No. 757,412. PATENTED APR. 12, 1904.

S. O. RICHARDSON, Jr.

LADLE AND MOLD.

APPLICATION FILED DEC. 28, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

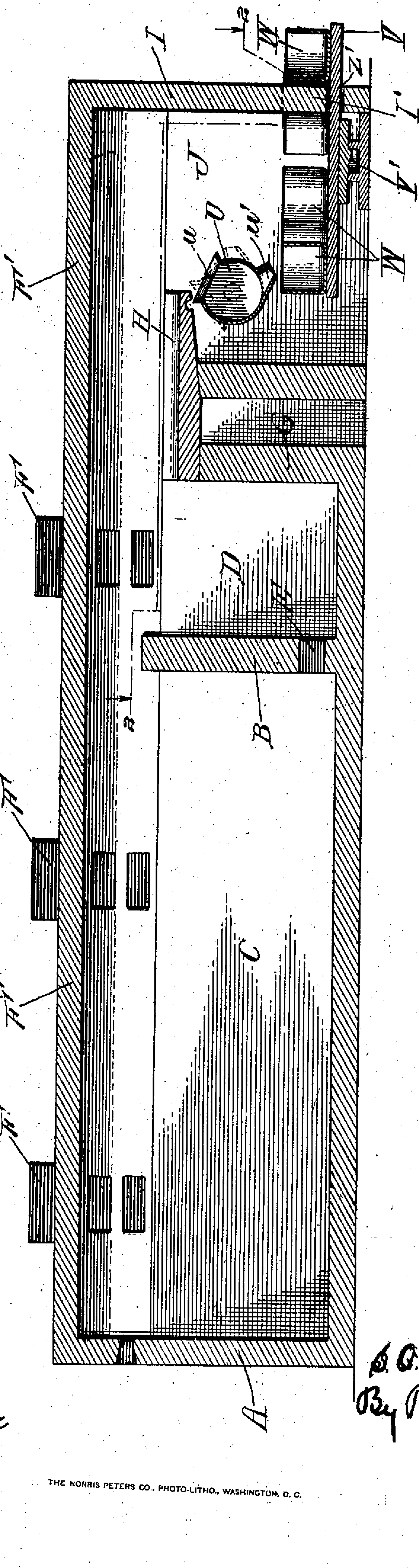

Fig. 1.

Witnesses:

