

No. 721,117.

PATENTED FEB. 17, 1903.

H. A. W. WOOD.

AUTOMATIC STEREOTYPE PRINTING PLATE CASTING AND
FINISHING APPARATUS.

APPLICATION FILED MAR. 4, 1898.

NO MODEL.

7 SHEETS—SHEET 1.

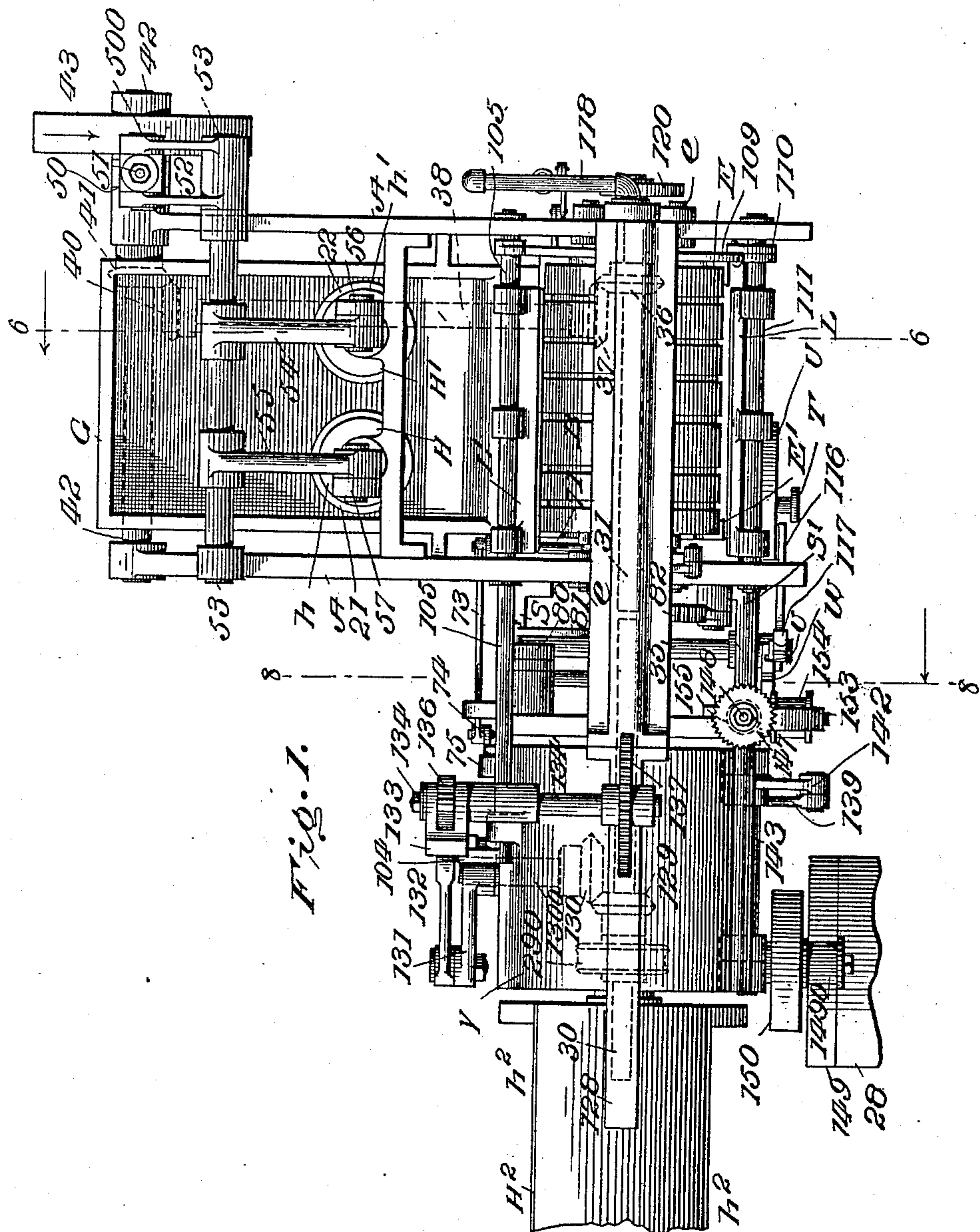


Fig. 1.

Witnesses

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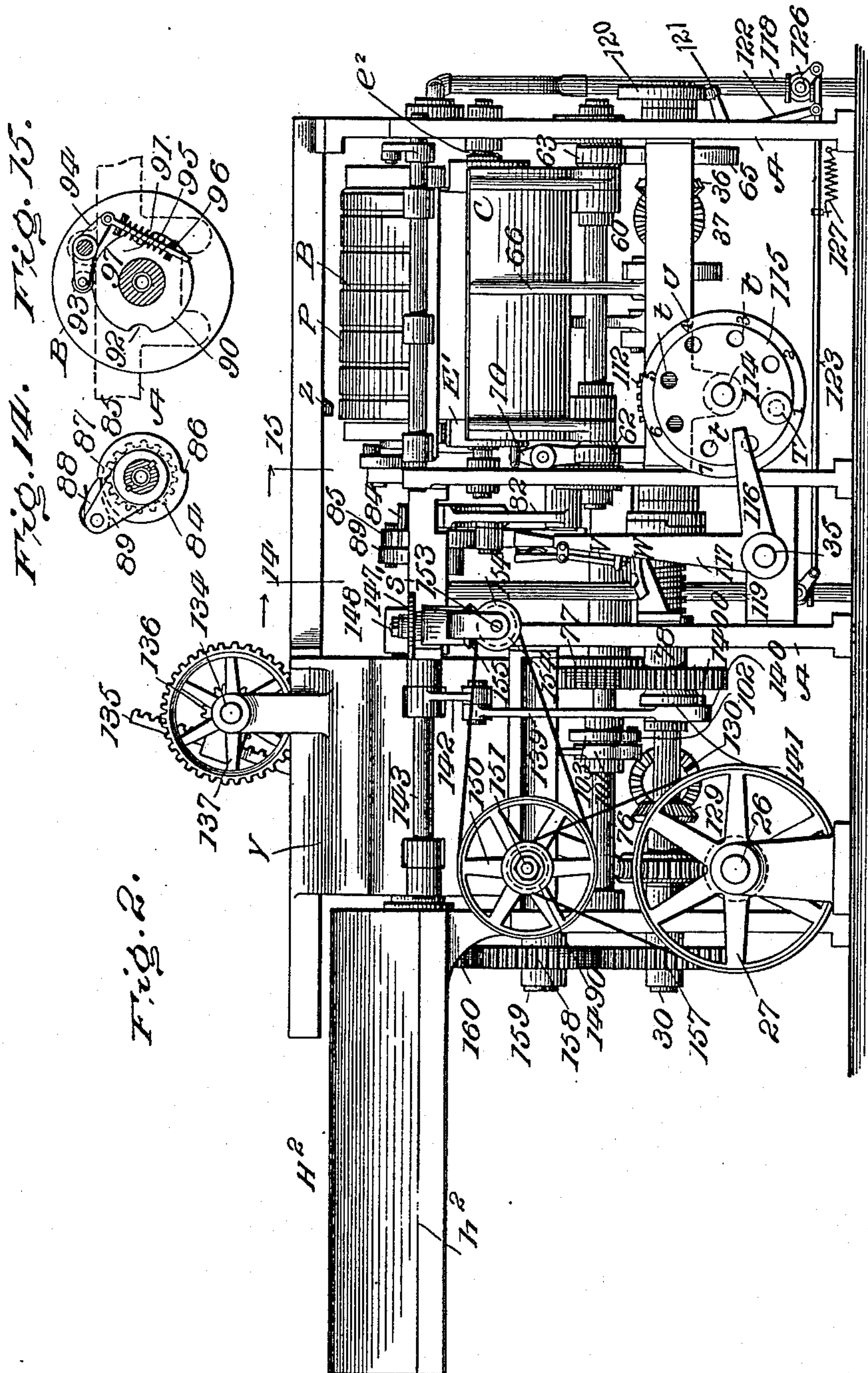
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7 SHEETS—SHEET 2.



