No. 863,469. PATENTED AUG. 13, 1907.

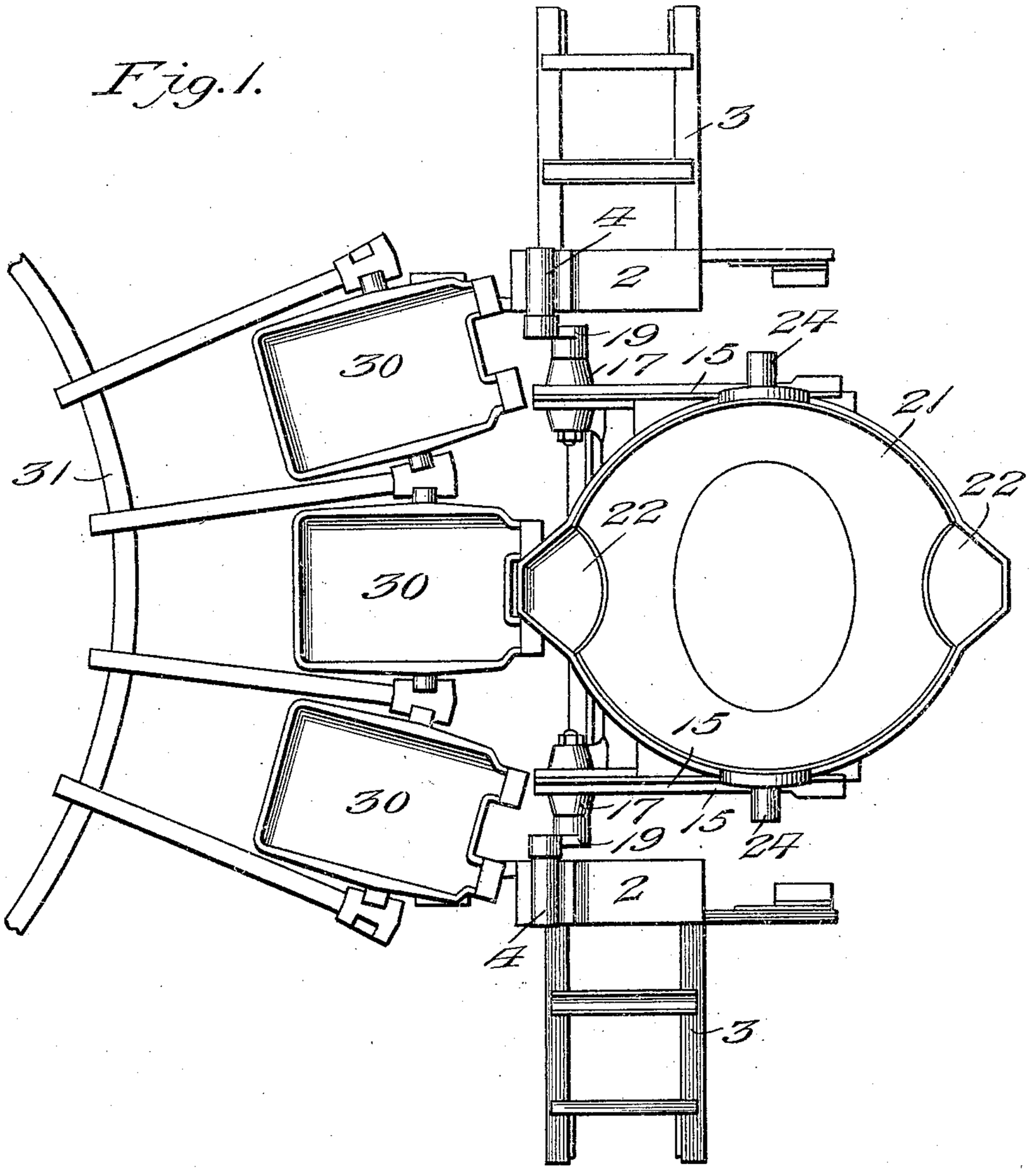
P. THILL & J. H. KLEPINGER

METAL POURING APPARATUS.

APPLICATION FILED JULY 21, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

Edwin L. McKee

F. S. Elmore

Inventors

John H. Klepinger

Peter Thill

By Victor J. Evans.

Attorney

No. 863,469. PATENTED AUG. 13, 1907.