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

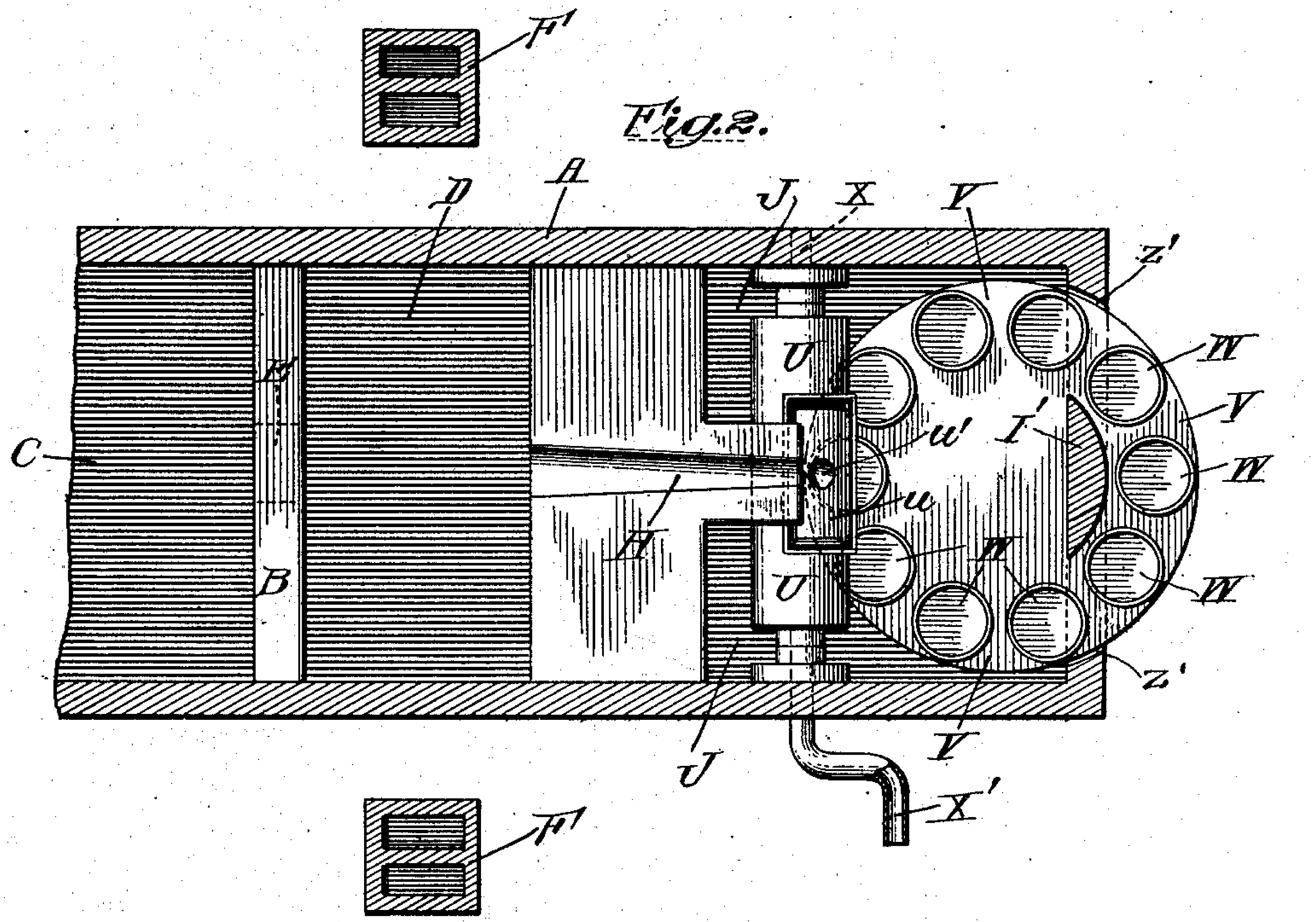
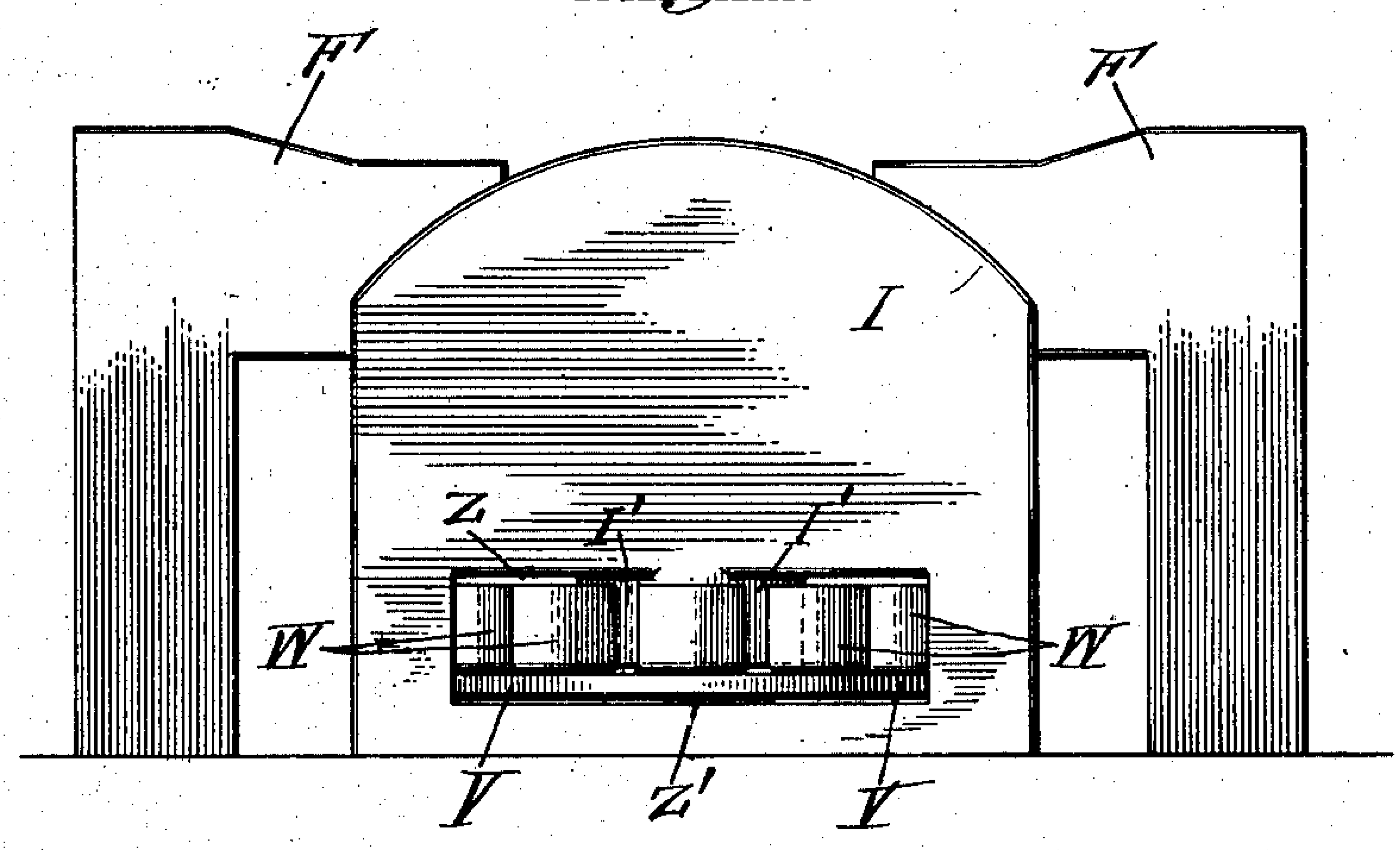


