No. 652,578 Patented June 26, 1900.

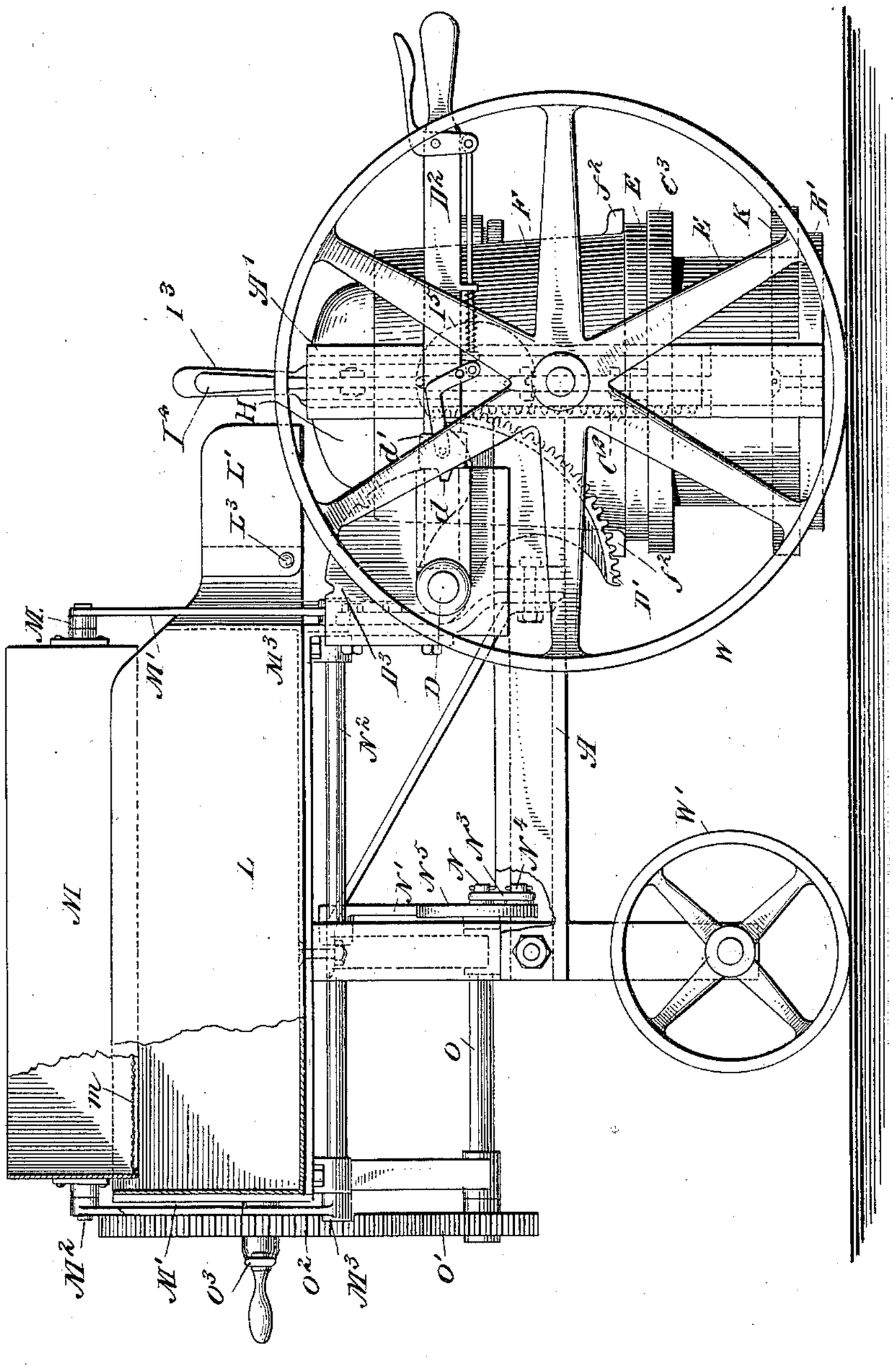
M. F. ALLEN.

MOLDING MACHINE.

(Application filed Aug. 30, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



WITNESSES:

Geo. W. Taylor

H. L. Reynolds.

INVENTOR

M. F. Allen

BY

Munn & Co

ATTORNEYS

No. 652,578. Patented June 26, 1900.

