No. 703,358. Patented June 24, 1902.

C. C. WEBSTER.

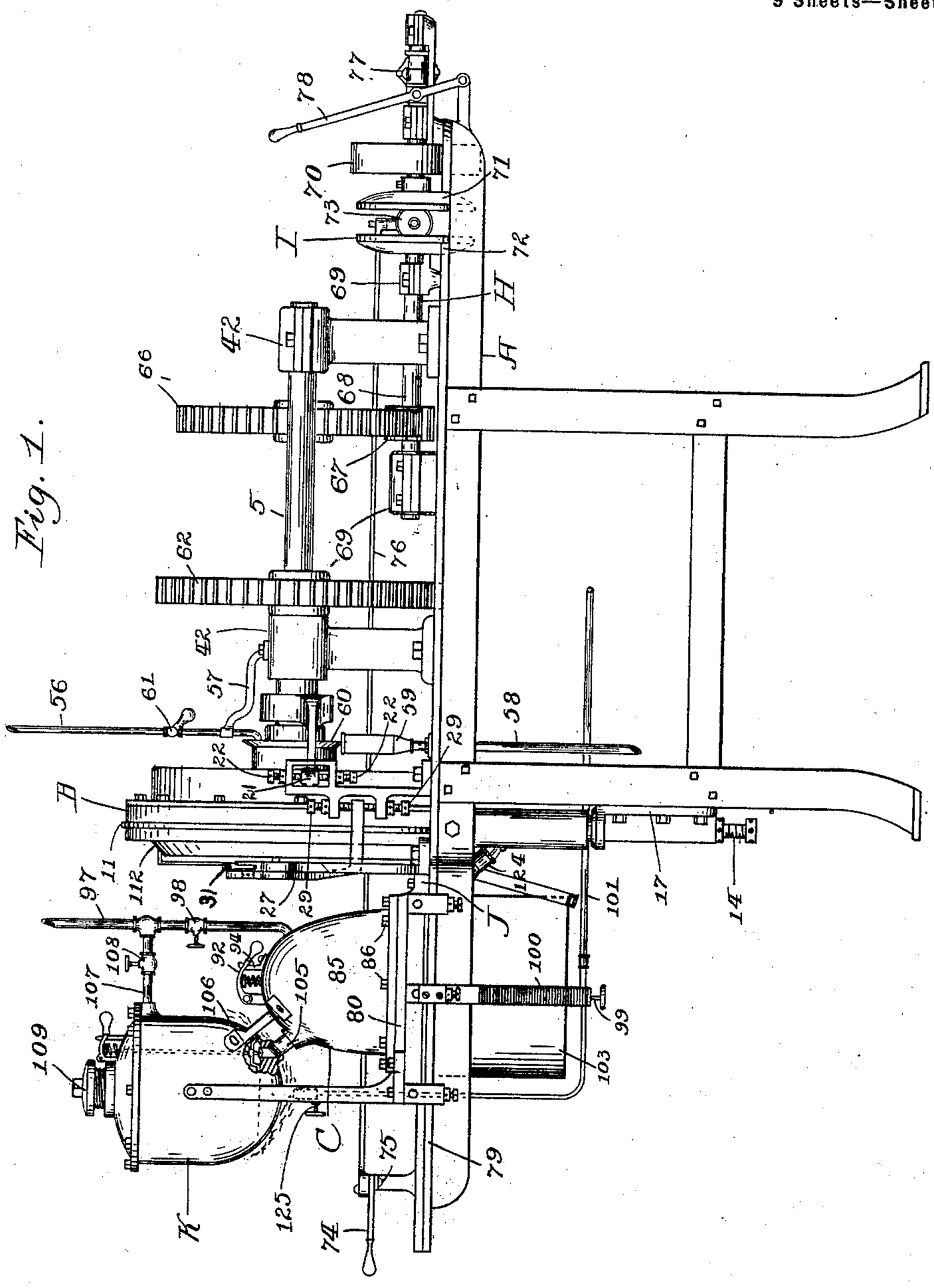
STRIP METAL CASTING MACHINE.

(Application filed June 12, 1900.)

(No Model.)

9 Sheets—Sheet 1.

Fig. 1.



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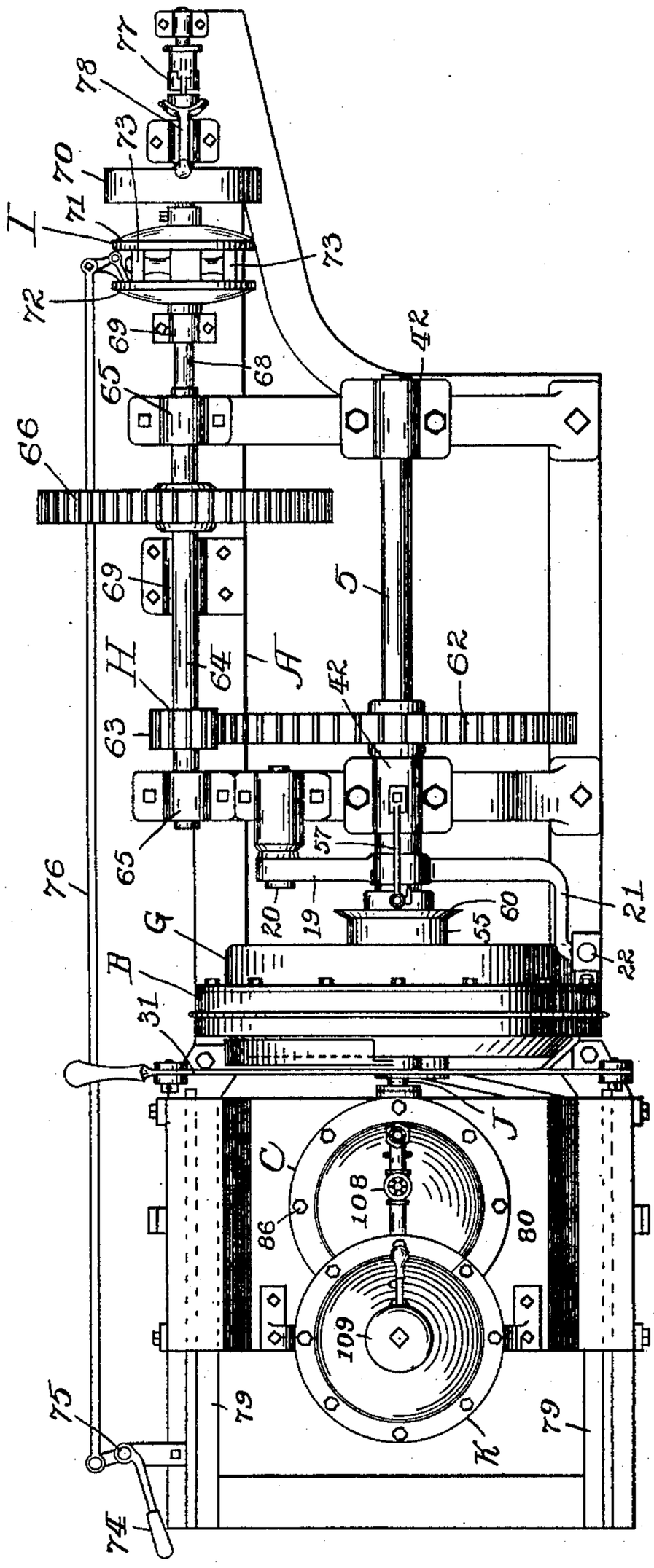
(No Model.) 9 Sheets—Sheet 2.

Fig. 2.



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No. 703,358. Patented June 24, 1902.

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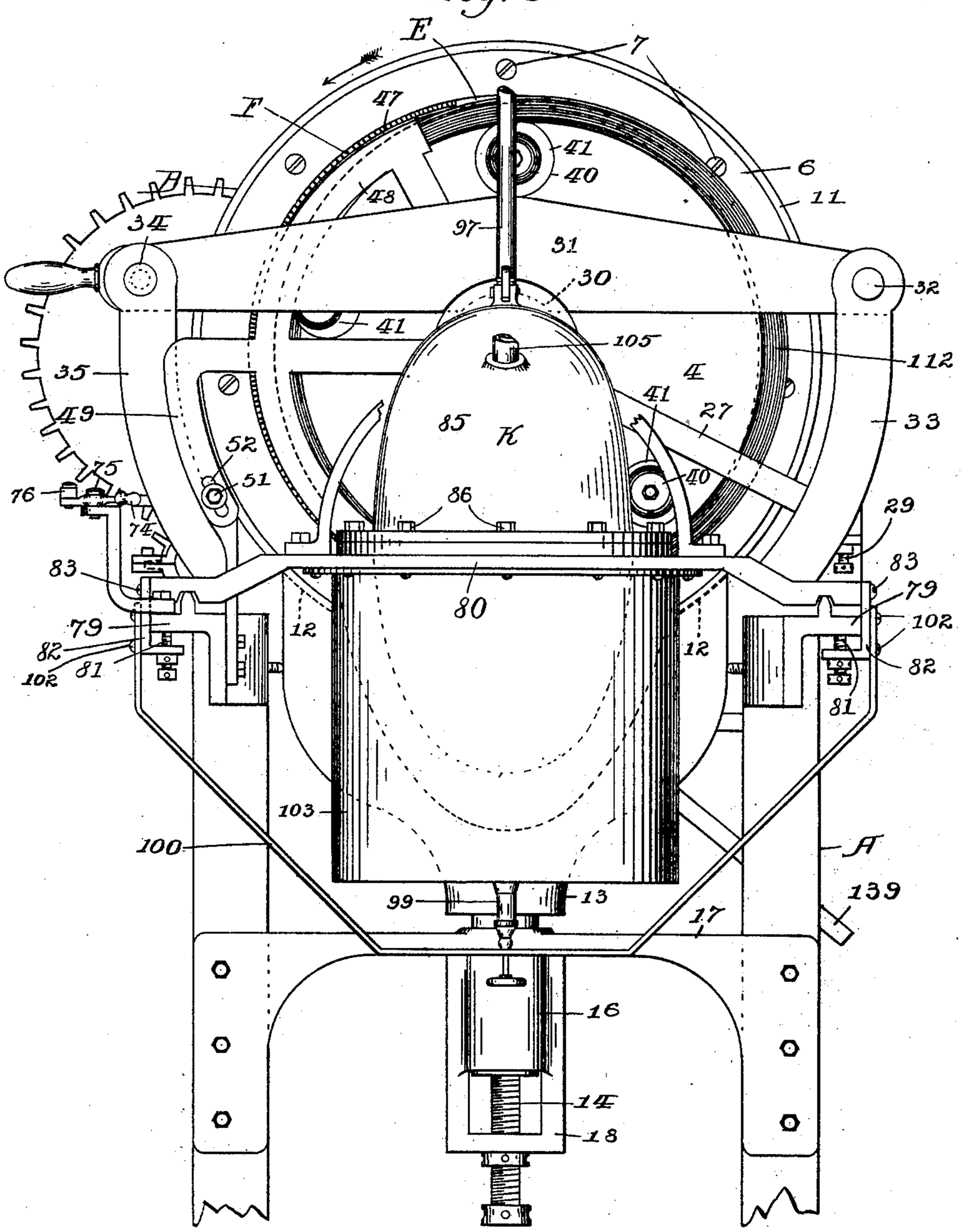
(No Model.) 9 Sheets—Sheet 3.