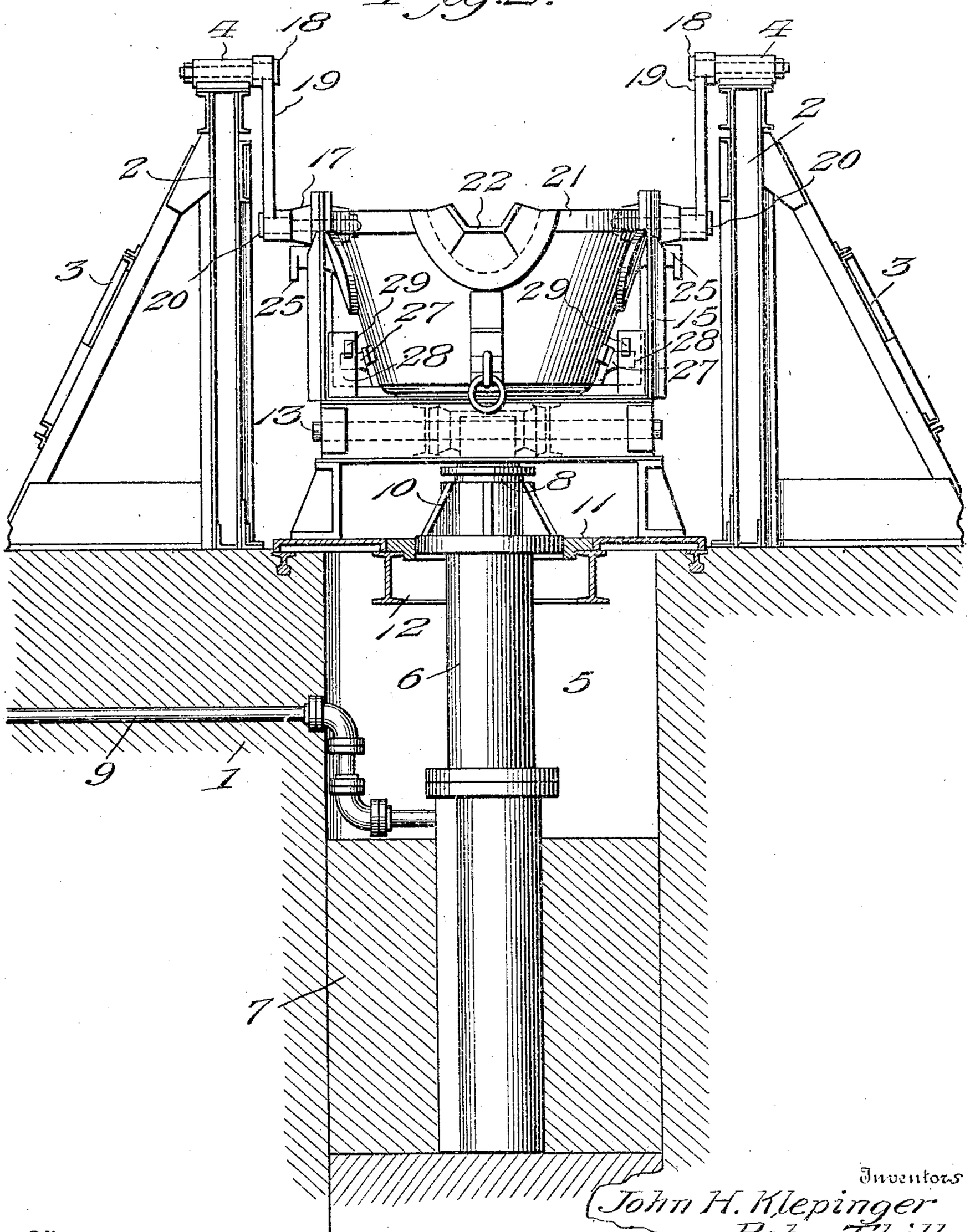
P. THILL & J. H. KLEPINGER.

METAL POURING APPARATUS.

APPLICATION FILED JULY 21, 1906.

4 SHEETS—SHEET 2.

Fig. 2.



Witnesses

Edwin L. Hackee

A. D. Elmore

Inventors

John H. Klepinger

Peter Thill

By Victor J. Evans.

Attorney

No. 863,469. PATENTED AUG. 13, 1907.