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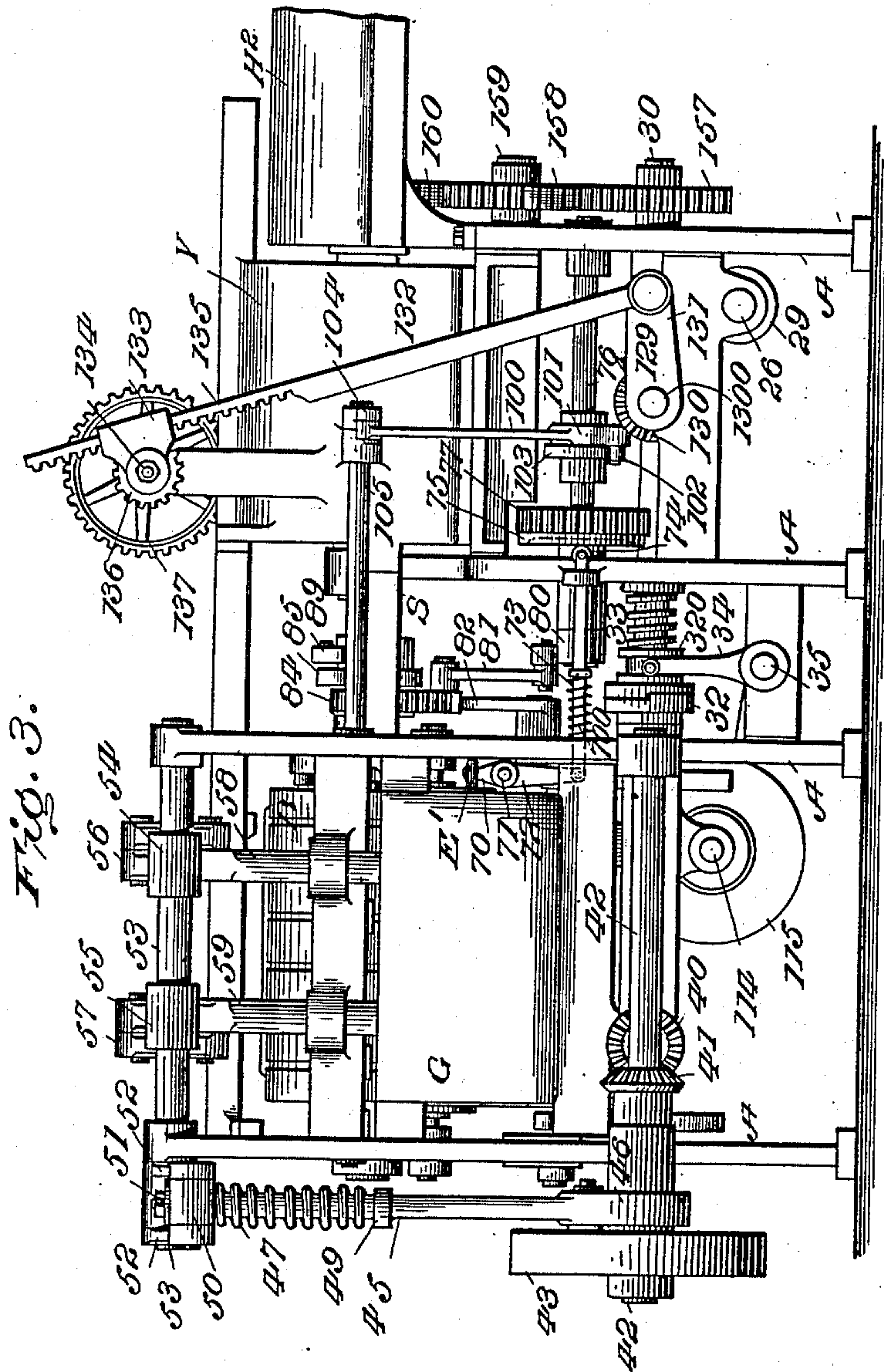
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7 SHEETS—SHEET 3.