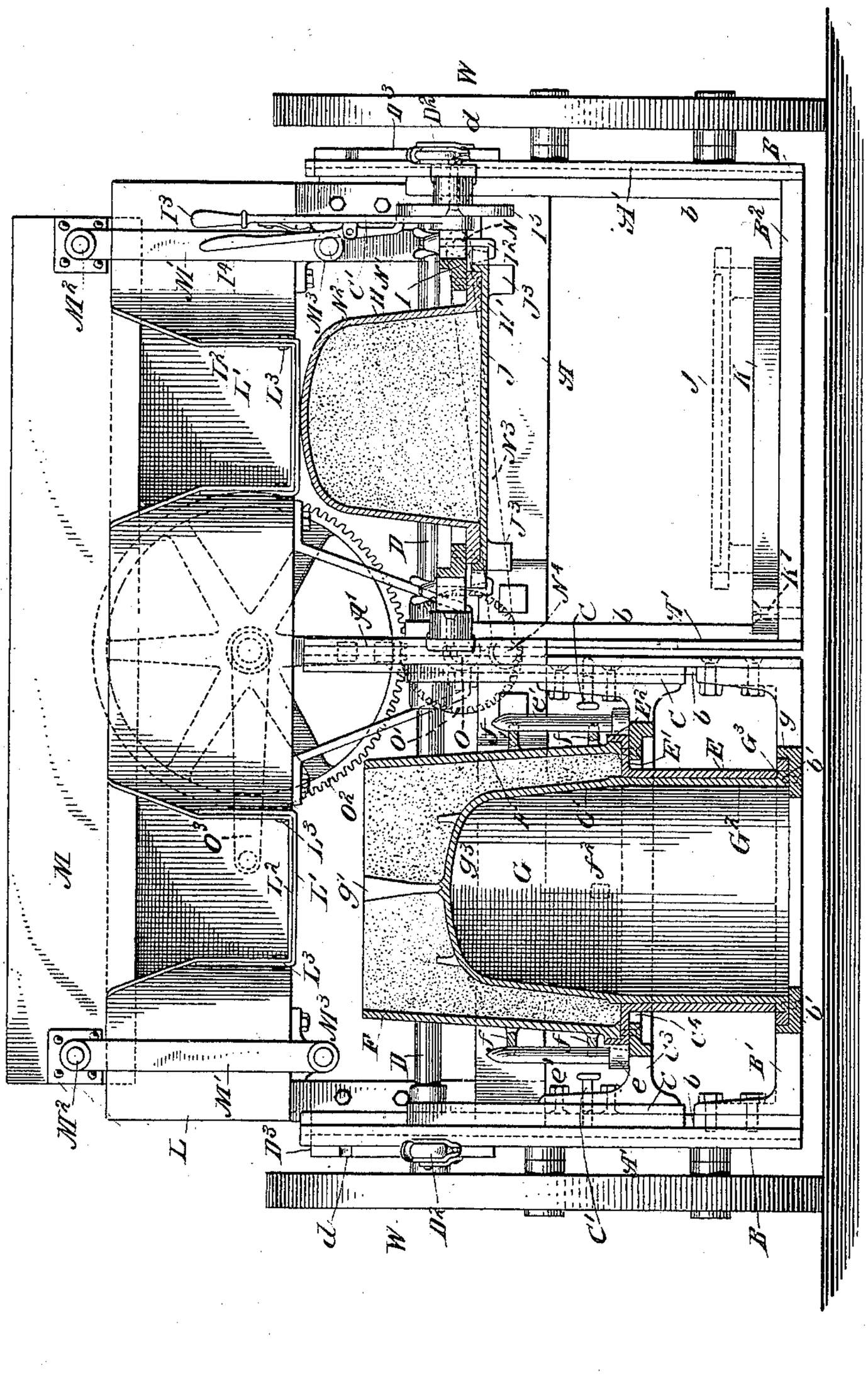
M. F. ALLEN.

MOLDING MACHINE.

(Application filed Aug. 30, 1899.)

(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



WITNESSES:

Geo. W. Naylor

H. L. Reynolds.

INVENTOR

M. F. Allen

BY Munn & Co.

ATTORNEYS

No. 652,578. Patented June 26, 1900.

M. F. ALLEN.

MOLDING MACHINE.

(Application filed Aug. 30, 1899.)

(No Model.) 4 Sheets—Sheet 3.

