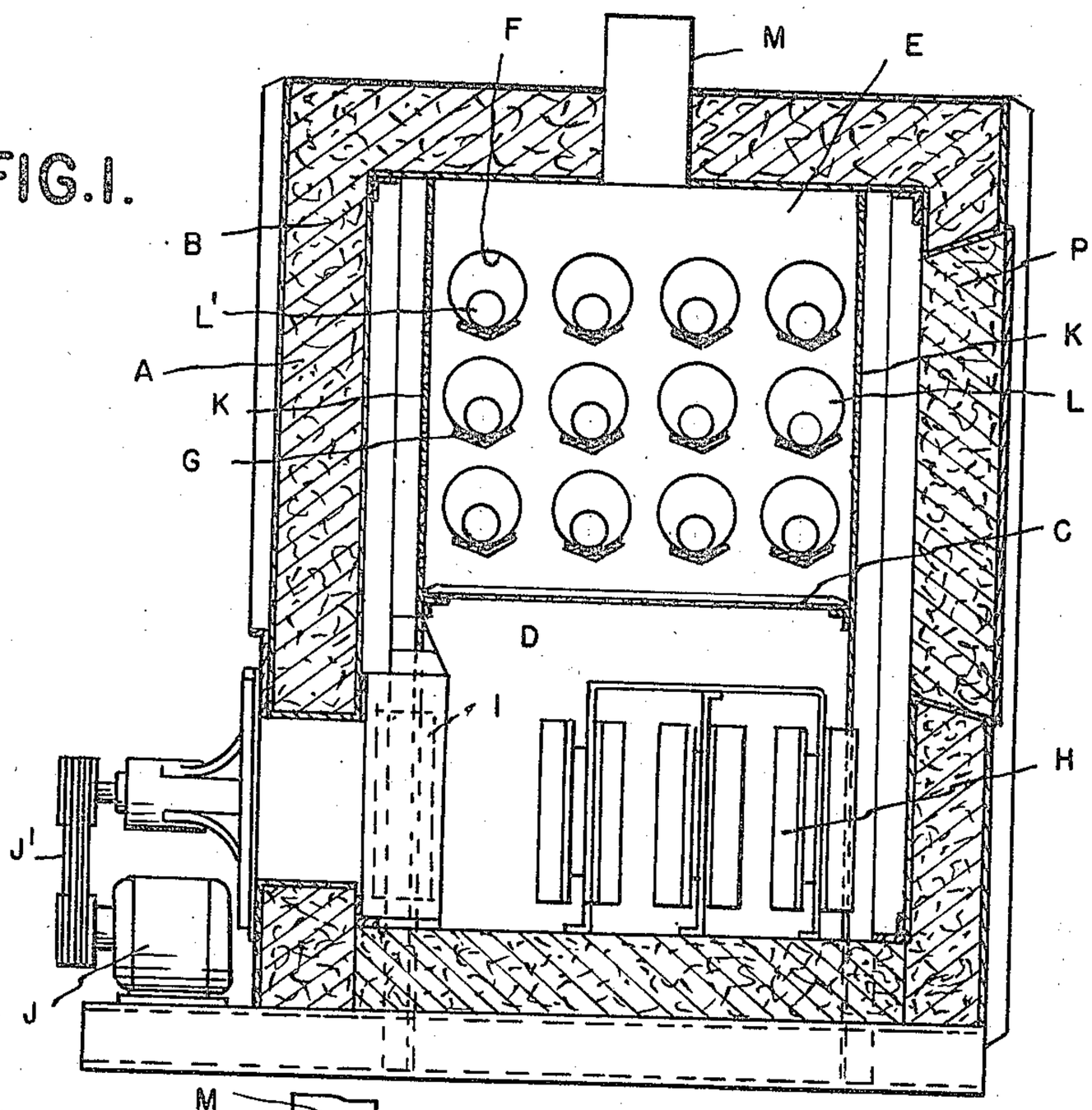
July 6, 1948. R. E. CHRISTIAN ET AL 2,444,805

FURNACE

Filed June 18, 1945 2 Sheets-Sheet 1

FIG.1.



