H. LANG.

STEREOTYPE PLATE CASTING MACHINE.

APPLICATION FILED JAN. 14, 1909.

945,789.

Patented Jan. 11, 1910.

3 SHEETS—SHEET 1.

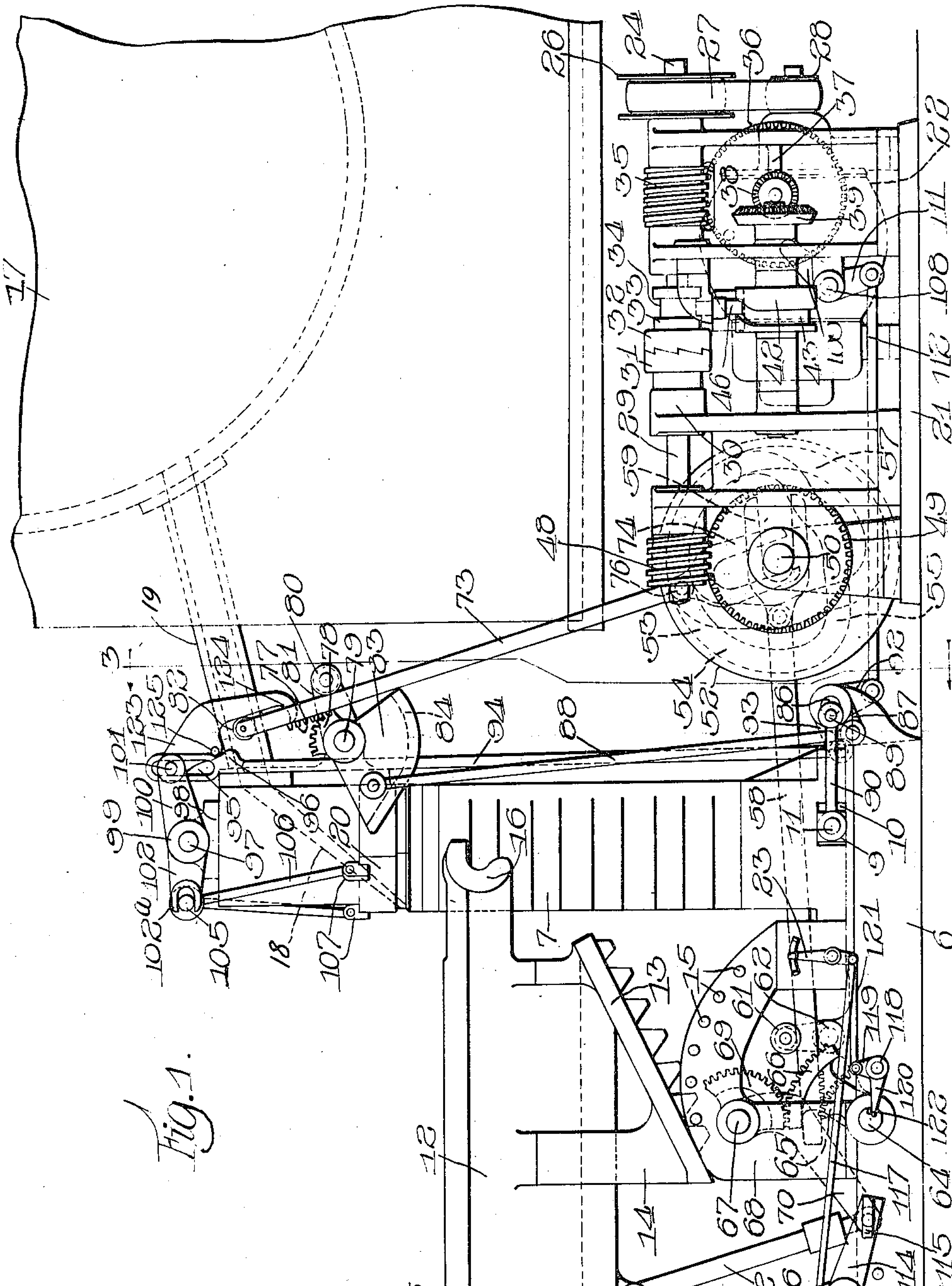

Fig. 1.

