H. F. BECHMAN.

STEREOTYPE CASTING BOX.

APPLICATION FILED MAR. 20, 1909.

945,678.

Patented Jan. 4, 1910.

3 SHEETS—SHEET 1.

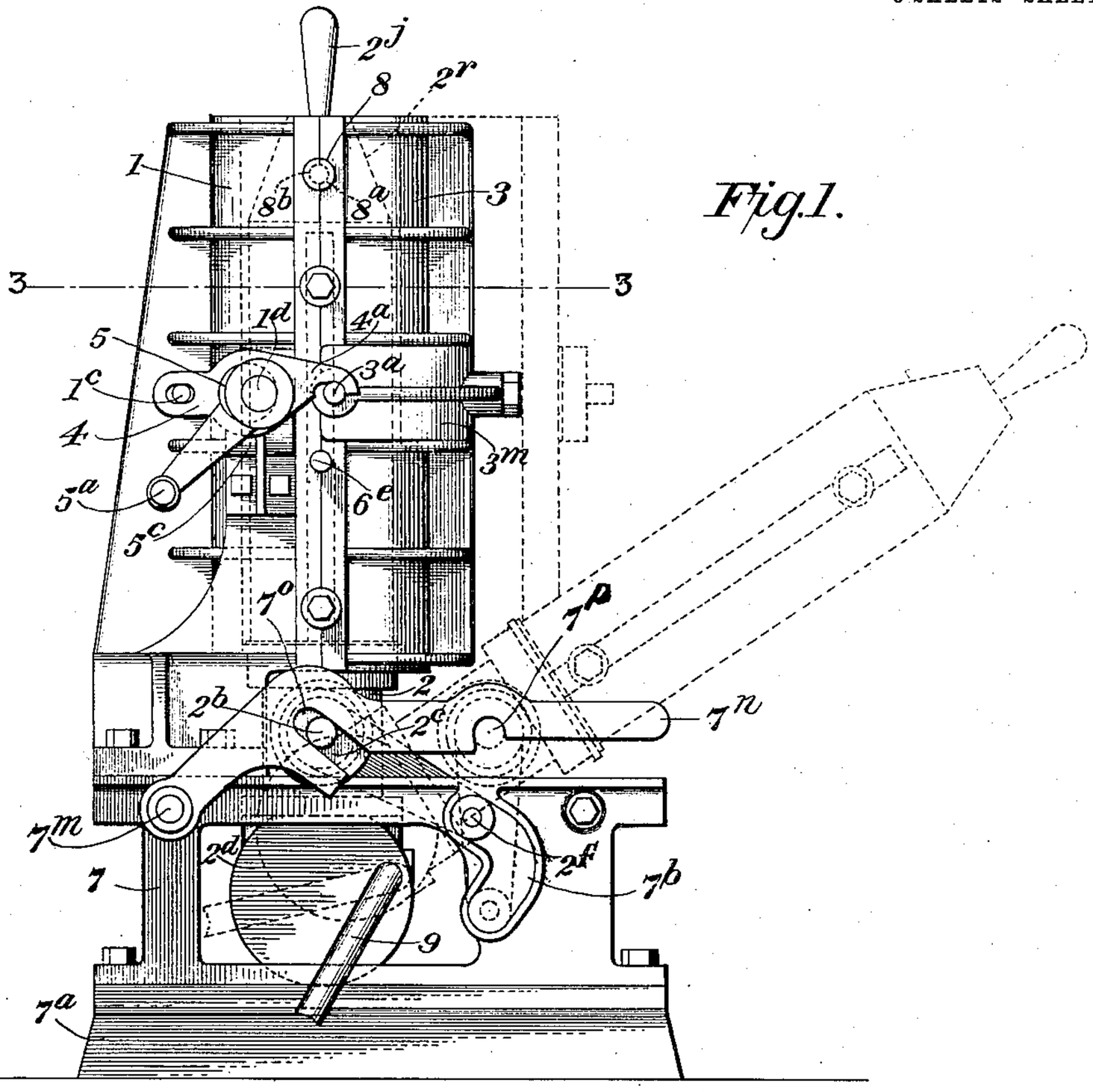

Fig. 1.

