

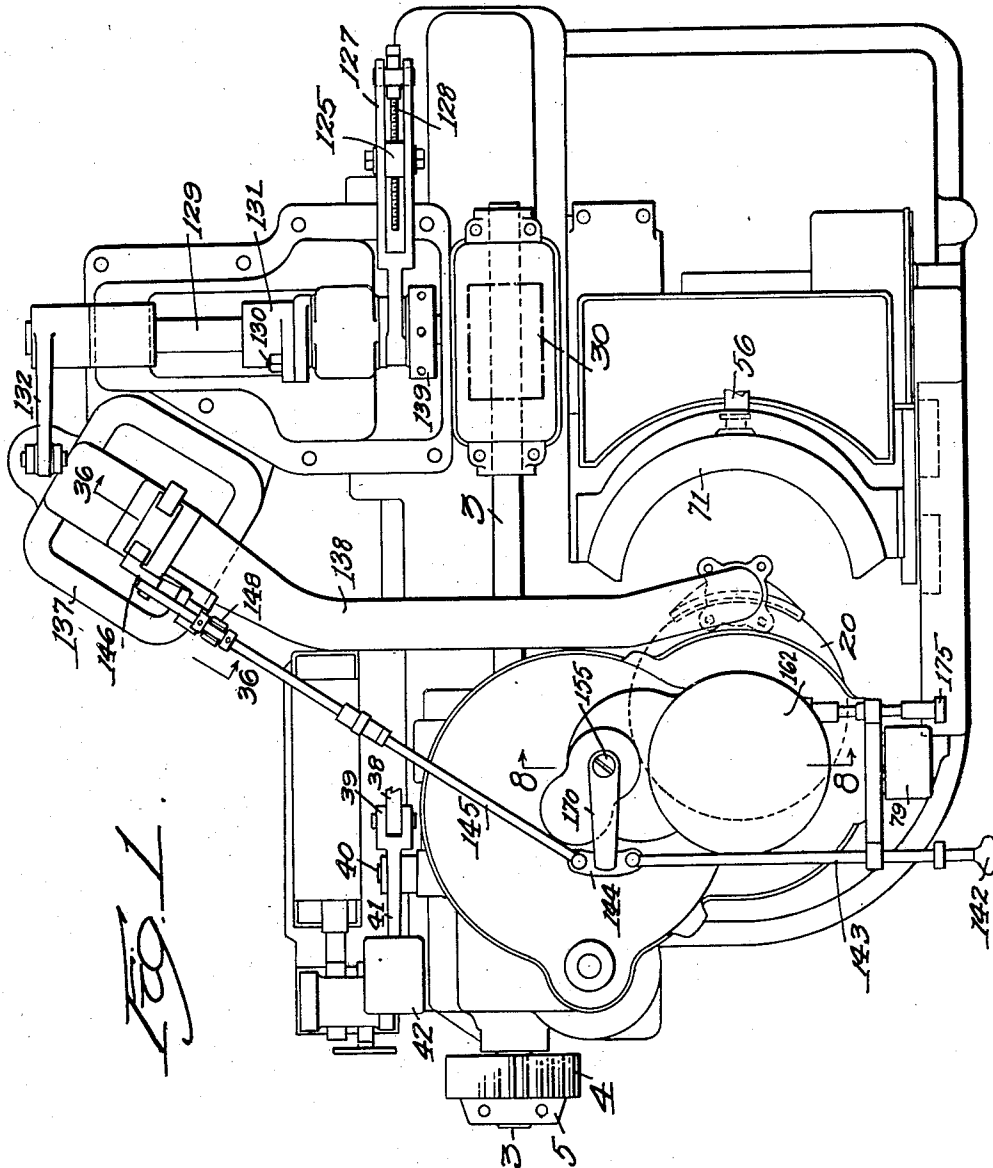
March 8, 1932.

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1,848,592

AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

Original Filed June 28, 1928 16 Sheets-Sheet 1



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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

Original Filed June 28, 1928 16 Sheets-Sheet 2

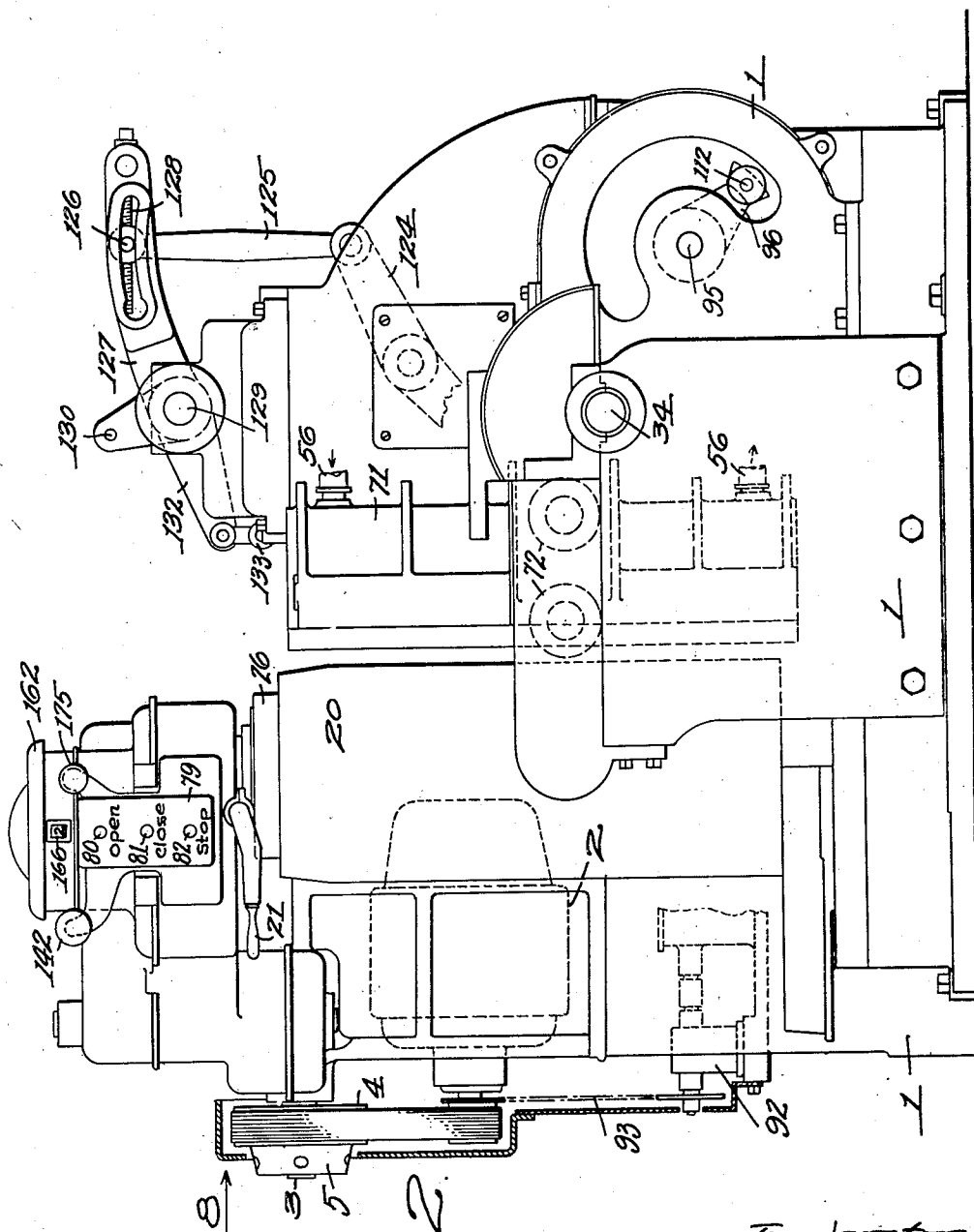


Fig. 2

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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

Original Filed June 28, 1928 16 Sheets-Sheet 3

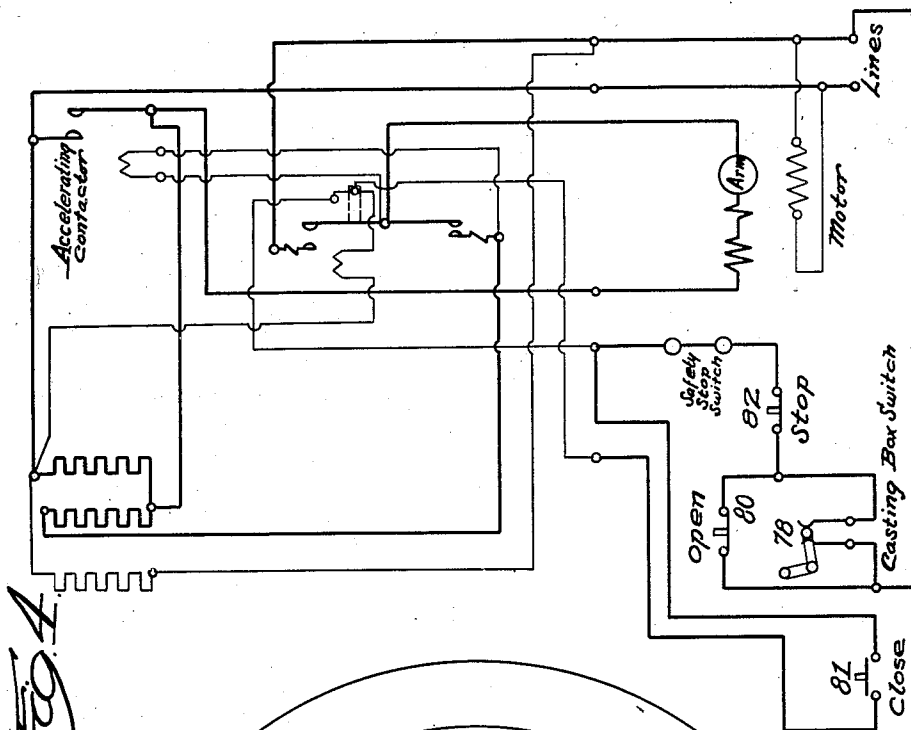


Fig. 4.

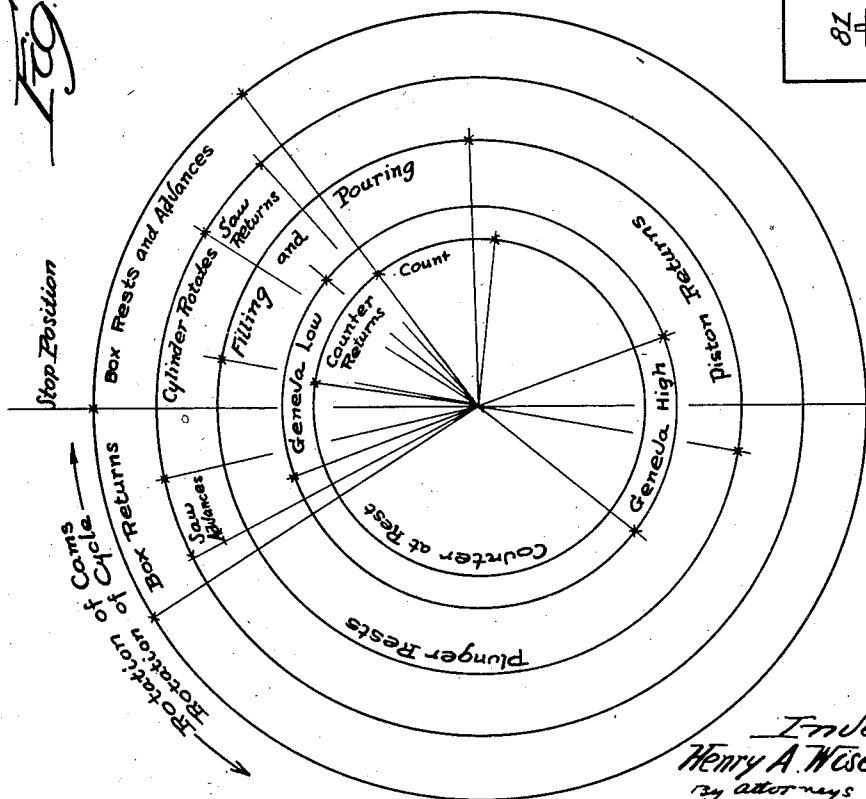


Fig. 3.