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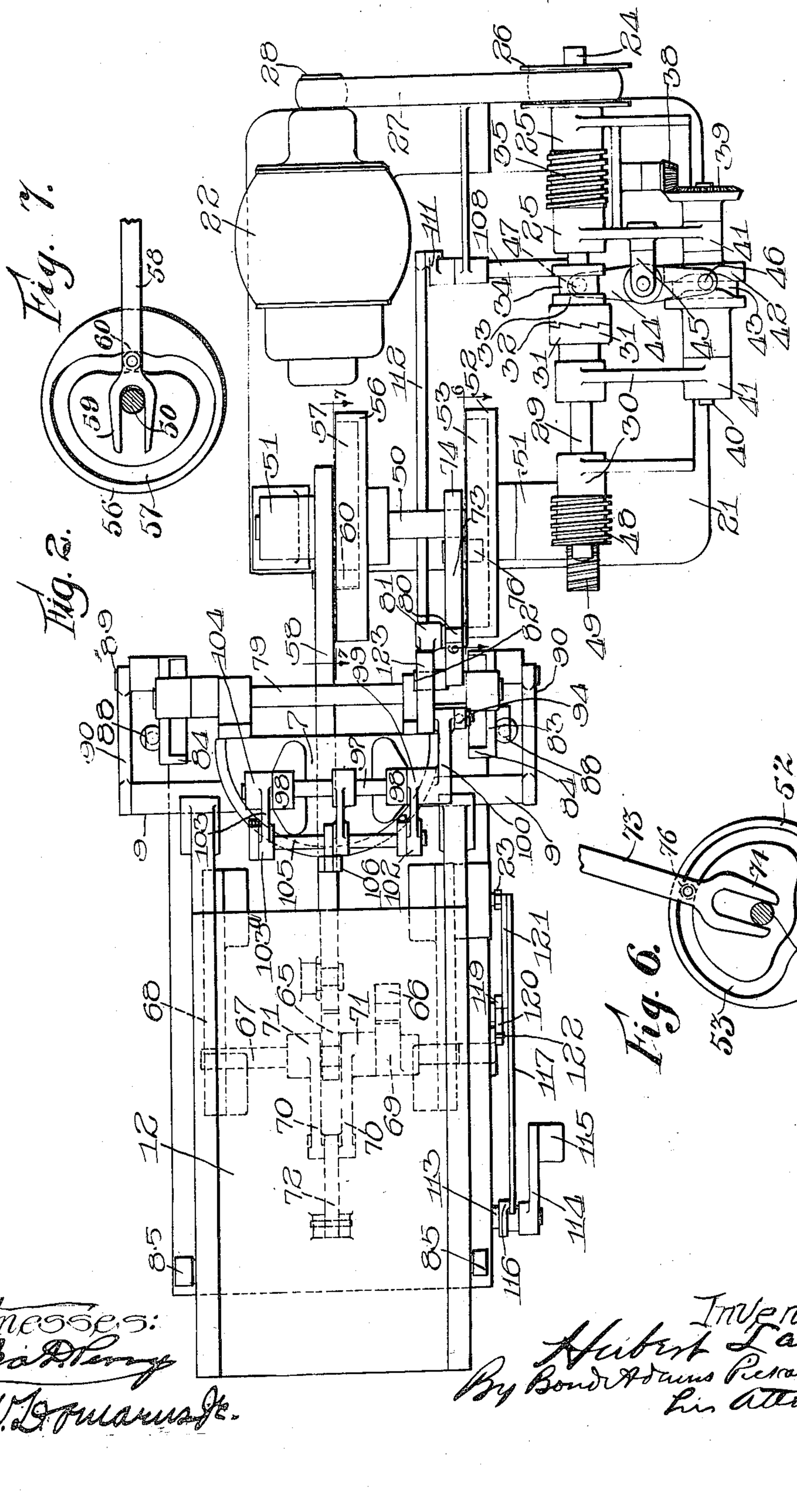

Fig. 1.

Fig. 2.

Fig. 6.

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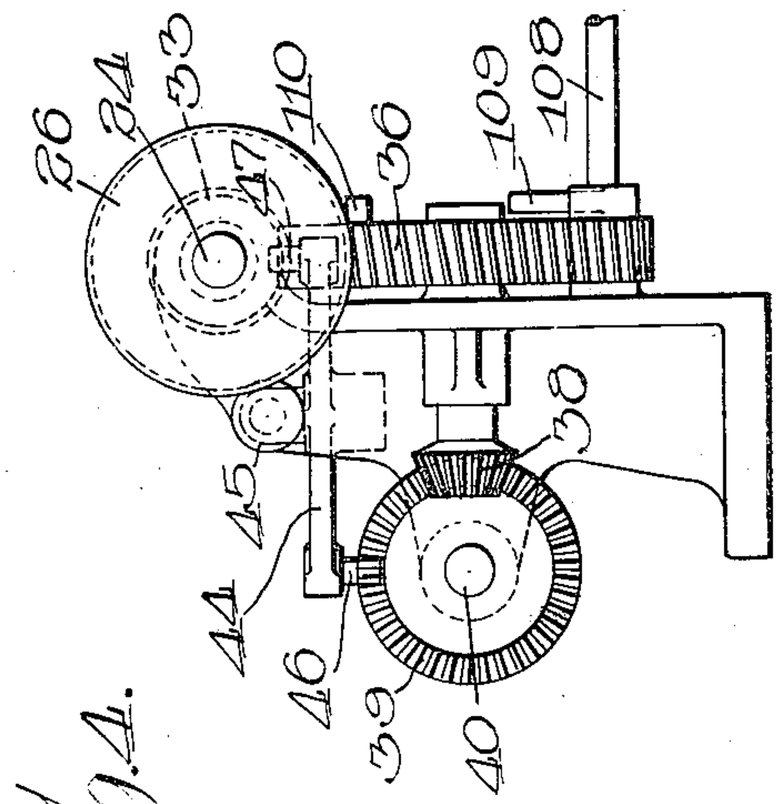

Fig. 4.