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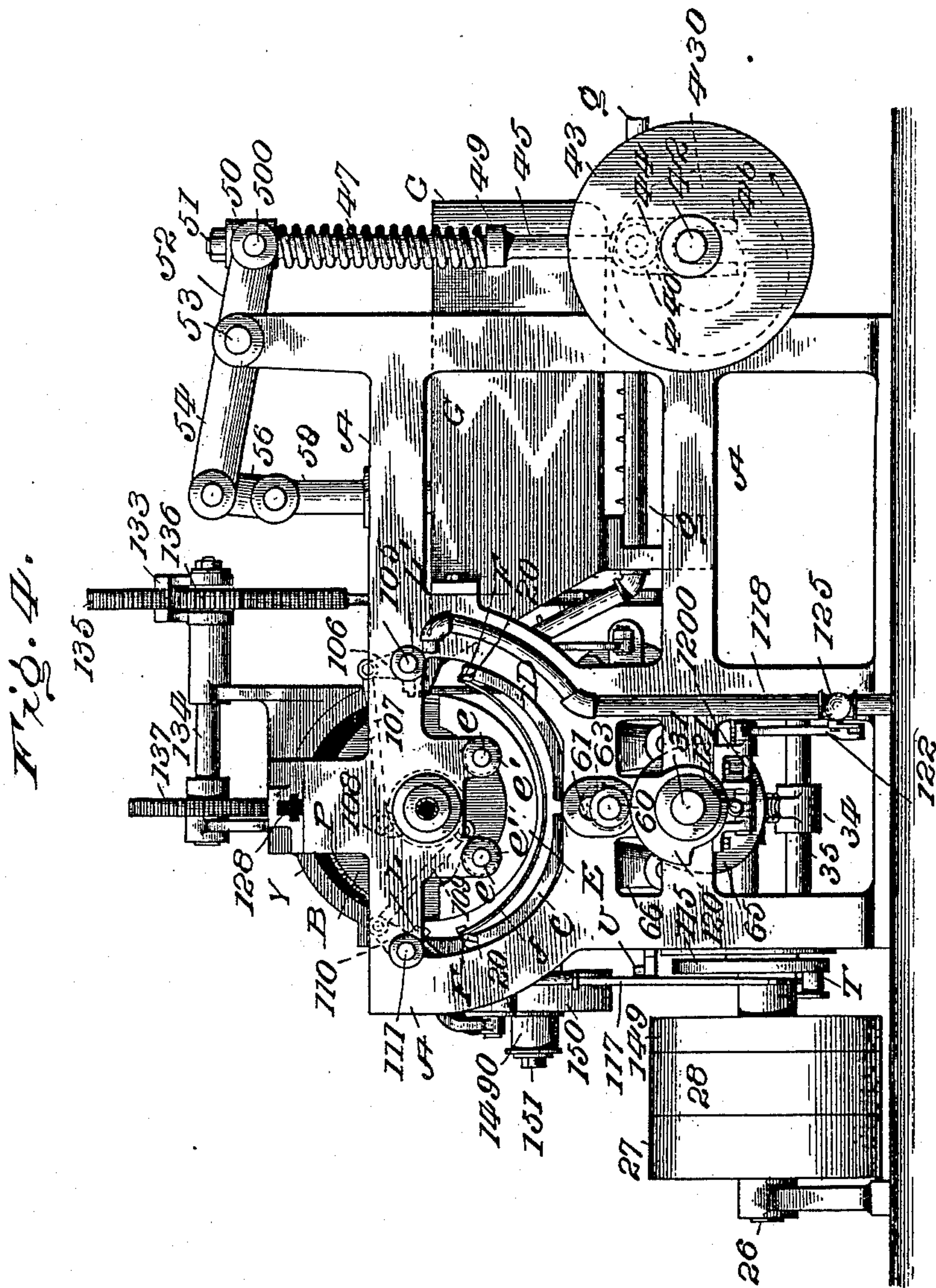
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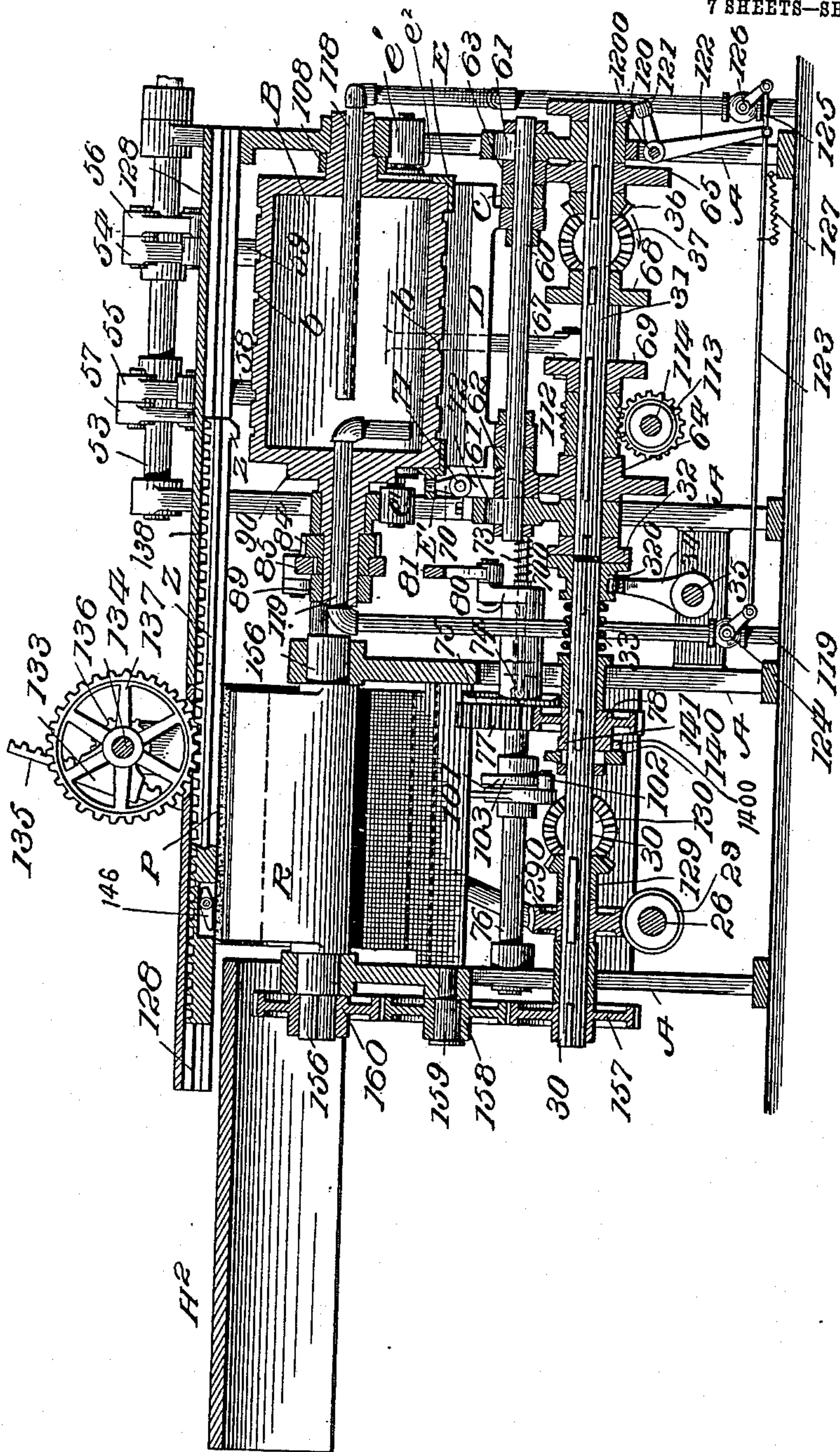
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7 SHEETS—SHEET 5.

Fig. 5.