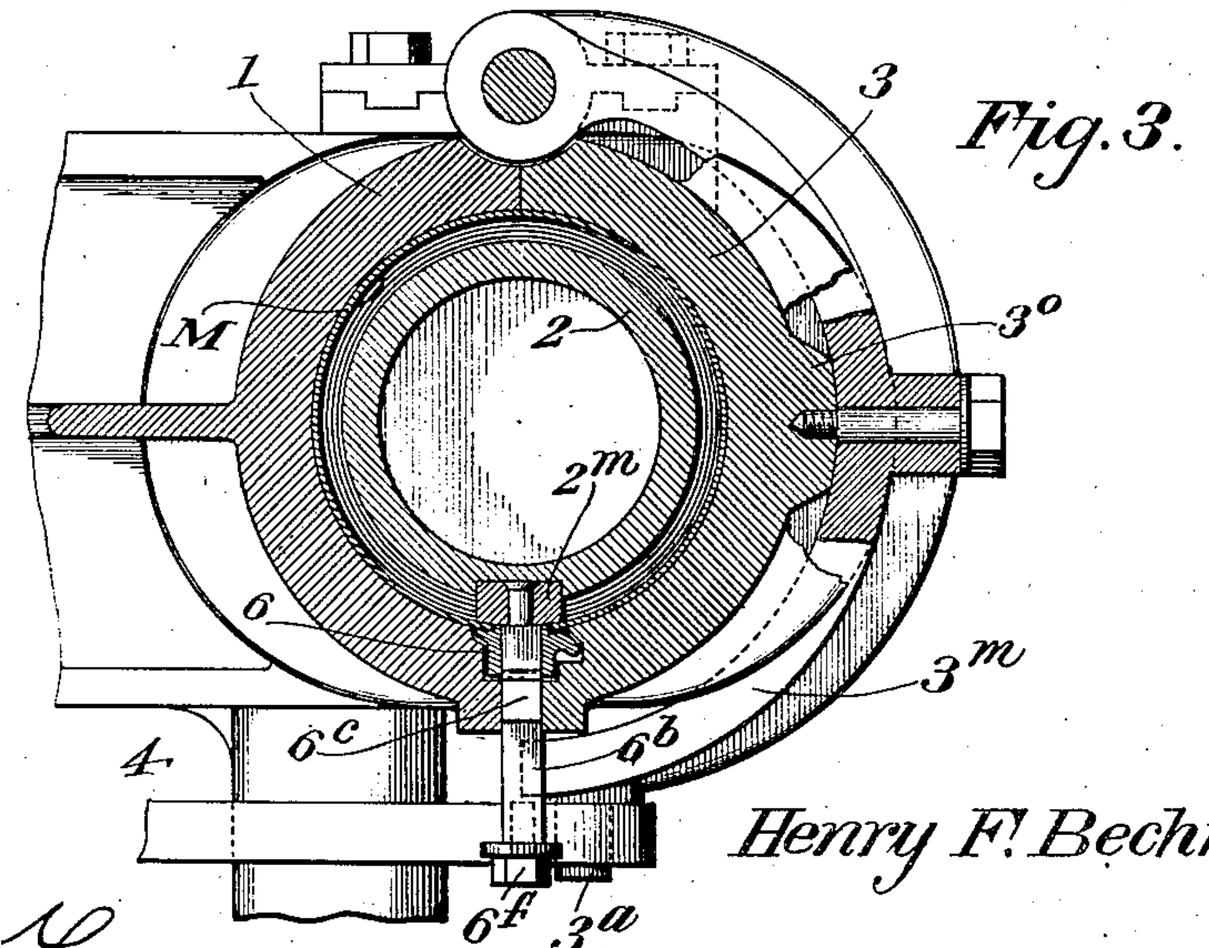

Fig. 3.

Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

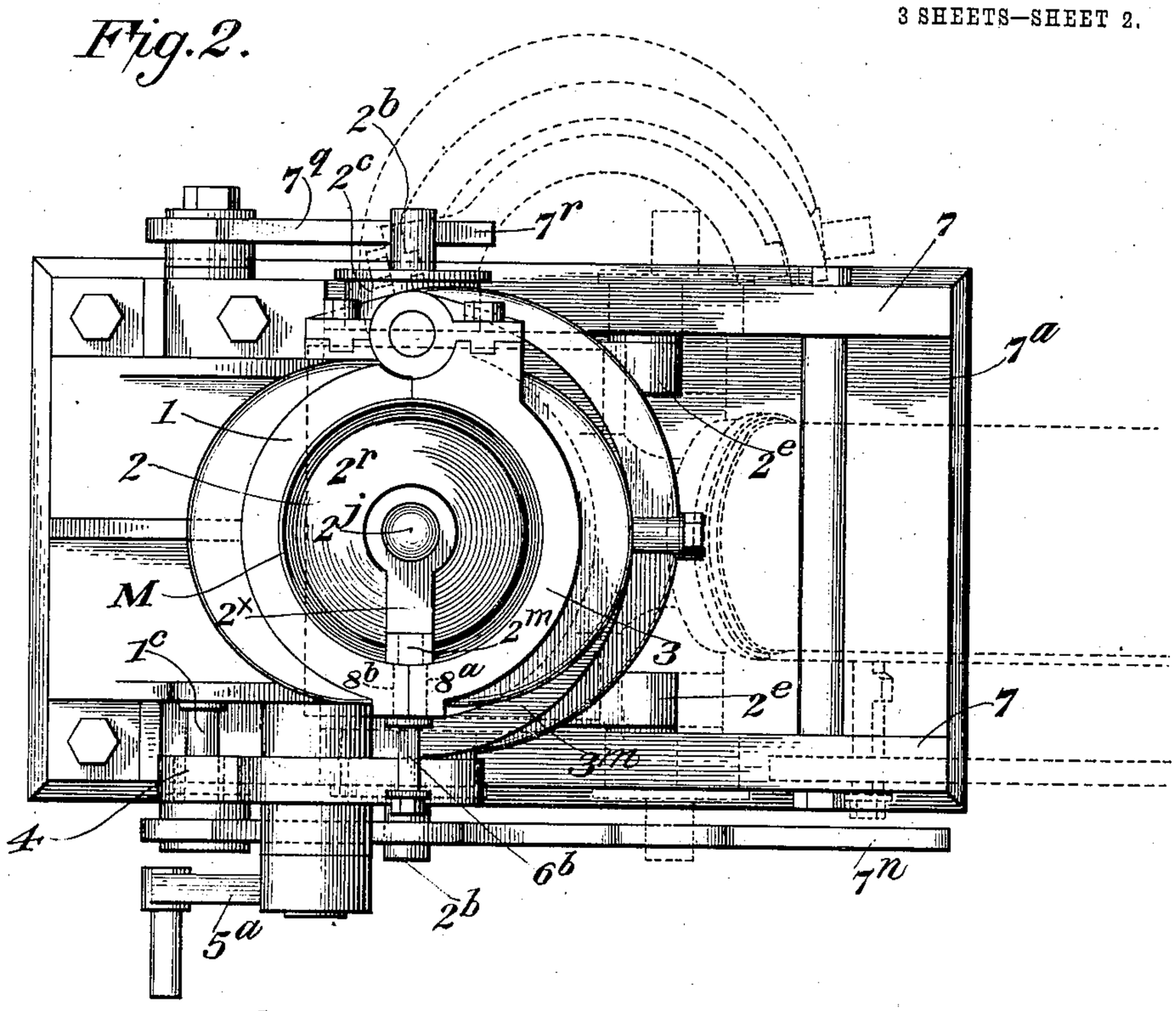


Fig. 5.

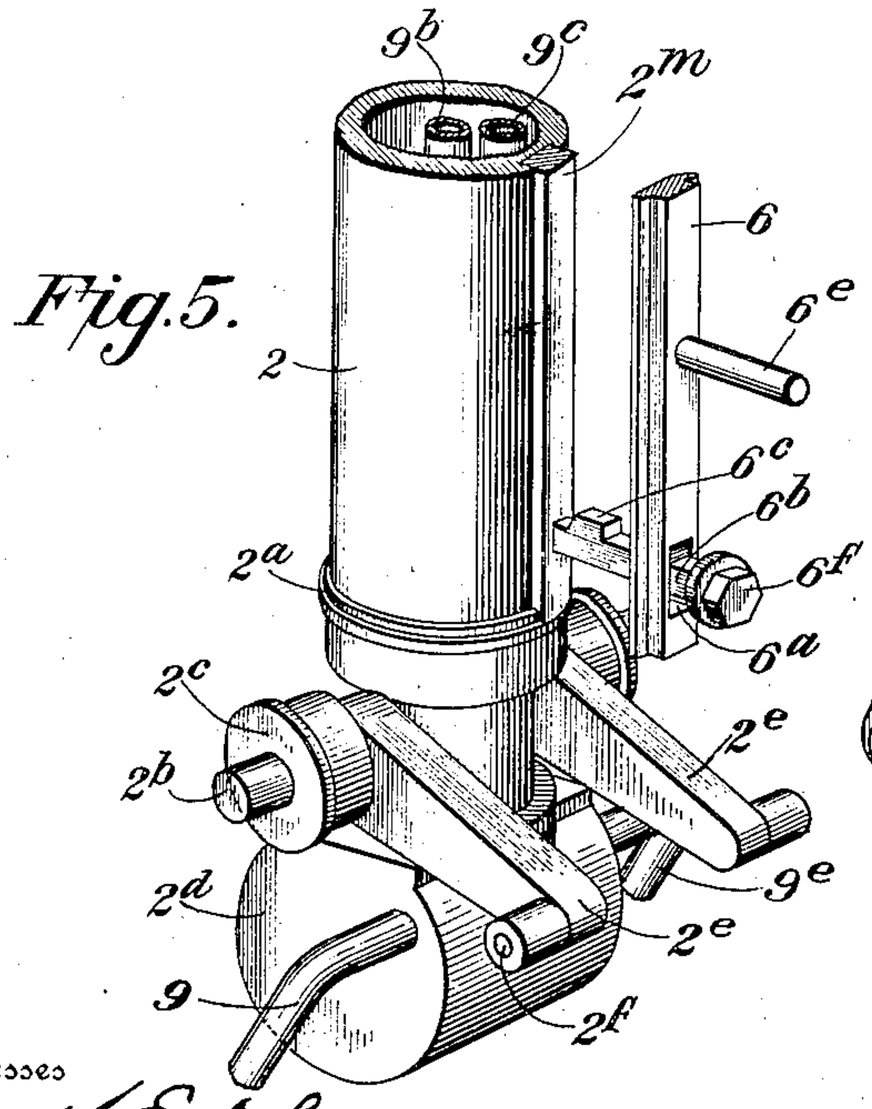
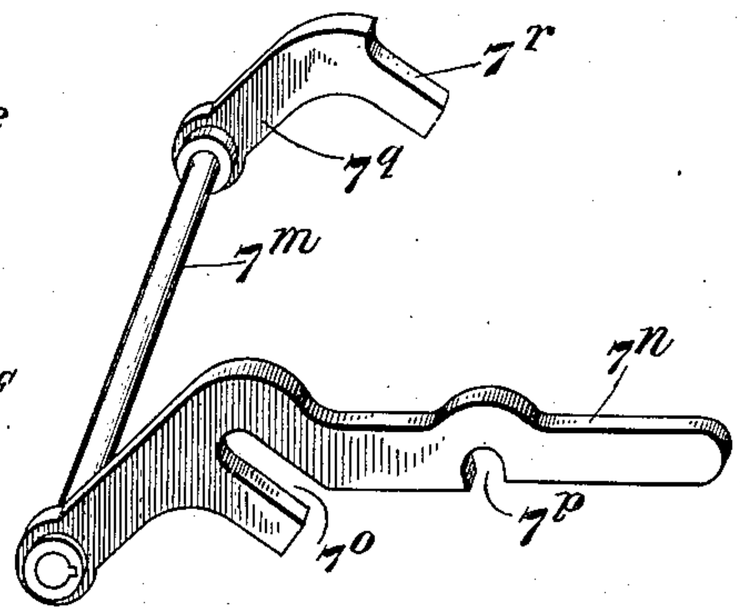