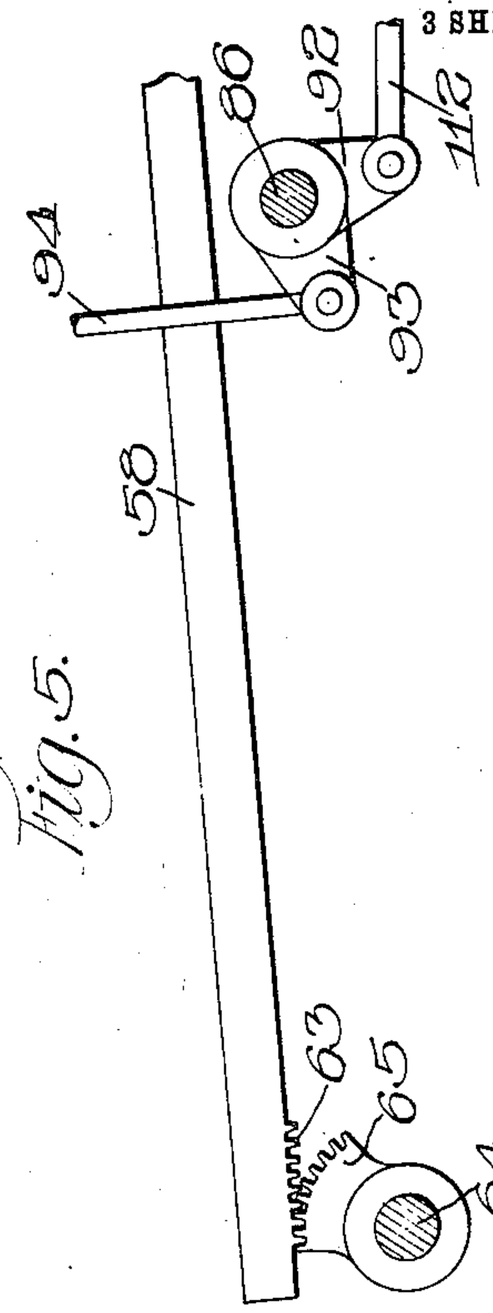

Fig. 5.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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STEREOTYPE-PLATE-CASTING MACHINE.

945,789. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed January 14, 1909. Serial No. 472,298.

To all whom it may concern:

Be it known that I, HUBERT LANG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stereotype-Plate-Casting Machines, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to machinery for casting stereotype plates, and its principal object is to provide new and improved automatic mechanism for operating the members of the casting box during the casting of the plate. To that end I have provided new and improved power-driven mechanism, which being set in motion by the operator will bring the two members of the stereotype plate casting box—known generally as the drag and plunger—into operative relation with one another, will lock them in position, open the valve permitting metal to flow from the furnace into the mold, operate the valve when the mold is full to cut off the plate from the metal supply, will unlock the members, bring the movable member, which is usually the drag, into position from which the casting can be removed, and then automatically stop until again set in motion for a new plate.

My further object is to improve stereotype plate casting mechanism of the character described in sundry details hereinafter pointed out.

In the drawings,—Figure 1 is a side elevation; Fig. 2 is a top or plan view with the furnace and connecting spout removed; Fig. 3 is a somewhat enlarged detail, being a section on line 3—3 of Fig. 1; Fig. 4 is an enlarged detail, being a view of the end of the driving mechanism seen from the right in Fig. 1; and Fig. 5 is an enlarged detail, being a view of the rod which operates the drag, shown as broken away, and a portion of the rock-shaft mechanism which lock the parts together. Fig. 6 is a detail, being a section on line 6—6 of Fig. 2. Fig. 7 is a detail, being a section on line 7—7 of Fig. 2.

Referring to the drawings,—6 indicates a base, on which is mounted the fixed portion 7 of the casting-box, which is preferably, of course, the plunger, as is shown in the drawings.

9 indicates a bar, which passes through the plunger 7 from side to side through openings 10 and is provided at each end with studs 11 circular in section. The openings 10 in the bottom of the plunger 7 are made somewhat larger longitudinally of the base than the bar 9 in order to permit a limited motion of said bar therein longitudinally of the base 6 for purposes hereinafter described.

12 indicates the movable member or drag of the casting box, which by means of a rack 13 mounted on brackets 14 secured to the plunger 12 coöperating with a set of rack-bars 15 arranged in a curve may be rocked into position against the plunger in the usual manner, the drag being provided with sockets 16 which engage the studs 11 upon each side of the plunger 7 when the members are in casting position.

So far as my present invention is concerned, the plunger 7 and drag 12 may be of any well-known form and description. It is enough, therefore, to say that the drag is adapted to hold the usual matrix and that the plunger 7 and drag 12 are adapted when brought together to form between the convex surface of the plunger and the concave surface of the drag on which the matrix is supported a mold of suitable size and shape for casting the usual curved stereotype plate.

17 indicates a furnace or melting pot, which is mounted in a convenient position adjacent to the plunger and is provided with a discharge spout 18 which opens into a suitable metal passage 19 in the top of the plunger leading from its rear downward and outward to the convex surface upon which it opens to afford a passage of the molten metal from the furnace into the top of the mold formed between the two members of the casting box when in operative relation to each other.

20 indicates a curved cut-off valve, or knife as it is usually called, which is mounted in the usual manner upon the convex surface of the drag at the top of the casting chamber formed when the two members are brought together and operates when raised or lowered to open or close the passage of the molten metal out of the discharge spout 19 so as to permit the metal to flow into the mold and to sever the metal behind it from the cast plate when the mold is full.

The members of the casting-box are preferably kept cold during the casting by water, or in any other approved manner, which forming no part of my present invention I have not shown in order not to encumber the drawings with unnecessary figures. The discharge spouts 18 and 19 are kept hot in any well-known and approved way, which for the same reason I have not shown, so that the metal in them may be kept constantly in a molten condition. These details form no part of my present invention and are well known and understood, and I believe it is, therefore, unnecessary to encumber the drawings by illustrations thereof.

The knife 20 is operated automatically in the manner hereinafter described. It is enough at present to say that when the members are brought together in the manner hereinafter described it is lifted to permit the flow of metal into the plate chamber, and when said chamber is full to close the opening so as to sever the cast plate from the metal behind it.

21 indicates a bed-plate, upon which is mounted an electric motor 22 which may be of any well-known kind or description. The motor is operated by means of a switch 23 on the bed-plate 6 (see Fig. 1) which is wired to the motor and the source of supply in any well-known and approved manner (not shown), and the switch operates when thrown in one direction or the other, as hereinafter described, to control the motor in any well-known way so as to start or stop the same.

24 indicates a shaft, which is journaled in suitable bearings 25 on the bed-plate 21.