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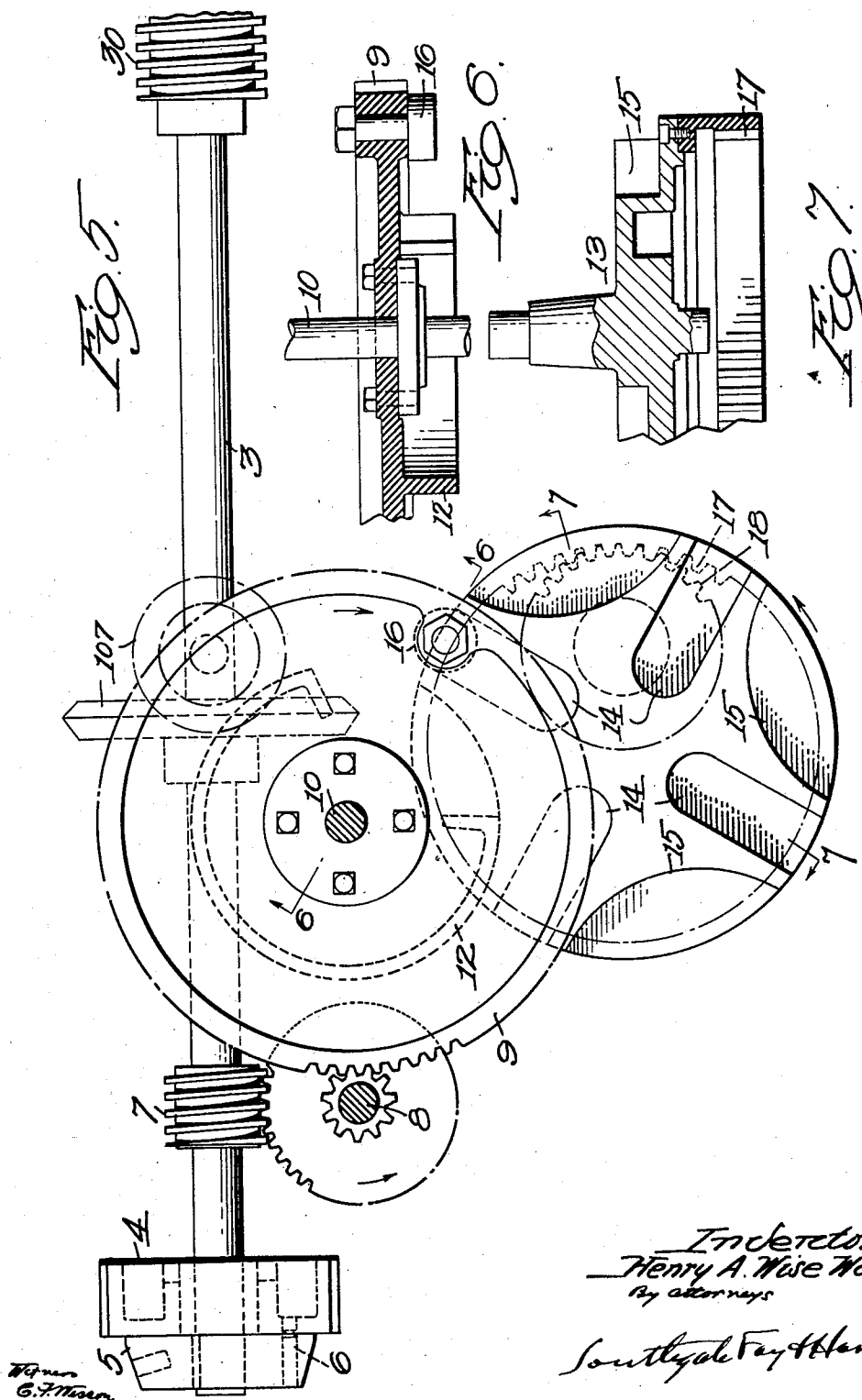
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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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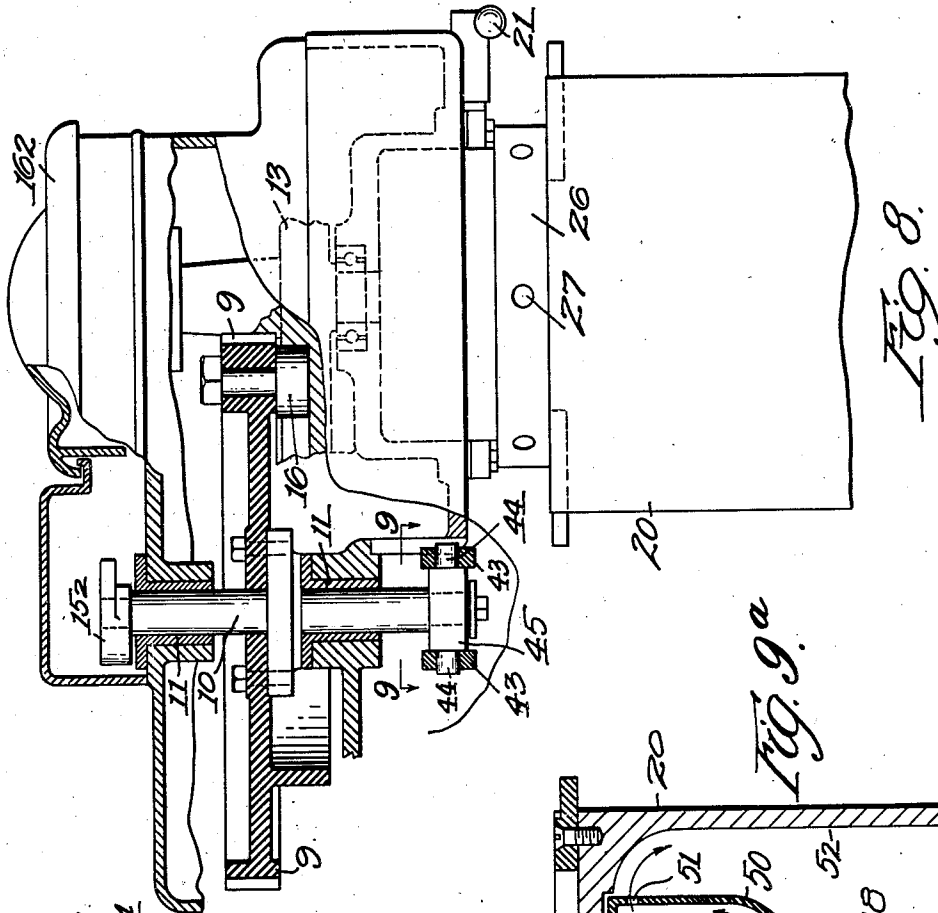


Fig. 8.

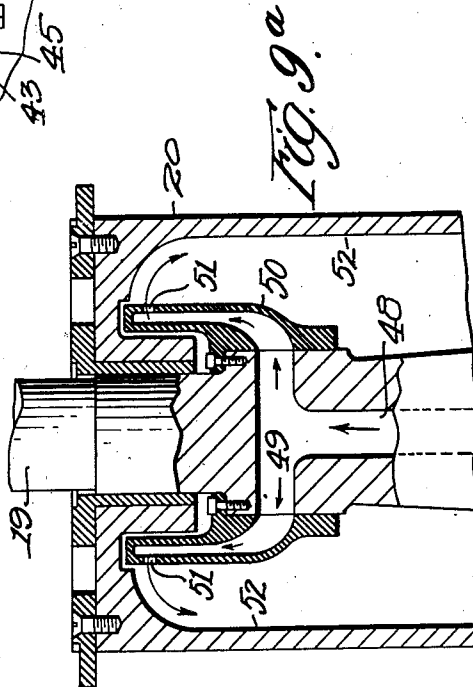


Fig. 9a.

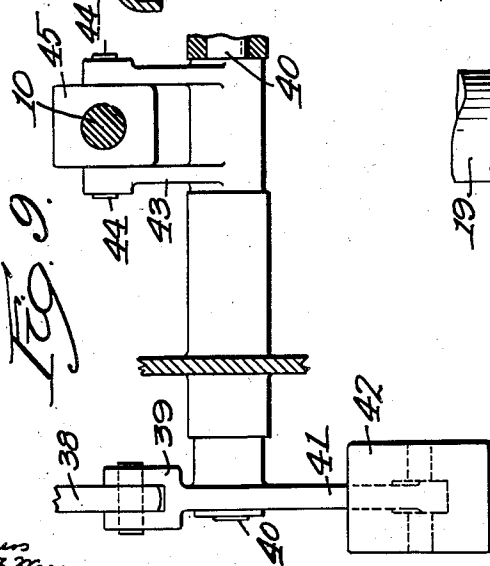


Fig. 9.