Witnesses

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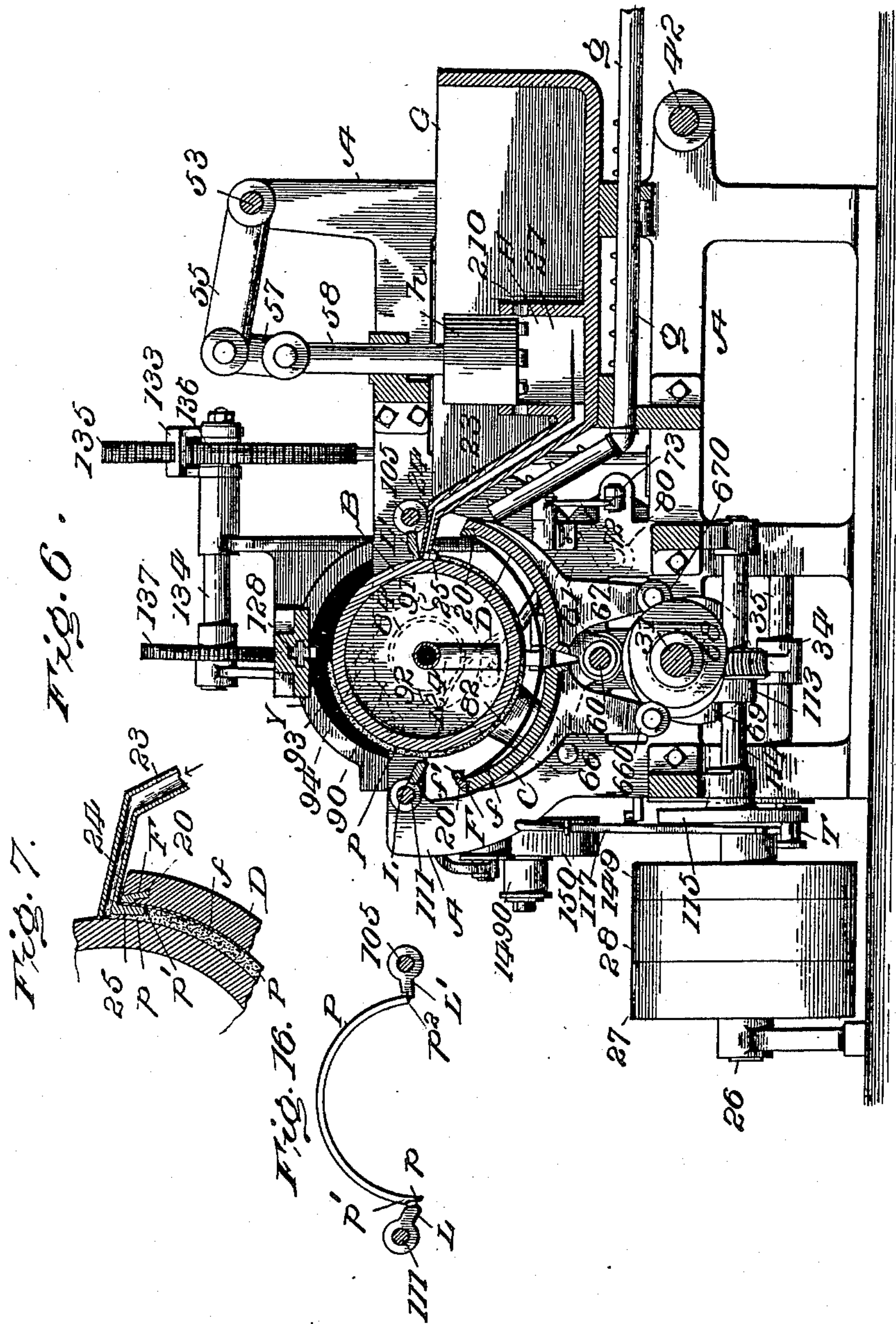
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7 SHEETS—SHEET 6.



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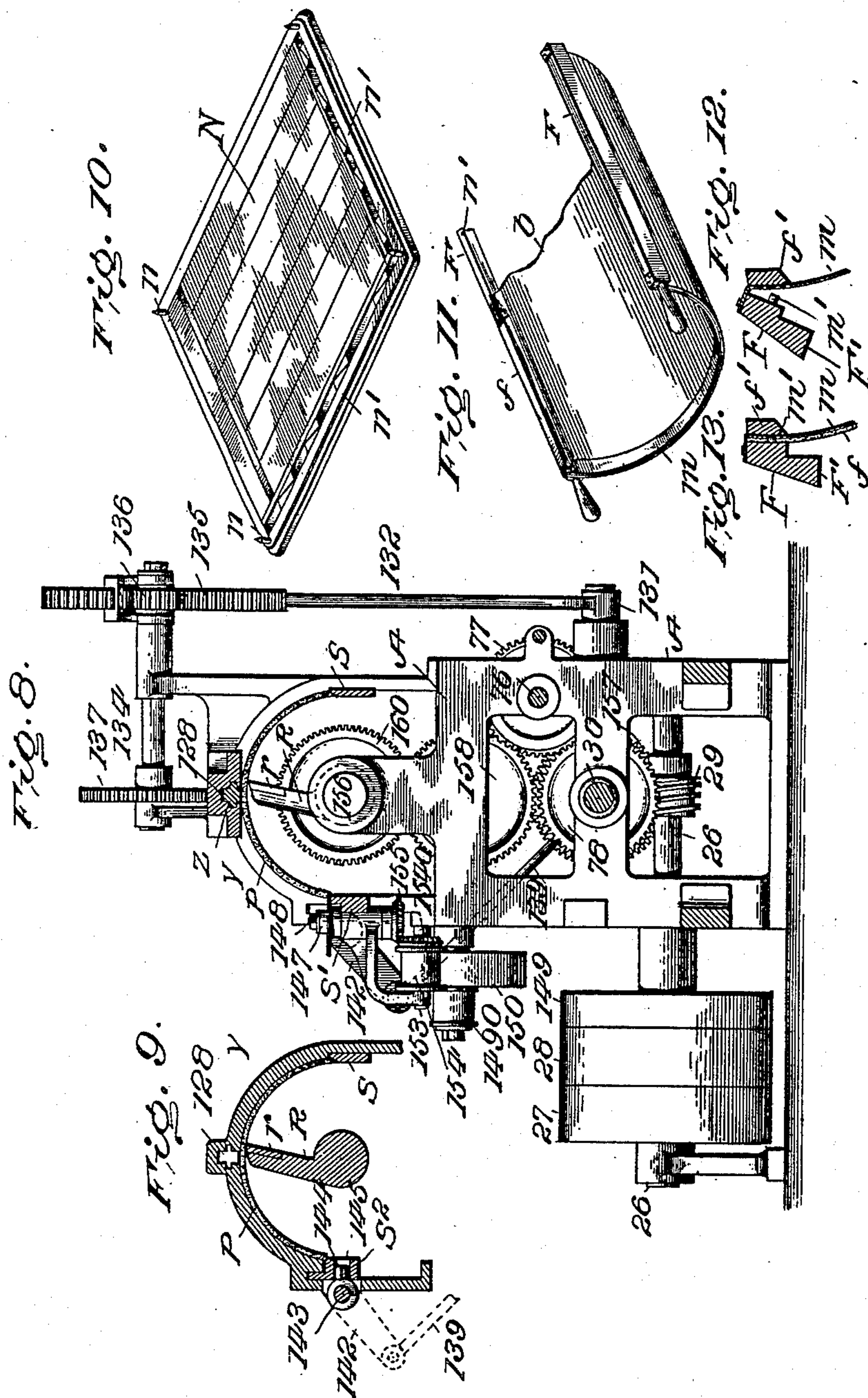
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NO MODEL.

7 SHEETS—SHEET 7.



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UNITED STATES PATENT OFFICE.

HENRY A. WISE WOOD, OF NEW YORK, N. Y., ASSIGNOR TO THE CAMPBELL PRINTING PRESS & MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

AUTOMATIC STEREOTYPE-PRINTING-PLATE CASTING AND FINISHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 721,117, dated February 17, 1903.

Application filed March 4, 1898. Serial No. 672,549. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. WISE WOOD, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Automatic Plate Casting and Finishing Machine, of which the following is a specification.

This invention is directed to the rapid production of stereotype printing-plates, and relates to a power-driven machine consisting of plate-casting mechanism combined with automatically-operating devices for operating said mechanism to automatically cast stereotype printing-plates. In combination therewith is also preferably arranged automatically-operating finishing mechanism.

By this invention many of the manual operations now necessarily incident to the ordinary methods of making stereotype-plates may be dispensed with, and by the use of this machine accurately-finished printing-plates ready for immediate attachment to the cylinders of a printing-press may be produced with great rapidity.

The invention especially relates to a machine by which a number of duplicate curved plates can be successively cast from the same matrix and each finished while in the machine.