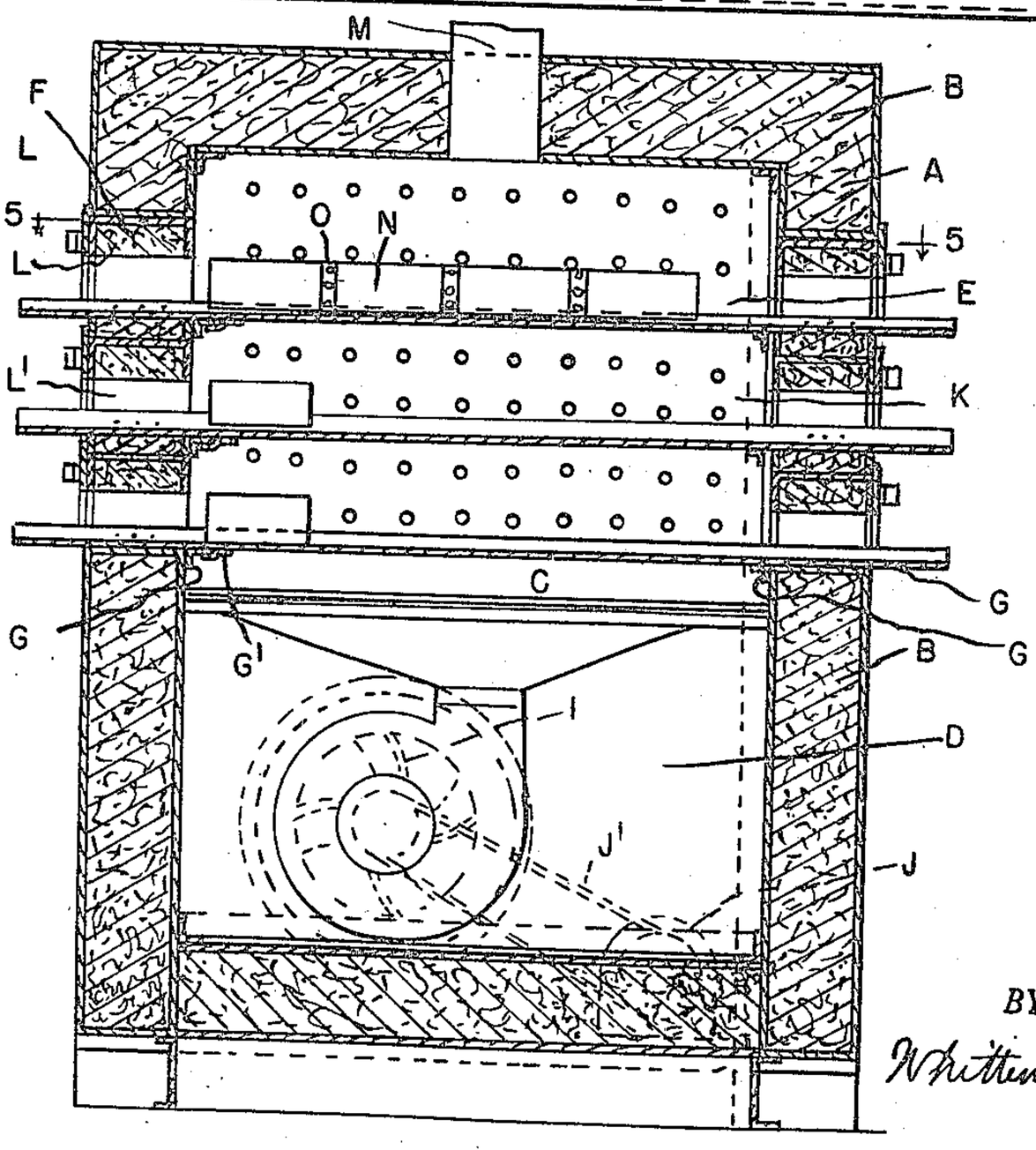


FIG.2.