Fig. 6.



Witnesses

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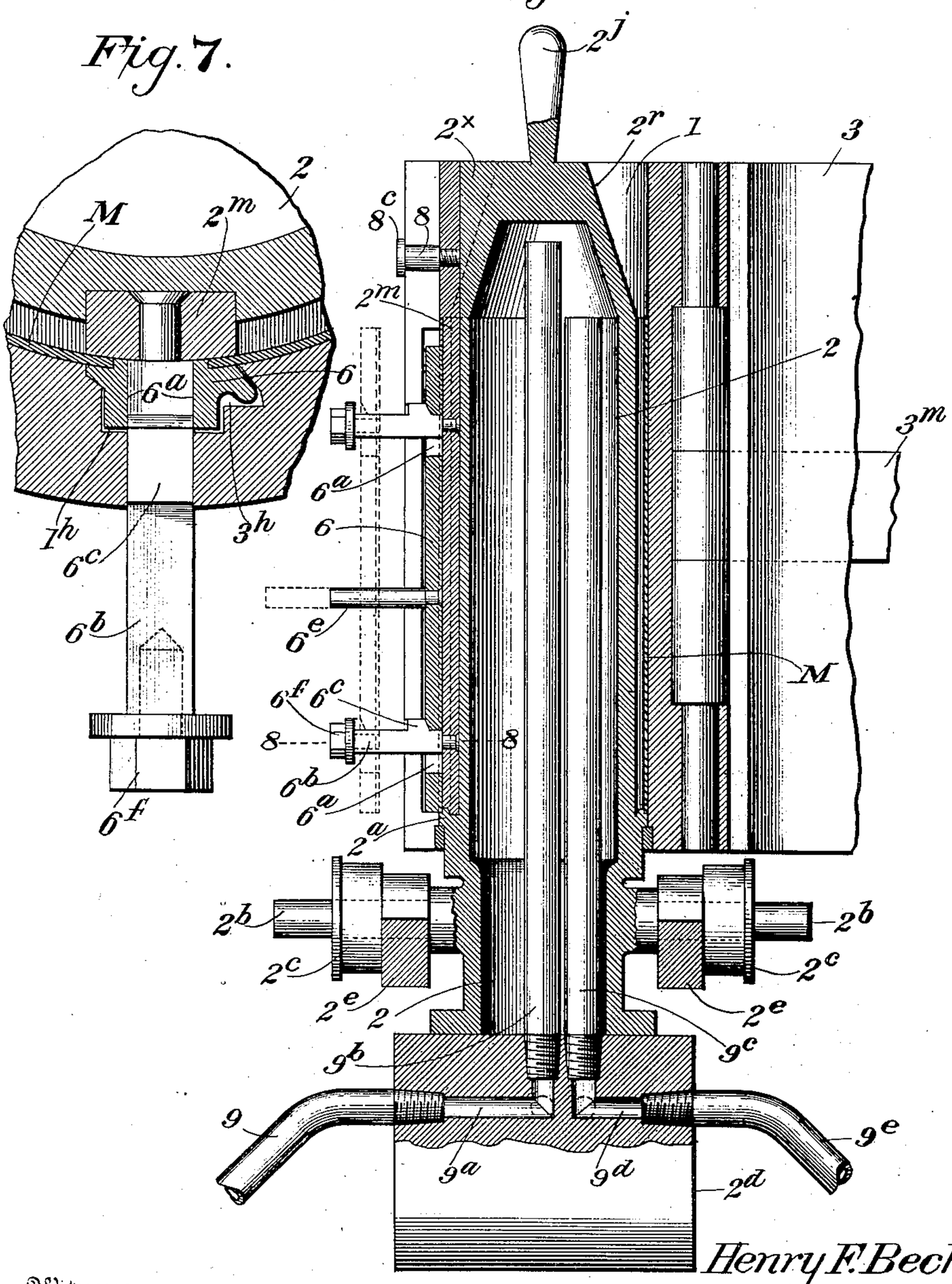
3 SHEETS—SHEET 3.