26 indicates a pulley, which is connected by a belt 27 with the driving pulley 28 of the motor.

29 indicates a second shaft journaled in bearings 30—30 on the bed-plate 21.

31 indicates a clutch-member, which is keyed, or otherwise secured, to the shaft 29.

32 indicates a clutch-member, which is feathered on the inner end of the shaft 24 and is provided with a hub 33 having a peripheral groove 34.

35 indicates a worm fixed to the shaft 24 between the bearings 25.

36 indicates a gear, which is journaled in suitable bearings, as 37, below the worm 35 and meshes therewith so that when the shaft 24 is driven the gear 36 is driven by the worm 35.

38 indicates a beveled gear, which is secured to the end of the shaft on which the gear 36 is mounted and which meshes with a beveled gear 39 keyed, or otherwise secured, to the outer end of a shaft 40 journaled in suitable bearings 41 supported on the bed 21.

42 indicates a disk, which is provided with a peripheral cam groove 43. The groove 43 is parallel with the sides of the disk 42 during a greater part of its surface, as is best shown in Figs. 1 and 2.

44 indicates a lever, which is pivoted at its middle upon a bracket 45 supported above the bed-plate 21. One end of the lever 44 is provided with a roller 46, which is engaged by the cam groove 43 and the other end with a roller 47 which engages the peripheral groove 34 of the hub 33.

It will be obvious that as the shaft 40 is operated through the medium of the worm 35, gear 36 and beveled gears 38—39, the cam groove 43, when the roller 46 reaches the cam portion thereof, will throw the clutch-members 31—32 into engagement so as to drive the shaft 29. When the roller 46 passes out of the cam portion of the cam groove 43 into that portion of the groove which is parallel with the sides, the clutch-members will be thrown apart, stopping the revolution of the shaft 29. It will be noticed, therefore, that the period of revolution of the shaft 29 is considerably less than the period of revolution of the shaft 40 and they are timed as hereinafter described.

48 indicates a worm, which is secured upon the outer end of the shaft 29 and meshes with a gear 49 keyed to the end of the shaft 50 which is supported in suitable bearings 51 on the bed-plate 21. It will be obvious that when the shaft 29 is rotated the shaft 50 will be rotated by the action of the worm 48 and gear 49.

52 indicates a disk or closed cam upon whose inner surface is cut a cam groove 53. The greater portion 54 of this cam groove 53 is concentric with the axis of the disk, and the other portion 55 turns quite sharply inward so as to approach the center of the disk, as is best shown in Fig. 1. 56 indicates a second disk or closed cam keyed upon the shaft 50 and provided upon its outer surface with a cam groove 57 which is of the same shape as the cam groove 53 on the closed cam 52. These closed cams are so arranged as to have the cam portions of their grooves ninety degrees apart so as to act a quarter of a revolution after one another.

58 indicates a rod, one end of which is provided with a fork 59 which embraces the bearing 51 outside of the disk 56 so as to slide thereon.

60 indicates a roller on the inner side of the rod 58 which engages the cam groove 57. The other end of the rod 59 passing between guide rollers 61—62 mounted in a suitable bearing upon the base 6 carries near its extreme end a rack 63, best shown in Fig. 5.

It will be readily understood that when the shaft 50 is rotated the rod 58 will be

moved longitudinally of itself, the forks sliding on the shaft 50 and its other end moving between the guide rollers.

64 indicates a rock-shaft, which is journaled in the base 6 and is provided at its central portion underlying and in registry with the rack 63 with a segmental gear 65 which meshes with the rack 63 whereby when the shaft 58 is moved longitudinally of itself the rock-shaft 64 will be rocked in one direction or the other.

66 indicates a segmental gear, or curved rack-sections as it might be called, which is secured to the shaft 64.

67 indicates a rock-shaft, which is journaled in the standards 68 and which carries secured to it a segmental gear or rack-section 69 in registry with and gearing into the segmental gear or rack-section 66 whereby when the rock-shaft 64 is rocked, as above described, the rock-shaft 67 will be also rocked.

70 indicates arms, which are secured by suitable collars 71 to the rock-shaft 67.

72 indicates a link, which is pivotally connected at its lower end with the arms 70 and at its upper end with the under side of the drag 12.

The parts are so adjusted that when the rod 58 is moved by the cam 57 outward—that is to say, toward the left in Fig. 1—the arms 70 will be moved upward, rocking the casting box on the rack 13 and rack-bars 15 into a vertical position against the plunger 7 with the sockets 16 engaging the studs 11 at the base of the plunger.

73 indicates a rod, whose lower end is provided with a fork 74 which rides the shaft 50 just inside the cam 52 and is provided above the fork with a roller 76 which moves in the cam groove 54. Near the upper end of the rod 73 is a rack 77 which engages a rack segment 78 keyed, or otherwise secured, to a shaft 79 mounted in suitable bearings on the back of the upright 7 of the casting box.

80 indicates a roller, which is journaled upon a bracket 81 on the back of the casting box. The roller 80 engages the side of the bar 73 opposite that upon which the rack 77 is placed so as to form a bearing between which and the rack segment the bar slides.

82 indicates a roller, which is journaled in the upper end of the arm 73.

83 indicates plates, which are keyed to one end of the shaft 79. Each of the plates 83 has upon its inner surface a cam flange 84. The cam flanges 84 are adapted to engage rollers 85 on the drag 12 when the same is brought into vertical or casting position so as to lock the members of the casting box together at the top in the manner hereinafter described.

86 indicates a rock-shaft journaled on the end of the bed-plate 6 and provided with arms 87.