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FURNACE

Filed June 18, 1945 2 Sheets-Sheet 2

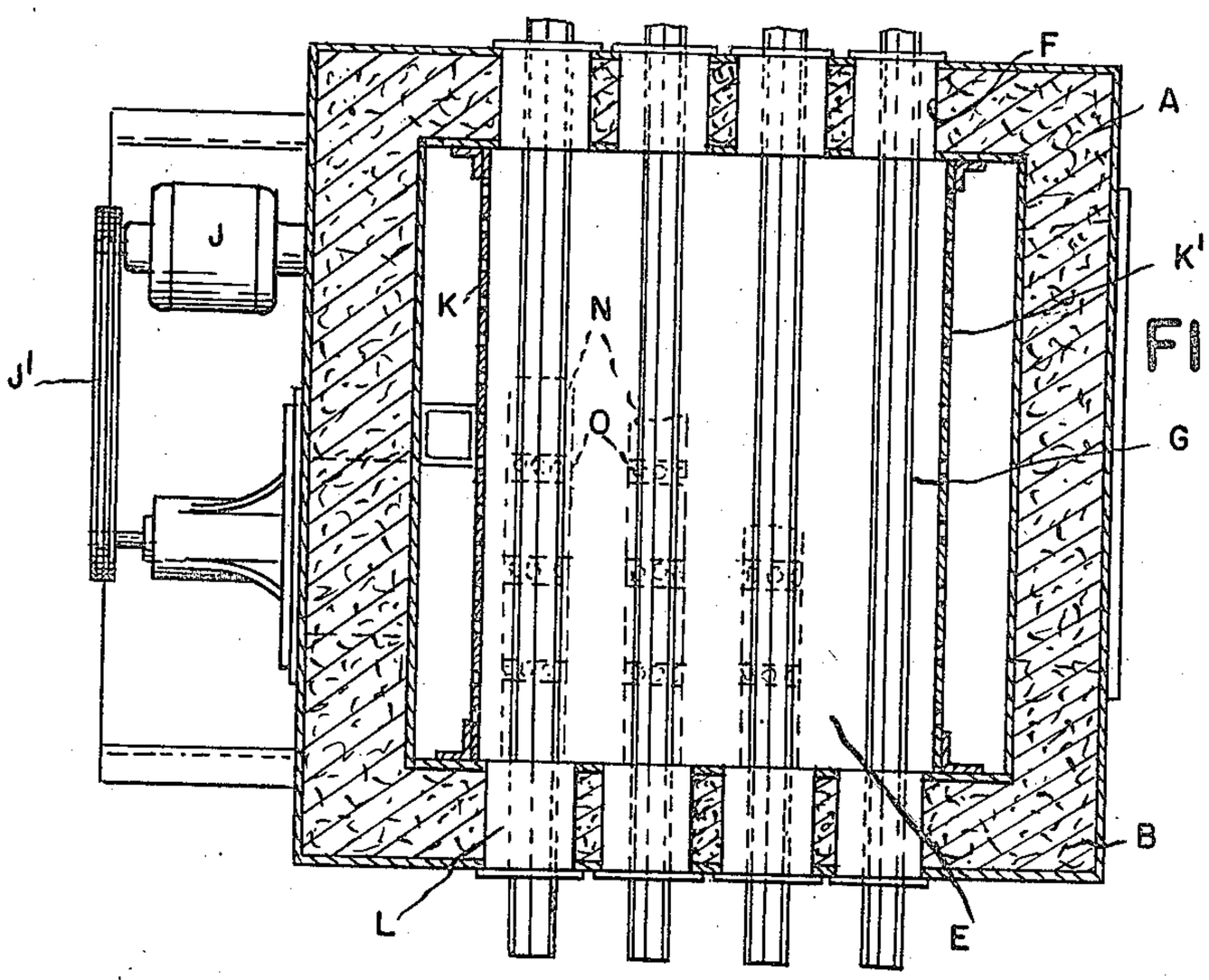


FIG.5.

FIG.3.