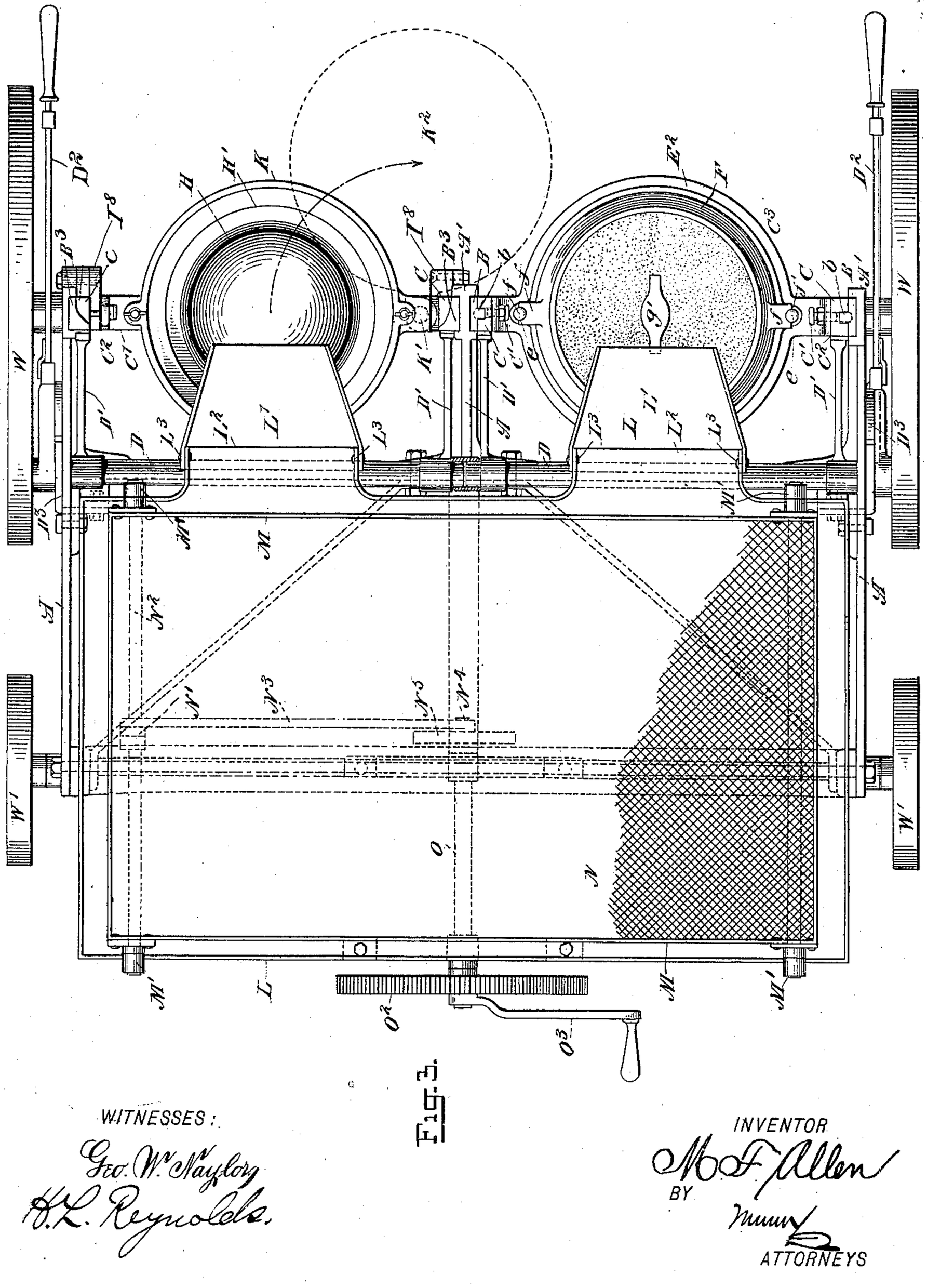


Fig. 3.

WITNESSES:

Geo. W. Naylor

H. L. Reynolds.

INVENTOR

M. F. Allen

BY Munn & Co.

ATTORNEYS

No. 652,578. Patented June 26, 1900.

M. F. ALLEN.

MOLDING MACHINE.

(Application filed Aug. 30, 1899.)

(No Model.) 4 Sheets—Sheet 4.

FIG. 5.

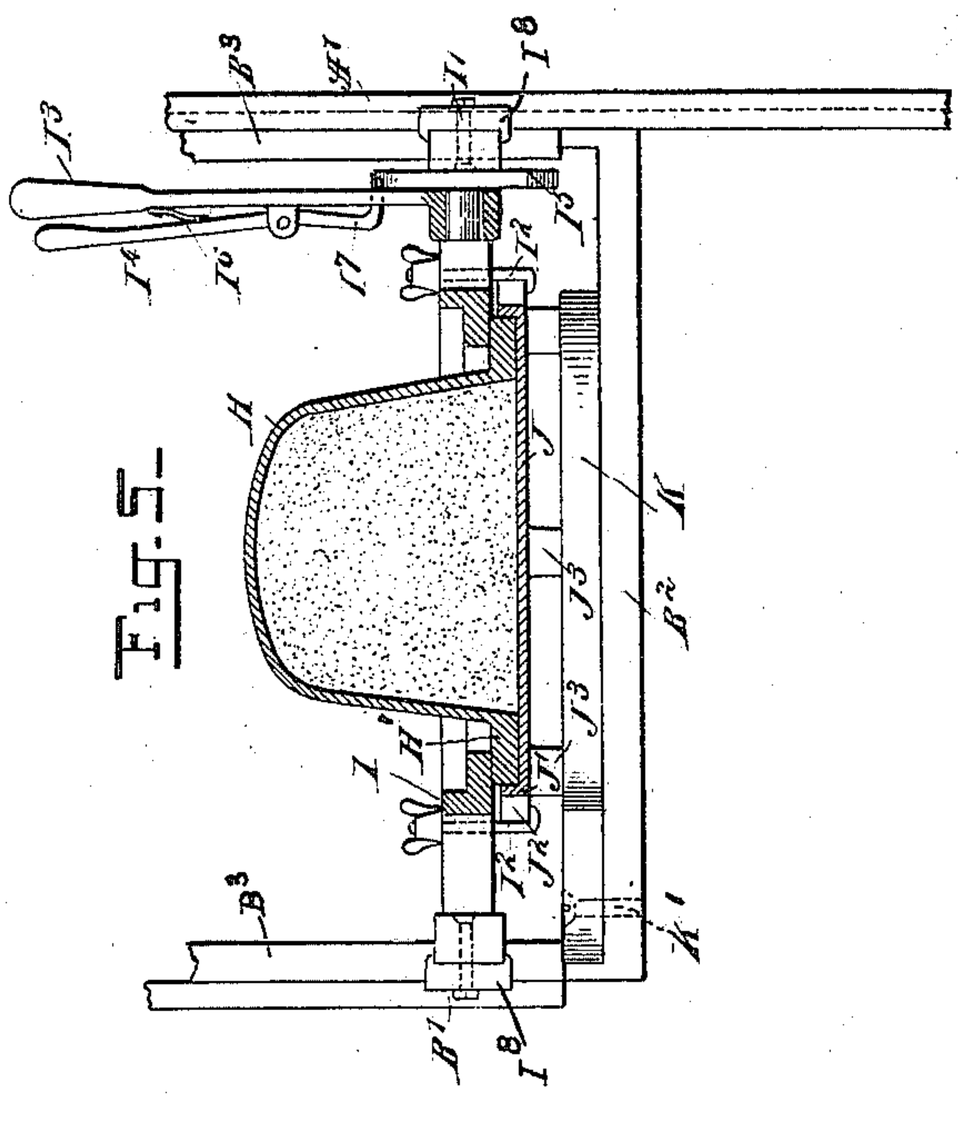


FIG. 6.