Fig. 3.



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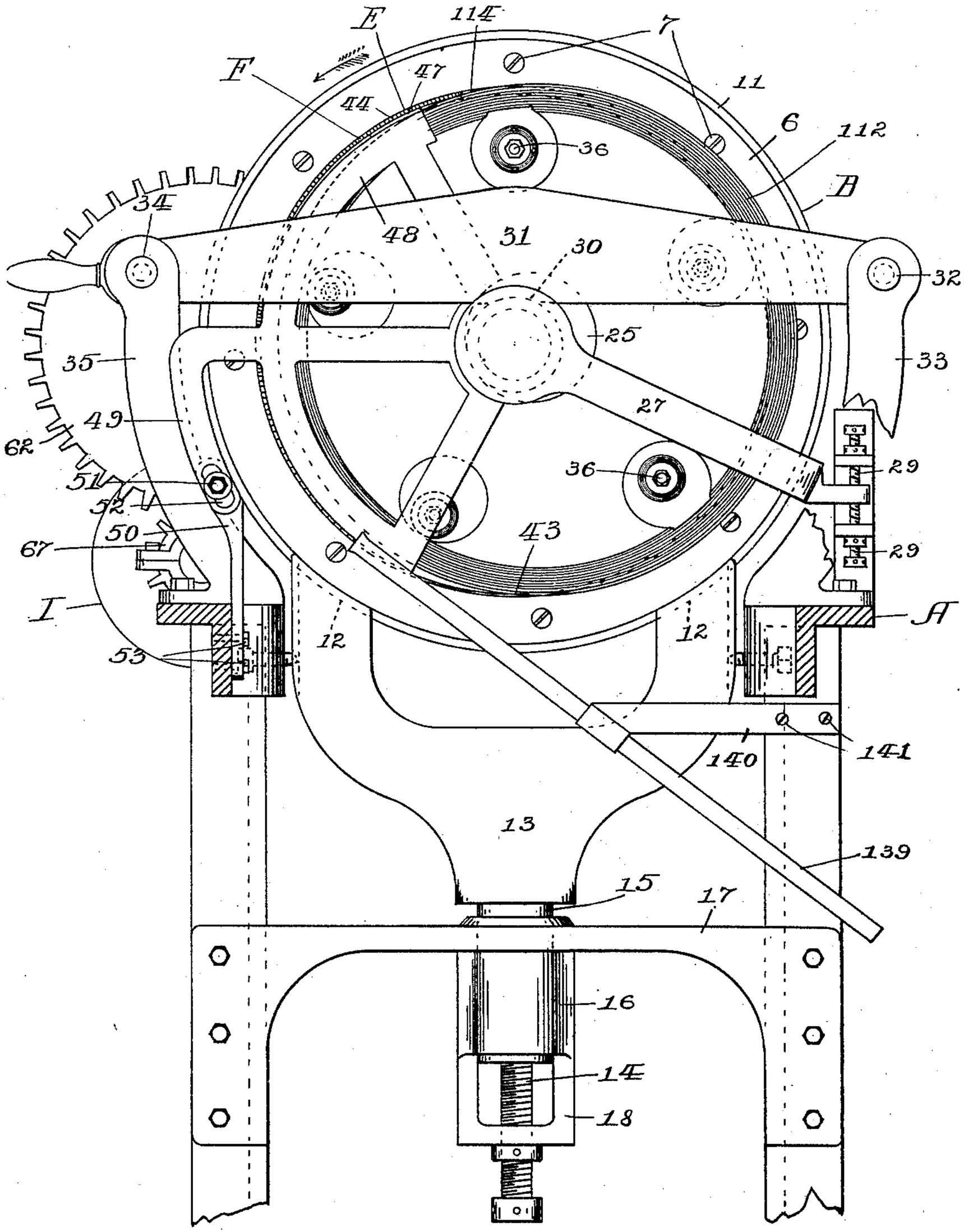
STRIP METAL CASTING MACHINE.

(Application filed June 13, 1900.)

(No Model.) 9 Sheets—Sheet 4.

Fig. 4.



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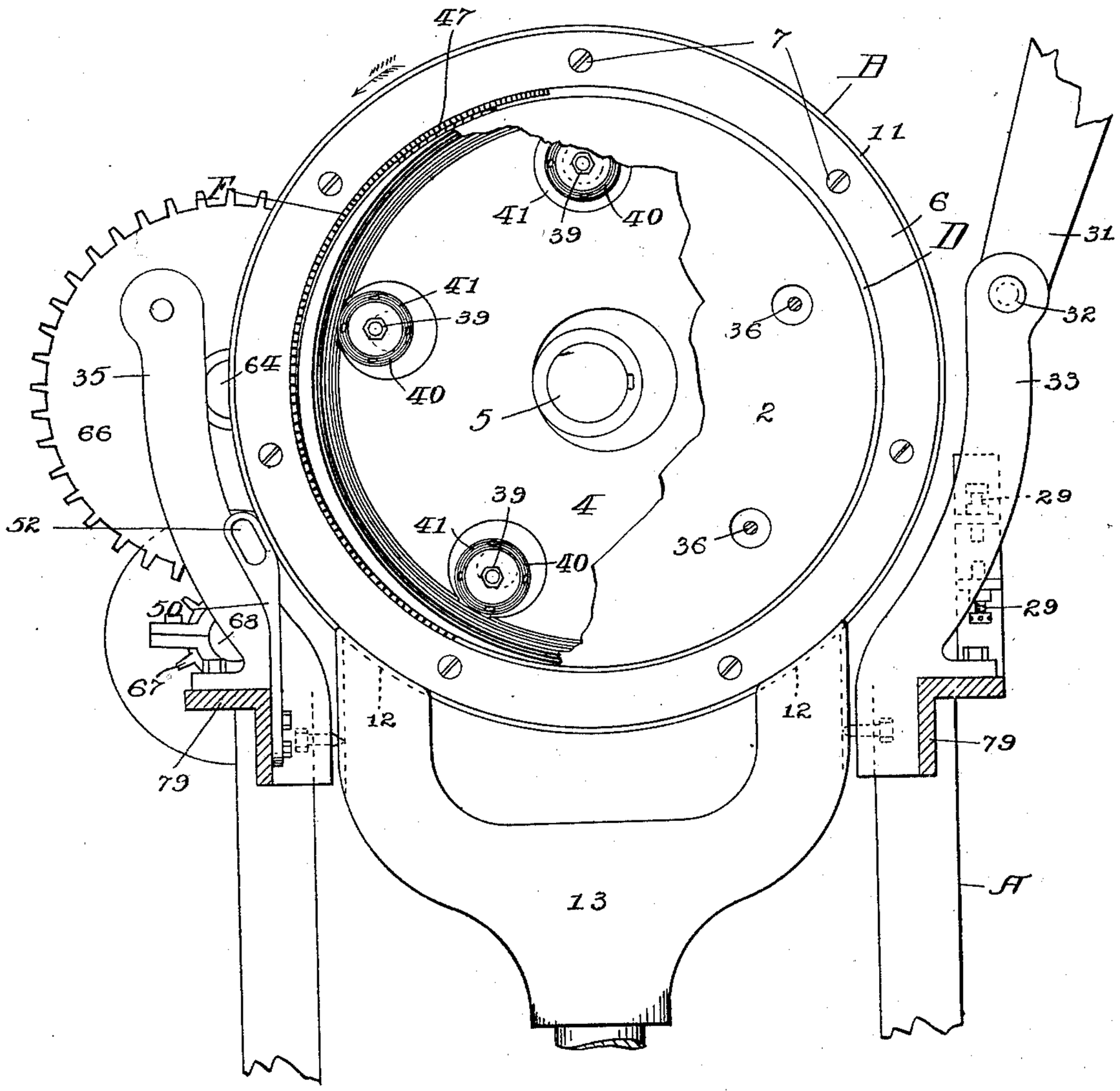
STRIP METAL CASTING MACHINE.