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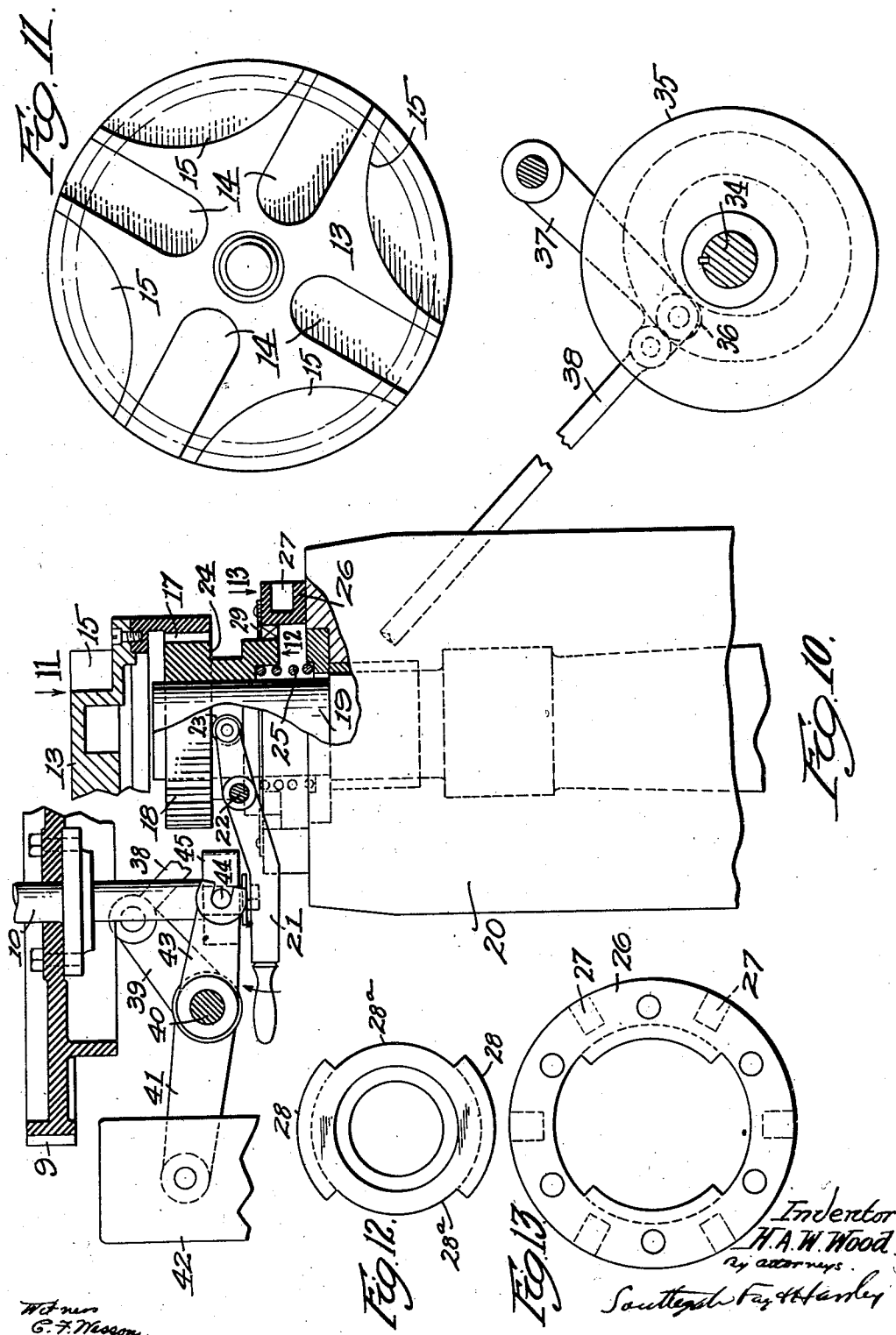
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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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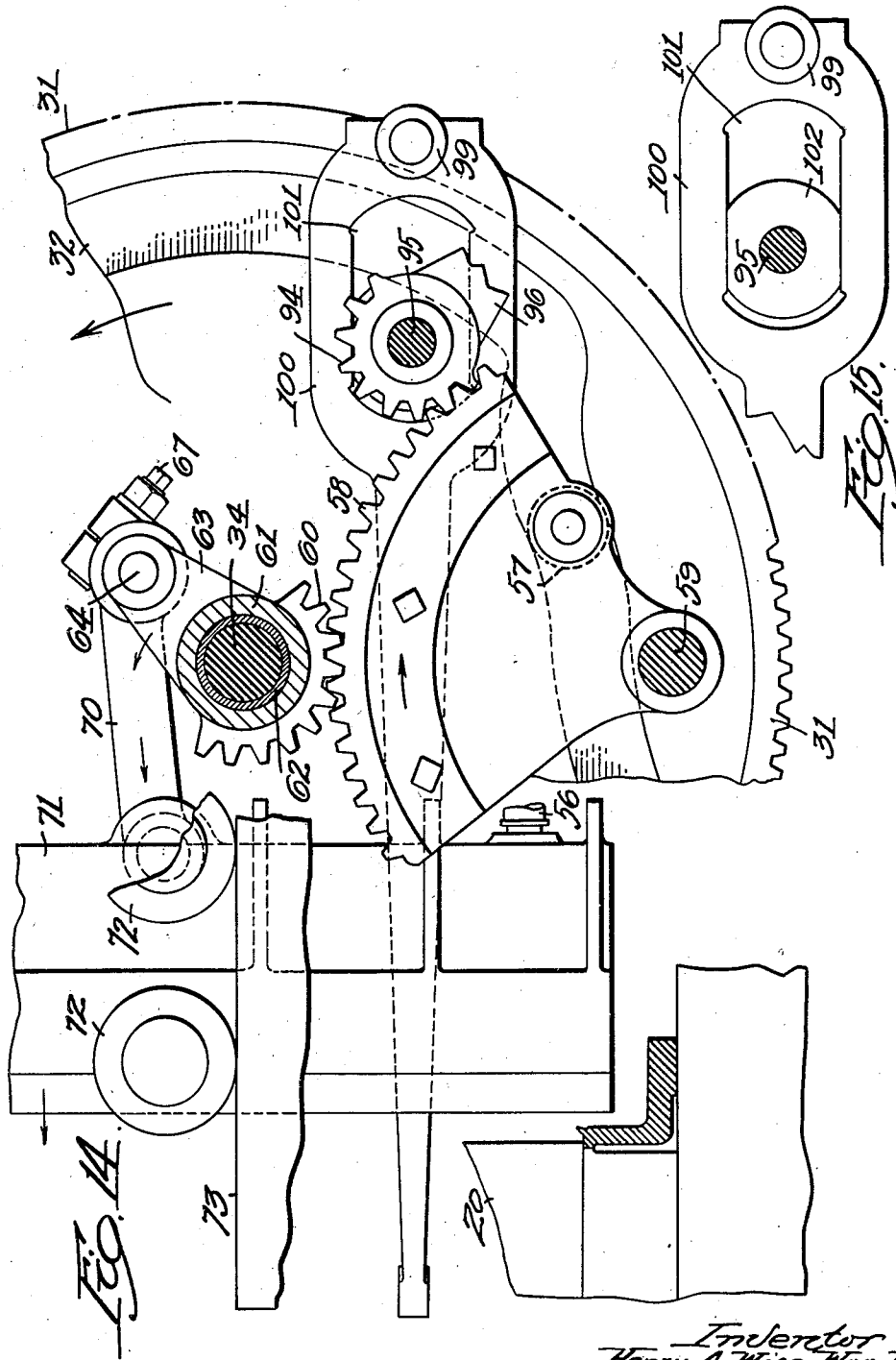
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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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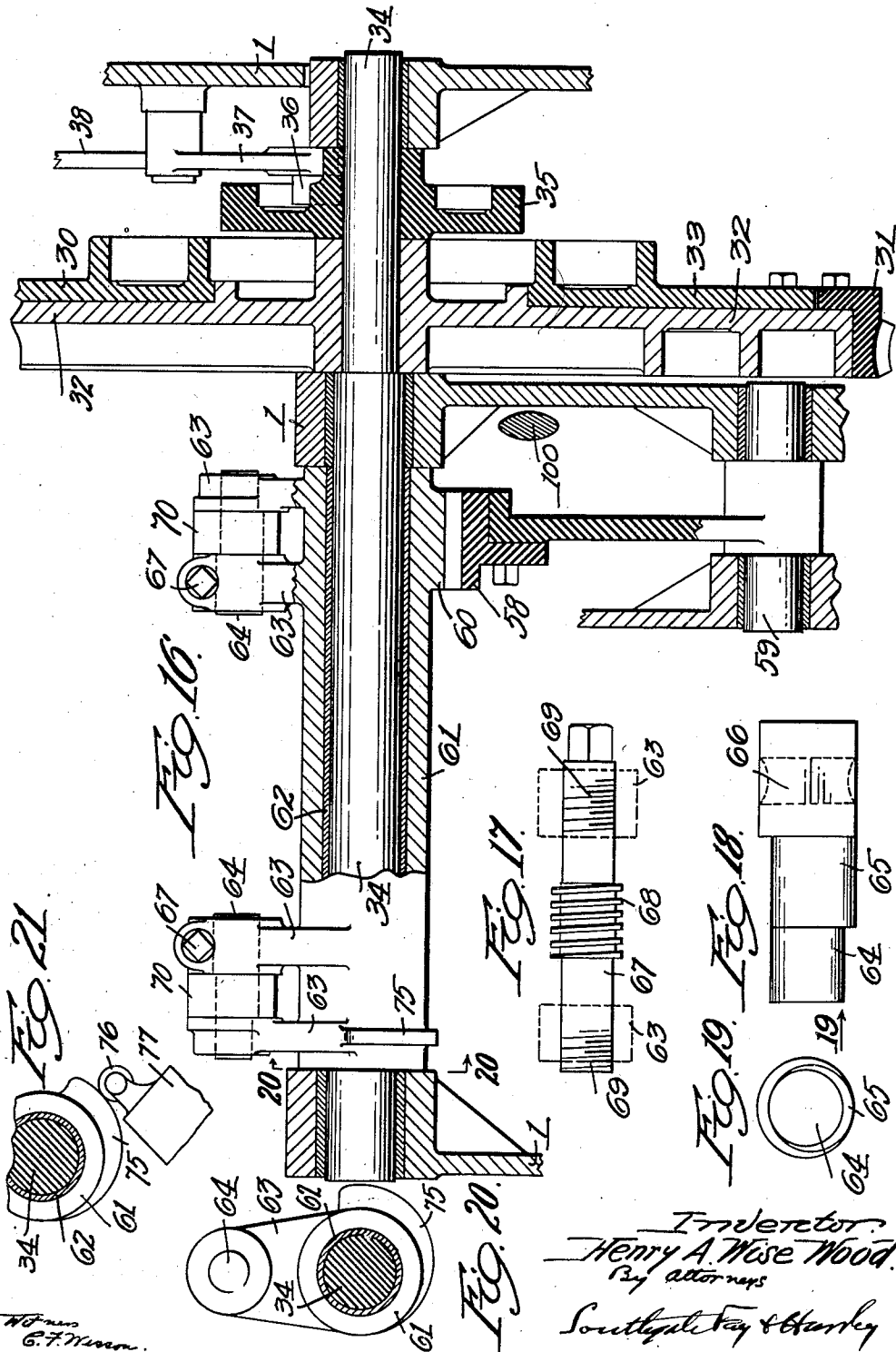
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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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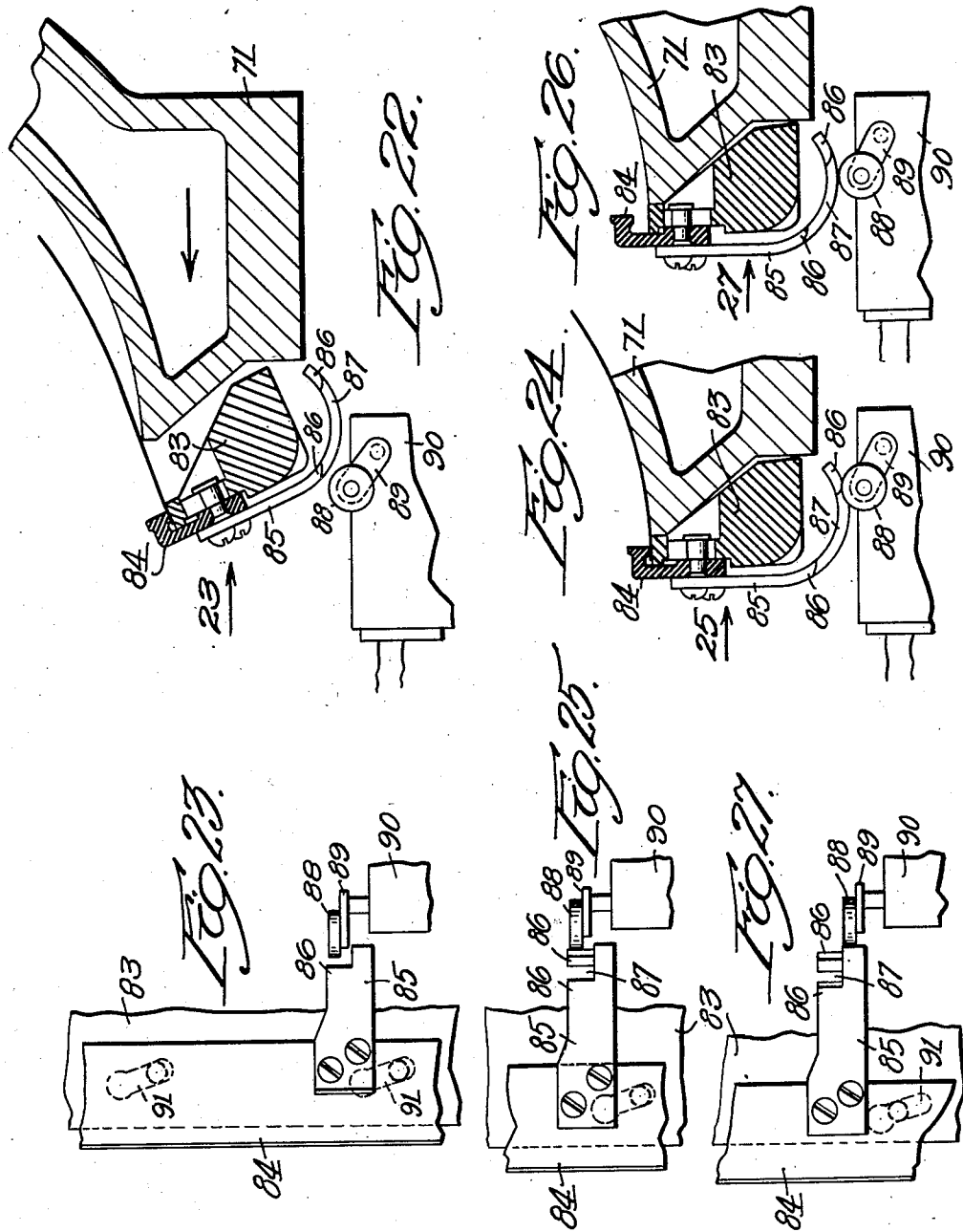
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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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FIG. 28.