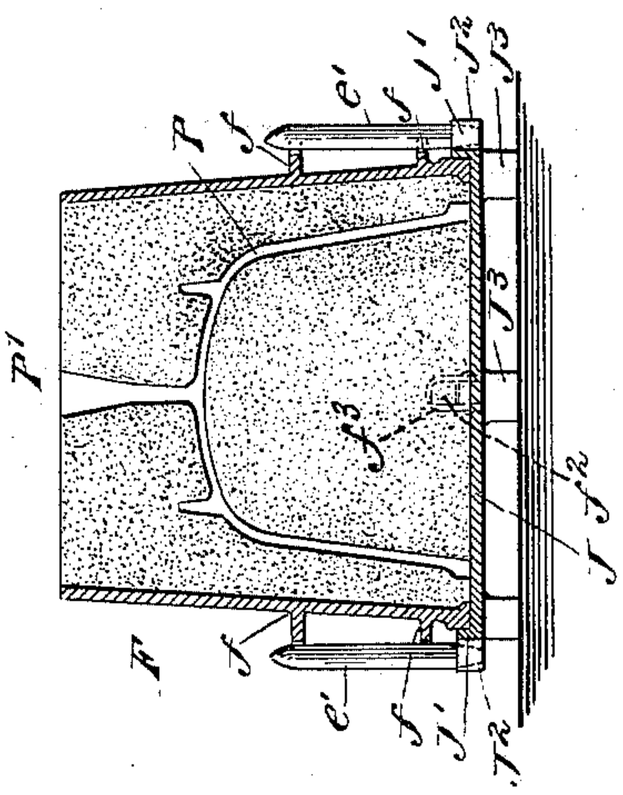
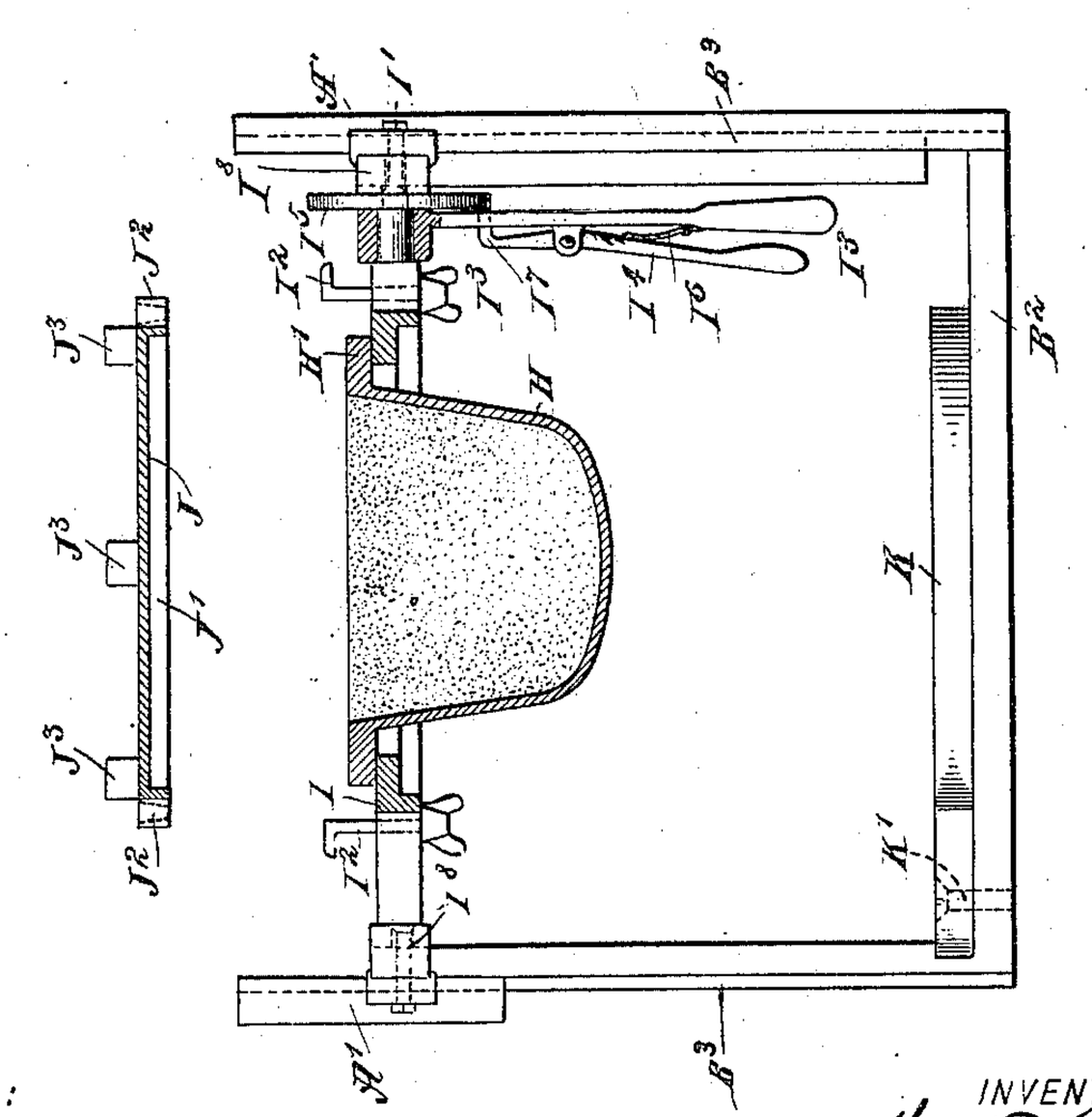