Fig. 3.



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UNITED STATES PATENT OFFICE.

SOLON O. RICHARDSON, JR., OF TOLEDO, OHIO.

LADLE AND MOLD.

SPECIFICATION forming part of Letters Patent No. 757,412, dated April 12, 1904.

Original application filed March 28, 1903, Serial No. 150,008. Divided and this application filed December 28, 1903. Serial No. 186,841. (No model.)

To all whom it may concern:

Be it known that I, SOLON O. RICHARDSON, Jr., a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Ladles and Molds, of which the following is a specification.

This is a division of an application filed by me March 28, 1903, Serial No. 150,008, for improvements in furnaces, and relates more particularly to improvements in ladle and molding means used immediately adjoining or forming a part of a furnace for casting glass.

The object of my invention is to facilitate the casting or molding of glass by providing an intermediate means within or adjacent to the chamber containing the molten glass between such supply and the molding means.

Another object is to so arrange the molding means with reference to the casting means that there may be no appreciable loss of heat during the casting operation.

A further object is to so arrange the casting and molding means that definite quantities of molten metal may be poured into a series of molds.

These and such other objects as may hereinafter appear are attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of a complete glass-furnace embodying my invention. Fig. 2 is a horizontal sectional view on the line 2 2 of Fig. 1 looking in the direction indicated by the arrows, and Fig. 3 is an end elevation of Fig. 2.

Like letters of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A indicates the outer wall of an ordinary tank-furnace, said furnace being divided by a bridge-wall B into a reducing-chamber C and a working chamber D, connected by a passage E, through said bridge-wall.