(Application filed June 12, 1900.)

(No Model.) 9 Sheets—Sheet 5.

Fig. 5.



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(Application filed June 12, 1900.)

(No Model.) 9 Sheets—Sheet 6.

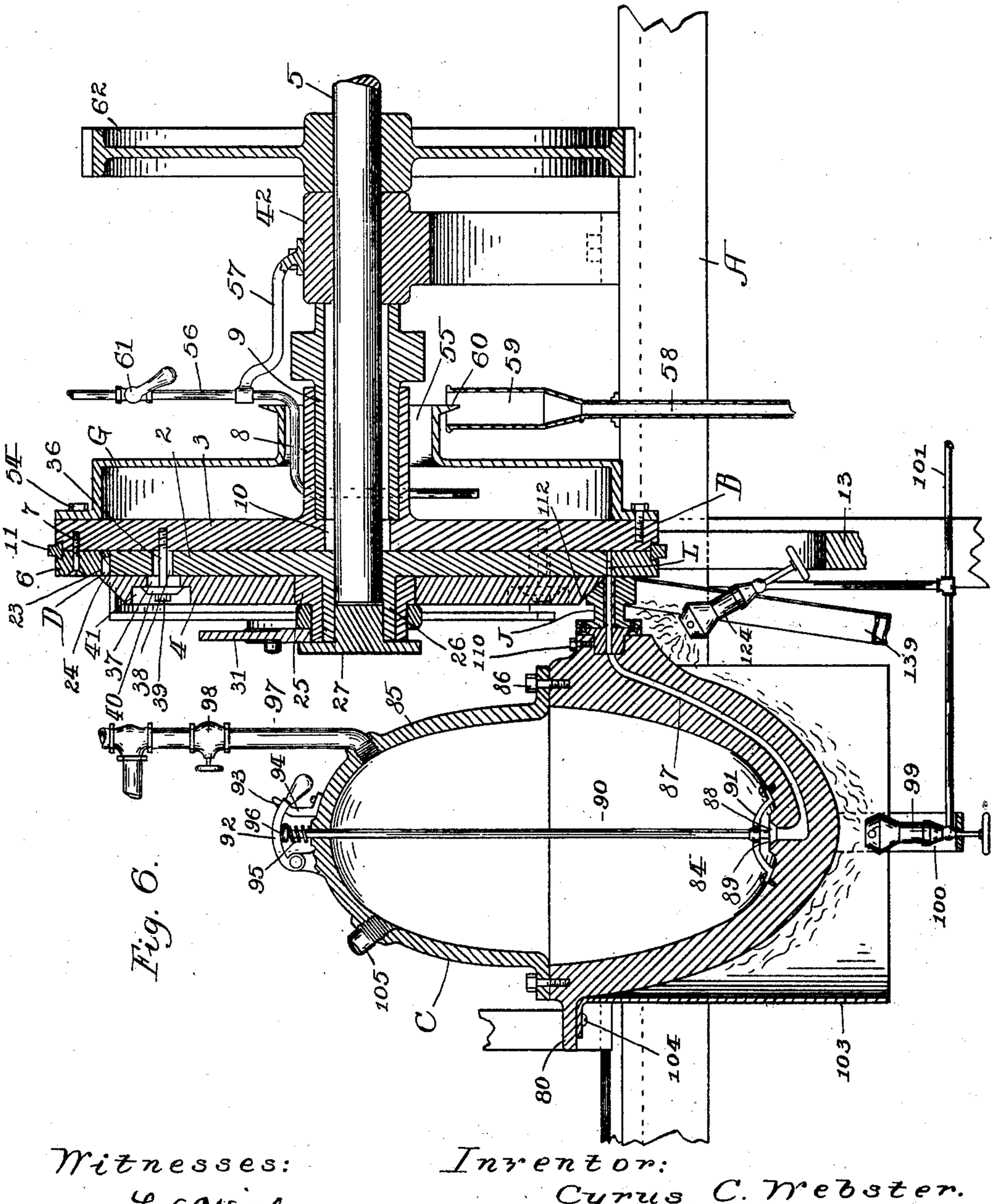

Fig. 6.

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STRIP METAL CASTING MACHINE.

(Application filed June 12, 1900.)

(No Model.) 9 Sheets—Sheet 7.

Fig. 9.

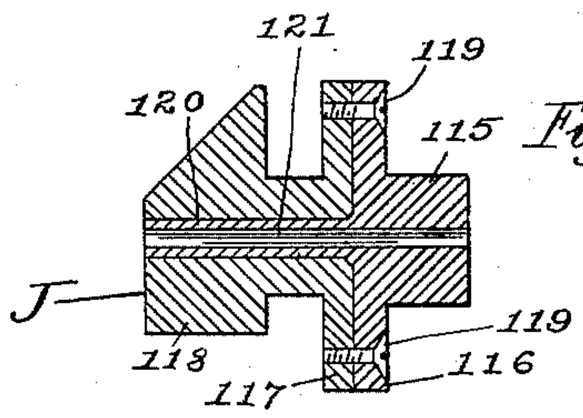


Fig. 7.

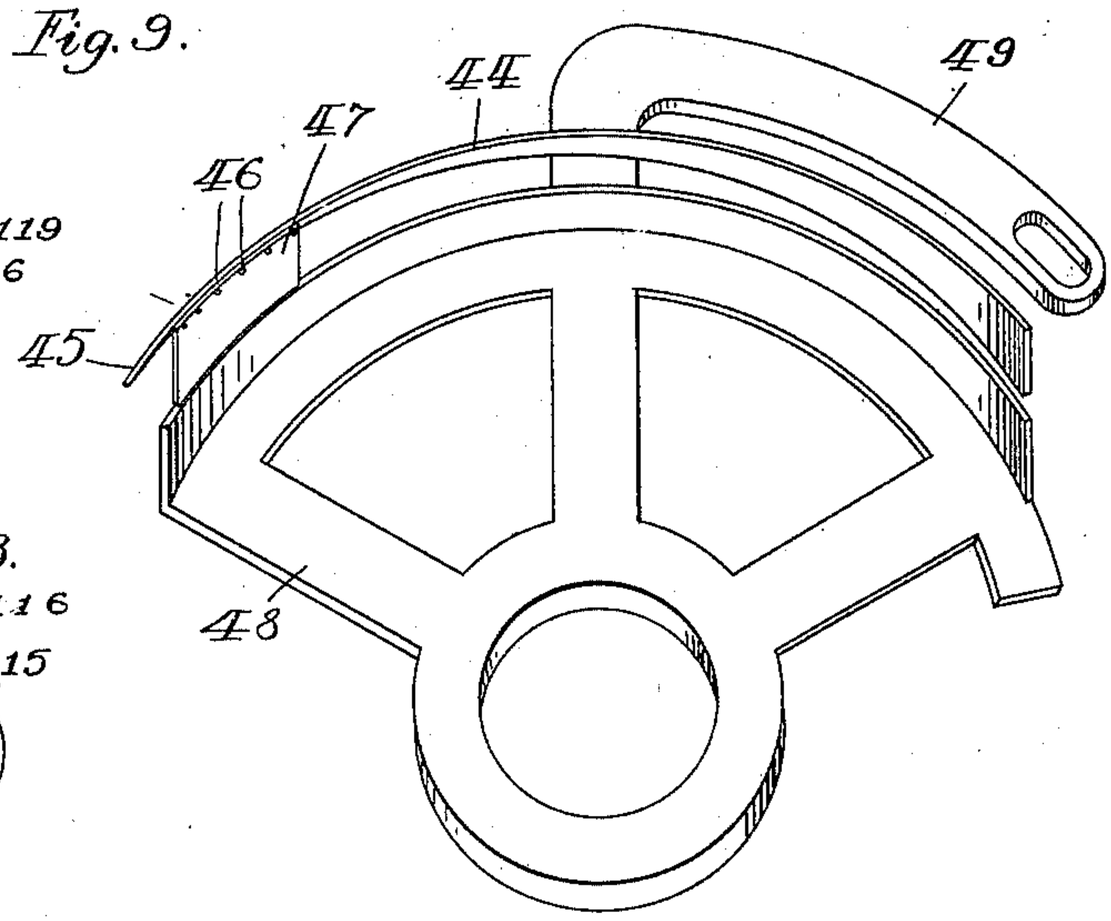


Fig. 8.

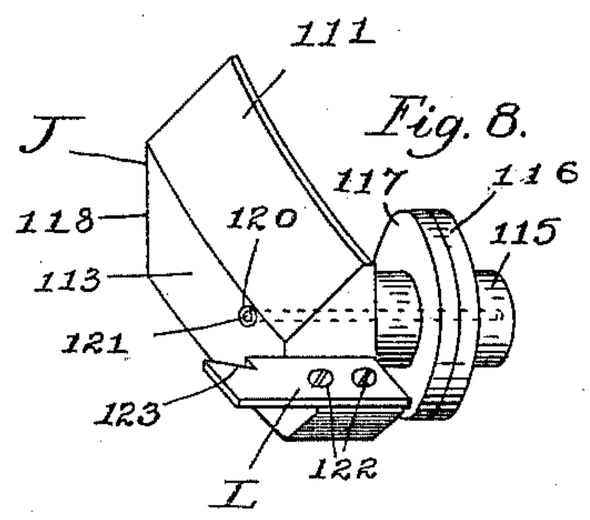


Fig. 10.