Fig. 4.

Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRY F. BECHMAN, OF BATTLE CREEK, MICHIGAN, ASSIGNOR TO DUPLEX PRINTING PRESS COMPANY, OF BATTLE CREEK, MICHIGAN, A CORPORATION OF MICHIGAN.

STEREOTYPE-CASTING BOX.

945,678. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed March 20, 1909. Serial No. 484,616.

To all whom it may concern:

Be it known that I, HENRY F. BECHMAN, of Battle Creek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Stereotype-Casting Boxes; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improved apparatus for casting metal plates, and is especially designed for casting tubular stereotype plates, which plates are curved into substantially complete cylindrical form and adapted to surround the surface of the plate-cylinders to which they are attached.

In particular the invention is an improvement upon the casting apparatus shown in my application filed December 5, 1907, Serial No. 405204, and its object is to enable cylindric tubular plates to be cast of a size and form to fit upon and surround the plate cylinders, such cylinders being preferably of very small diameter and such as are used in connection with the novel rotary web printing machine shown in my Patents No. 867230, and No. 867231, dated October 1st, 1907, and in my pending application filed March 15, 1909, Serial No. 483,600.

The present invention has particular reference to (1) novel means for clamping the matrix to the core; (2) novel means for centering the core between the drag and cope during the casting operation; (3) novel means for cooling the core; (4) novel means for throwing the core into and out of position in the drag when the cope is opened.

This invention will be clearly understood from the following description of such a casting box in connection with the accompanying drawings, which show the present perfected form of the apparatus, although I do not restrict myself to the precise details of construction shown as they are capable of modification by one skilled in the art within the scope of the invention.

In the drawings—Figure 1 is a side elevation of a complete stereotype plate casting box showing the parts in closed position, and also showing the cope and core in open positions in dotted lines. Fig. 2 is an enlarged top plan view of Fig. 1 also showing the cope in open position in dotted lines. Fig. 3 is an enlarged sectional view on line 3—3, Fig. 1, showing a matrix secured in the machine, and certain parts broken away. Fig. 4 is an enlarged vertical section through the casting box showing the cope opened, the core in section, and the matrix holder in closed position. Fig. 5 is a detail perspective view of the core and part of the matrix holding devices. Fig. 6 is a detail perspective view of the core shifting lever. Fig. 7 is an enlarged transverse sectional view on line 8—8, Fig. 4.

The machine or casting box embodies a drag 1, which is preferably mounted in vertical position upon a supporting frame, composed of side pieces 7 and base plate 7ª. This drag has a semi-circular recess in its front face corresponding in contour to one-half of the cylindrical plate to be cast in the machine.

The core 2, is preferably cylindrical in cross section and substantially corresponds in diameter to that of the plate cylinder of the press on which the plates are to be used. The core 2 has a circumferential flange 2ª near its lower end which forms the bottom of the mold during the casting operations. The core is provided at its lower end with trunnions 2ᵇ upon which are mounted rollers 2ᶜ that rest upon the upper edges of the side pieces 7; and below these trunnions, and in axial alinement with the core 2, and rigidly connected therewith, is a weight or counterbalance 2ᵈ, which is calculated to practically equal the weight of the core, and thus enable the core to be readily swung upon the trunnions to either vertical or inclined position.

The core 2 is guided in its movements to and from the drag 1, and prevented from running off the side pieces 7, by means of arms 2ᵉ which are rigidly fastened to the trunnions 2ᵇ, or lower part of core and may be cast therewith, and are provided with pins 2ᶠ, which may be provided with rollers, that engage curved guide slots 7ᵇ in the side pieces 7 and not only limit the movements of the core, but cause it to swing to an inclined position when it is pulled away from the drag and to assume a vertical position when it is moved toward the drag. The upper end of the core is preferably made conical as at 2ʳ to facilitate pouring of the metal into the mold; and it may be provided with a handle 2ʲ to facilitate raising or lowering of the core.