88 indicates connecting rods, which are pivotally connected at their lower ends with the arms 87 on the rock-shaft 86 and at their upper ends with the plates 83 whereby when the shaft 79 is rocked, as above described, the rock-shaft 86 will be simultaneously rocked.

89 indicates eccentrics on the ends of the shaft 86, which are connected by links 90 with the ends of the crossbar 9 whereby when the rock-shaft 86 is rotated the crossbar is moved in the slots 10 a limited distance longitudinally at the base 6.

When the drag 12 is brought into operative relation to the plunger 7 so that the socket 16 is engaged on the ends of the bar 9 a movement of the bar 9 toward the back of the plunger—that is, to the right in Fig. 1—will, of course, draw with it the lower end of the drag, and this coöperating with the rocking movement applied to the upper member of the drag last above described will lock the drag firmly against the plunger. The method of operation, however, will be described later more in detail.

91 (best shown in Fig. 2) indicates a collar, which is rotatably mounted on the rock-shaft 86 and is provided with two arms 92—93.

94 indicates a connecting rod or link whose lower end is pivotally connected with the end of the arm 93 and which extending upward is provided with a slot 95 at its upper end and with an eccentric 96 which is below the slot 95.

97 indicates a rock-shaft, which is journaled in suitable bearings 98 on the top of the plunger.

99 indicates a collar, which is secured to the rock-shaft 97 and carries an arm 100, the outer end of which is provided with a pin 101 which engages the slot 95 in the connecting rod 94. 102 indicates an arm, which is secured to the collar 99. 103 indicates an arm, which is secured to the other end of the rock-shaft 97 by a suitable collar 104. As is best shown in Fig. 1, the arms 102—103 are provided with forks 102^a—103^a at their ends which carry a crossbar 105.

106 indicates links, which are pivotally connected at their upper ends to the crossbar 105 and at their lower ends to suitable lugs 107 which are secured to the slice-bar or valve 20.

108 indicates a rock-shaft, which is journaled in suitable bearings on the bed-plate 21. 109 indicates an arm on said rock-shaft 108 which lies close to the outer face of the worm gear 36 and is adapted as said worm gear rotates to be engaged by a pin 110 on the outer surface of said worm gear 36, in the manner hereinafter described, so as to rock the shaft 108.

111 indicates an arm depending downward from the rock-shaft 108.

112 indicates a connecting rod which is pivotally connected at one end with the arm 111 on the rock-shaft 108 and at the other end to the frame 92 on the collar 91.

When the rock-shaft 108 is rocked in the manner hereinafter described by the engagement of the pin 110 on the worm gear 36 so as to throw the connecting rod 94 upward, as soon as the bottom of the slot 95 comes in contact with the pin 101 the arm 100 of the rock-shaft 97 will be forced upward and the arms 102 downward, thus moving downward the knife or valve 20 across the discharge orifice through which the metal is discharged into the mold. This operation also will be further described hereinafter.

113 indicates a rock-shaft, which is journaled in the bed-plate 6 of the machine near the forward end and is provided at its outer end with an arm 114 upon which is placed a foot-treadle 115.

116 indicates a short arm upon the rock-shaft 113, which is connected by a link 117 with the switch 23, and the switch is so arranged that when the treadle 115 is depressed the switch is moved so as to turn on the electric current to the motor 22.

118 indicates a bell-crank lever, which is pivoted upon the base-plate 6 and is provided with arms 119—120. The arm 119 is connected by means of a link 121 with the switch 23.

122 indicates a pin on the outer end of the shaft 64 which is adapted when said shaft is rocked to bring the drag 12 back into its position to be brought in contact with the end of the arm 120 and throw the switch to cut off the current from the motor.

123 indicates an arm, which is pivotally mounted upon the arm 100 of the rock-shaft 97, and depends downward therefrom behind the plunger and is provided with a hook 124 at its lower end which is adapted to be engaged by the roller 82 on the upper end of the rod 73 when the same is moved to near the limit of its downward motion.

125 indicates a pin on the arm 123, which is adapted to be engaged by the cam 96 on the arm 94 when the same moves upward so as to rock the arm 123 backward and free the hook from the roller 82—all in the manner hereinafter described.

The operation of the above-described mechanism is as follows: The parts being in the position shown in the several figures, the machine is ready to be set in operation. The matrix having been prepared and placed in the drag in the usual manner, the foot-treadle 115 is depressed, moving the upper arm of the switch 23 to the left in Fig. 1 and turning the current on to the motor, which thereupon is set in motion. It will be seen that when the parts are in this position, as shown in the drawings, the roller 60 on the operating bar 58 is at the central part of the cam portion of the cam groove 57 on the cam disk 56 and ready upon the rotation of the shaft 50 to be moved forward; the clutch members 31 and 32 are in engagement, the roller 46 on the lever 44 being in the cam portion of the groove 43. The shaft 24 being rotated by the motor through the belt 27, the shaft 29 is rotated as long as the clutch members are in engagement, and through the medium of the worm 48 and the worm gear 49 the shaft 50 is rotated causing the cam groove 57 to throw the operating rod 58 to the left in Fig. 1. By means of the rack 63 and rack segment 65 the rock-shaft 64 is rotated, and by means of the engagement of the rack segment 66 on the rock-shaft 64 and the rack-segment 69 on the rock-shaft 67 the arms 70 are moved up,—thus through the medium of the connecting rod 72 swinging the drag on its bearings into operative position against the plunger 7, the sockets 16 engaging the ends of the bar 9. As this movement is completed the roller 60 on the operating bar 58 reaches the circular portion of the cam, and the drag and plunger are thus held in operative relation to one another as long as the roller travels in the circular portion of said cam. As the cams 52 and 56 are set, as has been above described, ninety degrees or a quarter of a revolution apart, as the operating bar 58 has completed its movement to the left the disk 53 has been rotated through a quarter of its revolution so as to bring the cam portion 54 of the groove 53 into operation with the roller 76. The revolution continuing, the cam portion 54 of the groove 53 operates by engaging the roller 76 on the rod 73 to pull the rod 73 downward, which through the medium of the rack 77 and rack segment 78 rock the rock-shaft 79 and move the cam 83 upward to the left. This movement of the plate 83 through the link or connecting rod 88 rocks the shaft 86 while the cam flange 84 engages the roller 85 on the drag 12. The rocking of the rock-shaft 86 through the medium of the eccentric 89 pulls back the bar 9, which, engaging with the socket 16, locks the lower end of the drag against the plunger; while at the same time the flange cam 84 engaging the roller 85 locks the upper portion of the drag against the plunger, and the parts thus locked firmly together are ready for the casting of the plate.