F F indicate regenerators of any familiar type, having air and gas ports, and by means of which the batch is reduced.

F′ is a crown of the furnace extending over the reducing-chamber C and working chamber D. The bridge-wall being of less height than the furnace it is obvious that there is free communication between the chambers C and D over the top of the bridge-wall. The end wall G of the furnace is also of less height than the furnace and may be, as shown, of less height than the bridge-wall and provided with a spout H.

Adjacent to the wall G is an auxiliary structure I, which contains the casting-chamber J. Adjacent to the spout H and within the casting-chamber is a ladle U, with an opening *u* in the upper side and provided with a spout *u*′ in its lower side. Situated below the level of the spout *u*′ is a table or carrier V, rotatably mounted at V′, on which are placed the molds W. The rear wall of the chamber is pierced with a vertical opening Z, connected by a horizontal opening Z′, through which the molds and carrier may revolve, and is also provided with a depending portion or curtain I′. The ladle U is pivotally mounted on a hollow bar X, provided with a crank X′ outside of the casting-chamber.

Referring to Fig. 1, the operation is as follows: The materials for the batch are first reduced in the chamber C and a portion of the molten metal runs through the opening E and fills the working chamber D with clear molten metal, the slag and impurities floating on top of the metal in the chamber C. The metal is then allowed to flow through the conduit H into the ladle U. If it is desired, the flow may be checked by any well-known means when a definite amount has been allowed to flow into the ladle, or the flow may be continuous during the entire time of casting and the amount of such flow regulated by the amount of material fed into the reducing-chamber C from time to time. If it is desired to allow a definite quantity of metal to enter the receptacle, the ladle will be in the position shown in dotted lines in Fig. 1, and when the desired quantity of metal has been poured the ladle is tipped into pouring position. If it should be desired to stop or check the flow of metal through the spout *u*′, the ladle may be rotated on its pivot to the position indicated in dotted lines, or any well-known means, such as a valve or gate, may be used. The ladle is preferably provided with a relatively large opening, so that metal may flow into it from the conduit when it is in pouring position and also when it is in a tilted position, as indicated by the dotted lines in Fig. 1.

The molds W may be placed in any position upon the carrier; but I prefer to arrange them in a circle and by revolving the carrier upon its pivot to bring each mold successively in position to receive the contents of the ladle. The same revolution also carries the molds successively outside the casting-chamber, where the filled molds may be removed and empty ones substituted.

While I prefer to cast the metal into molds from which blanks may be removed in a partially-filled condition and in shape for further manipulation, I have used in my illustration an ordinary receptacle, and I do not limit myself to any specific form.

While the temperature of the casting-chamber is not so high as that of the reducing and working chambers, it is sufficiently high to preserve a proper liquidity in the molten metal.

The ladle and molds are made of refractory material and the hollow rod X may be kept cool by running a stream of water through it.

New material is constantly put into the reducing-chamber to take the place of that removed in the molds, and the person operating the ladle and molds having a view of the interior of the casting-chamber through a convenient peephole the entire operation may be made continuous. The manner of piercing the rear wall allows the free access of the molds and carrier, but prevents the admission of cold air in quantities sufficient to appreciably lower the temperature of the casting-chamber.

As mere matters of detail the form of carrier, number of spouts on the ladle, &c., may be varied to suit the exigencies of any given service.

While I prefer the construction shown and described, other forms may be used without departing from the broad idea of my invention.

It will be noted that the process hereinabove described is involved in the subject-matter of my copending application, Serial No. 185,804.