Hinged to one side of the drag 1 is a cope 3, which has a semi-circular recess in its inner face corresponding in contour to one-half the plate to be cast, and slightly greater in diameter than the core; and is adapted, when the core is in position in the drag, to be closed against the drag and therewith completely surround the core, as indicated in Figs. 2 and 3, the space between the cope and drag and the interposed core forming an annular casting chamber into which metal can be poured at the top of the core. The cope may be fastened to the drag, when closed, by any suitable means. As shown a yoke 3^m is hinged to the side of the drag intermediate the cope hinges and is adapted to embrace the cope, when the latter is closed, and to contact with a central rib or boss 3^o on the cope to press the cope directly against the drag when the yoke is locked. The yoke is provided on its free end with a pin 3^a; which is adapted to be engaged by a hook 4^a, on a slide 4, which is supported on a pin 1^c, attached to the drag, and upon an eccentric 5 attached to a pin or stub shaft 1^d having a handle 5^a as shown. The pin 1^d may be additionally supported by a bracket 5^c attached to the drag, said bracket serving as a guide to prevent lateral displacement of the sliding catch in locking or unlocking the yoke.

Thus far the parts described are substantially the same as like parts described in my aforesaid application No. 448893 (Case 1186) and I will now describe the improvements therein which embody the present invention.

Means for cooling the core.—It will be observed that the core 2 and the weight 2^d are hollow, and to this hollow weight 2^d is connected, in any suitable manner, an inlet pipe 9 and an outlet pipe 9^e. The pipe 9 communicates with one end of a passage 9^a in weight 2^d and the other end of the passage connects with a pipe 9^b which extends upwardly into and about centrally of the core, and substantially to the top thereof so that the cool water will be conducted through pipe 9^b to the top of the core and discharged at this point. The top of the core is subjected to the greatest heat because at this point the head or slug is formed on the cast plate, as a mass of surplus hot metal is always formed around the upper end 2^r of the core when a plate is cast. The outlet pipe 9^e connects with one end of the passage 9^d in the weight 2^d, the inner end of which passage communicates with a pipe 9^c extending upwardly into the core but shorter than pipe 9^b, so that the cool water will circulate in the core before it enters the pipe 9^c. By this arrangement the water is introduced into the core at the point where it is subjected to the greatest heat. The core is subjected to the least heat at bottom, and it is therefore not necessary to have the coldest water at this point; but at the top, or point where it is subjected to the greatest amount of heat it is cooled by an abundant supply of cool water. I have found this apparatus very efficient and reliable for keeping the core in clean working condition while casting a great number of plates, and the core is effectively protected thereby from burning. The flow of water through the core is readily controllable by valves, not shown, on the pipes 9, 9^e, or their connections.

The matrix clamp.—The core is provided at one side with a longitudinal rib or bar 2^m which extends from the bottom ring 2^a to the top of the core, a web 2^x filling the space between the upper end of the bar and the inclined surface of the conical top of the core. This bar 2^m forms a marginal space between the two sides of the plate, so that blank spaces will be left on the web between successive impressions taken from the plate corresponding to the width of bar 2^m. This bar 2^m also imparts a finish to the two edges of the plate, and produces a longitudinal narrow slot in the plate when cast, otherwise except for the slot formed by this bar 2^m the cast plates would be complete tubular cylinders. In the present case the bar 2^m is made rectangular in cross section so as to present a square edge to both sides of the plate, and opposite said bar 2^m is a clamp bar 6 which is adapted to be closed against the bar 2^m and secure the edges of the matrix M therebetween. This clamp 6 is slotted as at 6^a to permit it to be hung upon studs 6^b fast to the bar 2^m and projecting outwardly therefrom. The studs 6^b are provided with bevel lugs 6^c which are adapted to engage beveled surfaces on the outer faces of the clamp 6, at the upper edges of the slots 6^a, so that when the clamp 6 is dropped between the lugs 6^c and the bar 2^m the opposed beveled faces will cause clamp 6 to move toward the bar 2^m by gravity. The matrix clamp 6 may be provided with a handle 6^e by which it can be readily moved, and when the clamp is lifted up so that the upper edges of slots 6^a will clear the lugs 6^c it can be drawn outward to the position shown in dotted lines in Fig. 4. The matrix clamp may be kept on the studs 6^b by means of washers or flanged nuts 6^f attached to the outer ends of the studs.

As shown in Fig. 7 when a matrix is to be positioned in the box the clamp 6 is drawn outward; a matrix M is then bent around the core and its side edges are lapped over the outer face of bar 2^m. The clamp 6 is then moved inward against the face of the bar 2^m and clamps the edges of the matrix against said bar. The core 2 is then swung into position in the drag, and one edge of the bar 6 enters a recess 1^h in the edge of the drag, and the free edge of the cope 3 is also

provided with a recess 3^h which when the cope is closed engages the opposite edge of the clamp 6. When the parts are locked in closed position the matrix clamp 6 is caused to hold the edges of the matrix M securely. The drag and core are recessed in their meeting edges to accommodate the studs 6^b and the handle 6^e. After a plate has been cast the cope is swung open, and the core may be swung out of the drag and the matrix clamp 6 moved into the position indicated in dotted lines in Fig. 4 releasing the matrix M which can then be quickly removed and another matrix secured in the box.