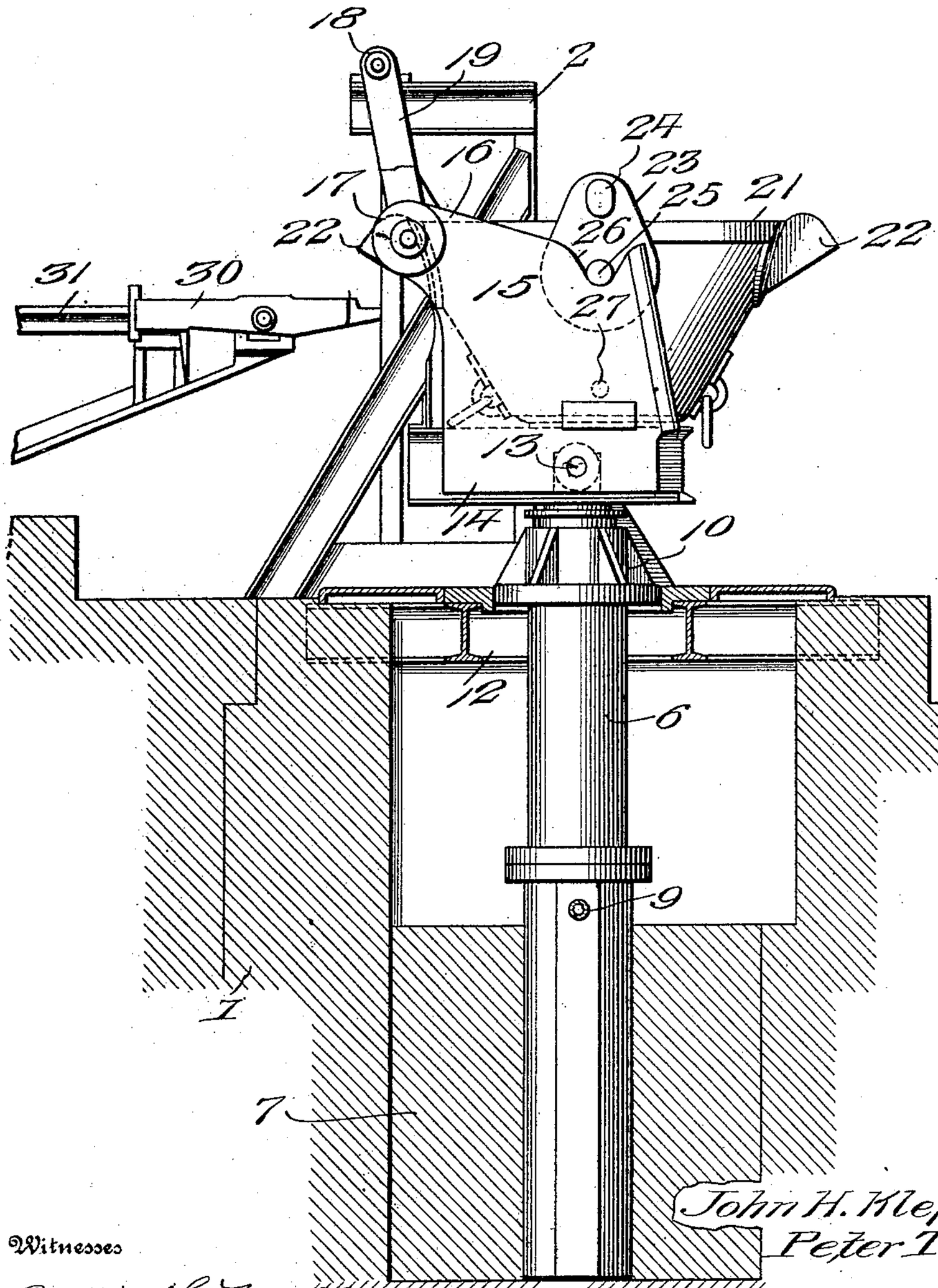
P. THILL & J. H. KLEPINGER.

METAL POURING APPARATUS.

APPLICATION FILED JULY 21, 1906.

4 SHEETS—SHEET 3.

Fig. 3.



Witnesses

Edwin G. McKee

F. J. Elmore

Inventors

John H. Klepinger

Peter Thill

By

Victor J. Evans

Attorney

No. 863,469. PATENTED AUG. 13, 1907.