As the parts are locked closely together, the roller 82 on the upper end of the connecting rod 73 is brought into contact with the hook 124 on the arm 123, thus pulling down the arm 120 of the rock-shaft 97, lifting the arms 102—103 and lifting the slice-bar or valve 20 so as to open the discharge passage from the furnace into the casting box, and the metal flowing from

the furnace or melting pot 17 fills the chamber between the drag and the plunger. By the time these operations are completed the roller 46 on the lever 44 has passed out of the cam portion of the groove 43 and the clutch members 31—32 have been separated causing the stoppage of the further rotation of the shaft 29 until the cam portion of the groove 43 again reaches the roller 46, and thus stopping the motion of all the parts so far described. The shaft 24 being, of course continuously rotated by the belt 26, the worm gear 36 is rotated by the worm 35 in the direction indicated by the arrow in Fig. 1, and the movement is so timed that by the time the casting chamber is run full of metal, or very shortly thereafter, the pin 110 is brought into contact with the arm 109, rocking the shaft 108, moving the link 112 to the left in Figs. 1 and 2, which rocks the collar 91 and lifts the rod 94. The cam 96 on the rod 94 is thus brought into contact with the pin 125 on the swinging arm 123 rocking it outward and freeing the hook 124 from engagement with the roller 82. As the upward motion of the connecting rod 94 continues the bottom of the slot 95 engages the pin 91, the arm 100 is rocked upward, the arms 102—103 downward and the slice-bar or valve 20 is moved downward over the discharge opening severing the cast plate from the metal behind it. As the gear 36 continues to rotate the pin passes off from the arm 109 and leaves the knife free to be moved upward again for the next operation.

The various operative parts which are operated through the clutch members 31—32, as above described, all remain stationary until by the rotation of the disk 42 the cam portion of the groove 43 is again brought into contact with the roller 46 on the arm 44, and the drag and plunger are held locked together for a sufficient time for the metal in the cast plate to cool off and solidify so that it can be removed,—the respective lengths of the straight portion and the cam portion of the groove 43 being so related to one another and the movement so timed as to accomplish this. This stoppage of the parts, it may be noted, also occurs when the roller 76 is opposite the middle part of the cam portion of the cam groove 55. A sufficient time, therefore, having elapsed for the plate to cool, the cam portion of the groove 43 again engages the roller 46 on the arm 44, the clutch members 31—32 are thrown into engagement and the rotation of the shaft 29 begins again. The roller 60 on the operating part 58 being about the central portion of the circular portion of the groove 53 and the roller 76 in the middle of the cam groove 55, the rotation of the cam disk 52 causes the roller 76 to be carried farther away from the center of the disk and the arm 73 to be moved upward. This upward movement of the arm 73 reversing the movement of the rock-shaft 79 above described moves the plate 83 downward and to the right and freeing the roller 85 on the drag 12 from the cam flange 83 unlocks the upper portion of the drag. The same movement rocks the shaft 86 in the reverse direction from that above described and through the eccentric 89 moving the bar 9 forward with the socket 16 supported thereon unlocks the lower end of the drag from the plunger. As this movement is completed and the roller 76 enters upon the circular portion of the cam groove 55 the roller 60 enters the cam portion 54 of the cam groove 57 on the cam disk 56 and moving inward toward the center of the disk pulls the drag bar 58 to the right in the figures, rocking the rock-shaft 64 in the opposite direction. Through the medium of the rack segments 66—69 the rock-shaft 67 is moved in the reverse direction from its first movement, the arms 70 move downward, and through the medium of the connecting rod 72 the drag is turned to its horizontal position. As the drag rotates to horizontal position the pin 122 comes in contact with the arm 120 of the bell-crank lever 118 and moving it downward throws the switch 23 so as to shut off the power, which movement of the switch, of course, raises the foot-treadle into position to be again depressed through the medium of the connecting link 117. The cast plate may then be removed in the usual manner and by the depressing of the foot-treadle the parts be again set into motion and the operation repeated.

That which I claim as my invention, and desire to secure by Letters Patent, is,—

1. In a stereotype plate casting machine, the combination with a drag and plunger adapted to be brought into operative relation with one another to form a casting box, and operating mechanism adapted to bring said drag and plunger into and out of operative relation with each other, of a prime mover, connections between said prime mover and said operating mechanism, start and stop mechanism in said connections, and means operated by said prime mover to start said start and stop mechanism to operate said operating mechanism, to then stop said start and stop mechanism when said drag and plunger are brought into operative relation with one another and while the cast plate is cooling, and then again to start said start and stop mechanism.