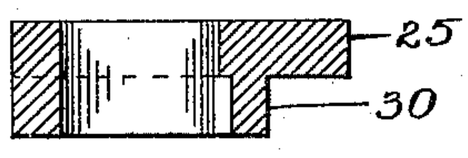
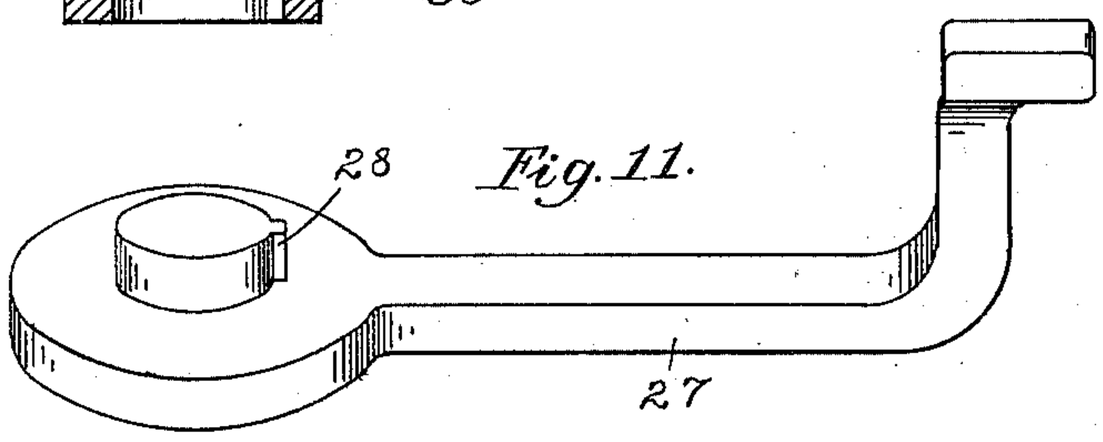


Fig. 11.



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No. 703,358. Patented June 24, 1902.

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STRIP METAL CASTING MACHINE.

(Application filed June 12, 1900.)

(No Model.) 9 Sheets—Sheet 8.

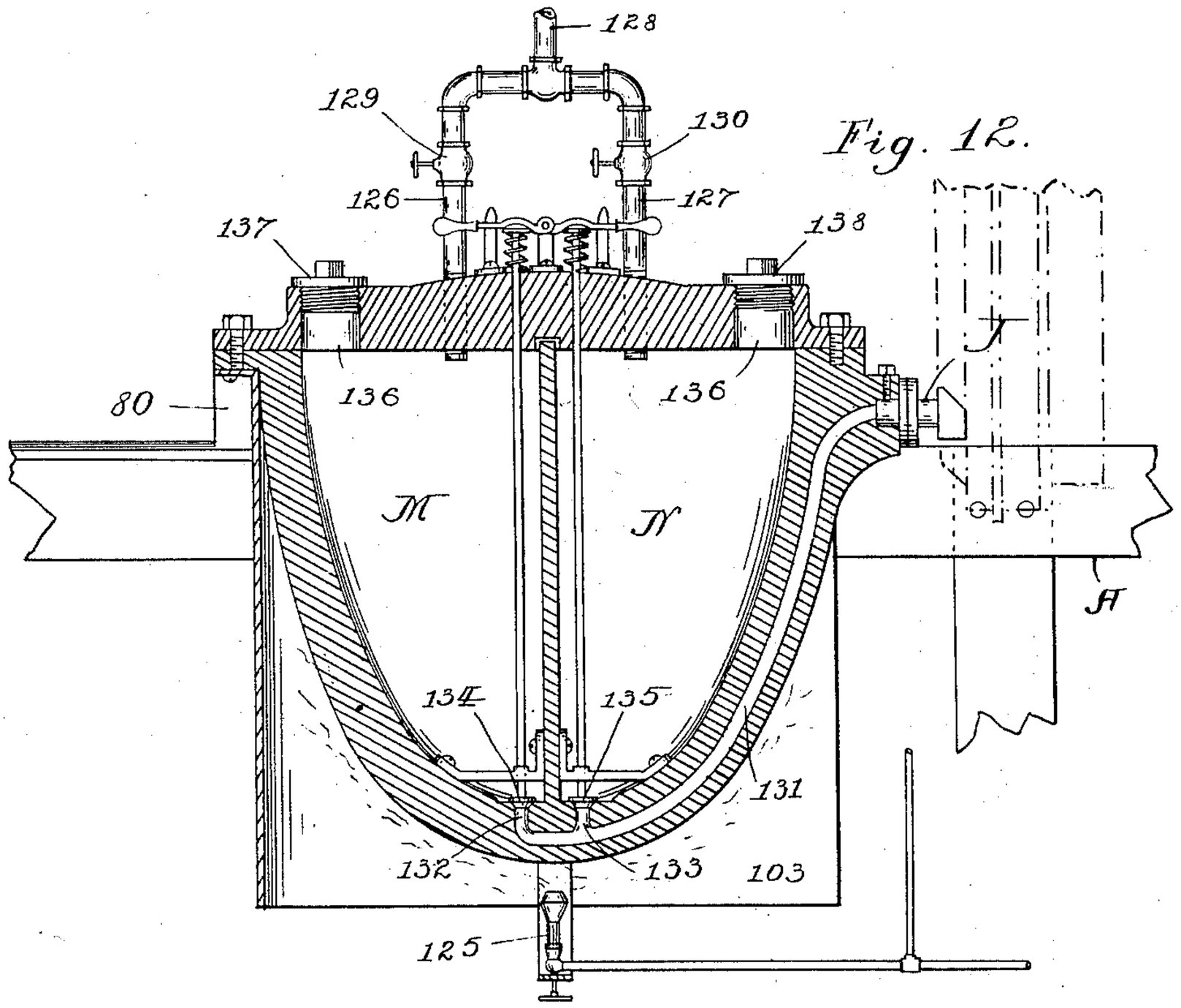

Fig. 12.

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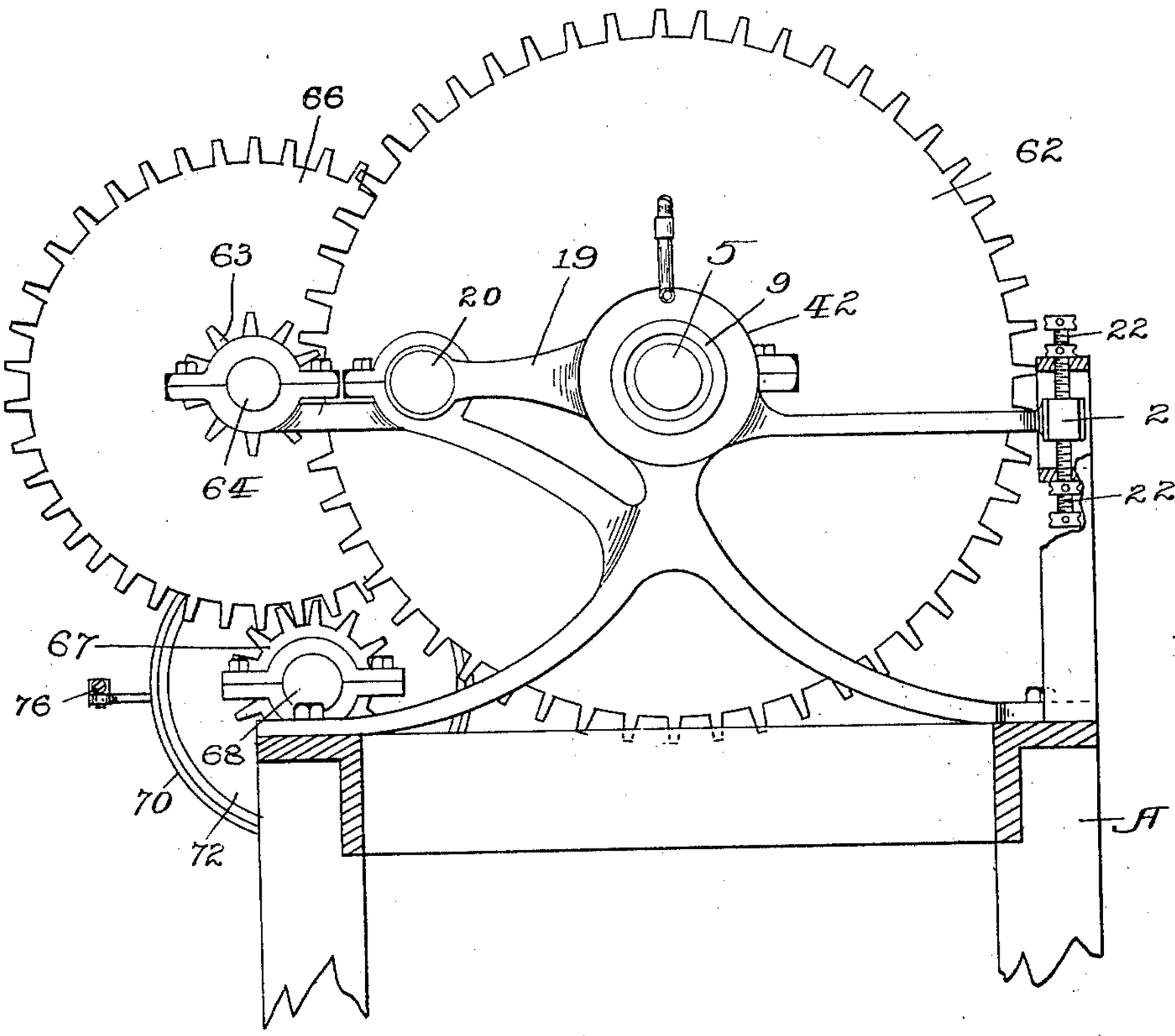
STRIP METAL CASTING MACHINE.

(Application filed June 12, 1900.)