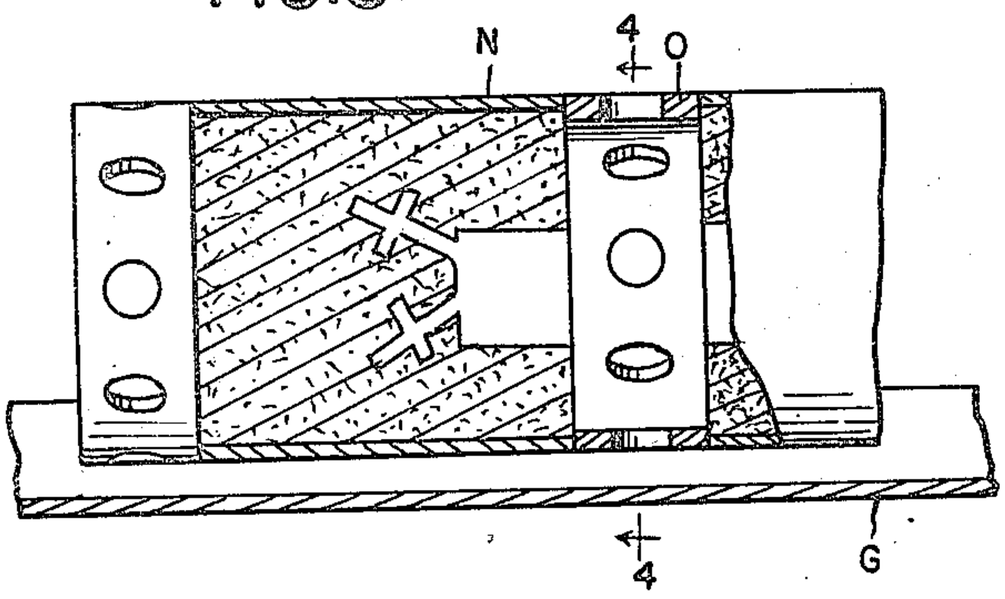
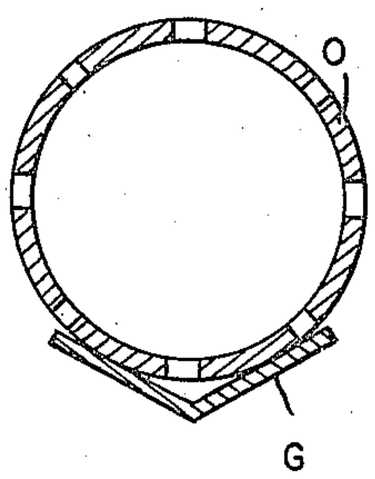


FIG.4.



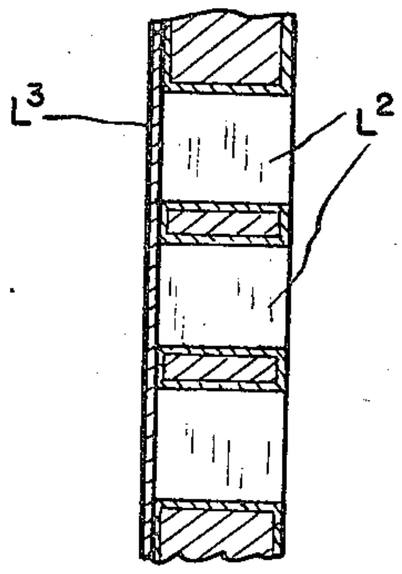


FIG.6.

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UNITED STATES PATENT OFFICE

2,444,805

FURNACE

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1 Claim. (Cl. 34—193)

1

The invention relates to means for heat treating molds and more particularly to investment molds formed from patterns of wax or other low fusing material. The purpose of the treatment is, first, to eliminate moisture from the molds; second, to remove the patterns by melting and draining off the wax; third, to bring the mold up to proper temperature for casting; and, fourth, to volatilize any carbonaceous material formed by wax being absorbed into the mold.

It is the object of the invention to obtain a construction of heat treating apparatus capable of simultaneously operating upon a large number of molds for the purpose above described.

It is a further object to obtain a construction in which the molds can be introduced into and removed from the heat treating apparatus with a minimum loss of heat. With these objects in view the invention consists in the construction as hereinafter set forth.

In the drawings:

Fig. 1 is a vertical longitudinal section through the heat treating apparatus;

Fig. 2 is a cross section therethrough;

Fig. 3 is a sectional elevation showing a plurality of molds as supported within the heating chamber and separated by spacers;

Fig. 4 is a cross section on line 4—4, Fig. 3;

Fig. 5 is a section taken on line 5—5, Fig. 2;

Fig. 6 is a modification of a plurality of plugs mounted on a single plate;