The machine embraces three leading groups of mechanism—first, a casting mechanism and automatically-operating actuating devices, which are preferably arranged to bring a matrix into position in a casting-chamber, direct the molten metal into said casting-chamber, cool the plate, and then strip the matrix off from the surface of the plate; second, automatically-operating devices for removing the plate from the casting-chamber, presenting the plate to the finishing mechanism, and finally removing the finished plate from the machine, and, third, automatically-operating finishing mechanism, which includes devices for finishing the plate.

In the preferred construction the parts are all mounted in a strong rigid framework and the mechanisms are so arranged that the molten metal is introduced at one point of

the machine while the finished plates are delivered at another point of the machine.

The moving parts of the machine may be driven by belt or from any suitable source of power, and the gearing for the various parts has been arranged as simply and as directly as possible.

In the accompanying seven sheets of drawings, Figure 1 is a plan view of a plate casting and finishing machine constructed according to the invention. Fig. 2 is a side elevation of the machine. Fig. 3 is a rear elevation of the machine. Fig. 4 is an end elevation. Fig. 5 is a longitudinal sectional view. Fig. 6 is a transverse sectional view taken through the casting mechanism on line 6 6 of Fig. 1. Fig. 7 is an enlarged detail view of certain of the parts shown in Fig. 6. Fig. 8 is a second transverse sectional view taken on line 8 8 of Fig. 1. Fig. 9 is a detail sectional view. Fig. 10 is a perspective view of the chase which is preferably used. Fig. 11 is a detail view of a frame which may be employed for holding the matrix. Figs. 12 and 13 are detail views showing the manner in which the matrix may be fastened in the matrix-frame. Figs. 14 and 15 are detail sectional views taken on the lines 14 and 15, respectively, of Fig. 2, and illustrate details of the cylinder turning and locking devices; and Fig. 16 is a detail view illustrating the operation of certain lifting devices.

The machine has been especially designed for use in newspaper-offices.

The present manual operations involved in casting and finishing curved printing-plates are expensive and require a number of skilled laborers.

In newspaper printing-offices, moreover, the present methods of stereotyping are especially objectionable on account of the time which they require.

The especial purpose of the invention is to do away with manual operation in the process of stereotyping after the matrix has been made up to the production of the finished plate.

By the use of this new plate casting and finishing machine not only is it possible to

produce uniform and accurately-finished plates more cheaply than it has heretofore been possible, but it is also possible to make a considerable saving in the time consumed in their manufacture. This can be done, first, because a single plate can be produced more rapidly by the mechanism than can be now done by the various manual operations, and, second, because the improved machine will rapidly produce and deliver any desired number of finished plates, all cast from the same matrix. This is an exceedingly important point in practice, as it will enable newspaper publishers to keep their forms open for a longer time, so that later items of news may be reported and inserted without delaying the issue of the printed newspaper and will enable them to start their presses in successive operation in so much less time as to increase greatly the number of papers printed in the early moments of the run, when large production is most needed.

The various groups of instrumentalities which go to make up the complete machine will now be described, it being understood that it is not meant by this description of specific details to at all limit the broad terms that are used in the claims to such details.

The type N is received in the matrix-making room locked in a chase. The chase that is preferably employed has a registering pin *n* near each corner and also preferably a projection *n'*, running around the four sides thereof. The moist flog is laid and beaten onto the type and is then baked or dried in any of the usual manners. The pins *n* will prick four holes in the flog for the purpose of register, as hereinafter described. After the flog is baked or dried the same may be accurately cut to proper size, the ridge formed by the edge of projection *n'* serving as an accurate guide for this operation. The matrix *f* thus prepared is then placed in a suitable framing or clamping device. This framing consists of two side bars or members *F*, which are provided with extensions having dovetail sections *F'*, as shown, for a purpose hereinafter described, and spring-strips *m* may be secured at the inside and near the ends of each side bar or member to connect said members together. Projecting from the side bars are pins *m'*, which are arranged to fit into holes formed in the spring-strips. The matrix is clamped in place by being placed between the spring-strips and the side bars, the pins *m'* fitting into the holes formed in the matrix by the pins *n'* on the chase. A finishing-strip *f'* is secured on the spring-strips near one of the side bars *F*, for a purpose hereinafter described. By this means the matrix can be securely held at its straight edges in the side bars, and the side bars by means of the dovetails may be slid into grooves 20 of the sections C and D, hereinafter referred to, to bring the matrix into defined relation with the casting apparatus. This mechanism is referred to in the claims

as "means for holding the matrix." Other clamping or holding devices may be devised, the one previously described being a preferred device for this purpose.

In some cases it is contemplated placing the moist flog in the holding device and beating the flog onto the type and baking or drying the flog while held in the holding device, thus saving the few seconds necessary to secure the dried matrix in the holding device.

The machine for automatically casting and producing the finished plates consists of a strong framing A, in which the operative parts are arranged. In this framing are arranged three shafts 30, 31, and 76, a clutch being arranged to connect the shaft 31 to the shaft 30 when desired and the shaft 76 being geared to turn with the shaft 30 by means of gears 77 and 78. At the rear side of the machine a melting pot or tank G is arranged, and in this tank a pumping mechanism is placed for forcing or injecting the molten metal into the casting-chamber. This pumping mechanism consists in the device shown of two pumps H and H'. The pumps consist of cylinders 21 and 22, which have suitable inlet-ports 210, and each cylinder communicates with the casting-chamber by a suitable channel 23, having a spout 24, with a downwardly-extending lip 25, which has a flat end, as shown. Arranged in the pump-cylinders are the pistons *h* and *h'*, which are operated by the connections hereinafter described. A suitable heating device, as a gas-pipe *g* with various burners, is arranged under the melting-pot and also under the channel or channels 23, so as to keep the metal in the melting-pot and channel or channels in a molten condition. When the pump-pistons are raised, the metal in the channel or channels 23 will be drawn back into the pump-cylinders, and when the pistons are above the ports 210 metal will flow into the pump-cylinders from the melting-pot. When the pump-pistons are depressed, the molten metal in the pump-cylinders will be forced into the casting-chamber.

The pump-pistons *h* and *h'* are operated from the shaft 31 by the following means: Arranged on the shaft 31 is a bevel-gear 36, which meshes with and drives a bevel-gear 37, secured upon a transverse shaft 38. On the other end of this shaft 38 is mounted a bevel-gear 40, which meshes with and drives a bevel-gear 41, secured upon a shaft 42. Mounted on the shaft 42 is a cam 43, which has a suitable groove 430, fitting into which groove is a roller 44, mounted on a yoke 46, projecting from the rod 45. This rod 45 projects through a block 50, which block 50 is mounted in the crank-arms 52 by means of suitable studs 500. A nut 51 is screwed on the top of the rod 45. The rod 45 fits loosely into the block 50, and arranged between the block 50 and a shoulder 49 on the rod 45 is a spring 47. By this means a yielding connec-

tion is formed between the cam and the crank-arms 52. These crank-arms 52 are mounted upon a rock-shaft 53. Mounted on this rock-shaft 53 are crank-arms 54 and 55, which connect by suitable links 56 and 57 to the piston-rods 58 and 59 of the pumps. It will be seen that this gearing is so arranged that the pistons will make one complete reciprocation for each rotation of the shaft 31. The spring-relief is used so that the molten metal can be forced into the casting-box and pressure exerted on the metal therein as the plate solidifies, which pressure is determined by the tension of the spring 47. This mechanism forms an improved pumping device for forcing the molten metal into the casting-chamber.