(No Model.) 9 Sheets—Sheet 9.

Fig. 13.



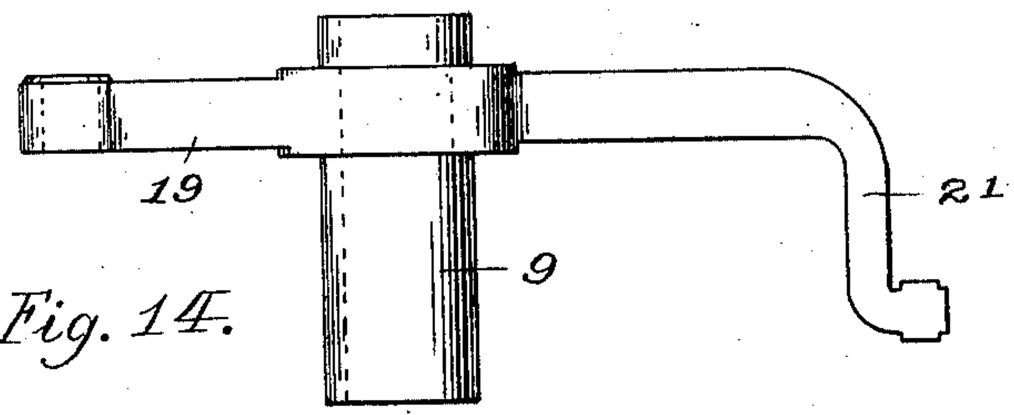


Fig. 14.

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UNITED STATES PATENT OFFICE.

CYRUS C. WEBSTER, OF MINNEAPOLIS, MINNESOTA.

STRIP-METAL-CASTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 703,358, dated June 24, 1902.

Application filed June 12, 1900. Serial No. 20,090. (No model.)

To all whom it may concern:

Be it known that I, CYRUS C. WEBSTER, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Strip-Metal-Casting Machines, of which the following is a specification.

My invention relates to improvements in strip-metal-casting machines, the object being to provide means whereby a continuous strip or ribbon of lead or other metal may be cast with a minimum amount of labor and expense.

The machine herein described is an improvement upon that described in my application No. 716,162, filed May 9, 1899.

More specifically, my present improvements relate to the method of injecting the molten metal into the mold, to the jacketing of the mold so as to more quickly solidify the molten metal injected therein, to the control of the speed of the mold-frame, and the simplification of the construction of the mold-frame.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a casting-machine used with my improved apparatus. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged detail view of the casting-machine shown in front elevation. Fig. 4 is a similar view to Fig. 3 with the crucible removed and showing the supporting-frame in section. Fig. 5 is a detail front elevation of the mold-frame, showing the cover-plate partly broken away and the eccentric upon which it is mounted removed. Fig. 6 is an enlarged detail view of Fig. 1 shown in central longitudinal section. Fig. 7 is a perspective view of the ejector and its supporting-frame. Fig. 8 is a perspective view of the gate-block and dam. Fig. 9 is a section of the gate-block, taken longitudinally through the center of the nipple. Fig. 10 is a cross-section of the eccentric upon which the cover-plate of the mold is journaled. Fig. 11 is a perspective view of the arm which is fitted to the eccentric by which the cover-plate is adjusted. Fig. 12 is a longitudinal section of an alternate construction of the crucible. Fig. 13 is a detail elevation looking toward the rear of the casting-machine as shown in Fig. 1, with the crucible and rotary mold removed, showing the journal-sleeve of the mold and the method of supporting and adjusting it in position upon the frame. Fig. 14 is a plan view of the journal-sleeve.

In the following specification where the word "front" is used it is applied to those surfaces nearest the crucible, and the word "rear" indicates those surfaces nearest the belt end of the machine.

Throughout this specification by the word "crucible" I mean the vessel from which the molten metal is injected into the mold-cavity and by the word "ladle" the vessel by which the molten metal is fed into the crucible.

In the drawings let A represent the frame of my improved metal-casting apparatus, B the mold-frame, and C the crucible. The mold-frame is sectional in construction and composed of circular disks 2, 3, and 4, which are longitudinally adjacent and arranged so as to form the mold-cavity D. The disk 2 is carried by the shaft 5, to which it is centrally fastened by shrinking. The disk 3 is positioned upon the rear face of the disk 2 and has the flange 6 fastened to its front face by screws 7. The disk 3 is formed with the hollow hub 8, which extends rearwardly, by which the disk is journaled upon the inner hub 9. This disk is formed with the central opening 10, through which the shaft 5 passes freely. The annular collar 11 is recessed between the flange 6 and disk 3 and projects slightly from their perimeters. This collar travels in the groove 12 of the journal-support 13. In this journal-support the mold-frame is journaled. This support is vertically adjustable by means of screw 14, so as to provide for raising and lowering of the disk when it is adjusted. It is also provided with the stud 15, which passes through the collar 16, in which it is free to slide. This collar is carried by the bracket 17, which is bolted to the frame A of the apparatus. The bolt 14 passes vertically through yoke 18 of the collar and impinges against the stud 15. The inner hub 9 incloses the shaft 5 and is carried by the adjusting-arm 19, one end of which is pivoted at 20 to the frame A and the other end 21 supported between set-bolts 22 in the frame, by which it is raised or lowered. The disk 3 is vertically adjustable to vary

the eccentricity of its inner face 23 relative to the perimeter of the disk 2. The mold-cavity D is a groove bounded by the inner face 23 of the flange 6, the front face of the disk 3, the outer face of the disk 2, and the rear face of the cover-disk 4. The object of arranging the face 23 of the flange and face 24 of the disk 2 relatively eccentric is to free the cast metal from the mold-cavity by widening the groove D toward the place of egress E. The cover-disk 4 is journaled upon the eccentric 25, which in turn is centrally journaled upon the hub 26 of disk 2. (See Fig. 6.)

An arm 27 is attached to the eccentric by the feather 28, and its end is adjustable between the set-bolts 29 on the frame. By adjusting these bolts the eccentric is turned and the cover raised or lowered. The eccentric is provided with the circular shoulder 30, upon which the bar 31 rests, which forms a journal-bearing for the mold-frame. The bar is pivoted at 32 upon the arm 33 of the frame. It is locked in position by pin 34, which is passed through the bar and the arm 35 of the frame. The cover-disk is revolved by stud-bolts 36, passing through the openings 37 in the cover and 38 in the disk 2. The openings 38 are of sufficient size to allow the pins to move freely as the mold-frame revolves. The cover is held laterally in position by nuts and washers 39 and 40, which are recessed at 41 into the cover.

The shaft 5 revolves in journal-bearings 42, and the mold is carried upon this shaft and journaled upon the support 13 and the journal-bar 31. The cover-disk revolves over the mold-cavity from the place of ingress of the molten metal at 43 to its place of egress E. At the latter place the ejector F is stationary in the mold-cavity. This ejector consists of the tapering blade 44, which is positioned in the mold-cavity with its edge 45 facing the strip. The blade is fastened at 46 to the flange 47, which in turn is carried upon the frame 48. This frame is journaled upon the shoulder 30 of the eccentric 25, joining the journal-bar 31, and is held adjusted by its arm 49, which is fastened to the bracket 50 by a bolt 51, passing through the slot 52. The rod 50 is fastened to the frame A by means of bolts 53. The mold is reduced in temperature by means of the jacket G, which is fastened to the rear face of the disk 3 by bolts 54. This jacket is a shell formed with the collar 55, passing freely over the hub 8 of the disk 3. Between this collar and the hub the feed-pipe 56 passes into the jacket. This pipe is supported by the bracket 57 upon one of the journal-bearings 42. The outer end of the collar of the jacket is formed with the drip-flange 60, below which the drip-cup 59 is mounted on the frame A. This drip-cup is provided with the drain-pipe 58.

The cooling fluid is fed into the jacket for reducing the temperature of the mold at the desired rate by the regulating-valve 61, which is connected with the feed-pipe 56.

The mold is revolved by the driving mechanism H, consisting as follows: The mold-shaft 5 carries the gear 62, which meshes with the pinion 63, carried by the counter-shaft 64. This counter-shaft is journaled at 65 upon the frame A and carries the gear 66, which in turn meshes with the pinion 67, carried by the drive-shaft 68. This drive-shaft is journaled at 69 on the frame and is revolved by the drive-pulley 70. The drive-shaft carries the speed-controller I, which is of ordinary construction and consists of the disks 71 and 72. Between these disks the friction-rollers 73 are mounted. The controller is regulated by the shipper-handle 74, which is pivoted to the frame A at 75, near the front of the machine. The controller and handle are connected by rod 76. The drive-pulley is adapted to be thrown into and out of operation by the clutch 77 by handle 78. The object of varying the speed of the mold by the controller is to compensate for any change of speed of the driving mechanism or for change of temperature of the metal entering the mold or the cooling liquid entering the jacket.

The crucible mechanism C, in which the crude lead or other material is contained, consists of the following parts: The framework A is provided with the trackway 79, upon which is movably mounted the carriage 80. This carriage is moved on the trackway by hand and may be fastened by the set-bolts 81, which pass through the clips 82 and impinge against the trackway. The clips are attached to the carriage by screws 83.

The crucible is mounted upon the carriage and consists of the receptacle 84 for containing the molten lead or other metal. It is provided with the cap 85, which is attached to the receptacle by bolts 86. The receptacle is air-tight and provided with a passage-way 87, connecting it with the ingate-block J. This passage-way is opened and closed by the valve 88, which is seated at 89 in the bottom of the receptacle 84. The valve is operated by the rod 90, which passes through the guide 91 and the cap of the crucible. By swinging the lever 92 the valve is opened or shut. The spring 94, carried by the cap, is adapted to hold the handle closed against its shoulder 93, and upon tripping this spring the handle flies back and releases the valve. The valve is opened by means of the expansion-spring 95, inserted between the cap 85 and the button 96, carried upon the upper end of the valve-rod, against which the handle is adapted to impinge when the valve is shut.