The core centering devices.—The core is accurately centered at bottom by its trunnions and by the close fit of the cope and drag around the bottom ring 2^a of the core; but in order to prevent any lateral displacement of the upper end of the core from a true axial position within the box during the casting operation, a cylindric pin 8 is attached to the core,—to the bar 2^m, near the upper end thereof and projects between the meeting faces of the cope and drag, which latter are provided with circumferential recesses 8^a, 8^b, in their meeting edges, to engage the pin 8 and embrace the same closely when the cope is locked to the drag. The pin moreover has an enlarged head 8^c the inner face of which is engaged by the adjacent portions of the outer surfaces of the cope and drag when the box is closed, so that the pin 8 is held firmly against either lateral or longitudinal movement and consequently the upper end of the core 2 is locked by the pin 8 when the drag is closed, and is held by such pin in true axial alinement between the drag and cope, and therefore the resultant plate cast in the box will be of uniform thickness throughout its length.

The throwout lever.—Journaled in the frame 7 is a transverse shaft 7^m to one end of which is attached a lever 7^n which is provided with an inclined slot 7^o adapted to engage the projecting end of the adjacent trunnion pin 2^b of the core. This lever 7^n extends forward beyond said trunnion and is provided at a point in advance of the inclined slot 7^o with a notch 7^p which is adapted to engage the trunnion 2^b when the box is opened and the core is lowered into the position shown in dotted lines in Fig. 1, and will hold the cope in such position. On the other end of shaft 7^m is a lever 7^q, which might be of the same shape as lever 7^n, but it is unnecessary to have it so long, therefore I make the lever 7^q shorter and provide it with an inclined face 7^r corresponding to the lower or rear face of the slot 7^o; and lever 7^q might be made to include the entire slot 7^o, if desired. When the parts are to be closed in the position indicated in Fig. 1, the core is raised and moved toward the drag, then lever 7^n is lowered and as the slot 7^o engages the trunnion 2^b by depressing lever 7^n the slot 7^o acts as a cam to force the core rearward to the proper limit before the cope 3 is closed. After the casting operation the cope is thrown open, then lever 7^n is raised whereupon the inclined rear side of slot 7^o of lever 7^n and the cam face 7^r of lever 7^q, engage the trunnions 2^b and move the core away from the drag, and thus facilitating the separation of the core from the drag without the workman having to risk burning his hands. After the core is started out it can be easily lowered into the position indicated in dotted lines in Fig. 1, in which position notch 7^p engages one of the trunnions 2^b and holds the core in lowered position while the plate is being removed therefrom, or a matrix applied.

Operation.—The operation of the machine is as follows: When a plate is to be cast the cope is thrown open and the core lowered to the position shown in dotted lines Fig. 1. A matrix M is then wrapped around the core and its edges secured between the clamp 6 and bar 2^m as shown in full lines in Figs. 3–7. The core 2 is then swung into position within the drag and then the cope is closed, and the yoke is swung against the cope and secured as described. The flange 2^a on the bottom of the core makes a tight joint with the opposed surfaces of the drag and core, and closes the bottom of the mold formed by the space between the inner faces of the drag and cope and the external face of the core. The metal is then poured into the top of the box and after the metal has set the cope is opened and the core with the cylindrical plate thereon is swung out of the drag, the matrix clamp 6 is then disengaged and the matrix removed; then the plate may be slipped endwise off the core. The metal is delivered in the mold in such manner that it will naturally tend to force the matrix outward against the walls of the drag and cope and insure a clean and perfect casting.

It is obvious that boxes of this kind can be made to produce cylindrical tubular plates of any desired diameter and length, and also if desired they could be adapted to cast a plurality of parti-cylindric plates.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a stereotype casting apparatus the combination of a hollow core, water supply and drain pipes connected with one end thereof, a pipe connected with the supply and extending within the core to near the other end thereof, and a shorter pipe in the core beside the inlet pipe and connected with the drain.

2. In a stereotype casting apparatus the combination of a hollow core, water supply and drain pipes connected with the bottom

thereof, an inlet pipe connected with the supply and extending in the core to near the upper end thereof, and a second pipe in the core connected with the drain and extending beside but terminating below the upper end of the inlet pipe.

3. In a casting box the combination of a tiltable core, water supply and drain pipes connected with the bottom thereof and extending upwardly therein, a water inlet pipe within the core and a water outlet pipe within the core, the outlet pipe being shorter than the inlet pipe.

4. In a casting box the combination of a tiltable weighted core, water inlet and outlet pipes within the core, and connected to the weighted end thereof the inlet pipe being longer than the outlet pipe, and water supply and drain connections to said pipes.