As illustrated in Figs. 1 and 2, A is a hollow wall casing preferably formed of sheet metal and provided with insulating material B within its hollow walls. The space within this casing is divided by a horizontal partition C into a lower air heating chamber D and an upper heat treatment chamber E. The opposite side walls of the latter chamber are provided with series of aligned apertures F, each of sufficient area for the passage of the largest mold to be treated. Extending across the chamber between aligned apertures F and outward therethrough are mold supporting members G. These are preferably metal bars of V-shaped cross section adapted to retain cylindrical molds placed thereon and also to receive and convey outward from the chamber any melted wax. Each bar G is removable but is normally locked in position by a hook member G′ on the underside of the bar engageable with a detent G^2 on the one wall of the casing. A lug G^3 also on the bottom of the bar extends adjacent to the inner face of the opposite wall of the casing thereby holding the bar from accidental longitudinal displacement. Within the chamber D is arranged an air heater preferably an electrical heater H. Also within this chamber is a fan I having its shaft extending outward through the wall of the casing and actuated from a motor J and belt transmission J′. The fan is so arranged that air will be withdrawn from the chamber D and propelled upward into the chamber E through a passage at one end of the horizontal partition C. A similar passage at the opposite end of said horizontal partition permits the air or a portion thereof to return to the chamber D thereby effecting a constant air circulating system. Perforated vertical partitions K and K′ separate the air inlet and outlet passages from the work chamber E. As has been stated, the apertures F are of sufficient area to receive the largest of the molds to be treated. However, where smaller molds are used, these apertures are reduced in area by exchangeable filler plugs L. These are preferably formed of sheet metal to loosely fit the apertures F and with an opening L′ therethrough corresponding to the particular mold which is to be treated. Also, the space surrounding this opening is preferably filled with insulated material. If desired, instead of separate plugs L for each of the apertures F, a plurality of plugs L^2 may be mounted on a single plate L^3, so that they may be simultaneously engaged with or removed from the whole series of apertures F. The chamber E is also provided at its top with a vent conduit M for the escape of gases and vapor from said chamber.

2

In operation, the apertures F having been reduced in area by the exchangeable plugs L to correspond to the particular molds being treated, the operator successively introduces molds, such as N, into the chamber E. This is accomplished by first placing a mold on the portion of the trough G which extends outward through the wall of the casing and then pressing it inward by any suitable pusher. A second mold is then similarly placed in the trough and pressed against the first mold and this is continued until the series extends across the chamber E. However, to provide for the escape of vapor and wax, perforated spacers O are placed between successive molds, these also resting on the trough G. After filling one trough G with molds, the same operation is repeated in connection with another trough and so on until the whole chamber E is filled with molds. The time required for filling the entire chamber is generally sufficient to complete the heat treatment of the molds first introduced. These are then removed from the heating cham-

ber by successively introducing untreated molds at the entrance end thereby expelling the treated molds from the opposite end. Thus, the apparatus is used continuously without interruption for the removal of the work.

To provide for draining away the molten wax, the troughs G may be slightly inclined from one wall to the other as indicated in Fig. 3 or the whole furnace may be slightly tilted to produce the same effect. The troughs G may at any time be easily removed for cleaning and then replaced. Access to the chambers D and E is provided by a removable closure P in the rear wall of the casing.

One very important advantage of the construction is that the openings in the oven through which the molds are entered and expelled are of minimum size thereby reducing heat losses to the minimum.

What we claim as our invention is:

In a heat treatment apparatus, a casing having aligned apertures in opposite side walls thereof, a trough-shaped member extending through the lower portions of said aligned apertures and the chamber therebetween within said casing, said member constituting a slideway on which molds may be successively placed in alignment with each other, advanced through and in air communication with said chamber and expelled through the aligned aperture in the opposite side wall, means for circulating heated air within said chamber, and perforated spacers adapted to be placed between successive molds for the escape of vapor and liquid therefrom during heat treatment.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
169,500	Webber	Nov. 2, 1875
235,531	Holmes	Dec. 14, 1880
705,767	Kurtz	July 29, 1902
720,669	Chapin	Feb. 17, 1903
1,362,369	Talley	Dec. 14, 1920
1,549,880	Johnson	Aug. 18, 1925
1,943,575	Abendroth	Jan. 16, 1934
1,980,875	Northrup	Nov. 13, 1934
2,148,358	Lang et al.	Dec. 21, 1934
2,329,520	Duberstein et al.	July 24, 1941
2,412,407	Kilbury	Dec. 10, 1946