The molten metal contained in the crucible is forced through the passage-way 87 by compressed air, which is conducted into the crucible by pipe 97, connected into the cap. This pipe communicates with a constant source of air-supply, such as a force-pump and reservoir-tank, (not shown,) and is controlled by the valve 98.

The molten metal in the crucible is kept at an even temperature by means of the burner

99, which is carried by the hanger 100 and positioned below the crucible and connected by pipe 101 with the source of fuel-supply. (Not shown.) The hanger is attached to the clips 82 by screws 102. The receptacle is also provided with the shield 103, which is fastened to the carriage by means of screws 104 for confining the flame of the burner.

By means of the ladle K carried by the carriage molten metal is fed into the crucible during the operation of casting. This ladle is connected to the crucible by the feed-pipe 105 and provided with the valve 106, leading to the passage-way in the pipe. The ladle is connected with the feed-pipe 97, leading to the source of air-supply by pipe 107, which is provided with the valve 108. The ladle is air-tight. By removing the plug 109 molten metal may be placed in the ladle. By opening valves 106 and 108 the metal contained in the ladle passes through pipe 105 into the crucible. When the ladle is empty, these two valves are closed and the plug removed. The ladle is then in readiness for another charge. It is obvious that by the use of the crucible with its ladle, as above described, the operation of casting is continuous.

The gate-block J is attached to the front face of the crucible by set-bolt 110 and is adapted to register with the mold-cavity D when the crucible is in the position shown in Fig. 6. The face 111 of the gate-block coincides with the face 112 of the cover, while the face 113 of the block coincides with the front face of the flange 6. (See Figs. 6, 8, and 9.) This arrangement permits the closing of the opening to the mold-cavity lying between the ingate and the point of contact of the cover 4 and the annular flange 6. The mold-cavity is closed from the ingate to the place indicated by the numeral 114, (see Fig. 4,) where the outer edge of the cover 4 intersects the mold-cavity.

The ingate is sectional in form and consists of the plug 115, having a flange 116, which abuts against the flange 117 on block 118. These two sections are fastened together by screws 119, passing through their respective flanges. The block 118 is preferably iron with chilled faces. The plug 115 is formed with the nipple 120, which passes through the block. This nipple is preferably soft steel. The passage-way 121 through the nipple communicates with the passage-way 87 in the crucible and is adapted to register with the mold-cavity when the machine is in operation.

The object of using two different metals in the gate is to prevent cracking the nipple under influence of heat and the consequent leaking of the molten metal when casting. The gate-block 118 carries the dam L, which is attached by screws 122. This dam is notched at 123. The length and width of the dam correspond with the depth and width of the mold-cavity. The purpose of the dam is to stop the lower end of the mold-cavity. The dam is positioned substantially adjoining the nipple.

The burner 124, connecting with pipe 101, is positioned adjoining the ingate-block and is adapted to heat the same and to assist in heating the crucible, so as to prevent the stoppage of their passage-ways.

In operating my improved machine heat is applied to the crucible, ingate-block, and ladle, respectively, by burners 99, 124, and 125. The molten or solid metal or other material to be cast is placed in the ladle K. The plug 109 is then inserted in the crucible and the valves 108, 106, and 98 opened. The metal flows by gravitation from the ladle into the crucible. The valves 106 and 108 are then closed and the ladle is in readiness for another charge of metal. The ingate is brought into communication with the mold-cavity by sliding the carriage forward. The set-bolts 81 are then tightened upon the trackway 79, so as to lock the carriage in position. The mold-frame B is rotated in the direction of the arrows shown in Figs. 3, 4, and 5 at a suitable speed by the gearing, which is connected by the belt-pulley 70 to a source of power. Sufficient heat is applied to the gate-block and the crucible by the burners to retard cooling until the casting is complete. The injected metal solidifies into a strip before reaching the opening E, (shown in Figs. 3 and 4,) at which place the ejector F removes the strip from the groove. The cast strip is then passed from the machine by the tube 139, which is positioned with its upper end adjoining the lower end of the ejector and is carried by the bracket 140, which in turn is fastened to the frame A by screws 141.

In the alternate construction shown in Fig. 12 the crucible is double in form, each section M and N of which is respectively connected by pipes 126 and 127 with the pipe 128, leading from the source of air-pressure. The pipes 126 and 127 are respectively provided with valves 129 and 130. The crucible is air-tight and provided with the passage-way 131, connecting the ingate J with each of its reservoirs M and N. At each of the entries 132 and 133 of this passage-way to the reservoir are the valves 134 and 135, which are of ordinary construction. Heat is applied to the crucible by the burner 125 and is confined thereto by the shield 103.

The crucible is mounted upon the carriage 80, and its ingate J is adapted to be brought into communication with the mold-cavity as in the preferred construction.

In operation solid or molten metal is passed into the reservoir through the openings 136. The plugs 137 and 138 are then screwed into place. The valves 129 and 130 are opened and the molten metal injected by air-pressure through the ingate into the mold-cavity by opening first one and then the other of the valves 134 and 135. As soon as one reservoir is nearly empty its valves are closed

and the valves of the other opened, so that the operation of casting is continuous. The empty reservoir may then be refilled with metal for use before the supply of molten metal from the other has been exhausted.

Having described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. A mold having an ingress and egress opening, a cover adapted to rotate over the mold, drive mechanism for rotating the mold and cover, a crucible connected with the mold, an ingate adapted to register with the mold and communicate with the crucible, a dam adjoining the ingate and an ejector positioned at said egress-opening for ejecting the cast strip; said crucible having mechanism by which molten metal is adapted to be continuously injected into the mold at the ingress-opening.

2. A machine of the class set forth, consisting in combination of a mold journaled upon a support, an annular mold-cavity in said mold, a cover over said mold-cavity, means for rotating said mold and cover, an ingress and egress opening in the mold communicating with said cavity, a dam in said cavity adjoining said ingress-opening, an ejector positioned in said egress-opening, means for continuously injecting molten metal into said cavity and a speed-controller connected with the mold.

3. A casting-machine, consisting in combination of a revoluble frame, inclosing a mold-cavity, a transverse gate registering with said cavity, a notched dam carried by said gate, and a crucible and ladle having a system of valve-controlled passage-ways connecting with said gate and with a source of air-pressure.

4. A casting-machine, consisting in combination of a revoluble frame, inclosing a mold-cavity, a transverse gate registering with said cavity, a notched dam carried by said gate and a crucible and ladle carrying said gate, having a system of valve-controlled passage-ways connecting with said gate and with a source of air-pressure.

5. A casting-machine, consisting in combination with the mold having an inclosed mold-cavity, of drive mechanism for revolving said mold, a ladle and crucible both connected with a source of air-pressure by a system of valve-controlled passage-ways and a valve-controlled ingate carried by said crucible registering with said cavity, carrying a dam passing across said cavity.

6. A casting-machine, consisting of a mold having an ingress and egress opening, an inclosed mold-cavity in said mold, means for rotating said mold, an ejector in said egress-opening; said mold consisting of a plurality of disks, eccentrics upon which said disks are journaled and levers carried by said eccentrics for adjusting the position of the eccentrics to vary the eccentricity of said disks so as to adjust the thickness of the mold-cavity.

7. A casting-machine, consisting of a system of vertical disks longitudinally adjacent, eccentric mechanism for supporting said disks, lever mechanism connected to the eccentric mechanism, a mold-cavity formed by the disks adapted to vary in size by operating the lever mechanism, a cover over said mold-cavity, an ingate registering with the cavity, a dam positioned in the cavity adjacent to the ingate, means for rotating the disks and cover and a crucible connected with the ingate and with a source of air-pressure by a system of valve-controlled passage-ways; said dam and ingate being separable from said disks.

8. A casting-machine, consisting in combination of the mold-frame, having a cavity, disks carried by a supporting-shaft and provided with mold-faces so combined and arranged as to form said cavity, a cover over said cavity, driving mechanism for revolving said disks, a ladle and a crucible, both connected with a source of air-pressure by a system of valve-controlled passage-ways, having an ingate registering with said cavity, a notched dam adjacent to said ingate and positioned in said cavity, and a stationary ejector; said ingate and dam being movable upon a stationary frame.

9. The combination in a strip-metal-casting machine, of a number of disks fastened together and carried by a shaft, each having an adjoining mold-face, driving means and adjusting mechanism for varying the thickness of the mold, a cover over the mold, an ejector fixed upon said frame and passing into said mold, a pair of guide-bars directed longitudinally toward said disks, a crucible with a ladle, both movable upon said guide-bars and carrying an ingate-block, and a dam which projects so as to register with the mold-cavity when the crucible is forward; said ladle and crucible being both connected with a source of air-pressure by a system of valve-controlled passage-ways, and a heater for said crucible; said disks, cover, dam, ingate-block and ejector being so arranged as to form a segmental mold.

10. A casting-machine, consisting in combination of a mold, having a mold-cavity, a cover over said cavity, a jacket carried by said mold adjoining its cavity, fluid feed and draining mechanism for said jacket, carried by a support, drive mechanism for revolving the mold-frame and cover, a crucible, having passage-ways respectively connecting with the mold-cavity and with a source of air-pressure, and a dam adjoining the passage-way registering with said cavity.