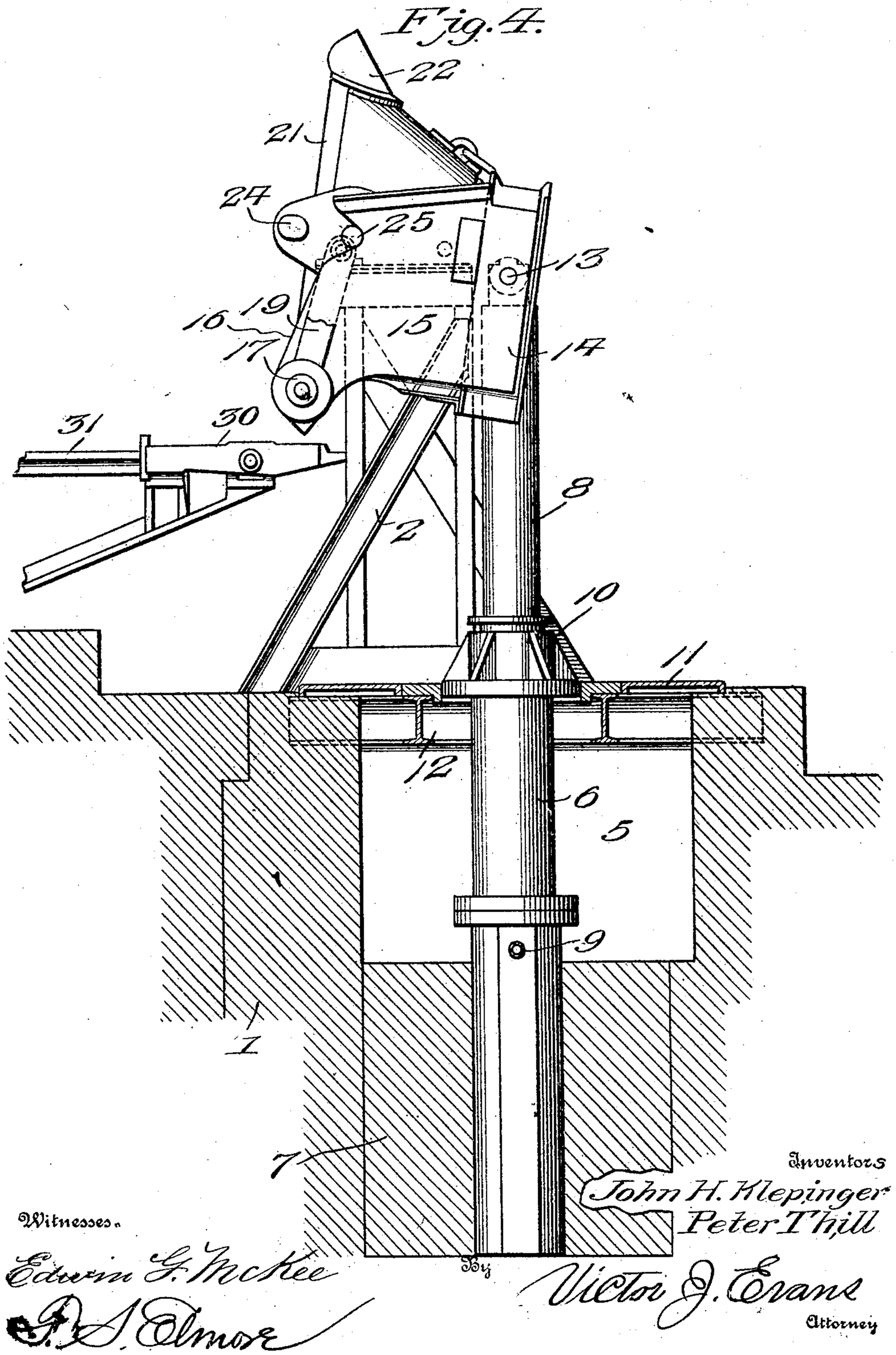
P. THILL & J. H. KLEPINGER.

METAL POURING APPARATUS.

APPLICATION FILED JULY 21, 1906.

4 SHEETS—SHEET 4.

Fig. 4.



Witnesses.

Edwin G. McKee

E. L. Elmore

Inventors

John H. Klepinger

Peter Thill

By

Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

PETER THILL AND JOHN H. KLEPINGER, OF GREAT FALLS, MONTANA.

METAL-POURING APPARATUS.

No. 863,469. Specification of Letters Patent. Patented Aug. 13, 1907.

Application filed July 21, 1906. Serial No. 327,190.

To all whom it may concern:

Be it known that we, PETER THILL and JOHN H. KLEPINGER, citizens of the United States, residing at Great Falls, in the county of Cascade and State of Montana, have invented new and useful Improvements in Metal-Pouring Apparatus, of which the following is a specification.