FIG. 4.



WITNESSES:

Geo. W. Naylor.

H. L. Reynolds.

INVENTOR

M. F. Allen

BY

Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

MATTHEW FRANKLIN ALLEN, OF NASHVILLE, TENNESSEE.

MOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 652,578, dated June 26, 1900.

Application filed August 30, 1899. Serial No. 728,992. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW FRANKLIN ALLEN, of Nashville, in the county of Davidson and State of Tennessee, have invented a new and Improved Molding-Machine, of which the following is a full, clear, and exact description.

My invention relates to an improvement in molding-machines, and it is designed particularly for use in forming what is known in the trade as "metal hollow ware"—that is, cast articles which are hollow, after the manner of kettles and such articles.

My invention comprises the novel features which are hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my device. Fig. 2 is a front elevation with the pattern and molding apparatus shown in section. Fig. 3 is a plan view. Fig. 4 is a vertical section through the pattern which is used in forming the core. Fig. 5 is a similar view showing the pattern inverted for depositing the core. Fig. 6 is a vertical section through the flask when completed and ready for pouring.

The object of my invention is to provide a device which shall be capable of producing the class of castings known as "hollow ware" more rapidly than by present methods and which may be moved about over the foundry-floor, so that the sand may be shoveled directly from the floor into the machine and the finished molds deposited upon the floor back of the machine, thus obviating the necessity of transporting the sand to the machine and the molds from the machine to the floor.

My machine is adapted for use in molding any of the ordinary forms of hollow ware. I have herein shown it as provided with patterns for forming a small kettle. The process of forming any other article would be exactly similar to that used for forming the kettle.

I have mounted my device upon a carriage which consists of a frame A, having four supporting-wheels W and W′ thereon, so that the device may be readily moved over the foundry-floor. Upon the carriage thus formed is mounted a molding-table which is movable vertically, so that it may be brought close to the floor while the molding operation is in progress and may then be raised above the floor, so as to clear either the sand-heap or the row of completed flasks, thus enabling the machine to move back and forth over the foundry-floor. This molding-table is constructed in two parts, said parts consisting, first, of the bottom plate B′, having the two side bars B connected with the ends thereof and mounted to slide in guides upon vertical posts A′ of the carriage-frame, as clearly shown in Fig. 3, and, second, of the corresponding bottom bar B^2, mounted upon similar vertical bars B, which slide in guides upon the vertical posts A′. The vertical bars or posts B are each provided with a central rib *b*, which serves as a guide for the bars *c*, which are secured to the ends of the pattern-supporting members. The pattern-supporting members for the two parts of the pattern differ somewhat in shape and will be described separately.

The patterns are formed in two parts. One part, G, being the outside pattern, has its outer surface shaped to the exact size and shape of the outside of the article to be cast, while the other pattern, H, has its inside surface shaped to the exact size and shape of the inside of the article to be cast. The thickness of the material from which these patterns are made is immaterial, as only one surface thereof is used as a pattern. It is therefore possible to make the walls of the patterns of sufficient thickness so that there is no possibility of spring or breakage and also to finish them very accurately. The patterns are of course made of metal and finished smoothly.

The pattern G, which is the outside pattern, has a cylindrical extension G^2, provided with an external flange G^3 at its lower end. The pattern-supporting member C^3 in this case consists of a ring which is secured at each end to the vertical bars C, which slide upon the guiding-ribs *b* of the bars B. The bars C are provided upon one edge with rack-teeth C^2, as clearly shown in Fig. 1, and are engaged by toothed segments D′, which extend through substantially a quadrant of a circle and are pivoted upon a shaft D. This shaft

has a lever D^2 secured thereto and provided with a releasing-catch d', which is adapted to engage teeth d upon a segment-plate D^3. By throwing the lever D^2 to the vertical or horizontal position the bars C and the flask which is supported thereby are raised or lowered vertically.

The cylindrical extension G^2 of the pattern is made of a diameter equal to the largest diameter of the upper portion of the pattern, so that when the flask is raised the pattern will not be raised with it. The pattern is also secured to the bar B', which forms the lower portion of the molding-table, so that it cannot rise without carrying the molding-table with it.