11. A casting-machine, consisting in combination of a journaled frame, inclosing a mold-cavity, a journaled cover rotating over the mold-cavity, a water-jacket carried on the back of the frame adjoining the mold-cavity, an ingate registering with said cavity, a dam positioned in said cavity adjacent to said ingate; said dam and ingate being separable from said frame, an ejector having an in-

clined face passing out of said cavity, and means for rotating said frame and cover.

12. The combination with the mold, composed of disks, journaled together and inclosing an annular mold-cavity, a segment of which is open, a cover over said cavity, a water-jacket carried by one of said disks, adjoining said cavity, of a movable valve-controlled ingate, transverse to said cavity, an ejector having a tapering edge intercepting said groove at said opening, a dam stopping said cavity adjacent to said ingate, and a crucible being connected with a source of air-pressure by a system of valve-controlled passage-ways, so as to continuously inject molten metal into the cavity.

13. A mold forming an inclosed mold-cavity, a cover over said mold-cavity, a water-jacket carried by said mold adjoining said cavity, mechanism for adjusting said mold so as to vary the size of said cavity, an ejector arranged in the cavity and means for rotating said mold, in combination with a ladle, a crucible, an ingate and a dam; said ingate and dam being movably mounted upon a stationary frame and adjacent to said mold-cavity, and the ladle and crucible provided with heaters and both constantly connected with a source of air-pressure by a system of valve-controlled passage-ways.

14. A casting-machine, consisting in combination of a revoluble jacketed mold, inclosing a mold-cavity, a cover over said cavity, a transverse gate registering with said cavity, and a notched dam carried by said gate, for the purposes specified.

15. A casting-machine, consisting of a revolving, jacketed mold, a crucible and a ladle, connected with a source of air-pressure by a system of valve-controlled passage-ways, parallel guides, longitudinally positioned with reference to said mold, said crucible and ladle being movably mounted upon said guides, an annular cavity in said mold, a cover over said cavity, an ingate carried by said crucible, adapted to register with said cavity and means for continuously revolving said mold and heating the crucible.

16. A machine of the class described consisting of a plurality of disks, eccentric mechanism upon which said disks are journaled, an annular mold-cavity inclosed by said disks, lever mechanism carried by said eccentric mechanism for adjusting the disks so as to vary the size of the mold-cavity, a dam in said cavity and means for revolving said disks and continuously injecting molten metal into and ejecting the cast strip from the cavity.

17. The combination of a number of adjacent disks, one of which carries a water-jacket, a water-supply pipe connected with said jacket; said disks arranged to form a mold-groove, a cover over said mold-groove, means for revolving the disks and cover, an ingate-block, a dam, an ejector, longitudinal guide-bars, a crucible, a ladle, a source of air-pressure to which said crucible and ladle are connected by a system of valve-controlled passages; said crucible carrying said ingate and dam and movable upon said bars, means for locking said crucible with reference to the disks and a passage-way leading from the crucible to said ingate.

18. In a strip-metal-casting machine, the combination with the carrying-bars of a vertical disk-like frame journaled upon a shaft and having an annular mold-groove within, a cover over the mold-groove, driving mechanism for said mold and cover, speed-controlling mechanism connected with said driving mechanism, an ejector fixed in said groove carried by said shaft, a crucible movable forward and backward upon said bars having an ingate block and stop registering with and damming said mold-groove when the crucible is forward, mechanism by which the crucible is locked in position, said crucible connected with a source of air-pressure by a system of valve-controlled pipes, passages connecting said crucible with said mold-groove, and a water-jacket carried by said disk-frame adjoining said mold-groove, with means for feeding fluid thereto and draining the same.

19. A casting-machine, consisting of revoluble disks eccentrically journaled and adapted to form an annular mold-cavity, a dam passing across said cavity, a water-jacket carried by one of said disks adjoining said cavity, a cover over said cavity, adjusting mechanism connected to said disks, adapted to vary the size of the mold-cavity, a valve-controlled inlet leading to the cavity and a crucible connected with said inlet and to a source of air-pressure by a system of valve-controlled passage-ways; whereby molten metal is adapted to be continuously projected from the crucible into the cavity.

20. A casting-machine, consisting of revoluble disks, having adjoining mold-faces so arranged as to form a mold-cavity, a cover over said cavity, a water-jacket carried by said disks adjoining said cavity, means for revolving said disks, mechanism for adjusting the size of the mold-cavity by varying the positions of the disks, mechanism by which the speed of the disks is governed, a stationary ejector extending into the mold-cavity, an ingate adapted to communicate with the mold-cavity and a dam adjoining the ingate adapted to stop the mold-cavity.

21. A strip-metal-casting machine, consisting of an annular mold, journaled upon a frame, a cover over the mold, a jacket carried by said mold, means for feeding cooling liquid to said jacket and draining it from the same, an ingate for receiving the molten metal into the mold, a dam adjoining said ingate, an ejector for ejecting the cast strip out of the mold, means for revolving said mold and cover and mechanism by which its speed is governed.

22. The combination of a mold, an annular groove in said mold, a cover adapted to

revolve over the groove and positioned to form an ingress and egress opening for the groove, an ingate registering with the groove at the ingress-opening, an ejector entering the groove at the egress-opening, a dam adjoining the ingate, extending across the groove, means for continuously projecting molten metal through the ingate into the groove and means for rotating the mold and cover.

23. A mold having a tapering mold-cavity therein, consisting of rotary disks having mold-faces, means for rotating the disks, a jacket carried by said mold adjoining said cavity, a cover over the mold-cavity, a fixed ejector, driving mechanism for revolving said mold and cover, a speed-controller for said mechanism, a movable crucible and ladle, both connected with a source of air-pressure by a system of valve-controlled passage-ways, a heater for said crucible and an ingate carried by said crucible, having a notched dam passing across said mold-cavity.

24. A casting-machine, consisting of a mold journaled upon a support, having a mold-groove, a jacket adjoining said groove, a cover over said groove, means for feeding fluid to said jacket, a crucible and a ladle, both connected with a source of air-pressure by a system of valve-controlled passage-ways, a guide-way upon which said crucible and ladle are movable toward the mold, a valve-controlled ingate carried by said crucible so as to register with said groove, a dam adjoining said ingate, a blade-like ejector passing into the mold-groove, and positioned upon and carried by a fixed support so as to eject the cast strip from the groove, driving means for said mold, speed-controlling means connected with said driving means, and a heater for the crucible, as shown, and for the purposes specified.

25. A casting-machine, consisting of a jacketed frame, suitably journaled, having an annular mold-cavity positioned broadside toward the center of said frame and within the same, a cover over the mold-cavity, an ingate registering with said cavity at its edge, a notched dam adjoining said ingate and positioned in said cavity, a movable and independent carriage carrying said ingate and dam, an ejector having an inclined face in said cavity, and driving mechanism with means for controlling its speed.

26. A strip-metal-casting machine, consisting of a ladle in combination with a crucible, both connected with a source of air-pressure by a system of valve-controlled passage-ways, a heater for said crucible, an ingate-block, a dam, a mold-frame, having an annular mold-cavity within and positioned edgewise toward the front and back of said frame; said cavity being of tapering thickness lengthwise, an ejector in said cavity, a cover over said cavity and the driving mechanism for said frame and cover with means for controlling their speed; said ingate block and dam being so arranged as respectively to register with and intercept said cavity at its place of least thickness.

27. A machine of the class described, consisting of a mold, inclosing a mold-cavity, a cover over said mold-cavity, drive mechanism for rotating said mold, an ingate registering with said cavity, a stop carried by said ingate and intercepting said cavity, a main receptacle, an egress passage-way from the main receptacle connecting with said ingate, an auxiliary receptacle, a passage-way between the receptacles, a valve in the passage-way between the receptacles, an air-supply reservoir, supply passage-ways between the reservoir and receptacles, valves interposed in said supply passage-ways and means for heating said receptacles.

28. A casting-machine consisting of a journaled mold having an annular mold-cavity, tapering in diametral cross-section, a water-jacket carried by said mold, a cover over the mold-cavity, mechanism for adjusting said mold and cover so as to vary the size of the mold-cavity, means for rotating said cover and mold, and an ingate removable from the cavity, and a dam carried by said ingate.

29. A machine of the class described, consisting of a mold-frame, drive mechanism for rotating the frame, an annular mold-cavity, tapering in diametral cross-section to free the cast strip in the mold-frame, a cover over the mold-cavity, an ingate registering with said cavity, a dam adjoining the ingate and intercepting said cavity, a crucible by which the ingate is carried, a ladle, a connection between said crucible and ladle, ingress and egress passage-ways in said crucible and ladle, valve mechanism in said passage-ways and means for maintaining pressure in the crucible and ladle; whereby the metal gravitates from the ladle into the crucible and is projected through the ingate continuously.

30. A machine of the class described, consisting of a journaled mold, an annular mold-groove tapering in diametral cross-section to free the cast strip in said mold, a cover over the mold-groove, drive mechanism for revolving said mold and cover, an ingate registering with said groove, a stop carried by said ingate intercepting said groove, a main receptacle, an egress passage-way from the main receptacle connecting with said ingate, an auxiliary receptacle, a passage-way between the receptacles, a valve in the passage-way between the receptacles, an air-supply reservoir, supply passage-ways between the reservoir and receptacles, valves interposed in said supply passage-ways and means for heating said receptacles.

31. In a machine of the class described, a revoluble mold, an annular mold-cavity tapering in diametral cross-section in said mold to free the cast strip, a cover over the mold-cavity and a notched dam positioned in said cavity, for the purposes specified.

32. In a machine of the class described, a journaled mold, means for revolving said mold,

an annular mold-cavity tapering in diametral cross-section to free the cast strip from the mold, a cover over said cavity, a dam intercepting said cavity, and speed-controlling mechanism connected to said driving mechanism.