This invention relates to apparatus for handling molten metal and embodies in its organization a vessel or ladle adapted to receive the charge of molten metal from the furnace or converter and to be thereafter operated for depositing the material into molds, and has for its objects to produce a comparatively simple, inexpensive device of this character wherein the ladle will be firmly supported upon its operating carriage, one wherein the ladle will be under complete control and will be tilted to the requisite degree in discharging its contents, and one in which the mouth of the ladle will, during the pouring operation, be moved forward and back over the mold, thus to obviate the hot metal falling at a single point on the mold and consequently prolonging the life of the latter.

A further object of the invention is to provide a device of this character wherein the carriage will receive and properly sustain the ladle during the pouring operation, one in which the carriage and ladle will be positively lifted by suitable means during the operation of tilting the ladle, and one in which the ladle will, during its upward movement, be positively tilted forwardly for carrying the ladle to discharging position.

With these and other objects in view, the invention comprises the novel features of construction and combination of parts more fully hereinafter described.

In the accompanying drawings: Figure 1 is a top plan view of an apparatus embodying the invention and showing the relative positions of the ladle and mold. Fig. 2 is a rear elevation of the same, the foundation being shown in section. Fig. 3 is a side elevation of the apparatus, showing the parts in normal position. Fig. 4 is a similar view showing the ladle tilted to its extreme discharging position.

Referring to the drawings, 1 designates a foundation on which is erected a frame or super-structure comprising a pair of relatively spaced vertical supports or standards 2 strengthened by diagonal braces 3 and provided at the forward portion of their upper ends with bearings 4, there being formed in the foundation 1 between the supports 2 a well or cavity 5, in which is fixed a lifting device shown herein as being in the form of a hydraulic cylinder 6 anchored at its lower end in a bed 7 and containing a vertically movable lifting member or plunger 8 adapted to move upward under the action of hydraulic pressure within the cylinder 6 to which liquid is supplied through the medium of a pipe or duct 9 and which is sustained at its upper end in a tubular bearing 10 fixed in a frame work 11 covering the mouth of the well 5 and including crossed supporting girders 12.

Journaled at its center in the upper end of the plunger 8 is a horizontal shaft 13 on which is fixedly mounted a carriage 14 in the form of a box-like receptacle open at its rear and comprising a front and side walls, of which the side walls 15 are provided with upper, forward extensions 16 equipped with bearings 17 disposed on a line in advance of the plane of the front wall of the carriage, there being pivoted to the supports 2 by means of pivoting members or bolts 18 connecting members or links 19 in turn pivoted at their lower ends to the carrier 14 by means of pivoting members or bolts 20 entered through the bearings 17.

The carrier 14 is adapted to receive a vessel or ladle 21 having a pair of discharge lips or spouts 22 and equipped with oppositely disposed ears 23, fixed to the sides of the ladle and each provided with a pair of outwardly projecting trunnions 24, 25, of which the latter enter seats or recesses 26 formed in the upper edges of the side walls 15 when the ladle is positioned in the carrier, there being also provided on the ladle 21 at points vertically beneath the trunnions 25, outwardly projecting retaining members or trunnions 27 adapted to enter upwardly opening boxes 28 fixed to the inner face of the walls 15 and to be secured in said boxes by means of removable keys 29 adapted to be entered through the boxes above the trunnions.

Sustained adjacent the carriage are movable molds 30 adapted to pass successively beneath the forward lip 22 of the ladle and to receive the molten metal from the latter. The molds are shown herein as being carried by a rotary mold frame 31, it being understood that after one of the molds has been properly filled, the frame is rotated in a suitable manner for bringing another mold in position relative to the ladle.