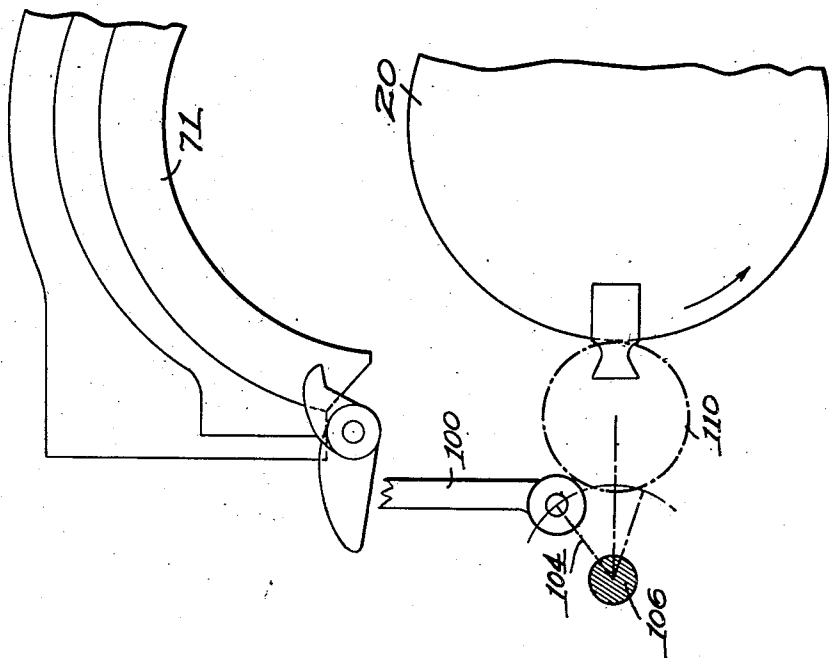
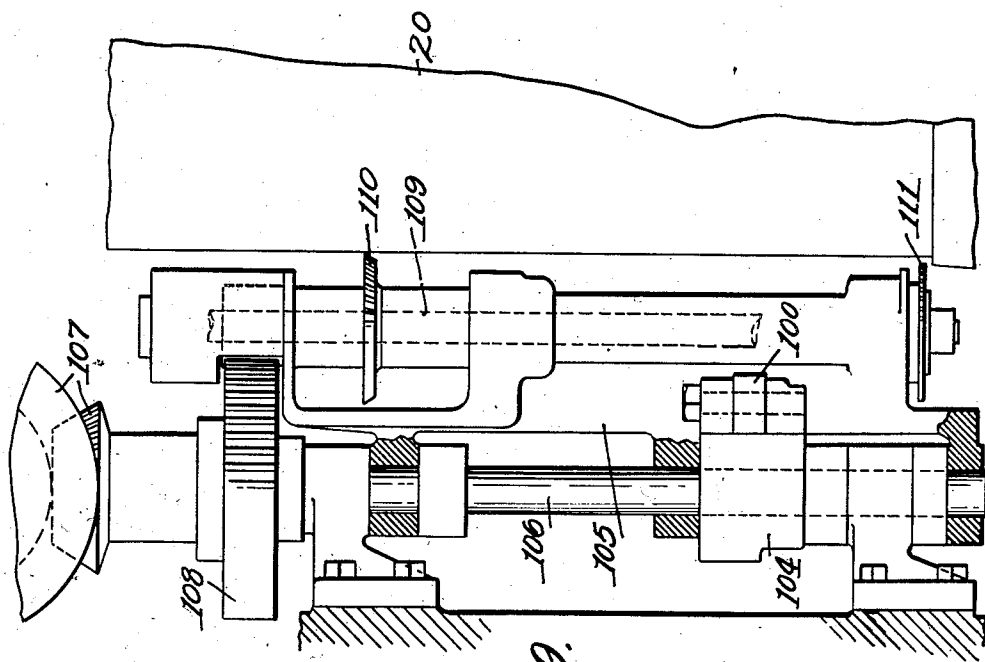


FIG. 29.

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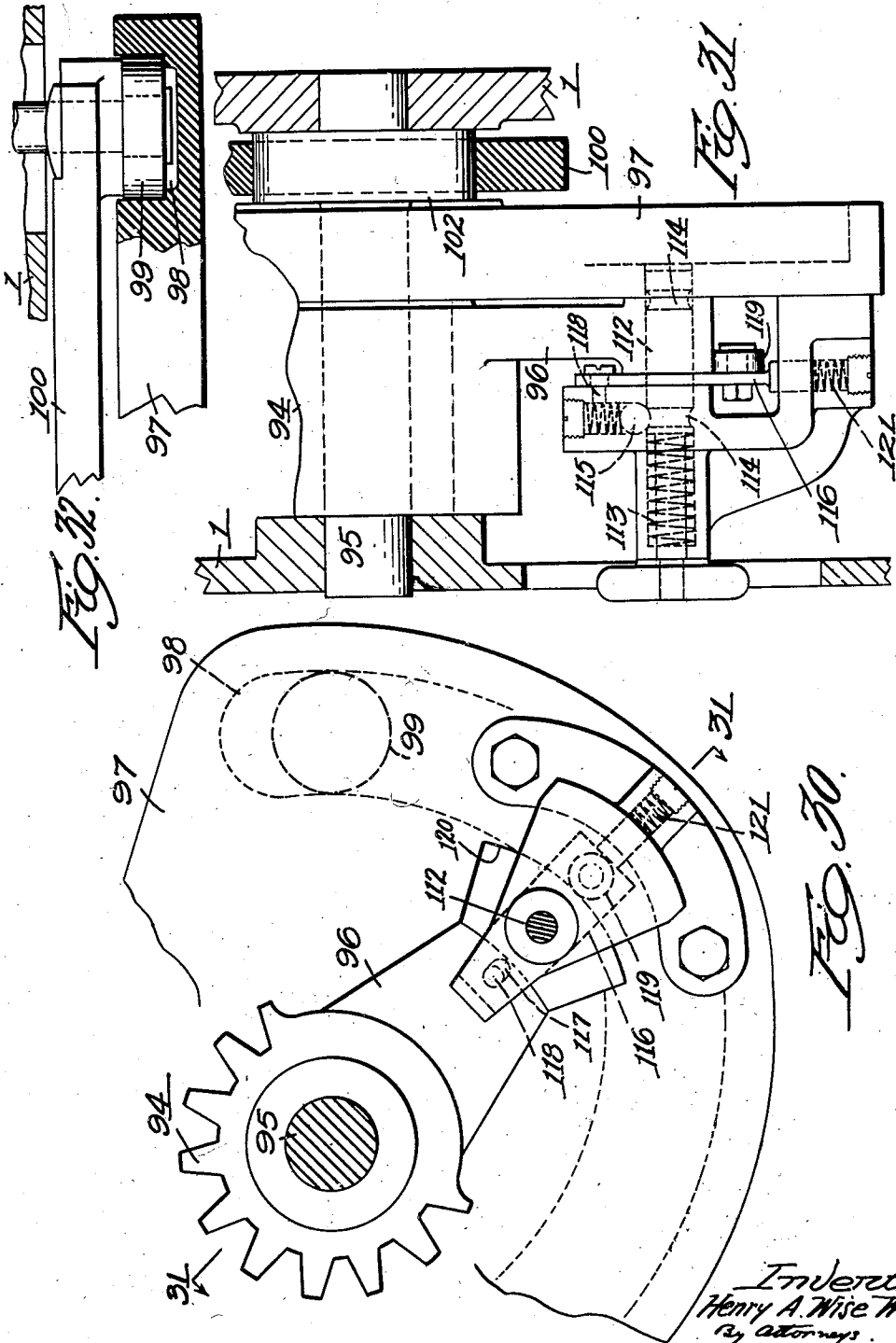
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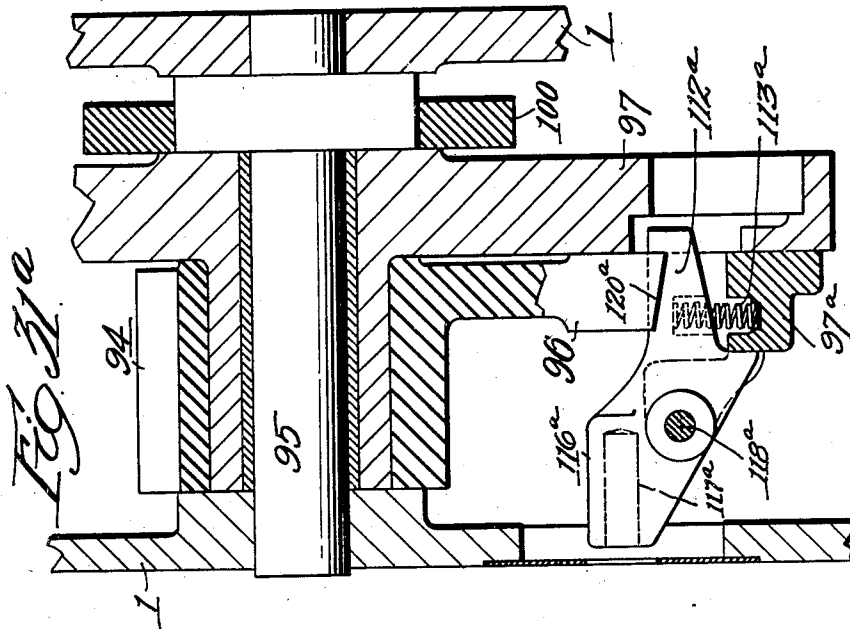
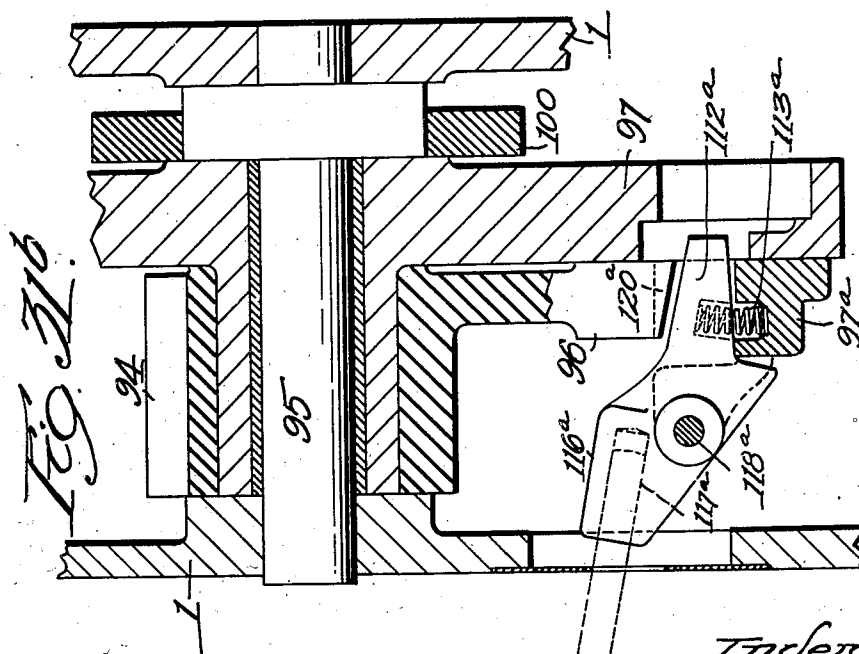
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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

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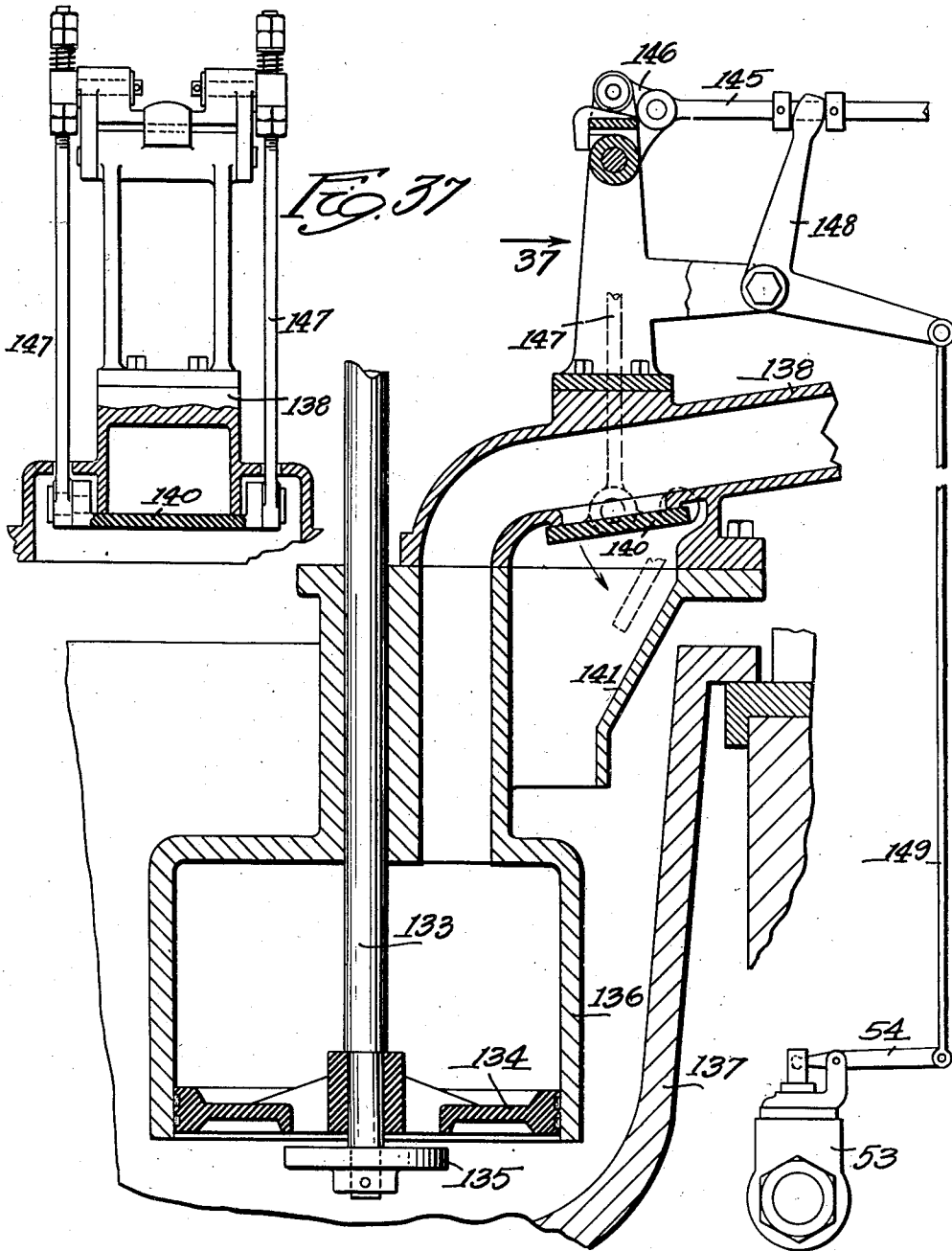


Fig. 36.