33. In a machine of the class described, the combination of a revoluble mold, a water-jacket carried by said frame, a mold-cavity tapering in diametral cross-section to free the cast strip in the mold, a cover over said cavity, a transverse gate registering with said cavity, a notched dam carried by said gate, drive mechanism for revolving the mold and mechanism for controlling the speed of the mold.

34. A casting-machine, consisting of a frame, an annular mold-groove, tapering in diametral cross-section to free the cast strip, in said frame, a cover over the mold-groove, drive mechanism for rotating said frame and cover, a plurality of receptacles adjoining the frame, an egress passage-way in the bottom of each receptacle, valve mechanism in the receptacles for the ingress and egress of the metal, means for maintaining pressure in one of said receptacles so as to eject molten metal continuously, means for heating the receptacles and a stop passing across said cavity, carried by said receptacles.

35. An apparatus, consisting in combination of a mold-frame journaled upon a support, means for rotating said frame, an annular mold-cavity tapering in diametral cross-section in the frame, a cover over said cavity, an ingress and egress opening in the mold-frame communicating with said cavity, an ejector positioned in the egress-opening and entering the cavity, a dam in said ingress-opening and a speed-controller in the drive mechanism.

36. A casting-machine, consisting of a frame, having a mold-cavity, means for rotating said frame, an ingress and egress opening in the frame communicating with said cavity, a cover over said cavity, a dam entering the cavity at the ingress-opening, an ejector entering the cavity at the egress-opening, a water-jacket carried by the frame adjoining the cavity and mechanism for feeding water into said jacket for cooling the frame; said cavity tapering in diametral cross-section from the ingress-opening toward the egress-opening to free the cast strip from the cavity.

37. A casting-machine, consisting in combination of a revoluble frame inclosing a mold-cavity, a cover over said cavity, a transverse gate registering with said cavity, a notched dam carried by said gate and a crucible having a system of valve-controlled passage-ways connecting with said gate and with a source of air-pressure, said cavity tapering in diametral cross-section from the dam for the purpose of freeing the cast strip from the cavity.

38. A casting-machine, consisting in combination of a revoluble frame, an annular cavity tapering in diametral cross-section in said frame, a cover over said cavity, means for rotating said frame and cover, a transverse gate registering with said cavity at its place of least thickness, and a notched dam carried by said gate stopping said cavity.

39. A casting apparatus composed of a journaled frame, mechanism for rotating said frame, an annular mold-cavity tapering in diametral cross-section in the frame, a cover over said cavity, a ladle and crucible, both connected with a source of air-pressure by a system of valve-controlled passage-ways, a connection between said crucible and ladle, a valve-controlled ingate connecting said crucible with said mold-cavity and a dam carried by said crucible passing across said cavity.

40. In a strip-metal-casting machine the combination of a carrying-bed, a vertical disk-like frame journaled upon said bed, an annular groove in said frame, a cover over said grooves, means for rotating said frame, an ejector passing into said groove and fixed upon a support, a crucible and ladle movable forward and backward upon said bed, an ingate-block, said groove tapering in diametral cross-section from the ingate-block to the ejector, a stop registering with and damming said groove when the crucible and ladle are forward; said ingate block and stop being carried by said crucible, mechanism for locking the crucible and ladle in forward position, and a system of valve-controlled passage-ways connecting said crucible and ladle with a source of air-pressure.

41. A casting-machine, consisting of a rotary mold-frame composed of vertical disks eccentrically arranged and journaled, having faces so arranged as to form an annular mold-groove, an opening in said groove for the ingress and egress of the molten metal and the cast strip, respectively, an ejector intercepting said groove in said opening and an ingate registering with said groove in said opening; said groove tapering in diametral cross-section from the ingate to the ejector.

42. A casting-machine, consisting of a rotary mold composed of vertical disks, having faces so arranged as to form an annular mold-groove, a cover over said mold-groove, lever mechanism connected with said disks for adjusting the thickness of the mold-groove, a passage-way leading to the mold-groove, an ejector positioned in said passage-way and intercepting said groove and a dam blocking said groove at said passage-way; said groove tapering in diametral cross-section from the dam to the ejector.

43. A machine of the class described, consisting in combination of disks arranged to form an annular mold-groove, tapering in diametral cross-section, and having an ingress and egress opening, a cover over the mold-groove, an ejector intercepting said groove at said egress-opening, an ingate registering with said groove at said ingress-opening, a dam blocking said groove adjoining the ingate, and adjusting mechanism for said disks for varying the size of said groove.

44. A casting-machine consisting of a system of vertical disks longitudinally adjacent and eccentrically journaled, a mold-cavity tapering in diametral cross-section formed by said disks, a cover over said cavity, lever mechanism connected to said disks, adapted to change the size of the mold and lock the disks in position, an ingate registering with said cavity, a dam positioned in the cavity adjacent to said ingate; said dam and ingate being separable from said disks, means for independently rotating said disks and cover and a crucible connected with said ingate and with a source of air-pressure by a system of valve-controlled passage-ways.

45. A casting-machine, consisting in combination of a revoluble mold, an annular mold-cavity formed by said mold, a cover over the mold-cavity, an ingress and egress opening in said mold to said mold-cavity, a crucible adjoining the mold and registering with the ingress-opening, a ladle having an opening through which the metal may be passed, a valve in said opening; and a connection between the crucible and ladle, said crucible and ladle being connected with a source of air-pressure by a system of valve-controlled passage-ways.

46. A machine for casting metal strips, consisting in combination of a mold, an annular mold-cavity in said mold, means for rotating the mold, a cover over the mold-cavity, so positioned as to form an ingress and egress opening in the mold to the matrix, means for rotating the cover, a dam intercepting said cavity at said egress-opening, a ladle, and a crucible, both the ladle and crucible being connected with a source of air-pressure by a system of valve-controlled passage-ways.

47. In a machine of the class described, a journaled mold inclosing an annular mold-cavity, a cover adapted to rotate over the mold-cavity, an eccentric upon which the cover is journaled, an ingate registering with the mold-cavity, a notched dam adjoining the ingate, and means for rotating said mold and cover; said ingate and cam being removable from the mold-cavity.

48. A casting-machine, consisting of a journaled frame, an annular mold-cavity in said frame, a cover over said cavity, means for rotating said frame, a cover, an ingate, a dam adjoining said ingate and means for heating said frame and ingate; said ingate registering with said mold-cavity and consisting of a block and a nipple passing through the block; said block having its face coinciding with the face of the mold-frame and the block and nipple composed of dissimilar metals to prevent cracking under the influence of heat.

49. In a machine of the class described, the combination with driving mechanism, of a plurality of independent disks, eccentrically journaled, an annular cavity tapering in diametral cross-section to free the cast strip; a cover over the mold-cavity and a dam intercepting said cavity.

50. A casting-machine, consisting of a plurality of journaled disks, an annular groove formed by said disks, a cover over a segment of said groove, means for rotating said disks, a stationary ingate adapted to register with the covered portion of the groove, a notched dam adjoining the ingate and intercepting said groove, and an ejector having an inclined face intercepting the uncovered portion of the groove; said groove tapering in diametral cross-section from the dam to the ejector, whereby the cast strip is freed from the groove as the disks revolve.

51. A machine of the class described, consisting of a frame of disks 2, 3 and 4, so arranged as to form a mold-cavity, D, having the egress-opening E for the cast strip and increasing in diametral cross-section toward said opening from the place of ingress of the molten metal into the mold-cavity; a stationary support A upon which said disks are journaled; means for adjusting said disks; a water-jacket G; a crucible C adjoining said frame of disks; an ingate-block J, carried by said crucible; a dam L adjoining the ingate-block; an air-reservoir; valve mechanism connecting said reservoir with said crucible, adapted to project the molten metal from the crucible into the cavity in a continuous stream; a heater adjoining the crucible; an ejector F positioned in the egress-opening, corresponding in thickness and shape respectively with the thickness and curvature of the mold-cavity, mounted on the frame A and so arranged as to eject the cast strip from the cavity; mechanism H for rotating the disks, and a controller I, connected with the disks, for governing their speed, said frame of disks positioned adjoining and having its cavity registering with said ingate-block.

52. A casting-machine, consisting in combination with a revoluble mold, of an annular groove in said mold, a cover-disk over the groove, means for rotating said mold and disk, mechanism for governing the speed of the mold and disk, a shaft upon which the mold is journaled, an ejector fixed in said groove and carried by said shaft, carrying mechanism adjoining the mold, a carriage movable forward and backward upon said carrying mechanism, a crucible mounted upon the carriage, an ingate block and stop carried by the crucible adapted respectively to register with and dam the mold-groove when the carriage is forward, means for locking the carriage in operative position and an air-reservoir to which the crucible is connected, adapted to project the molten metal from the crucible into the mold-groove in a continuous stream.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CYRUS C. WEBSTER.

Witnesses:
F. G. BRADBURY,
L. E. WICKMAN.

Corrections in Letters Patent No. 703,358.

It is hereby certified that in Letters Patent No. 703,358, granted June 24, 1902, upon the application of Cyrus C. Webster, of Minneapolis, Minnesota, for an improvement in "Strip-Metal-Casting Machines," errors appear in the printed specification requiring correction, as follows: Page 3, line 118, the word "reservoir" should read *reservoirs;* page 5, line 80, the word "mold" should read *frame;* page 7, line 87, the word "grooves" should read *groove*, and on page 8, line 46, the word "cam" should read *dam*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22d day of July, A. D., 1902.

[SEAL.]

E. B. MOORE,

Acting Commissioner of Patents.