2. The combination with a stationary plunger, a drag adapted to be swung into operative relation against said plunger to form a casting chamber for a stereotype plate, operating mechanism adapted to move said drag into and out of operative relation with said plunger, of a

prime mover, connections between said prime mover and said operating mechanism adapted when set in motion by said prime mover to swing said drag into operative relation with said plunger, and mechanism operated by said prime mover to throw off the connections between it and said operating mechanism after said drag has been moved into operative relation with said plunger and hold the same in position while the plate is cooled and then automatically throw said connecting mechanism into engagement again with said operating mechanism to move said drag out of operative relation with said plunger.

3. The combination with a stationary plunger, a movable drag adapted to be swung into operative relation with said plunger to form a stereotype casting chamber between them, said plunger having a passage for molten metal leading into the top of said chamber, a valve adapted to open and close the opening in said passage for molten metal, and operating mechanism adapted to move said drag into and out of operative relation with said plunger, of a prime mover, connecting mechanism between said prime mover and said operating mechanism and adapted when thrown into engagement with said plunger to successively move said drag into operative relation with said plunger and move it out of operative relation with said plunger, means operated by said prime mover and adapted to throw said connecting mechanism out of engagement with said operating mechanism when said drag and plunger are in operative relation and hold the same in operative relation until the cast plate cools and then automatically throw said connecting mechanism into operative engagement with said operating mechanism and move said drag out of operative relation with said plunger.

4. In a stereotype-plate casting machine, the combination with a drag and plunger adapted to be brought into operative relation with one another to form a casting-box and operating mechanism adapted to bring said drag and plunger into and out of operative relation, of a prime mover, connections between said prime mover and said operating mechanism, clutch mechanism in said connecting mechanism adapted when thrown into engagement to operate the same, and means operated by said prime mover to throw said clutch mechanism into engagement, throw the same out of engagement when said drag and plunger are brought into operative relation with one another and while the cast plate is cooling and then throw said clutch mechanism into engagement to bring said drag and plunger out of operative relation with one another.

5. In a stereotype-plate casting machine, the combination with a drag and plunger adapted to be brought into operative relation with one another to form a metal chamber between them and having a metal passage leading into said chamber, operating mechanism adapted to bring said drag and plunger into and out of operative relation, locking mechanism adapted to lock said drag and plunger together and unlock the same, and a valve adapted to control said metal passage, of a prime mover, connections between said prime mover and said operating mechanism, connections between said prime mover and said locking mechanism, connections between said prime mover and said valve-operating mechanism, clutch mechanism interposed between said prime mover and said operating and locking mechanism and adapted when engaged to move said locking and unlocking mechanism, and clutch-operating mechanism operated by said prime mover and adapted to throw said clutch members into engagement to bring said drag and plunger together and lock the same, then throw said clutch mechanism out of engagement and hold said drag and plunger in operative relation while the cast plate is cooling and then throw said clutch members into engagement to unlock said locking mechanism and operate said operating mechanism to bring the drag and plunger out of operative relation.

6. In a stereotype-plate casting machine having a casting-box consisting of a drag and plunger adapted when put into operative relation with each other to form a casting chamber, the combination with operating mechanism adapted to bring said drag and plunger into and out of operative relation, of a prime mover adapted to drive said operating mechanism, a clutch interposed between said prime mover and said operating mechanism, and mechanism driven by said prime mover and adapted to throw said clutch into engagement, drive said operating mechanism and bring said drag and plunger into operative relation, then throw said clutch out of engagement while the cast plate cools and then into engagement again to operate said operating mechanism and move them out of operative relation.

7. In a stereotype-plate casting machine having a casting-box consisting of a drag and plunger adapted when put into operative relation with each other to form a casting chamber, the combination with operating mechanism adapted to bring said drag and plunger into operative relation, lock the same together, unlock the same and bring them out of operative relation, of a prime mover adapted to drive said operating mechanism, a clutch interposed between said prime mover and said operating mechanism, and mechanism driven by said prime mover and adapted to throw said clutch into en-

gagement, drive said operating mechanism and bring said drag and plunger into operative relation and lock the same, then to throw said clutch out of engagement while the cast plate cools and then into engagement again to operate said unlocking and operating mechanism and unlock said drag and plunger and bring them out of operative relation.

8. The combination with a stereotype-plate casting-box having a drag and plunger adapted to be brought into operative relation with each other to form a casting chamber and operating mechanism adapted to bring said drag and plunger into and out of operative relation and locking mechanism adapted to lock said drag and plunger together in operative relation, of a prime mover, a shaft driven by said prime mover and containing one member of a clutch mechanism, a second shaft having thereon the other member of said clutch mechanism, connections between said second shaft and said operating mechanism, connections between said second shaft and said locking mechanism, clutch-operating mechanism driven by said prime mover and adapted to move said clutch members into engagement to operate said operating mechanism and said locking mechanism to bring said drag and plunger into operative relation and lock the same together, then to move said clutch members out of engagement while the cast plate cools, then to move said clutch members into engagement and operate said locking mechanism to unlock said clutch members and said operating mechanism to move said clutch members out of operative relation.

9. The combination with a stereotype-plate casting-box having a drag and plunger adapted to be brought into operative relation with each other to form a casting chamber and operating mechanism adapted to bring said drag and plunger into and out of operative relation and locking mechanism adapted to lock said drag and plunger together in operative relation, of a prime mover, a shaft driven by said prime mover and containing one member of a clutch mechanism, a second shaft having thereon the other member of said clutch mechanism, connections between said second shaft and said operating mechanism, connections between said second shaft and said locking mechanism, clutch-operating mechanism driven by said prime mover and adapted to move said clutch members into engagement to operate said operating mechanism and said locking mechanism to bring said drag and plunger into operative relation and lock the same together, then to move said clutch members out of engagement while the cast plate cools, then to move said clutch members into engagement and operate said locking mechanism to unlock said clutch members and said operating mechanism to move said clutch members out of operative relation, and mechanism connected with said operating mechanism and adapted when said casting-box members are brought out of operative relation to stop said prime mover.