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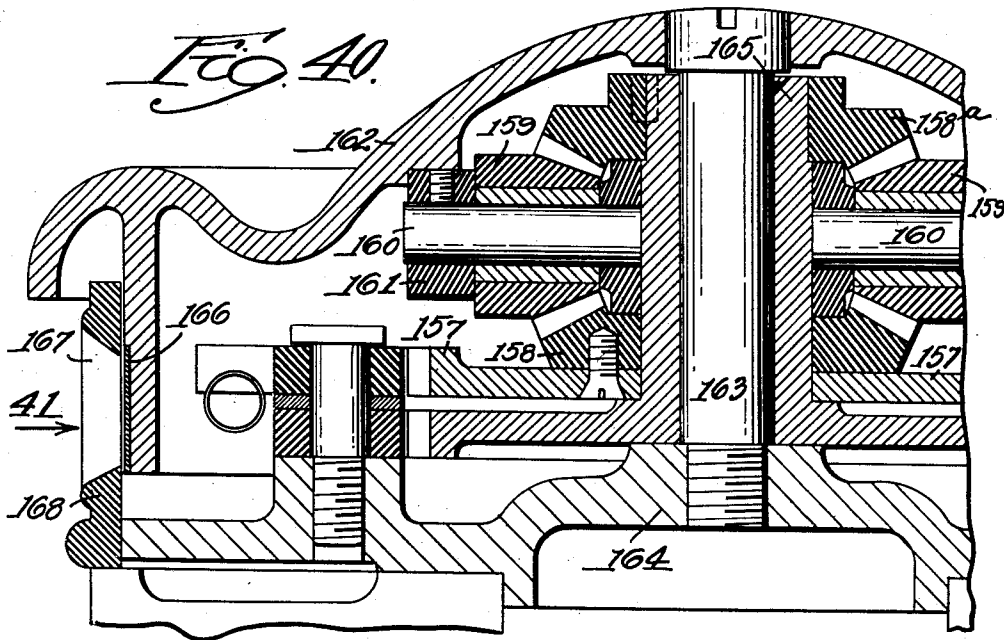
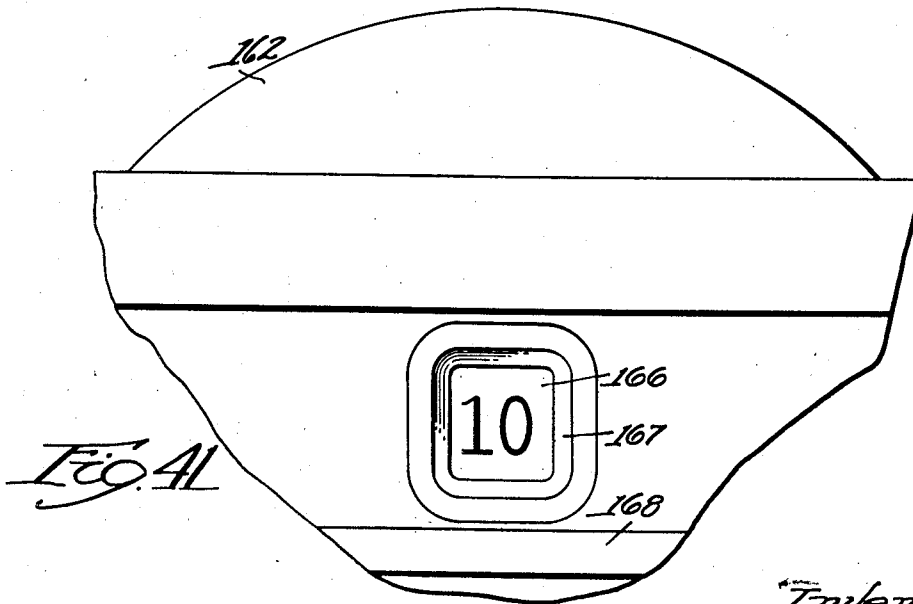
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UNITED STATES PATENT OFFICE

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AUTOMATIC STEREOTYPE PLATE CASTING MACHINE

Application filed June 28, 1928, Serial No. 288,847. Renewed June 29, 1931.

This invention relates to a machine for casting stereotype printing plates of the Junior autoplate type in which the cylindrical core and back are arranged vertically.

6 The principal objects of the invention are to provide a construction in which the three ordinarily separate functions of opening and closing the mold, pouring the metal and severing the tail are performed automatically by
10 the machine without any effort or attention on the part of the operator except the starting and stopping of the motor which drives the machine; to provide for the automatic continuing of the casting operation to produce
15 a plurality of plates; to provide a combination of parts by which a positive action is employed to secure a half revolution of the cylinder while the box is moving the plate from the casting to delivery position and positively stops the cylinder and prevents any
20 over running at the end of this operation, without the use of any detents or ratchet mechanism and in which no shock is felt at either end of the motion on account of this
25 said positive mechanism; to provide for a smooth action of the casting box and insure a quietly operating machine; to provide a construction which will operate at high speed; to provide exact timing of the various
30 mechanism; to provide means for starting and stopping the machine without the use of clutches, the motor being permanently connected with the driving shaft, to provide a push button starter preferably, comprising
35 three buttons, one a start button which starts the rotation of the motor when pressed at any time, another being connected to start the motor from any stop position and a third connected in parallel with a limit switch arranged
40 to be operated by the mechanism to open whenever the crank-shaft assumes a certain position; to provide means whereby when it is desired to bring the machine to a standstill, which is done when the box is open, the
45 last named of said buttons will be depressed and the motor will continue to rotate until the crank-shaft has reached a position to operate the limit switch whereby the motor will come to a stop; to provide means whereby when the
50 usual clips are left open or the matrix bars

loosely locked the casting box will be prevented from leaving its stop position, the action being the same as that accomplished by pushing the stop button, this being claimed broadly in my co-pending application Serial No. 356,494, filed April 19, 1929, and patented on even date herewith; to provide means whereby the exact moment of pouring may be adjusted to suit requirements; to provide means whereby the pump may be operated by hand if desired, although ordinarily operated automatically; to provide means whereby the cylinder also can be operated by hand, without actuating the rest of the mechanism; to provide improved and simplified means for automatically swinging the saw hanger into place just before the cylinder starts its rotation; to provide means for disconnecting the saw hanger so that it can be oscillated by hand, if desired, for removal of the saw or when it is desired to deliver a plate without sawing off the tail; to provide novel means for cooling the back of the plate without the use of a number of small spraying orifices which are likely to be plugged up after considerable use and means by which water can be delivered through large holes thus flooding the water on the grooves in the interior surface formed integrally with the cylinder and causing it to flow outwardly in an even manner and without any turbulence, thereby using less water than in the case of cooling by sprinkling and having a construction which is not likely to clog; to provide connections between the cooling mechanism and the mechanism for controlling the pour to prevent water being delivered when the metal is not delivered to the casting box, thus avoiding chilling of the mold prior to the casting of the plates; to provide means whereby the automatic machine can be put through its various operations without actually pouring metal into the mold or water into the cooling mechanism; to provide a counter for showing the number of operations of the machine at all times actuated so as to skip one operation of the Geneva motion employed in operating the machine, thus causing one operation of the counting mechanism to two revolutions of the Geneva driving shaft in accord-

ance with the fact that one plate is cast during that time; to provide means whereby no number is registered on the counter when the machine is operated without casting a plate although it moves through a complete cycle; to provide a subtracting mechanism for the counter to measure the number of plates previously cast which are found to be defective during that run of the machine and thus count the number of perfect plates only; to provide a subtracting means for controlling the subtracting mechanism which can be operated at any time during the cycle of the machine whether the counting mechanism is at that instant in operation or not; to provide means whereby the use of this subtracting mechanism will not interfere with the counter except to subtract one from the count and to provide improvements in the details of the mechanism for accomplishing these various results.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which

Fig. 1 is a plan of a stereotype plate casing machine of the Junior autoplate type, showing a preferred embodiment of this invention;

Fig. 2 is a side view of the same;

Fig. 3 is a diagram showing the various operations of the machine;

Fig. 4 is a wiring diagram of the control circuit for the driving motor;

Fig. 5 is a plan view of the driving mechanism for the cylinder;

Figs. 6 and 7 are sectional views on the lines 6—6 and 7—7 respectively of Fig. 5;

Fig. 8 is a sectional view on the line 8—8 of Fig. 1, looking in the direction of the arrow 8 of Fig. 2.

Fig. 9 is a sectional view on the line 9—9 of Fig. 8;

Fig. 9^a is a diametrical sectional view of a part of the cylinder showing the cooling means;

Fig. 10 is a side view of the cylinder and the parts for operating it, certain of said parts being in radial section;

Fig. 11 is a plan view of one of the members of the Geneva motion, looking in the direction of the arrow 11 of Fig. 10.

Fig. 12 is an inverted plan of the clutch member, looking in the direction of the arrow 12 of Fig. 10.

Fig. 13 is a plan view of the corresponding member which is fastened to the cylinder and looking in the direction of the arrow 13 of Fig. 10;

Fig. 14 is a side view partly in section of the mechanism for reciprocating the back;

Fig. 15 is a side view of the yoke and associated parts constituting a part of the said back moving mechanism;

Fig. 16 is a view mainly in diametrical sec-

tion of the toggle link mechanism for reciprocating the back;

Fig. 17 is a detail of the toggle link adjusting worm;

Fig. 18 is a detail of the toggle link eccentric stud;

Fig. 19 is an end view of the same, looking in the direction of the arrow 19 of Fig. 18;

Fig. 20 is a sectional view on the line 20—20 of Fig. 16;

Fig. 21 is a similar view showing the operation of the switch box roll;

Fig. 22 is an enlarged sectional view on a horizontal plane of one edge of the mold, showing the matrix bar turned to proper position and the clip in position to hold the matrix and how the box closes without operating the electric switch;

Fig. 23 is a side view of the same, looking in the direction of the arrow 23 of Fig. 22;

Fig. 24 is a view similar to Fig. 22 showing the position when the matrix clip is not locked before the back starts to close, thereby operating the switch;

Fig. 25 is a side view of the same, looking in the direction of the arrow 27 of Fig. 26.

Fig. 26 is a view similar to Fig. 22 showing the position of the parts when the matrix clip is not set to grip the matrix, thereby operating the switch;

Fig. 27 is a side view of the same, looking in the direction of the arrow 27 of Fig. 26.

Fig. 28 is a plan of the back and cylinder separated, indicating the movement of the saw;

Fig. 29 is a side view partly in section of the saw supporting and operating means;

Fig. 30 is a side view of the saw cam locking mechanism;

Fig. 31 is a diametrical sectional view of the same on the line 31—31 of Fig. 30;

Figs. 31^a and 31^b are diametrical sectional views showing a modification in two positions;

Fig. 32 is a sectional view showing the position of the cam and cam roll thereof;

Fig. 33 is a side view of the pump operating mechanism;

Fig. 34 is a sectional view of the operating means therefor;

Fig. 35 is a plan view of a connecting means used in the pump operating mechanism, looking in the direction of the arrow 35 of Fig. 33.

Fig. 36 is a sectional view of the pump on the line 36—36 of Fig. 1;

Fig. 37 is a side view of the upper part of the same looking in the direction of the arrow 37 in Fig. 36;

Fig. 38 is a plan view of the counting mechanism;

Fig. 39 is a sectional view of the pivot connection therefor taken on the line 39—39 of Fig. 38;

Fig. 40 is a diametrical sectional view of

the differential used in the counting mechanism, taken on the line 40-40 of Fig. 38, and

Fig. 41 is an end view of the same looking in the direction of the arrow 41 in Fig. 40 showing how the counting mechanism indicates the count.

