maintained and that this be maintained substantially uniform, since an insufficient humidity at the high temperature will dry out the wood so as to open the joints, too high a humidity will cause the glue to loosen so that the joints become weak and the veneer works loose, while a fluctuating humidity will cause the parts to warp and crack and the varnish to become crazed.

It is the object of this invention, therefore, to provide a simple, cheap, economical and reliable apparatus for maintaining such an oven or drying chamber at a uniform temperature and at a uniform humidity. This result is attained by first bringing the air to a known condition of humidity, and thereafter by changing the temperature to bring this humidity to the desired point, which point will be maintained so long as the temperature remains constant. Inasmuch as the condition of saturation at a fixed temperature is the condition of humidity most easily and certainly obtained, I first saturate the air with moisture, and then increase the temperature thereof to the point at which I desire to maintain the oven, and I so choose the temperature of saturation that the humidity of the air in the oven will stand at the desired figure.

Generally considered my invention may be defined as consisting of the combinations and constructions defined in the claims hereto annexed and illustrated in the drawings accompanying and forming part hereof, wherein:

Figure 1 is a longitudinal cross sectional view through a drying oven and humidifying apparatus constructed in accordance with my invention; and Fig. 2 is a horizontal cross sectional view taken on the line 2—2 of Fig. 1 and looking downwardly.

Describing the parts by reference characters, 1 represents the body of an oven, the same being preferably defined by non-conducting walls 2, and having at one side the draft connection 3 which may be a flue, exhaust fan, or other suitable device. This flue preferably communicates with the interior of the oven through passageways 4 formed near the floor at one side thereof. At a suitable point in the oven, preferably at a point on the opposite side thereof from the openings 4, an inlet opening 5 is provided, the same preferably being provided with louvers or dampers 6 whereby its area may be regulated. Although it is obvious that the interior of the oven might be provided with heating means for use in maintaining the same at the proper temperature in a cold climate such as steam coils, radiators or the like, (not shown) I prefer, in any case to bring the air to the proper condition of temperature and humidity prior to its entrance into the oven, and the preferred means for effecting this result will now be described.

Formed in communication with the opening 5 is a chamber 7, which, in turn, communicates by way of an opening 8 with a preliminary heating chamber 9, the chamber 9 being in communication with the outer air by any suitable inlet, such as 10. The chambers 7 and 9 are here shown as formed exteriorly of the oven and are here shown as

defined by walls 11 preferably of nonheat-conducting material, although the same will be constructed differently in different localities, depending upon the price of material. The chambers 7 and 9 are separated by a partition 12, the opening 8 preferably being in the upper part of this partition and the opening 10 into the chamber 9 being at the lower side of its wall, so that the air passing from the opening 10 to the opening 5 will be obliged to take a circuitous or interrupted course as illustrated by the arrows. Supported in the chamber 9 between the inlet 10 and the opening 8 is a bank of heating pipes 15 so arranged that all air entering the chamber will become warmed before reaching the opening 8. A suitable thermostatic regulator 16 of the usual or any convenient type may be employed for maintaining the temperature of these coils at a substantially uniform point. For the purpose of humidifying the air in this chamber a steam supply pipe 17 may be employed, the same being provided with nozzles or jets 18 whereby steam is blown substantially in the direction of movement of the air. With this arrangement it will be possible to effect the complete saturation of the air entering into this chamber, excess moisture falling into a drip pan 19 whence it is discharged into a suitable overflow. The opening 8 is preferably provided with louvers 20 which should be of metal and should slope toward the chamber 9, their action being not only to control the flow of air through the chambers but also to provide baffle plates to remove excess water from the air and return it to the drip-pan 19. Supported in the chamber 7 between the opening 8 and the opening 5 is a second bank of heating coils 25 which may, if desired, be connected with the same heating circuit as the first coils but must be regulable independently thereof. The coils 25 are preferably regulated by means of a suitable thermostat 26 mounted within the body of the oven.

The operation of the device is substantially as follows:—Let it be supposed that for the particular varnish being dried it is found that the best results are obtained when the articles are maintained at a temperature of about 120° Fahrenheit with a humidity of about 45%. The thermostat 16 is regulated to maintain the chamber 9 at a temperature of say 100° Fahrenheit and sufficient steam is admitted through the pipe 17 to saturate the air at this temperature. The thermostat 26 is, however, set to maintain the oven at a temperature of approximately 120° so that the saturated air as it passes from the chamber 9 to the chamber 7 has its temperature raised by 20 degrees and the relative humidity thereby decreased from 100% to 45%. Likewise if it be desired to maintain the air in the oven at a relative humidity other than 45% but at the same temperature, the humidity can be increased by increasing the temperature in the chamber 9 or can be decreased by decreasing the temperature, the steam supply being simultaneously varied as may be necessary. The air as it enters the oven through the opening 5 first rises owing to its lightness due to its high temperature but later upon striking the cooler top and sides of the oven it falls as shown by the arrows in the direction of the openings 4 through which it is drawn out and into the flue 3.

While I have described my improved construction in detail it is obvious that many changes can be made while still remaining within the spirit of the invention. I have described it thus at length from the fact that it is the simplest and cheapest construction with which I am familiar.

Having thus described my invention, what I claim is:

1. The combination, with a varnish drying oven provided with air induction and eduction passageways, of a chamber with which said air induction passageway communicates, heating means in said chamber, thermostatic means in said oven and operatively connected to said heating means, a preliminary heating chamber communicating with said first chamber, means for admitting air to said preliminary heating chamber, means for maintaining said preliminary heating chamber at a fixed temperature, and means for saturating with moisture the air in said preliminary heating chamber.

2. The combination, with a chamber having an air induction and an air eduction opening, of a heating device between said openings, a steam pipe in said chamber and having jet apertures, a drip pan beneath said jet apertures, baffle plates between said heating device and said eduction opening, a second chamber with which said eduction opening communicates, a varnish drying oven, means establishing communication between said second chamber and said oven, heating devices in said second chamber between said eduction opening and said oven, and thermostatic means in said oven and connected to said last heating means.

3. The combination, with a varnish-drying oven having at its lower portion an air inlet opening, of a chamber communicating with said opening, a second chamber communicating with said first chamber at a point not materially lower than said opening, said second chamber having communication with the outside air at a point not higher than its point of communication with said first chamber, air heating devices in said first chamber and interposed between said oven opening and said point of communication with the second chamber, air heating devices in said second chamber and interposed be-

tween its point of communication with the outer air and its point of communication with said first chamber, temperature controlling means in said oven operatively connected to said first heating devices, other temperature controlling means located between the two sets of heating devices and operatively connected to said last named heating devices, means for aspirating air from said oven, and means for imparting an excess of water vapor to the air in said second chamber.

4. The combination, with a drying oven having inlet and outlet openings and means for creating a current of air therethrough, of a pair of inter communicating chambers, one of which communicates with said inlet opening and the other of which communicates with the outside air, a pipe coil in each of said chambers and interposed between the inlet and outlet thereof, means for admitting heating fluid separately to said coils whereby the air passing through said chambers may be brought to different temperatures, means for injecting into said second chamber an amount of moisture greater than the air passing therethrough can absorb at the temperature of that chamber, and means for separating excess of entrained moisture from the air stream prior to its entrance into said first chamber.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JOHN C. GILLETTE.

Witnesses:
R. S. LEONARD,
B. W. IRAM.