It has been found to be an advantageous point to arrange the casting-chamber in horizontal position and to pump the metal in from the side thereof, as by this arrangement the downward sweep of the metal in the right-hand side of the casting-chamber, as illustrated in the cross-sectional views, will be opposed by the rise of the metal in the left-hand side, so that the pump can quickly fill the casting-chamber without the usual agitation encountered in pouring molten metal by hand. In other words, the metal is forced in uniform volume into the chamber and is pushed down on one side and rises on the other with a mechanically-controlled flow, which is checked when the chamber is filled at the pressure to which the pump is adjusted.

The casting-chamber is formed by a core consisting, preferably, of part of a cylinder B, two pivoted sections C and D, and two rings or end pieces E and E'. The sections or pieces C and D may carry the matrix-holding devices, as before described. These sections C and D together form the segmental back and are mounted or pivoted upon a shaft 60, which is placed in slots 61 in the main framing and held therein by means of collars, as shown. Mounted on the shaft 60 are rollers 62 and 63, which bear on cams 64 and 65, mounted on the shaft 31. The sections C and D have projecting arms 66 and 67, which carry rollers 660 and 670, which bear on cams 68 and 69, mounted on said shaft 31. This operating mechanism for the sections is so arranged that during the casting operation the sections will support and bring the matrix in semicylindrical position at the proper distance from the periphery of the cylinder B, so that as the molten metal is forced into the casting-chamber a curved plate of the proper thickness will be cast. After the plate has been cast this operating mechanism will move the matrix so as to strip or unwind the same from the surface of the curved cast plate. The matrix-holding devices will first move away from the cylinder to impart an unwinding or stripping movement to the matrix and so that when the matrix has been unwound in this manner from

the plate the matrix and the plate can be separated, as shown in Fig. 6. This stripping or unwinding of the matrix from the plate is a very important point in practice. It is impossible to remove the matrix in its curved casting shape bodily from the surface of the curved cast plate, for if this should be done the matrix would be injured, because portions of the surface of the matrix would be dragged across and over the raised or relief surfaces of the plate.

While it is preferred to unwind or strip the matrix from the plate from both sides, as shown, so that a very rapid operation may take place, in some cases it is contemplated unwinding or stripping the matrix from one side only.

In some cases the frames or side bars F may be omitted, the matrix then secured directly to the sides of the pivoted sections C and D.

The spring-strips *m*, when used, bearing on the inner face of the matrix will help keep the matrix in curved form and will help to strip the matrix from the cast plate.

The half-rings E and E', which form the ends of the casting-chamber under which the curved edges of the matrix (and also the spring-strips, if they are used) fit, have projecting studs *e*, which fit into lugs *e'*, carried by the frame. The ring E is generally arranged rigidly in the lugs *e'* or in the lugs *e'* with a spring-relief by putting springs *e²* between the same and said lugs, and the ring E' is operated to relieve the end of the plate, as hereinafter described, although in some cases both end rings may be operated. The mechanism for operating the end ring E' is driven from the shaft 76. A crank-arm 70 is mounted on a short shaft 71, and this crank-arm 70 engages the ring E'. Also mounted on the shaft 71 is a crank-arm 72, to which is connected a sliding rod 73, having a friction-roller 74 at its end, and also mounted on this rod 73 is a spring 700, which is arranged to normally keep the roller 74 against a face-cam 75, mounted on the shaft 76. This mechanism is so timed that when the sections are raised to close the casting-chamber the ring E' will be pushed inward and so that when the sections are moved away from the periphery of the cylinder the end piece or ring E' will be moved outwardly to free the end of the cast plate. This relief of the end ring E' is slight, so that the beveled inner edges of the half-rings E E' will act to sustain the plate against the stripping of the matrix and so that the rings will guide and support the plate from dropping off the cylinder as the latter is turned to eject the plate from the casting-chamber. The plate P that is cast in this manner will have a tail *p*, as shown in Fig. 7, which is formed between the periphery of the cylinder and the lip 25 of the spout 24. A shoulder *p'* will also be formed on the plate by the lower end of the lip 25, and this shoulder *p'* will form with the other edge *p²* of the plate accurate guiding edges, so that the plate

may be manipulated, as hereinafter described. The front face of the lug 25 is inclined outwardly and downwardly toward the segment D, so that the plate P can be withdrawn from the spout and the lug 25. The finish-strip f' , which is used in connection with one of the side bars or frames F, will form the edge p^2 of the plate, and this finish-strip will be moved to clear the plate when the section C is lowered. The periphery of the cylinder B has two series of grooves b cut therein, which will form the working or finishing ribs on the inside of the plate and which will also form a means to help in the removal of the plate from the casting-chamber, as hereinafter described.

By the mechanism before described it will be seen that the casting operation will very rapidly take place.

When the sections C and D are moved upward, the matrix is brought in position so that the plate may be cast therefrom, and when the sections move away from the periphery of the casting-cylinder the matrix f will be accurately and nicely stripped or unwound from the type-face of the plate P, and this operation takes place with the casting of each plate.

Of course the matrix either by means of the holding-frames F F or other devices might be supported in the casting-chamber by means independent of the sections C and D and might be operated to strip or unwind the matrix by other means, thus leaving the sections free to open and close without performing the function of unwinding or stripping the matrix, which would be accomplished by any suitable means, as shown in my companion application, Serial No. 672,550; but the construction which is shown and described is preferred, as it greatly simplifies the operation and the number of parts.

The core B is preferably made in the form of a complete cylinder, as shown, although the core might be made only part of the cylinder, and it is preferred to rotate instead of to oscillate the core to deliver the plate, although the oscillation of the core would accomplish the delivery as well as the rotation, as shown in my companion application Serial No. 672,552.

If desired, a cooling mechanism may be used to immediately cool the plate after the same is cast, although this mechanism is not always used. This cooling mechanism consists of a supply-pipe 118, which is connected to any suitable source of supply and which projects through one of the journals or hubs into the interior of the cylinder B. An outlet-pipe 119 is arranged to pass through the other journal of the cylinder B. The inlet-pipe in the inside of the cylinder B is perforated, so as to direct jets of water onto the interior periphery of the cylinder on which the plate is cast, and the outlet-pipe 119 is carried down to near the lower part of the inside of the cylinder B to form a siphon.