The making of a stereotype plate on an upright machine which casts the plate and saws the ends is a laborious job for the operator. He has to control manually three operations, opening and closing the mold, pouring the metal, and severing the tail. This invention is designed to provide for controlling automatically by the machine, without any effort on the part of the operator, except to start and stop the motor, these three operations. Furthermore it is necessary at times to cause the mechanism to perform the operations appropriate to each of these operations separately without casting a plate, and this machine is provided with means whereby these motions can be performed each by itself without running the whole machine or running a plate through the machine.

The device is provided also preferably with a counter and with means for preventing the operation of the counter when the machine is operated so as to test it without casting a plate, and means for subtracting on the counter to compensate for imperfect plates that may have been run through. This will indicate the general nature of the invention, although many operations have not been mentioned.

The machine is shown in the drawings as mounted on a frame 1 and run by a motor 2 carried by the frame. This motor, by a sprocket chain or belt, drives the driving shaft 3. This chain or belt operates a sprocket wheel or pulley 4 directly and this is loose on the shaft. This wheel is connected with the shaft through a hub 5 keyed to the shaft 3 and connected to the wheel 4 by a shear pin 6 for an obvious purpose.

On the main shaft 3 are the means for operating the various parts of the machine. A worm 7 drives a shaft 8 from which is driven a gear 9 on a Geneva driving shaft 10. The shaft 10 is mounted in two bearings 11 on the frame and is capable of sliding in these bearings as well as rotating.

The gear 9 has integrally mounted thereon a segmental circular projection 12 which constitutes a part of a Geneva motion, the other part of which comprises a wheel 13 which is provided with four radial grooves 14 and four segmental recesses 15 placed as usual in the Geneva motion. These segmental recesses fit the circumference of the projection 12 as indicated in Fig. 5, and the Geneva wheel 13 of course cannot operate while the parts are in the position shown in that figure, i. e. while the segment 12 is in engagement with the segmental recess 15.

On the gear 9 is a roll 16 which is adapted to engage in the radial grooves 14 for the purpose of rotating the wheel 13 when the parts come to the proper position and the projection 12 passes out of contact with the recess 15. The radial grooves 14 are arranged so as to be in tangential position with respect to the gear 9 when the roll enters them and also when it leaves them. Thus the stop and start of the wheel 13 are gradual and smooth.

This wheel 13 is provided with an internal gear 17 on the back side, and is mounted in bearings which receive an integral stud at the center of the wheel. This gear 17 operates a gear 18 which is mounted slidably and freely on the column 19 of the rotatable cylinder or core 20 and causes the operation of this core to rotate it a half revolution.

When it is desired to stop the rotation of the core, the following mechanism is employed. A hand lever 21 pivoted on a stud 22 is provided with a roll 23 which runs in a groove 24 on the hub of the gear 18. When this handle is pressed up the gear 18 will be forced down against the opposition of a spring 25 but its teeth do not come out of mesh with the teeth of the internal gear 17.

Fixed to the cylinder itself is a barring collar 26 which has radial openings 27 for the reception of the end of a bar adapted to be inserted by hand and turned to rotate the core as may be desired when it is disconnected from the drive.

The bottom of the gear 18 is made of a non-circular shape, preferably that indicated in Fig. 12. That is, it has two opposite concentric circular portions 28 and two concentric circular portions 28^a drawn on a smaller radius. This fits an opening of the same size and shape formed in the barring collar 26. Therefore, it will be seen that the lower shouldered portion of the gear 18 can move down into the barring collar so that it no longer registers with the opening in it, and after it has moved down, the turning of the gear will not rotate the cylinder 20, as the projection 28 can rotate freely in a circular opening of the same diameter. When the handle 21 is released the gear 18 can move up when the cylinder 20 is turned back to its original position or a position diametrically opposite or when the gear 18 is so turned. When that happens the spring 25 will raise the gear 18 and the projections 28 will rotate the cylinder. To limit the uppermost position of the gear 18 a plate 29 is fastened to the top of the barring collar 26 and provided with a circular portion of the same radius as the surfaces 28^a.

The gear 9 is mounted to slide vertically so as to bring the roller 16 out of engagement with the wheel 13 and prevent the operation of the core during a revolution of the shaft 10 to which the gear 9 is fixed. On the shaft 3 is a worm 30 which drives the mechanism

for operating the back of the mold, but also has a connection with the operation of the cylinder 20. It directly drives a worm wheel 31 to which is fixed the back and controlling cam 32 which carries the pouring cam 33.

The casting box cam is fixed on a shaft 34 on which is a cam 35. This cam operates a roll 36 on a pivoted arm 37 to which is pivoted a link 38 connected with an arm 39 on a shaft 40. This shaft has another arm 41 carrying a counterweight 42 for counterbalancing the weight of the parts.

On this shaft 40 is a yoke 43 which engages pins 44 mounted on a head 45 pivotally mounted on the bottom of the shaft 10. When the cam 35 moves around to the high part, that is, the position opposite that shown in Fig. 10, the shaft 10 will be raised from the position shown in Fig. 8, and the gear 9 will be raised with it, taking the roller 16 out of registration with the grooves in the Geneva stop wheel 13. This occurs once during each revolution of the shaft 34, and the gearing is so timed that it occurs once during every alternate revolution of the Geneva gear 9. In this way during every cycle the Geneva roller 16 will pass above and out of mesh with the Geneva cam during one of its revolutions, and during the subsequent revolution in the same cycle it will enter the slot of the Geneva cam and rotate it a quarter turn. The latter is geared to the cylinder 20 through the gears 17 and 18 in a ratio to cause the cylinder to rotate through a half revolution during the portion of the cycle indicated on the diagram, Fig. 3. As the Geneva action is positive it does not permit any overrunning and there is no need for detents or ratchet action. No shock is felt at either the stopping or starting as the cylinder partakes of the characteristic gradual action at these points of the Geneva movement.

Before leaving the subject of the rotatable cylinder 20, which constitutes the core of the mold, it is to be stated that this cylinder is cooled in a more efficient way than has been the case heretofore. This method of cooling differs from the existing methods in the manner of introducing the water into the interior of the cylinder. Heretofore this has been done by spraying the inner surface of the cylinder through a large number of small orifices in the walls of the tube surrounding the axle. This produces a great number of fine streams of water, some of the openings for which were likely to be clogged up because of their small size, and the water was delivered in a spray which was retarded somewhat by the air.

In this instance the water is delivered through a central passage 48 up through the column and is connected with suitable passages 49 of comparatively large size with a hollow head 50 which is cylindrical in form and receives the water under full pressure.

In the top of this head on the outer surface are a small number of comparatively large perforations 51 through which the water flows in a quiet manner, without producing a spray, against the grooved inner surface 52 of the cylinder. The upper part of this surface is curved and the water mushrooms out and flows gently down the sides of the cylinder without turbulence. In this way the plate is cooled with the use of less water than is possible by the use of the sprinkler above referred to, because all of the water ejected from the header is used to cool the plate and none of the efficiency is lost by the water rebounding or splashing off the inner walls of the cylinder. The holes 51, being larger, there is little likelihood of small matter clogging them. The water is controlled by a valve 53 placed on the supply line operated by a lever 54.

As will be seen later, this lever is connected with the mechanism for controlling the pour so that when no metal is delivered to the mold, no water is delivered to the interior of the cylinder. This avoids the chilling of the mold prior to the casting of the plates. The water for cooling the back is controlled by the same lever and passes through flexible pipes 56 for that purpose.

For the purpose of operating the back, the cam 32 is provided as stated. The groove of this cam operates a roll 57 which is mounted on a worm wheel segment 58 pivoted on a stud 59. This worm wheel segment therefore oscillates as the gear 31 turns. It meshes with a gear segment 60 fixed on a sleeve 61 which is mounted on the shaft 34. This sleeve 61 is provided with arms 63 which support studs 64. Each of these studs has an eccentric portion 65 and is adapted to be turned through a worm wheel 66 thereon. A shaft 67 having a worm 68 and having threaded engagement at 69 with projections on the arm 63 which is provided for turning this stud 64. These two shafts 64 support the ends of toggle links 70 and on account of the possibility of turning the shaft 64, these toggle links can be adjusted out and in to get the proper position. These toggle links are pivotally connected with the back 71 of the mold and the whole mechanism is adapted to open and close this mold or back against the cylinder 20. The back is mounted as usual on two wheels 72 on each side running on horizontal tracks 73. Thus the turning of the segment 58 will open and close the mold without operating the shaft 34 thereby.

On the sleeve 61 is a cam 75 which, of course, swings with the sleeve and when this sleeve swings to a position to open the mold the cam engages a roll 76 on an arm carried by the switch box 77 and opens the limit switch 78.

It may be stated at this time that the start-

ing and stopping of the machine is accomplished without the use of clutches, the motor being permanently connected to the shaft 3. The push button starter 79 mounted on the front of the machine has three buttons 80, 81 and 82. The stop button 82 is connected with the wiring to stop the rotation of the motor at any time. The close button 81 starts the motor from any position in which it is stopped. The open button 80 is connected in parallel with the limit switch 78, just described, which is fastened to the frame directly below the shaft 34 and is opened as stated above.

From the wiring diagram (Fig. 4) it will be seen that, unless the button 80 is held depressed, the operation of the limit switch 78 will not cause the motor to stop. When it is desired to bring the machine to a standstill, however, which occurs only when the box is open, the push button 80 is depressed and the motor continues to rotate until the shaft assumes the position for operating the cam 75 and thereby operating the limit switch. Both these contacts being broken, the machine will stop at that point.

In case the operator should neglect to close the matrix clips or should unlock the matrix bars and start the machine into operation, a serious mishap would occur. The back 71 is of the usual type otherwise and is provided with the usual matrix bar 83 and the usual clip 84 on each side to hold the matrix. On one clip is mounted a cam plate 85 provided with an upwardly extending cam surface 86 and a space 87. This cam has a rounded formation for a reason as will appear and it co-operates with a roller 88 on the arm 89 of a switch 90, which is fastened to the frame 1 of the machine. This is a limit switch and when actuated by the cam breaks the circuit in the same manner as is done by pushing the button 82 at the push button station and prevents the motor from driving the machine further until the improper setting of the clips or bars has been rectified. The motion of the clip is the same as usual, that is, slanting on account of the usual inclined slots 91.

It will be seen that the cam will pass by the roller 88 when the clip and matrix bar are in the position they should occupy for the proper functioning of the machine as shown in Figs. 22 and 23. That is, the space 87 will receive the roll 88 and the projection 86 will not touch it. However, if the matrix clips are allowed to remain unlocked as shown in Figs. 26 and 27, the lower portion of the cam plate 85 will touch the roller 88. Also if the matrix bars are allowed to remain in the position shown in Figs. 24 and 25, the projection 86 will engage the roller 88 and in either case the limit switch 90 will be actuated, thus breaking the circuit and preventing the machine from operating. The lubri-

cating system 92 is operated from the motor shaft by a chain 93 and sprockets.

As is usual the tail is severed from the plate while the cylinder makes a half revolution carrying the plate upon it half way around it from the casting to the delivery position. For accomplishing this purpose in time with the operation of the casting box 71, the segment 58 which directly operates the casting box also meshes with a gear segment 94 loose on a shaft 95. This segment is provided with a radial arm 96 and a saw cam 97 has a cam groove 98 which controls the operation of a roller 99 mounted on a yoke 100 for moving this yoke back and forth. The yoke is provided with a space 101 having parallel sides engaging the opposite parallel sides of a block 102 on the shaft 95.

Therefore, it will be seen that the yoke can be moved back and forth by the cam groove 98 and will remain in the same position horizontally. This yoke is provided with an arm extending in the same direction as the yoke. This arm is formed with a suitable eye by means to which it is connected with a lever 104 connected with the saw hanger 105 which is pivoted about a vertical shaft 106. By this means the saw hanger is swung in time with the operation of the back, and also of the core, so as to bring the saw into operation and swing it back away from the core 20 at the proper intervals. The shaft 106 is operated by gears 107 from the shaft 3 and by gearing 108 it operates the saw shaft 109 continuously to rotate the saws 110 and 111 at a high speed. They cut off the tail and trim the opposite end of the plate.

The arm 96 gives the cam 97 an oscillatory movement through a pin 112 entering a hole in the cam itself. The parts are shown in Fig. 31 as in position for connecting the arm 96 and the cam 97. The parts normally operate in this position but it is possible to disengage the cam from the arm so as to oscillate the saw hanger by hand, if desired, back out of position for the removal of the saw or to deliver a plate with its tail unsevered.