10. The combination with a stereotype-plate casting-box having a drag and plunger adapted to be brought into operative relation with each other to form a casting chamber and operating mechanism adapted to bring said drag and plunger into and out of operative relation and locking mechanism adapted to lock said drag and plunger together in operative relation, of a prime mover, a shaft driven by said prime mover and having a clutch member, a second shaft having a second clutch member, connections between said second shaft and said operating mechanism, connections between said second shaft and said locking mechanism, a cam driven by said prime mover, a shifting lever between said cam and one of said clutch members, said cam and shifting lever being adapted when said prime mover is set in motion to first automatically move one of said clutch members into engagement with the other and move said second shaft to operate said locking and unlocking mechanism and bring said drag and plunger into operative relation and lock the same together, then to shift said clutch member to disengage said clutch mechanism while the cast plate is being cooled, then to move said clutch members into engagement with the other clutch member and move said second shaft to operate said unlocking mechanism and said operating mechanism to bring said drag and plunger out of operative relation.

11. The combination with an upright plunger having a metal discharge passage, a valve controlling said metal discharge passage, a swinging drag adapted to be moved into operative relation with said plunger to form a casting chamber between them, operating mechanism adapted when set in motion to swing said drag into operative relation with said plunger and lock the same against said plunger, of a prime mover, a shaft driven by said prime mover and carrying a clutch member, a second shaft carrying a second clutch member, connections between said second shaft and said operating and locking mechanism, a shifting lever adapted when operated to move said clutch members into and out of engagement, a third shaft driven by said prime mover, an operating cam on said third shaft adapted to engage said shifting lever to first throw said clutch members into engagement and drive said second shaft and thereby operate said operating mechanism to bring said drag and plunger into operative relation and lock

the same together, then to throw said clutch members out of engagement until the cast plate cools, then to move said clutch members again into engagement, operate said second shaft and drive said operating mechanism to unlock the said drag and plunger to move the same out of operative relation.

12. The combination with an upright plunger having a metal discharge passage, a valve controlling said metal discharge passage, a swinging drag adapted to be moved into operative relation with said plunger to form a casting chamber between them, operating mechanism adapted when set in motion to swing said drag into operative relation with said plunger and lock the same against said plunger, of a prime mover, a shaft driven by said prime mover and carrying a clutch member, a second shaft carrying a second clutch member, connections between said second shaft and said operating and locking mechanism, a shifting lever adapted when operated to move said clutch members into and out of engagement, a third shaft driven by said prime mover, an operating cam on said third shaft adapted to engage said shifting lever to first throw said clutch members into engagement and drive said second shaft and thereby operate said operating mechanism to bring said drag and plunger into operative relation and lock the same together, then to throw said clutch members out of engagement until the cast plate cools, then to move said clutch members again into engagement, operate said second shaft and drive said operating mechanism to unlock the said drag and plunger to move the same out of operative relation, and mechanism connected with said operating mechanism and adapted when said drag is moved out of operative relation with the plunger to shut off said prime mover.

13. The combination with an upright plunger having a metal discharge passage, a valve controlling said metal discharge passage, a swinging drag adapted to be moved into operative relation with said plunger to form a casting chamber between them, operating mechanism adapted when set in motion to swing said drag into operative relation with said plunger and lock the same against said plunger, of a prime mover, a shaft driven by said prime mover and carrying a clutch member, a second shaft carrying a second clutch member, connections between said second shaft and said operating and locking mechanism, a shifting lever adapted when operated to move said clutch members into and out of engagement, a third shaft driven by said prime mover, an operating cam on said third shaft adapted to engage said shifting lever to first throw said clutch members into engagement and drive said second shaft and thereby operate said operating mechanism to bring said drag and plunger into operative relation and lock the same together, then to throw said clutch members out of engagement until the cast plate cools, then to move said clutch members again into engagement, operate said second shaft and drive said operating mechanism to unlock the said drag and plunger to move the same out of operative relation, and shut-off mechanism connected with said operating mechanism and adapted when said drag is moved out of operative relation with the plunger to shut off said prime mover.

14. The combination with an upright plunger having a metal discharge passage, a valve controlling said metal discharge passage, a swinging drag adapted to be moved into operative relation with said plunger to form a casting chamber between them, operating mechanism adapted when set in motion to swing said drag into operative relation with said plunger and lock the same against said plunger, of a prime mover, a shaft driven by said prime mover and carrying a clutch member, a second shaft carrying a second clutch member, connections between said second shaft and said operating and locking mechanism, a shifting lever adapted when operated to move said clutch members into and out of engagement, a third shaft driven by said prime mover, an operating cam on said third shaft adapted to engage said shifting lever to first throw said clutch members into engagement and drive said second shaft and thereby operate said operating mechanism to bring said drag and plunger into operative relation and lock the same together, then to throw said clutch members out of engagement until the cast plate cools, then to move said clutch members again into engagement, operate said second shaft and drive said operating mechanism to unlock the said drag and plunger to move the same out of operative relation, mechanism connected with said valve and with said prime mover and adapted to operate said valve to open said metal passage and then close the same, and shut-off mechanism connected with said operating mechanism and adapted when said drag is moved out of operative relation with the plunger to shut off said prime mover.

HUBERT LANG.

Witnesses:
C. E. PICKARD,
W. H. DE BUSK.