I claim—

1. In an apparatus for casting glass, the combination with a glass-furnace, of a substantially closed chamber, a removable molding-receptacle located within said chamber, a conduit leading from the metal-containing chamber of the furnace into said closed chamber, a cylindrical casting-ladle arranged to receive metal from said conduit and arranged to convey metal into said molding-receptacle, means for intermittently stopping the flow from said ladle to said molding-receptacle, means for keeping said closed chamber at a sufficiently high temperature, and a restricted opening for permitting the passage of the molding-receptacle into and out of said closed chamber without materially affecting the temperature of said chamber.

2. In a device of the class described, the combination with a glass-furnace, of a heated chamber, a receptacle, means for transferring the molten metal into said receptacle, said means comprising a conduit leading from said furnace, and a cylindrical ladle arranged to receive metal from said conduit and provided with a comparatively large opening adjacent to said conduit, and a relatively small opening adjacent to said receptacle, said ladle and receptacle being within said heated chamber.

3. In a device of the class described, the combination with a glass-furnace, of a heated chamber, a receptacle, means for transferring the molten metal into said receptacle, said means comprising a conduit leading from said furnace, a ladle provided with an opening arranged to continuously receive metal from said conduit, and a pouring-spout separate from said opening, said ladle and receptacle being within said heated chamber, and means, outside of said chamber, for operating said ladle so as to cause an intermittent flow of metal through said spout.

4. In a device of the class described, the combination with a glass-furnace, of a heated chamber, a receptacle, means for transferring molten metal into said receptacle, said means comprising a conduit leading from said furnace, a cylindrical ladle arranged to receive metal from said conduit, said ladle and receptacle being within said heated chamber, and means for operating said ladle consisting of a rod connected with said cylinder and terminating in a crank outside of said heated chamber.

5. In a device of the class described, the combination with a glass-furnace, of a heated chamber, a receptacle, means for transferring molten metal into said receptacle, said means comprising a conduit leading from said furnace, a cylindrical ladle arranged to receive metal from said conduit, said ladle and receptacle being within said heated chamber, and means for operating said ladle consisting of a hollow rod connected with said cylinder and terminating in a crank outside of said heated chamber.

6. In a device of the class described, the combination with a glass-furnace, a substantially closed heated chamber, a conduit leading from said furnace, a casting-ladle arranged to receive the metal from said conduit, molding means comprising a plurality of separate receptacles, and a movable carrier adapted to successively bring each receptacle from outside into said heating-chamber and adjacent to the spout of said casting-ladle and thence again outside of said chamber.

7. In a device of the class described, the combination with a glass-furnace, a substan-

tially closed heated chamber, a conduit leading from said furnace, a casting-ladle arranged to receive the metal from said conduit, a rotatable carrier extending partly into and partly outside of said chamber, and molding means comprising a plurality of separate receptacles arranged around the outer edge of said carrier, so that each receptacle may, in succession, be brought adjacent to the spout of said casting-ladle.

8. In a device of the class described, the combination with a glass-furnace comprising a plurality of substantially closed chambers in free communication with each other, of molding means, and means for continuously carrying said molding means into, and removing said means from, one of said chambers, said chamber being provided with opening so located and proportioned as to allow the continuous ingress and egress of said molding means to and from the exterior of said chamber without materially reducing the heat of said chamber.

9. In a device of the class described, the combination with a glass-furnace comprising a plurality of chambers in free communication with each other, of molding means, and means for inserting said molding means into, and removing said means from, one of said chambers, said chamber being provided with an approximately U-shaped opening to allow the ingress and egress of molding means to and from the exterior of said chamber without materially reducing the heat within said chamber.

10. An apparatus for the manufacture of glass, comprising a reducing-chamber, a working chamber, a heated casting-chamber, a conduit leading from said working chamber arranged to convey the molten metal into a casting-ladle within said heated casting-chamber, and means for tilting said casting-ladle and discharging its contents into a series of receptacles, each one of which is successively brought adjacent to the spout of said ladle by means of a revolving plate, said plate being so arranged that each of the receptacles are successively carried thereon outside of said casting-chamber without materially reducing the temperature of said chamber.

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Witnesses:

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