In order to disengage the arm from the cam it is necessary to withdraw the pin 112 against the resistance of its spring 113 by pulling it out to the circumferential groove on the end of the pin. This pin is provided with two circumferential grooves 114, each adapted to engage a spring-pressed ball 115 to hold the pin in either extreme position. The pin passes through a hole in a plate 116 which is provided with a slot 117 for receiving a guide pin 118 and also has a roll 119 for engaging a cam 120 on the end of the arm 96. A spring 121 and plunger force the plate inwardly so as to keep the roll on the cam surface.

In the position shown, the pin 112 connects the two elements 96 and 97 and when it is withdrawn it disconnects these elements and

also moves back out of the hole in the plate 116 and allows the spring 121 to force that plate back, leaving the cam 97 hanging down loosely from the shaft 95. Thus it is possible to oscillate the saw frame by hand. However, every time the arm 96 reaches the end of its stroke the cam 120 pushes the roll 119 out and brings the hole in the plate 116 into registration with the pin 112 so the pin can be pushed in to connect the arm 96 and cam 97 positively.

A simpler means for accomplishing these results is shown in Figs. 31^a and 31^b. The arm 96 has a notch or tooth 120^a in its edge. The cam 97 has a bracket 97^a fixed thereon, carrying a stud 118^a on which is pivoted an arm 116^a having a tooth or abrupt end 112^a. A spring 113^a normally swings the arm 116^a to the position shown in Fig. 31^a. Here the teeth 112^a and 120^a engage each other, and the members 96 and 97 are locked together. To provide for operating the saw frame by hand a rod is introduced into a hole 117^a in the arm 116^a and it is moved to the position shown in Fig. 31^b. Then using this rod as a handle, the cam 97 can be rocked back and forth at will.

For the purpose of pouring the metal, the cam 33, which is attached to the cam 32, operates a roller 123 on an arm or lever 124 connected by a link 125 to an adjustable pivot 126 on a lever 127. A screw 128 adjusts the pivot 126 back and forth to control the stroke.

The lever 127 is freely pivoted on a shaft 129 and has a projection provided with a shear pin 130 connected with a projection on a hub 131 fixed to the shaft 129. Also fixed to this shaft is an arm 132 which, by a piston rod 133, pivotally connected with it, operates a pump piston 134 and valve 135 in a pump cylinder 136.

The pump cylinder is located in a melting pot 137 as usual and supplies metal to the mold through a spout 138. The mount of metal to be delivered is controlled by the position of the pivot stud 126 in a slot in the lever 127. The cam 33 also is adjustably mounted on the cam 32 and the shaft 129 is equipped with a barring hub 139 having suitable holes for the reception of the end of a bar by which the pump may be operated by hand if desired.

To operate the machine without actually pouring the metal in the mold, a by-pass valve 140 is provided in the spout 138 arranged so that when the metal comes up the spout as far as this valve, if the valve is open, as indicated in dotted lines in Fig. 36, the metal will flow down through a chute 141.

This valve is operated by a hand control knob 142 which through a rod 143 and a link 144 operates an adjustable rod 145. This rod is connected with the crank 146 from which is pivotally suspended rod 147 connected with

the pivoted valve 140. The valve is opened and closed by the knob 142.

The rod 145 is provided with a pair of collars adapted, when the valve 140 is open, to swing a bell crank 148, which, through a rod 149, opens and closes the valve 53 in a water supply line which is connected by suitable piping or flexible hose to the pipe 56 and the bottom of the column 19 so as to enter through the passage 48 into the interior of the cylinder 20. Thus the mold and the core will not be water cooled when the machine is operated without pouring metal into the mold. In this way the mold can be opened and closed to try it out and the cylinder rotated in the usual way without chilling the mold before pouring the metal.

This machine is provided with a counting mechanism operated from the Geneva driving shaft 10 by means of a counter cam 152 thereon. The cam has a concentric portion and an eccentric portion, the use of which will appear, and when in position for operating the counter the eccentric portion operates a roll 153 on a bell crank 154 on a stud 155. This bell crank has a pawl 156 which operates a ratchet wheel 157 in a well known manner, in the direction of the arrow.

The ratchet wheel 157 is fixed to the bottom gear 158 of a differential which comprises, as usual, a companion gear 158^a and two pinions 159. The pinions are mounted on trunnions 160 on a spider 161, which is carried by a dome 162 which covers the differential mechanism and supports it. The differential is centered around a stud 163 fastened to the top of a casing 164 over the cylinder drive. The ratchet 157 being fastened to the bottom gear 158, the companion gear 158^a on the upper side being keyed to a rotary hollow shaft 165, and held against rotation by the engagement of a pawl with a ratchet wheel 179 fixed to the hollow shaft, and the trunnion 160 being mounted in the spiders carried by the dome 162, it will be obvious that the rotation of the ratchet wheel 157 in a step-by-step manner will rotate the dome 162. This dome is provided on its circumference with a series of numerals 166, thirty-five in number and one blank. There are thirty-six teeth in the ratchet. The turning of the ratchet through the space of one tooth will turn the dome so that the next number will appear through a side opening 167 in a circular plate 168 carried by the casing 164.

The Geneva driving shaft 10, as has been stated heretofore, makes two turns during each cycle of operations but the shaft 10 is raised during half the time, that is, during half of these turns and lowered during the other. This is for the purpose above described, that is, so that it may skip the Geneva motion during one of its rotations and enter and operate it during the other.

For this reason the cam 152 is equipped

with the cam portion as stated and with a concentric portion so as to operate the roller 153 only on every other rotation of the shaft 10. This causes one oscillation of the lever 154 and one operation of the pawl 156 to take place during two revolutions of the Geneva driving shaft, thus providing an exact count of the plates produced.

On account of the number of teeth on the ratchet wheel 157 and the differential gearing, each oscillation of the lever 154 will turn the dome to rotate it through one thirty-sixth of a revolution, as stated.

When it is desired to operate the machine without casting a plate it is of course desired also that the counter shall not act, even though the machine moves through a complete cycle. In order to accomplish this the link 144 is rigidly fastened to a lever 170 so that the lever is operated when the handle 142 is moved. This lever is provided with a cam 171, which engages a roll 172 on the pawl 156 and when turned to the left in Fig. 38 holds the pawl out of engagement with the teeth of the ratchet wheel. This prevents counting when the machine is operated without pouring.

By the above means the actual number of plates will be counted but sometimes one or more plates are cast in a defective condition and have to be thrown out. In order that the count may not indicate the casting of such plates, means is provided for subtracting from the count the number of plates which have been thrown out. This is operative by hand by means of a push button 175 which is normally held out of operation by a spring 176. When pushed in, as indicated by the arrow in said figure, a pivoted pawl 177 normally held against the stop 178 will move up into engagement with the teeth of a left-handed ratchet wheel 179 mounted directly on the hollow shaft 165 and therefore directly connected with the upper bevel gear 158^a. At the same time the gear wheel 158 cannot rotate owing to the co-operation of a spring controlled pawl with the ratchet wheel 157, as shown in Fig. 38.

Pushing in this rod the full distance thus rotates the differential backward and causes the drum carrying the counter plate, on which are the numerals, to rotate backwardly one number. This is due to the fact that the ratchet 179 has thirty-six teeth.

The operation of the subtracting button can be performed at any time during the cycle of operations of the machine whether the adding mechanism is in operation at that instant or not. This is due to the fact that each of the ratchet wheels is connected with a different gear of the differential mechanism, thus one operation cannot interfere with the other.

It will be seen therefore that the above mentioned objects are all accomplished in a

simple and effective manner by this mechanism. The push button station, the pouring control knob or handle 142 and the subtracting button 175 constitute the entire means by which the machine is controlled and they are all grouped directly in front of the operator in a convenient position. The operator does not have to pour the metal, move the mold or back or turn the cylinder by mechanical means in which he has to move any heavy parts. It is controlled mostly by electrical means and the mechanical means of control are used only when the machine is to be operated without casting a plate or when the count is to be reversed to correct the count for plates thrown out, because defective or for any other reason.

Although I have illustrated and described only a single form of the invention I am aware of the fact that modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited in this respect but what I do claim is:—

1. In a stereotype plate making machine, the combination with an upright cylinder, an upright back, a pouring device and a plate trimming device, of a source of power, an element to which the source of power is connected to operate continuously and means operated by said element for automatically intermittently rotating the cylinder, reciprocating the back horizontally, pouring the metal into the circular end of the mold and trimming the tail off the plate.

2. In a stereotype plate making machine, the combination with an upright cylinder, an upright back, and a pouring device, of a source of power, an element to which the source of power is connected to operate continuously and means operated by said element for automatically intermittently rotating the cylinder, reciprocating the back horizontally, and pouring the metal at the end of the mold.

3. In a stereotype plate making machine, the combination with an upright cylinder, an upright back and a plate trimming device, of a source of power, an element to which the source of power is connected to operate continuously and means operated by said element for automatically intermittently rotating the cylinder, reciprocating the back horizontally and trimming the tail off the end of the plate while on the cylinder.

4. In a stereotype plate casting machine, the combination with a vertical cylinder and back, of a motor, a wheel connected with the motor to operate continuously, a shaft on which the wheel is rotatably mounted, a hub keyed on the shaft, a shear pin connecting said hub and wheel and means connected with the shaft to operate continuously therewith for intermittently rotating the cylinder and

reciprocating the back in a horizontal direction toward and from the cylinder.

5. In a stereotype plate casting machine, the combination with a vertical cylinder and back, of a motor, a shaft connected with the motor to operate continuously, means connected with the shaft to operate continuously therewith for starting the cylinder into motion slowly, rotating it through a half turn and bringing it to a slow and gradual stop, and means for then positively holding it stopped during a period equal to that taken up by its semi-rotation.

6. In a casting machine, the combination of a driving pinion, a Geneva motion comprising a gear meshing with said pinion, and a wheel, a rotatable cylinder constituting a part of a mold connected with the wheel to be operated thereby, and means for moving the gear in an axial direction out of engagement with the pinion and with the other part of the Geneva motion.

7. In a casting machine, the combination of a driving shaft, a pinion connected therewith to be rotated thereby, a Geneva motion comprising a gear meshing with said pinion and a second wheel, a rotatable cylinder constituting a part of a mold connected with the second wheel, and means for moving the gear in an axial direction out of engagement with the pinion and with the second wheel after each half turn of the cylinder, to prevent the rotation of the cylinder during every alternate rotation of the gear.

8. In a casting machine, the combination of a driving shaft, a pinion connected therewith to be rotated thereby, a Geneva motion comprising a gear meshing with said pinion and a second wheel, a rotatable cylinder constituting a part of a mold connected with the second wheel, means for moving the gear in an axial direction out of engagement with the pinion and with the other part of the Geneva motion, after each half turn of the cylinder, to prevent the rotation of the cylinder during every alternate rotation of the gear, a cam connected with said driving shaft for moving the gear, and means for counterbalancing the weight of the gear.

9. In a casting mold, the combination with a driving shaft, a pinion connected therewith to be rotated thereby, a Geneva motion comprising a gear meshing with said pinion and a second wheel, a rotatable cylinder constituting a part of a mold connected with the second wheel, and means for moving the gear in an axial direction out of engagement with the pinion and with the other part of the Geneva motion, the second wheel constituting a member of the Geneva motion and having an internal gear, of a vertical shaft for the cylinder, a gear free on the vertical shaft meshing with the internal gear, means for connecting said gear with the cylinder, and means for disconnecting the connecting means

to permit operation of the main shaft without operating the cylinder.

10. In a casting mold, the combination with a driving pinion, a Geneva motion comprising a wheel, a rotatable cylinder connected with the wheel, the wheel having an internal gear, and a vertical shaft for the cylinder, of a gear loose on the vertical shaft meshing with the internal gear and means for disconnecting the gear on the vertical shaft by hand from the cylinder to permit operation of the cylinder by hand independently of the rest of the machine.

11. In a casting machine, the combination with a driving means comprising an internal gear, of a cylinder constituting a part of a mold, a vertical shaft on which said cylinder rotates, a gear loosely and slidably mounted on said shaft and engaging the internal gear, a hand lever by which the gear can be raised and lowered, a shoulder on the gear, a collar fixed to the cylinder, said collar having an opening therethrough, said shoulder and opening in the plate being of non-circular shape and coincident with each other, whereby when the shoulder is lowered through the opening and turned it will be disconnected from the collar.