The fall of the pattern-supporting member C^3 and the cylinder E, which is secured thereto, is limited by the lower end of said cylinder contacting with the flange G^3 upon the lower end of the cylindrical extension G^2 of the pattern. At the lower end the pattern is accurately centered with relation to the molding-table by entering a recess b', formed in the molding-table. In case a pattern is being used which is of smaller diameter than this recess, a packing-ring g is placed between the lower end of the pattern and the inside wall of the recess, as clearly shown in Fig. 2. The packing-ring will vary in size with the size of the pattern.

The upper end of the cylinder or sleeve E is provided with a radial flange E', and this radial flange is provided with a rim-flange E^2, which extends longitudinally of the sleeve or cylinder. In this manner a centering-recess is formed adapted to receive the lower end of the flask F. The flask F is constructed substantially as shown in Figs. 2 and 6, consisting of a cylinder which is preferably of smallest diameter at its upper end, having its lower end of such size as to accurately fit within the recess formed by the rim-flange E^2 and of such size as to surround the pattern, leaving a sufficient space between the walls thereof to hold the molding-sand. The height of the flask is sufficient to leave a proper depth of sand between its upper end and the top of the pattern.

The flask is provided upon two opposite sides with ears or lugs f, which are hollowed or notched at their outer ends to closely fit upon guide-pins e', which are used for centering the flask upon the bottom or base plate J, which is used for molding the core and for receiving the flask after the upper or cup mold has been formed. The flange E' of the sleeve E may be provided with lugs e, which lugs are provided with sockets adapted to receive the lower ends of the guide-pins e', as clearly shown in Fig. 2. This, however, will not ordinarily be required, as the use of the guide-pins e' is usually not necessary in molding the cope.

The other or core pattern is shown in Figs. 2 and 3 in place upon the other side of the machine. This pattern H is adapted to receive the sand within the same, so as to form the core. This pattern is provided with a flange H', adapted to rest upon the upper surface of a ring I, the said ring being provided with journals I', mounted within lugs I^8, projecting from the main frame-bars A', so that the ring and the pattern which is supported thereby may be reversed in position when desired. The position of the pattern shown in Fig. 2 is the inverted position, or the position which it is given at the time the core is to be discharged from the pattern. The position of the pattern while being filled is shown in Fig. 4.

The flange H' is secured to the ring I by screws or in any suitable manner, as shown in dotted lines in Fig. 2. The ring I is turned so as to hold the pattern with its open side upward. The pattern is then filled with sand and rammed by hand, and when the pattern has been filled the upper surface is struck off smoothly, and a bottom or base plate J is then placed over it. This base-plate is shown in Fig. 4 at a slight distance above the pattern, or as it would be held when about to be placed in position. This base-plate is provided with a flange J', adapted to fit closely about the flange H' of the pattern, and is also provided with lugs J^2, which contain sockets, as shown in dotted lines in Fig. 6, adapted to receive one end of the guiding-pins e'. The plate J is also provided with short legs J^3, which will hold it raised a short distance above any surface upon which it may be placed, so that it may be readily picked up by hand. When the plate J has been placed in position upon the pattern, it is temporarily secured thereto by means of L-shaped thumb-bolts I^2, which are turned so as to extend the bent ends thereof beneath the under surface of the base-plate J. The nuts are then tightened upon the bolts, so as to hold the plate in position, and the ring or frame I is then inverted or placed in the position shown in Fig. 2. This is done by means of a lever I^3, which is secured to one end of the frame and is provided with a lever I^4, pivoted to one side thereof and bent at one end so as to form a locking-pin I^7, adapted to engage a notch or hole in a fixed disk or segment I^5, and said lever I^4 is held in locking position by means of a spring I^6. By this means the frame and the pattern carried thereby may be inverted and held in accurate position.

A plate K for receiving the core is pivotally secured at K' to one end of the horizontal bottom bar B^2 of a U-shaped frame or rack, the side bars B^3 of which are mounted to slide in guides upon the main frame-bars A'. The bars B^3 are toothed upon one edge, as described for the bars C, used in connection with the other pattern, and are similarly raised and lowered by means of a lever D^2 and a segment-gear D'.

When the core-pattern H has had the bottom plate J secured thereto and been inverted, the receiving-plate K is raised into contact

therewith by means of the lever D^2. The pattern is then well rapped to loosen the core and the bottom plate freed from the pattern by loosening and turning the bolts I^2. The receiving-plate is then lowered, carrying with it the bottom plate J and the core thereon. The flask F, containing the cope, is then placed in position, either while the core is on the receiving-plate K or after removal to any convenient point. The flask is freed from the pattern G′ by raising the frame C^3, carrying it by means of its lever D^2 and segment-gear D′.

The pouring-gate is formed in the flask by placing a gate-pattern g' in place upon the pattern G′ while the flask is being rammed. This gate is different in one respect from the ordinary gate. Its lower end, instead of being square and simply resting upon the surface of the pattern, is made pointed or conical, and the pattern is provided with a circular fillet having a central recess adapted to receive the point of the gate g'. This holds the gate in place while being rammed and also forms a rounded edge in the mold, which prevents the sand from being carried away by the mold during the pouring and also strengthens the gate at its point of attachment with the casting, so that when broken off it will not injure the casting.