An operating-cam 120 is arranged on the end of the shaft 31, engaging which is a roller 121, mounted on a short crank-arm projecting from a rock-shaft 1200. Also mounted on the shaft 1200 is a crank-arm 122, which is connected by a rod 123 to a valve 124 in the outlet-pipe and by a rod 125 to a valve 126 in the inlet-pipe. A spring 127 may be arranged, as shown, to keep the roller 121 against the cam. This mechanism is so timed that so soon as the plate is cast the valve in the inlet-pipe 118 will be opened and the valve in the outlet-pipe 119 will be closed. This will spray water on or flood the inner surface of the cylinder, so that the periphery of the cylinder which carries the cast plate will be cooled. As the cylinder B is filled with water the air contained in the cylinder and the steam, if any is generated, will be put under more or less pressure. When enough water has been let into the cylinder to cool the plate, the valve 126 is closed and the valve 124 is opened. This will start the siphon formed by the outlet-pipe 119 in operation, and the siphon will rapidly exhaust and draw the water from the interior of the cylinder. By this means so soon as the plate is cast upon the periphery of the cylinder it may be cooled. By not starting the flow of water until the plate is cast the metal is kept at the proper temperature until the chamber is filled, and immediately the same is entirely filled the cooling commences by the flooding of the core. As before stated, the pump keeps pressure on the metal during the cooling or solidifying of the plate. This enables the metal to be worked at much lower temperature than in the ordinary stereotyping processes—that is to say, by this improvement I am enabled to work the metal at about 480° Fahrenheit, whereas the temperature of the ordinary stereotyping apparatuses is from 575° to 650° Fahrenheit. This low temperature and the maintained intimate contact between the plate and core enable me to cool the cast plate much quicker, with less shrinkage and therefore in better register, and hence adds materially to the speed of the machine and to the perfection of the plates. After the plate is cast in this manner upon the periphery of the cylinder B the cylinder B is turned or rotated to carry the plate out of the casting-box. The plate will adhere firmly to the periphery of the cylinder by means of the grooves b , so that as the cylinder is turned the plate will turn with the same, and the plate will be broken from the metal in the spout 24 at or near the end of the spout, this being the weakest or breaking point. The cylinder B thus constitutes two core-surfaces, which are alternately used in the casting of successive plates. The use of a plurality of core-surfaces coöperating with the matrix and back is a desirable point. It expedites the cooling operation and the continuation of the casting operation, as one core-surface will move into operative position as the other

core-surface moves to carry the plate out of the casting-chamber. The plate P will thus have a tail p , which has a rough or ragged edge and a finished or nice working shoulder p' . The purpose of this shoulder is now evident, as the breaking-line of the plate of course would be ragged and could not be easily or nicely used for the purpose of guiding or directing the plate, as hereinafter described.

The mechanism for rotating the cylinder is driven from the shaft 76 and may be arranged as follows: A crank 80 is mounted on the end of the shaft 76 and connects by rod 81 to a sector 82, pivoted on a suitable stud. By this means the sector 82 will be vibrated forward and backward. This mechanism is shown most clearly in Fig. 3. The sector 82 meshes with a gear 84, which is loosely mounted on the projecting hub of the cylinder B, and turning with this gear is a ratchet-plate 85, which has two teeth 86 and 87. Rigidly secured to the hub of the cylinder B is a pawl-arm 89, which carries a spring-actuated pawl 88, with which the teeth 86 and 87 of the ratchet-plate may engage. By this means for every revolution of the shaft 76 the cylinder B will be given half a revolution. It will be seen that the cylinder will remain stationary substantially during one-half of a revolution of the shaft 76 and will be turned during the other half-revolution of the shaft 76. This cylinder-driving mechanism is substantially crank-actuated—that is, it is operated by means of crank 80 and rod 81—and this is a desirable mechanism for rotating the cylinder, as the same will start the cylinder slowly in operation, thus easily breaking off the plate from the metal remaining in the spout and will gradually bring the cylinder to a state of rest, thus starting and stopping the parts without jar.

A locking mechanism is generally used to hold the cylinder in its various positions, and this locking mechanism may be arranged as follows: A hub 90 is arranged on one end of the cylinder B, and this hub has two recesses or sockets 91 and 92. A locking-roller 93 is carried by an arm 94, which is pivoted on the framing, and this arm has a projecting rod 95, which fits through a lug 96, also arranged on the framing, and a spring 97 is arranged on this rod so as to press the roller 93 into the sockets. By this means the cylinder will be held in its various positions.

The use and operation of the cylinder are now apparent.

A plate is cast on the cylinder, and the cylinder is then rotated to remove the plate from the casting-chamber, and after the plate is turned out of the casting-chamber in this manner the remaining portion of the periphery of the cylinder or the other core-surface may be used to form part of the casting-chamber for the next plate. This forms a very rapid and accurate means for casting and delivering plates, and also it will be seen that a

cylinder is a very desirable member for this use, as only part of the periphery is used for each plate, so that the cylinder will not get overheated in the operation of casting. It will also be noted that the first step in the delivery of the plate is to turn the same around with the intermittently-turning core, so that the whole surface of the plate is visible to the operator before the chamber again closes for the succeeding cast. It has been found necessary to examine each cast before the casting-chamber is again closed or has got beyond the control of the operator to stop it, and the above mechanism is admirably adapted for this purpose. In other words, the practice is as follows: The operator as the plate comes up looks over its surface and watches for pieces of broken matrix which may adhere to it. These pieces indicate a rupture of the surface of the matrix, and when they occur the casting operation should be instantly stopped and the matrix should be patched up before being used again. If these breaks are not detected after one or two casts have been made, the matrix is apt to go to pieces suddenly, which requires the making of a new matrix and the loss of much time. Therefore it is a valuable feature to have each cast present its whole surface to the eye of the operator, so that he may inspect it before the succeeding casting operation commences and so that if he finds evidence of a breaking matrix he may stop the operation at once. In other words, each cast in turn immediately after it has been made is exposed to the eye of the operator. It is also advantageous to expose the plate between the casting and finishing operations, so that any drippings of metal or adhering pieces may be removed by hand or with an instrument before the plate passes into the finishing devices, where, as in the shaver, for instance, a foreign substance remaining on the top surface of the plate might indent the plate and lead to the spoiling of its type-surface. After the plate has been moved from the casting-chamber by the cylinder in this manner it is lifted off from the cylinder by suitable detaching or lifting mechanism, which may be arranged as follows: A lifter-plate L is arranged on a shaft 111, and this lifter has a nose or projection which will engage the working shoulder p' of the plate. A similar lifter L' is mounted on a shaft 105 to engage the edge p^2 of the plate, and these parts are so arranged and actuated that when the plate is in proper position the lifters will forcibly lift the plate off of the cylinder B. This lifting mechanism may be operated from the shaft 76 by means of the following connections: A rod 100, having a yoke 101, carrying a roller 102, is arranged to bear on a cam 103, secured on the shaft 76. The upper part of this rod is connected to a crank-arm 104, mounted on the shaft 105. By this means the lifter L' will be operated. The other lifter may be operated from this shaft 105 by the following mechanism, as is shown most clearly in Fig. 4: A crank-arm 106 is