12. In a casting machine, the combination with a driving means comprising an internal gear, of a cylinder constituting a part of a mold, a vertical shaft on which said cylinder is rotatable, a gear slidably mounted on said shaft and engaging the internal gear, said gear having a circumferential groove, a hand lever having a roller in said groove by which the gear can be raised and lowered, a barring collar fixed to the top of the cylinder but adapted to be rotated by hand, a plate on the barring collar, a shoulder constituting the lower surface of the groove on the gear, said collar having an opening therethrough, said shoulder and opening in the collar being of non-circular shape and coincident with each other, whereby the gear drives the cylinder through the collar when the shoulder is lowered through the opening and turned it will be disconnected from the collar, and a spring for forcing the gear up whenever the shoulder and opening come into registration.

13. In a casting machine, the combination with a driving means comprising an internal gear, of a cylinder constituting a part of a mold, a vertical shaft, a gear slidably mounted on said shaft and engaging the internal gear, a hand lever by which the gear can be raised and lowered, a plate fixed to the top of the cylinder, a shoulder on the gear, a collar on the cylinder having an opening therethrough, the opening and the shoulder being of such shape that they will come into registration at the end of every half revolution and the cylinder will be driven by the gear through said collar, whereby when the

shoulder is lowered through the opening and turned it no longer drives the cylinder and a spring for forcing the shoulder out at the end of a half revolution.

position at the beginning of the closing motion of the back.

14. In a stereotype plate casting machine, the combination of a gear segment, means for oscillating it periodically, a second gear segment meshing therewith, a shaft on which the second gear segment is mounted, pairs of arms on the shaft, an eccentric pin mounted on each pair of arms, a worm on each pin, an adjusting screw for each worm adapted to be turned to change the eccentric position of the pin, toggle links connected with eccentric portions of said pins and adapted to be adjusted thereby and a mold member connected with the toggle links to be operated thereby.

19. In a stereotype plate casting machine, the combination with a water cooled back, of a hollow cylindrical core, a column extending through the core for supporting it, means for introducing water into the interior of the column, said column having a passage for the water and side passages therefrom near the end of the column and being provided with a head inside the hollow cylinder having comparatively large openings for allowing the water to flow out gently and without spray or turbulence for cooling the interior of the cylinder.

15. In a stereotype plate casting machine, the combination with a power shaft adapted to rotate continuously, a rotatable cylinder and back constituting the mold, of a rotatable cam connected with the power shaft to be rotated thereby, means connected with the power shaft for operating the cylinder, a gear segment pivotally mounted and having a roll engaging the cam to be oscillated thereby, a gear segment meshing with said segment and having an arm and means connected with said arm for reciprocating the back.

20. In a stereotype plate casting machine, the combination with a driving shaft, a cylinder, a back and means for sawing the tail from the cast plate, of means connected with said shaft for operating the cylinder, back and tail sawing mechanism, said back moving means comprising an oscillatory member connected with said shaft to be oscillated thereby, and means actuated by the oscillatory member for moving the tail sawing means into and out of operative position.

16. In a stereotype plate casting machine, the combination with a core and a movable back adapted to form the mold, of matrix bars and matrix clips movably associated with the back for holding and placing the matrix, a cam carried by one of the matrix clips, a switch connected to stop the machine, said cam comprising a projecting portion which is arranged in position to operate the switch and stop the machine if the clips are left unclosed when the back starts to close.

21. In a stereotype plate casting machine, the combination with a cylinder and a reciprocable back forming the mold, of a shaft, means connected with the shaft for operating the cylinder, a cam connected with said shaft to be rotated thereby, a pivoted gear segment having a roll engaging the cam to be oscillated thereby, a second gear segment meshing with the first and connected with the back for reciprocating it, a third gear segment meshing with the first segment, a pivoted frame, a saw on the frame, means operated by said shaft for constantly rotating the saw irrespective of the position of the frame, an arm extending from the third gear segment, a loose cam normally hanging down by gravity, means for positively connecting said arm with the latter cam to oscillate them together, said means being disconnectable, a yoke having a roll engaging the second cam to be operated thereby and means connected with the yoke for moving the saw frame toward and from operative position.

17. In a stereotype plate casting machine, the combination with a core and an adjustable back adapted to form the mold, of matrix bars and matrix clips associated with the back, a cam carried by one of the matrix clips, a switch connected to stop the machine, said cam being in a position to engage the switch and stop the machine if the matrix bars are left in closed position at the beginning of the closing motion of the back.

22. In a stereotype plate casting machine, the combination with a mold, a rotary cam and a pivoted gear segment oscillated by the cam, of a gear segment meshing with the first segment, means for severing the tail from the cast plate comprising a pivoted frame, a saw on the frame, an arm extending from the latter gear segment, a loose cam, means for positively connecting said arm with the second cam to oscillate it, a yoke having a roll engaging the second cam to be operated thereby and means connected with the yoke for moving the saw frame toward and from operative position.

18. In a stereotype plate casting machine, the combination with a core and an adjustable back adapted to form the mold, of matrix bars and matrix clips movably associated with the back, a cam carried by one of the matrix clips, a switch comprising a roll for operating the switch connected to the stop the machine, said cam comprising a projecting portion which is adapted to engage the roll and stop the machine if the clips are left open, and the low portion of the cam being in a position to engage the roll of the switch and stop the machine if the matrix bars are left in closed

23. In a stereotype plate casting machine, the combination with a movable mold part

and a saw for trimming the casting produced thereby, of a swinging frame on which the saw is mounted, means for constantly rotating the saw, a gear segment for moving the mold toward and from closed position, means for swinging said gear segment, a pivoted gear segment meshing with the first, a cam movable with said second segment, a yoke having a roll thereon engaging said cam, a guide for holding said yoke in the same position all the time but allowing it to reciprocate, and means connected with said yoke to bring the saw frame into and out of operative position.

24. In a stereotype plate casting machine, the combination with a movable mold part, a saw for trimming the casting produced thereby, a swinging frame on which the saw is mounted, means for constantly rotating the saw, a gear segment for moving the mold toward and from closed position, means for swinging said gear segment, a pivoted gear segment meshing with the first, a cam movable with said second segment, a yoke having a roll thereon engaging said cam, a guide for holding said yoke in the same position all the time but allowing it to reciprocate, and means connected with said yoke to bring the saw frame into and out of operative position, of a tooth on the latter gear segment and a lever mounted on said cam and movable to two positions, in one of which it holds said arm positively with respect to said cam and thereby oscillates the cam and in the other of which it releases the cam and prevents this operation to permit the operation of the saw frame by hand and disconnect it from the power.

25. In a stereotype plate casting machine, the combination with a movable mold part and a saw for trimming the casting produced thereby, of a swinging frame on which the saw is mounted, an arm, means for oscillating the arm, a loose cam, a yoke operated by the cam, means connected with said yoke to bring the saw frame into and out of operative position, a pin mounted on said arm and movable to two positions, in one of which it holds said cam positively with respect to said arm and thereby oscillates the cam and in the other of which it releases the cam and prevents this operation and thereby permits the operation of the saw frame by hand and disconnects it from the power, a sliding plate carried by the arm, a roll on the sliding plate, a cam on the arm engaging the roll, said plate having a perforation for said pin, whereby, when the pin is drawn out, the plate can be moved so as to prevent the pin moving in, and a spring for so moving the plate.

26. In a stereotype plate casting machine, the combination with a main shaft adapted to be driven constantly, a movable casting box, a pump and means connected with the shaft for operating the casting box and pump,

said means comprising two cams fixed together and rotatable by the shaft, and a shaft on which said cams are fixed, of a switch box having a roller in position to be engaged by one cam once during each rotation of the shaft, two circuits in parallel adapted when both are open to stop the operation of the machine, said switch box being arranged in one of said parallel circuits, and a stop button in the other, whereby when the stop button is closed the machine will stop only when said cam operates the switch.

27. In a stereotype plate casting machine, the combination of a main shaft adapted to be driven constantly, a movable casting box, a pump and means connected with the shaft for operating the casting box and pump, said means comprising two cams fixed together and rotatable by the shaft on another axis, one for operating the box and the other for operating the pump to pour the metal, a roller cooperating with the pouring cam and adjustable means connected with said roller for operating pump once during each revolution of said cam.

28. In a stereotype plate casting machine, the combination with a main shaft adapted to be driven constantly, of a movable casting box, a pump and means connected with the shaft for operating the casting box and pump, said means comprising two cams fixed together and rotatable by the shaft on another axis, a roller cooperating with one cam, a lever connected with said roller, an arm projecting from the lever, a hub pivoted on the same axis as the lever and having an arm projecting therefrom, the pump being positively connected with the hub, and a shear pin connecting said two arms.

29. In a casting machine, the combination with a main shaft, a cylinder, a back, and means operated by said shaft for intermittently rotating the cylinder and for reciprocating the back, of a pump for introducing metal into the mold formed by the cylinder and back comprising a piston, means operated by said shaft for reciprocating the piston when the mold is closed to discharge the metal into it, a by-pass for discharging the metal before it reaches the mold and preventing the pump from forcing the metal into the mold, a valve for controlling the admission of metal into said by-pass and hand operated means for operating said valve.

30. In a casting machine, the combination with a main shaft, a cylinder, a back, means operated by said shaft for intermittently rotating the cylinder and for reciprocating the back, a pump for introducing metal into the mold formed by the cylinder and back comprising a piston, means operated by said shaft for reciprocating the piston when the mold is closed to discharge the metal into it, a by-pass for discharging the metal before it reaches the mold and pre-

venting the pump from forcing the metal into the mold, a valve for controlling the admission of metal into said by-pass and hand operated means for operating said valve, of means for supplying water to the interior of the cylinder and back and means connected with said hand operated means for shutting off the water when the said latter means is operated to prevent the discharge of metal into the mold.

31. In a stereotype plate casting machine, the combination with a main shaft, a cylinder, a movable back, and a metal pumping device, of hand means operated by said shaft for actuating the cylinder, back and pumping device, a counter and means operated by said shaft for actuating the counter to show the number of plates cast.

32. In a stereotype plate casting machine, the combination with a shaft adapted to be operated by power, a cylinder, a back, and means operated by said shaft for actuating the cylinder and back to close the mold formed thereby and open it, of a counter for indicating the number of plates cast, said means for actuating the cylinder comprising a shaft, a cam on said shaft and means operated by said cam for operating the counter.

33. In a casting machine, the combination with a cylinder and back, of means for operating them to open and close them to form a mold and discharge the casting therefrom, said means for operating the cylinder comprising a shaft movable axially, a cam on said shaft having a non-circular and circular portion in different planes, a bell crank having a roll thereon adapted to engage the cam, either on the circular or non-circular portion according to the position of the shaft, a counter, and means connected with the bell crank for operating the counter each time the cylinder is turned to indicate the casting of a plate if the roll is on the non-circular surface of the cam.

34. In a casting machine, the combination with a cylinder and back, means for operating them to open and close them to form a mold and discharge the casting therefrom, said means for operating the cylinder comprising a shaft movable axially, a cam on said shaft having a non-circular and circular portion in different planes, and a bell crank having a roll thereon adapted to engage the cam, either on the circular or non-circular portion according to the position of the shaft, of a counter, means connected with the bell crank for operating the counter each time the cylinder is turned to indicate the casting of a plate if the roll is on the non-circular surface of the cam, and means for moving said shaft so as to prevent the operation of the counter after each casting motion of the cam and holding it in that position during

a period of time equivalent to that employed for turning the cam.

35. In a counting mechanism for the purpose described, the combination with a rotatable shaft having a cam thereon and a bell crank adapted to be operated by the cam, of a counting ratchet wheel, a pawl carried by the bell crank for operating the ratchet wheel upon each oscillation of the bell crank and means operated by hand for holding the pawl out of operative position when desired so that the machine may be operated without registering a count, of a pump for introducing molten metal into the mold and means connected with said hand operated means and operated thereby for preventing the operation of the pump at the same time.

36. In a stereotype plate making machine, the combination with an upright cylinder and an upright back forming the mold, and a pouring device, of an element to which a source of power is connected to operate continuously, and means operated by said element for automatically intermittently rotating the cylinder, reciprocating the back horizontally toward and from the cylinder and pouring the metal into the mold.

37. In a stereotype plate making machine, the combination with a cylinder, a back, and a pouring device, of an element to which a source of power is connected to operate continuously, and means operated by said element for automatically intermittently rotating the cylinder, reciprocating the back horizontally, and pouring the metal at the end of the mold.

38. In a stereotype plate making machine, the combination with a cylinder, a back, and a pouring device, of an element to which a source of power is connected to operate continuously, means operated by said element for automatically intermittently rotating the cylinder, reciprocating the back horizontally, and pouring the metal at the end of the mold, and means for trimming the tail off the end of the plate.

In testimony whereof I have hereunto affixed my signature.

HENRY A. WISE WOOD.

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