In practice, the charge from the furnace or converter is in its molten state poured into the ladle 21 which is thereafter moved to and positioned in the carrier 14, it being understood that the ladle may be moved in any suitable manner, as, for example, by means of a crane from which the ladle will be suspended by means of the trunnions 24. After seating the ladle in the carrier the keys 29 are inserted through the boxes 28 over the trunnions 27 and one of the molds is positioned vertically beneath the adjacent discharge spout 22. The parts having been thus arranged, the carriage 14 is raised through the medium of the lifting device, in the operation of which the lifting member 8 is raised by liquid under pressure admitted to the cylinder 6 whereby the carriage 14 and the ladle contained therein are carried upward. During each such movement of the lifting member the carriage 14 and ladle 21 are tilted forward through the medium of the links 19, and this action is continued until all the metal has been discharged from the ladle,

which then occupies the position shown in Fig. 4. It will be observed that as the member 8 moves upwardly, the carriage swings on the fulcrum 13 while the lower ends of the links 19 swing forwardly on the axes 18 from the position seen in Fig. 3 to that shown in Fig. 4, thus causing the mouth of the ladle to travel over the underlying molds at a practically uniform height above the same and in a direction from front to rear thereof, whereby the metal will during the mold filling operation, be deposited at constantly changing points in the mold, thus obviating the molten metal being deposited at a single spot on the mold and consequently prolonging the life of the mold. Further, it will be observed that after the mold has been filled, the power applied to the member 8 may be instantaneously relieved to thus lower the ladle to non-discharging position, the device being thus under complete control of the operator to permit the mold being properly filled without overflowing.

It may be mentioned in conclusion that heretofore it has been the general practice to pour the molten metal directly from the converter into molds mounted upon a hand-operated carriage, this mode of handling the material being expensive not only in the matter of labor and equipment, but also as a result of the loss attendant upon the inactivity of the converter during the metal pouring operation, and this especially in instances where the converter space or capacity is limited. Also the practice has been in vogue of utilizing a traveling crane for operating a ladle to receive the contents of the converter and discharge it into the molds, which operation is objectionable to the extent that the crane is thereby monopolized and that the amount of metal discharged from the ladle cannot be properly controlled, especially in filling small or shallow molds. With the improved apparatus as above described, these objections and difficulties are all overcome and provision is made for properly handling the molten metal, discharging the same into molds and permitting of this without interrupting the operation of the converter or monopolizing the use of the crane.

It is to be understood that while we have herein shown and described a hydraulic lifting device for raising the ladle carriage during the tilting or pouring operation, other forms of lifting devices, such as a rack and pinion or in some instances a drum and cable may be employed for the purpose and this without departing from the spirit of the invention, the essence of which resides in positively guiding the pivotal axis of the carriage and likewise of the ladle in a determined path while the metal is being discharged. Furthermore, it is not essential to the principle of the invention that this movement of the pivotal axis of the carriage and ladle shall be in a vertical plane, as herein described, as such movement may, under certain conditions, be effected in an inclined or even in a curvilinear path, the chief aim of the invention being to effect a movement of the ladle in a plane over the bottom of, and relative to, the mold, during the action of discharging the molten metal thereinto. Also, while the molds are described as being carried by a rotary frame, it will be understood that they may be moved in a rectilinear or other path, the only essential, in this connection, being that they be brought successively beneath the ladle spout.

Having thus described our invention, what we claim is:

1. In an apparatus of the class described, a lifting device including a carrier, a ladle pivotally supported thereon and having a pouring lip, and means actuated by the lifting mechanism for tilting the ladle during the operation of raising the carrier and for imparting to the pouring lip of said ladle a lateral movement.

2. In an apparatus of the class described, a lifting device, a carrier pivotally mounted on said device, a ladle supported upon the carrier, and means, actuated by the lifting mechanism for tipping the carrier to tilt the ladle and for at the same time imparting to the pouring lip of the ladle a lateral movement during the lifting operation.

3. In an apparatus of the character described, stationary supporting means, a power operated lifting device, a carrier pivotally mounted on said device, a ladle supported upon the carrier, and links connecting the carrier with the supporting means, said links operating upon the movement of said lifting device to impart vertical tilting and lateral swinging motion to the ladle.

4. In an apparatus of the class described, a pair of supports, a movable power operated lifting device, a carrier pivotally mounted on the lifting device to swing in a vertical plane, a ladle supported upon the carrier, and link connections between the supports and the carrier for tipping the latter forwardly during the upward movement of the lifting device and for at the same time imparting lateral movement to the pouring lip of the ladle.

5. In an apparatus of the class described, a movable power operated lifting device, a carrier pivotally mounted on said lifting device to swing in a vertical plane, said carrier being provided with boxes open in their upper sides, a ladle having laterally projecting trunnions fitted in the boxes, and keys removably engaging the boxes above the trunnions.

In testimony whereof, we affix our signatures in presence of two witnesses.

PETER THILL.
JOHN H. KLEPINGER.

Witnesses:
THOS. EVANS,
THOMAS E. SWIFT.