The sand-bin and screen device is mounted upon the carriage, so that the sand is supported in an elevated position, where it may be readily drawn out into the molds. This bin L is placed immediately back of and above the patterns, and it is provided with two spouts L^3, which project toward the pattern, and with hinged extensions L′, said extensions being pivoted at L^3, so that they may be raised upward, and thus permit the patterns to be raised, if desired. Above the sand-bin L is placed a screening box or frame M, said box being supplied with a wire or other screening bottom m and carried upon bars M′, which are pivoted at M^2 to the box and at M^3 to journals or pivots mounted upon the carriage-frame.

The shaft N^2, which forms the pivots for the lower ends of the links M′ at one end of the box, has an arm N′ extending downwardly therefrom beneath the box. This arm is connected by means of a link N^3, which is pivoted at the lower end thereof, to a crank-pin N^4, which is mounted upon a disk N^5, the said disk being secured to a shaft O, which is journaled upon the carriage-frame beneath the sand box or bin L. This shaft is carried outward, so that one end projects from beneath the bin, and has a pinion O′ secured thereto, which meshes with a gear O^2, journaled upon one side of the sand-box. To this gear is secured a crank O^3, by the revolution of which the screen M is given an oscillating movement. The sand is shoveled from the floor directly into the screen N and sifted by turning the crank O^3. This work may be done by a cheap laborer while the molding operation is progressing. The labor involved in this is much less than where the sand is carried from the floor to the molder and the molds are then carried back to the floor. It is not necessary to transport the sand at all, as the machine is moved along as the molding progresses, the sand being shoveled directly into the machine and the molds removed from the machine and placed upon the floor immediately in the rear of the machine. This machine is designed to be operated by two molders, one molder making the cope or outer mold, the same being shown at the left in Fig. 2, and the other molder making the core, which is shown at the right in Fig. 2.

The two parts of the mold are placed together by placing the removable guide-pins e' within the sockets of the base-plate J and then lowering the flask F upon said base-plate, the flask being guided by engagement with the pins e', and the mold will then be as shown in Fig. 6. By reason of the method of forming the mold the thickness of metal in the finished product may be made even at all points and the formation of thick and thin spots prevented. By reason of the accurate centering devices used the thickness of the metal may be reduced over that necessary for molds produced in the ordinary manner and the weight of metal used lessened thereby. The bottom plate J and the flask F are secured together by means of lugs f^2, which extend externally from opposite sides of the flask, and by loops f^3, which are secured to the base-plate J and are adapted to be swung over said lugs. These are shown by dotted lines in Fig. 6.

When it is desired to run the carriage either over a pile of sand or over the flasks which have just been filled, the molding-tables are raised in the following manner: The bars C, which support the cope-pattern and the flask, are provided with holes adapted to receive locking-pins C′, and the bars B are provided with holes also adapted to receive said pins. These pins, which ordinarily are drawn outward, are then forced inward, so as to lock the two bars B and C together. The levers D^2 are then operated, so as to raise the side bars B^3 and the frame C^3, which thereby raises the tables B′ and B^2. By this means the molding-tables may be raised so as to clear the pile of sand or the flasks, as necessary, and the machine run backward upon the floor and shifted to position ready to form another row of holes.

My machine is used in the following manner: The flask F is placed upon the frame C^3 while it is in its lower position or that shown in Fig. 2, the lower end of the flask entering the recess formed by the flange E^2 upon the upper end of the cylinder or sleeve E, and the flask being turned to accurately fit within this recess is thereby exactly centered upon the pattern G′. Sand is then drawn out of the bin through the chute L′ and rammed by

hand, and when the flask has been filled the sand is struck off from its upper end and the frame C^8 is raised, so as to lift the flask off of the pattern. While this is being done by one molder, another molder is forming the core-mold upon the other side of the machine. In doing this the frame I and the pattern H are placed in the position shown in Fig. 4, the open side of the pattern being upward. The sand is drawn out of the other chute into the pattern, the sand being rammed until the pattern is full, and surplus sand is then struck off in a similar manner to that used with the flask. The bottom plate J is then placed in position upon the pattern and secured by the clamping-bolts I^2. The pattern is then reversed in position and also upon the plate K. The bottom plate J is then freed from the pattern and the pattern is rapped and then raised, leaving the core and the bottom plate upon the plate K, which is then swung outward to one side and the core and the bottom plate either removed and placed upon the floor first, when the flask is then placed thereon, or the flask is placed thereon while the bottom plate and the core remain upon the plate K.

Before placing the flask in position upon the bottom plate the guide-pins *e'* are placed within the sockets in the lugs *e*. This guides the flask accurately to position, and the bottom plate being provided with a flange J', which is of exactly the same size as the rim-flange E^2, the two parts are accurately centered with relation to each other and an even thickness of metal in all parts of the casting is secured. A large number of bottom plates and flasks are used in connection with each machine, the number depending upon the amount of work which is being done upon the same article. It is possible with this apparatus to have continuous molding and pouring going on. When operated in this manner, a comparatively-small number of flasks will be sufficient, as the flasks may be removed from the casting very shortly after they have been poured and the pouring may be done close up to the molding-machine.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a molding device for use in producing hollow ware, a core-forming pattern provided with clamping devices, a bottom plate arranged to be engaged by said clamping devices whereby it may be temporarily held on the core-forming pattern, said bottom plate being provided with centering devices, and a cope-forming pattern and flask, the flask being formed with means for engaging the centering devices of the bottom plate whereby it may be accurately placed over the core, as set forth.