5. In a casting box the combination of a cope, a drag, a hollow tiltable core having water inlet and outlet passages in its lower end, with inlet and outlet pipes connected with said passages and extending upwardly within the core, the outlet pipe being shorter than the inlet pipe.

6. In a casting box, the combination of a hollow tiltable weighted core, water inlet and outlet passages in the weighted end of the core, an inlet pipe in the core and an outlet pipe therein, said inlet pipe being longer than the outlet pipe, said pipes being connected to said passages and water supply and drain connections to said passages.

7. In a casting box the combination of a cope, a drag, a hollow tiltable core having a weighted lower end, and water inlet and outlet passages in said weighted lower end, with inlet and outlet pipes connected with said passages within the core, the outlet pipe being shorter than the inlet pipe, said pipes being connected with said passages and supply and discharge pipes connected with the inlet and outlet passages.

8. In a stereotype casting box the combination of a cylindric core having a longitudinal rib, and a radially movable matrix clamp parallel with and adapted to engage the core rib.

9. In a stereotype casting box the combination of a core having a longitudinal rib, a matrix clamp bar parallel with and adapted to engage said rib, and beveled studs supporting said clamp.

10. In a stereotype casting apparatus the combination of a cylindric core, a longitudinal bar at one side thereof, and a slotted matrix clamp adapted to co-act with said bar to secure the opposite edges of a matrix around the core.

11. In a stereotype casting apparatus the combination of a core, a longitudinal bar at one side thereof, a radially movable matrix clamp opposite said bar and adapted to co-act therewith to secure the opposite edges of a matrix around the core, and means for fastening the clamp.

12. In a stereotype casting apparatus the combination of a core, a longitudinal rib at one side thereof, a slotted matrix clamp adapted to co-act with said rib to secure the opposite edges of a matrix around the core, and beveled studs attached to said rib and passing through the slots in said clamp.

13. In a stereotype casting apparatus the combination of a drag, a cope and a core having a longitudinal rib, a matrix clamp parallel with and adapted to engage said rib to clamp the edges of a matrix around the core, said core and drag having recesses on their meeting faces to engage the clamp when the box is closed.

14. In a tubular stereotype casting apparatus the combination of a drag, a cope, and a core having a longitudinal bar, a matrix clamp parallel with and adapted to engage said bar to clamp the edges of a matrix around the core, studs attached to said bar and supporting said clamp, said cope and drag having recesses on their meeting faces to engage the clamp when the box is closed.

15. In a tubular stereotype casting apparatus the combination of a drag, a cope, and a core having a longitudinal rib, a slotted matrix clamp parallel with and adapted to engage said rib to clamp the edges of a matrix around the core, beveled studs attached to said ribs and projecting through the slots in said clamp, said cope and drag having recesses on their meeting faces to engage the clamp when the box is closed, and also having notches to accommodate the said studs.

16. In a stereotype casting apparatus the combination of a drag, a cope and a core, a pin attached to said core and engaged by the cope and drag when closed to prevent axial displacement of the core therebetween.

17. In a casting box the combination of a drag, a cope and a tiltable core; with means whereby the free end of the core is held in true axial position by and between the drag and cope when the box is closed.

18. In a casting box the combination of a drag, a cope and a core; with means on the free end of the core adapted to be engaged by the drag and cope when the box is closed whereby the free end of the core is held in true axial position between the cope and drag during the casting operation.

19. In combination a drag, a cope, a core, and a pin attached to the free end of said core and adapted to be locked between the drag and cope when the box is closed, to hold the free end of the core in exact position between the cope and drag.

20. In combination a drag, a cope, and a swinging tiltable core; with a headed pin at-

tached to the free end of said core and adapted to be locked between the drag and cope when the box is closed, whereby the free end of the core is held in exact alinement within the box during the casting operation.

21. In combination a drag, a cope, and a movable core; with a lever adapted to engage a trunnion of the core and move the core into, or out of, operative position.

22. In a casting box the combination of a drag, a cope, and a movable core, a rock shaft, and a lever on said shaft adapted to engage the core to move the same into, or out of, operative position.

23. In combination with a drag, a cope, and a tiltable movable core, of a lever adapted to force the core into, or out of, operative position, said lever being also adapted to hold the core in opened position.

24. In combination with a drag, a cope, and a tiltable movable core supported on trunnions, of a lever adapted to engage a trunnion of the core to force the latter into, or out of, operative position.

25. In a casting box the combination of a drag, a cope, a movable core mounted on trunnions, a rock shaft, and a lever on said shaft adapted to engage a trunnion of the core to move the latter into, or out of, operative position.

26. In combination a drag, a cope, and a tiltable movable core supported on trunnions; with a lever adapted to engage one of the trunnions of the core to force the latter into, or out of, operative position, said lever also having a notch adapted to engage one of the trunnions to hold the core in opened position.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

HENRY F. BECHMAN.

Witnesses:

FRANK W. DUNNING,

IRVING H. STONE.