2. In a molding device for use in producing hollow ware, a supporting member for the cope-forming pattern provided with a centering recess for the pattern and a centering recess for the flask, a cope-forming pattern and flask arranged to fit in their respective recesses, a core-forming pattern, a bottom plate temporarily attached thereto and having a centering recess of a size equal to the centering recess for the flask, whereby the flask and cope may be accurately centered over the core, as and for the purpose set forth.

3. A molding device for use in producing hollow ware, comprising a core-forming pattern finished inwardly to form the core, a second pattern shaped outwardly to form the outer mold or cope, a bottom plate having means for centering the core-pattern and flask thereon, and a plate or frame in which the flask and cope-pattern are centered, said plate and the bottom plate having registering sockets, guide-pins adapted to be inserted in said sockets, and guides on the flask adapted to engage said pins, substantially as described.

4. A molding device for producing hollow ware, comprising a core-forming pattern having clamping-bolts, a bottom plate engaged by said bolts whereby to be held temporarily on said pattern and formed with sockets, a cope-forming pattern, a flask for the cope, said flask having lugs formed thereon, and pins adapted to be inserted in the sockets of the bottom plate whereby to engage the lugs to guide the flask over the core, as set forth.

5. A molding device for use in producing hollow ware, comprising a core-forming pattern, a pattern shaped to form the outer mold or cope, a flask for use in forming the cope, a bottom plate having means for centering the core-pattern and flask thereon, a frame supporting the core-pattern in an inverted position while ramming, supporting-journals therefor by which it may be turned over after ramming, a plate having means for centering the flask and cope-pattern thereon, and independent raising and lowering means for said plate and the core-supporting frame, substantially as described.

6. A core-forming device, comprising a frame having a recess for the reception of the pattern and provided with journals and a locking-lever, a supporting-frame having fixed bearings for said journals and vertical guides, a notched plate on said supporting-frame, said plate being adapted for engagement by said locking-lever, a frame or sash mounted to slide in said guides, a core-receiving plate carried on said frame or sash, means for raising and lowering said frame or sash to receive the core, a bottom plate for receiving the core, and clamping-bolts for temporarily securing the bottom plate to the pattern-receiving frame and pattern, substantially as described.

7. A core-forming device comprising a frame having a recess for the reception of the pattern and provided with journals, a supporting-frame having fixed bearings for said journals and vertical guides, a sliding frame mounted to slide on said guides and adapted to receive the core after it is formed, means for raising and lowering said sliding frame, a

lever secured to the pattern-receiving frame and having a locking-catch thereon, a plate having sockets receiving said catch, a bottom plate for receiving the core, and means for temporarily securing the bottom plate to the pattern-receiving frame and pattern, substantially as described.

8. In a molding-machine, a supporting-frame for the molding devices provided with vertical guides, a frame or sash having side bars fitted to slide in said guides, and a cross-bar connecting said side bars, means for raising and lowering said sash, and a mold-receiving plate hinged at one end in the cross-bar of said sash, as and for the purpose set forth.

9. In a molding-machine, a wheel-supported carriage having vertical guides, a supporting-frame for the cope-forming devices having side bars fitted to move in said vertical guides, and a bottom plate or table for the pattern connecting said side bars, a ring to support the flask having bars slidable vertically on the side bars of the supporting-frame, means for raising said ring independently of said pattern-supporting table, and means for fastening the bars of the flask-supporting ring to the side bars of the supporting-frame, as set forth.

10. In a molding-machine, a wheel-supported carriage having vertical guides, a supporting-frame for the cope-forming devices movable in said guides, a flask and cope supporting ring movable vertically in said frame, means for moving said ring in said frame, and devices for connecting said ring and frame together whereby when the ring is raised the frame will be carried with it, as set forth.

11. A molding-machine, comprising a frame mounted to slide on vertical guides, a pattern-receiving cylinder or sleeve mounted on said frame and having flask supporting and centering devices, an independently-supported pattern having an extension fitting said sleeve and provided with a flange engaging the sleeve to limit its downward movement, and means for raising and lowering the frame and flask thereon, substantially as described.

12. A molding-machine, comprising a frame mounted to slide on vertical guides, a pattern-receiving cylinder or sleeve having a radial flange on its upper end, and a rim-flange extended beyond the upper face thereof, and also having sockets adapted to receive flask-registering pins, a flask adapted to fit within said rim-flange and having guides adapted to engage the registering-pins, removable registering-pins adapted to be inserted in said sockets, a pattern having an extension fitting said sleeve and stops limiting the downward movement of the sleeve, and means for raising and lowering the flask-supporting frame, substantially as described.

13. A molding-machine for making sand molds for casting metal hollow-ware, having a carriage with molding-table and sand-box thereon and mounted on wheels to move over the floor, with suitable mechanism to raise the molding-table to pass over sand-heaps, substantially as described.

14. A sand molding-machine, having a pattern provided with a cylindrical guiding extension, and inclosing guide-cylinder for said extension, slidable thereon and having a recessed flange concentric with the extension, a flask supported upon the flange and fitting the recess thereof, and means for lifting the flanged cylinder and flask from the pattern, substantially as described.

MATTHEW FRANKLIN ALLEN.

Witnesses:
W. T. WATERS,
J. S. SHOCKLEY.