arranged on the shaft 105, and the same is connected by a rod 107 to a wrist-plate or disk 108, which is loosely mounted on the hub of the cylinder B. This wrist-plate also connects by a rod 109 to a crank-arm 110, connected to the shaft 111, and by this means the lifters L' and L will be simultaneously operated to raise the plate from the cylinder B. After the plate is lifted from the periphery of the cylinder B in this manner it may be slid along the lifters L and L' onto the skids or ways S and S' by the following mechanism: Mounted in a groove 128 is a traveler or conveyer Z, which has a small projection or tooth z, which is positioned to bear on the rear end of the plate after the same has been raised by the lifters, and this conveyer or traveler may be operated by the following gearing from the shaft 30: A bevel-gear 129 is mounted on main shaft 30 and meshes with and engages a bevel-gear 130, secured on the transverse shaft 1300. On the other end of this transverse shaft 1300 is mounted a crank-arm 131, to which is connected the rod 132, which rod 132 passes through a suitable guide 133, journaled on a shaft 134. The rod 132 has rack-teeth 135 formed thereon, which engage a pinion 136, secured on said shaft 134. Also mounted on this shaft 134 is a gear 137, which meshes with rack-teeth 138, cut in the top of the conveyer Z. By this mechanism the conveyer Z will be reciprocated by a crank-actuated mechanism—that is, it is actuated by means of crank-arm 131, which is a desirable mechanism for this purpose, as the same will gradually commence to move the plate and will bring the same gradually to a state of rest. By this means the plate is slid along the lifters L and L' and the ways S and S' longitudinally of the cylinder B. As this movement is imparted to the plate the rough edge of the plate and the projecting tail p may be cut off or this edge of the plate finished by means of a rotary cutter 147, mounted on a short shaft 148. Thus as the plate moves in this direction its edge will be trued. If desired, a similar cutter may be placed on the other side of the machine, so that both sides of the plate may be trued or finished, if desired; but the edge p² is generally accurate enough as the same is cast from the finish-strip f. As the plate is moved along in this direction it will pass into a dome or arch Y and the plate will be left in this arch and clamped in position by the following clamping mechanism, which may be actuated from the shaft 30: A rod 139, having a yoke 140 on the end thereof, carries a roller 1400, which bears on a cam 141, mounted on said shaft 30. This rod 139 connects by crank-arm 142 to a rock-shaft 143, which has small arms 144 projecting therefrom, as shown most clearly in Fig. 9. A clamping-strip S² is arranged in the arch Y, so as to be capable of a vertical movement, and the crank-arms 144 project into recesses 145 in said clamping-strip. The clamping-strip S² is arranged in

line with the skid or way S' when in its lowest position, so that as the plate is slid into the dome Y it will be brought to the position shown in Fig. 9, and when the clamp S² is actuated the plate will be tightly clamped and secured in the dome or arch Y. While in this clamped position, the interior of the plate may be trued out by the following mechanism, which may be driven from the shaft 30:

156 designates a shaft which is journaled in the framing and which is geared to the shaft 30 by means of gears 157, 158, and 160, the intermediate gear 158 being mounted upon a stud 159. The shaft 156 is arranged substantially at the center of the dome or arch Y. Mounted on this shaft 156 is an arm R, which carries a cutter r, arranged to shave or true out the inside of the plate. The cutter r is in its lowermost position when the plate is slid into the dome. By providing this cutter r with projections or tools at its ends, as shown in my companion application for patent, Serial No. 672,552, the ends of the plate may be also trued off. As soon as the plate is trued out the clamping mechanism will release the plate, and at the next movement of the conveyer Z a gravity-pawl 146 will engage the rear end of the plate and will slide the plate out onto a horse H², upon which horse the plate will be held by means of small ridges h², and this will deliver the finished plate. As successive plates are completed and delivered they will be pushed along out over the horse H². While on this horse the plates may be examined and touched up by hand, as is sometimes done. Thus the entire plate will be cast, finished, and delivered without any manual operation.

It will be seen that the pumping mechanism, the matrix-manipulating mechanism, and the cooling mechanism are actuated entirely from the shaft 31, so that a plate will be produced for each complete revolution of said shaft 31. The remaining mechanisms are driven either from the shaft 30 or the shaft 76.

The gearing for driving the shaft 30 and from the shaft 30 the shaft 31 may be arranged as follows: 26 designates a power-shaft which carries a tight and loose pulley 27 and 28, by which power may be imparted to the machine. Turning with the tight pulley is a pulley 149, which is belted to a small pulley 1490, mounted on a short shaft 151, which shaft carries a pulley 150, which is belted to a small pulley 154, mounted on the shaft 153. Also mounted on this shaft 153 is a bevel-gear 1540 which meshes with and drives a bevel-gear 155, secured upon the end of the shaft 148, which carries the cutter 147, and by this belting the cutter will be properly rotated to perform the function before described. Mounted on the shaft 26 is a worm 29, which meshes with a worm-wheel 290, secured upon the shaft 30, and by this means the shaft 30 will be driven. One section 32 of a single-toothed

clutch is keyed or secured on the end of the shaft 31, and the other section 320 of the clutch is secured by a feather on the opposing end of the shaft 30, so as to be capable of movement back and forth on said shaft. A spring 33 is arranged to keep the movable section of the clutch normally in engagement with the fixed section. Engaging the movable section 320 is a yoke 34, which is mounted upon a shaft 35, on the end of which shaft 35 is arranged a suitable operating-lever 117, by which the operator can start the shaft 31 and the mechanism driven therefrom in operation. This handle may be controlled by an automatic stopping mechanism which may be timed so that after the desired number of plates have been cast the shaft 31 will be automatically stopped. To do this, a worm 112 is arranged on the shaft 31, which meshes with a worm-wheel 113, secured upon a short transverse shaft 114. On the end of this shaft 114 is arranged a disk 115, which has a number of holes *t*. The arm 117 has a projecting arm 116, which extends over said disk 115 to be in line with the holes *t*. A pin *T* may be placed in any of the holes *t*. The disk 115 turns within a numbered ring *U*, secured to the frame. The lever 117 has any of the usual spring-catches *v*, which is adapted to engage a notch in a bracket *w*, projecting from the frame to keep the clutch disengaged. The pin *T* is inserted in the hole *t*, which comes opposite to the number corresponding with the number of plates which it is desired to cast. The worm-gearing before referred to is so arranged that one hole *t* will move past the arm 115 for each revolution of the shaft 31. Thus when the desired number of plates have been cast the pin *T* will strike on the arm 116, and by the connections before described the clutch will be disengaged and the shaft 31 automatically stopped after the desired number of plates have been cast. By this mechanism all that the operator has to do is to set the pin *T* opposite the proper number and start the machine in operation, and the casting mechanism will be stopped after the desired number of plates has been cast, while the finishing mechanism will continue to operate and will deliver the last plate cast regardless of the cessation of the casting operation. Thus by the means before described it will be seen that plates will be rapidly cast, finished, and delivered by my improved machine.

The details have been so fully described in referring to the various parts that it is not thought necessary to describe the operation of the complete machine.

It is known that there are machines now existing—as, for example, the well-known Mergenthaler linotype—in which a number of matrices are assembled in line, and then from this said line of matrices a line, or “linotype,” as it is called, is cast, these linotypes being assembled thereafter to take the place of type, a matrix being then prepared

from the assembled linotypes if the linotype-machine is used in connection with a rotary press. This invention differs radically from this in that my device relates to the automatic casting of a complete printing-plate a page from a flexible matrix, which matrix is prepared from type—as, for example, either the ordinary type set up in a chase or the linotypes set up in the same manner.

As it is believed that this is the first machine to substantially eliminate all manual operation in the process of producing curved stereotype-plates from the time when the matrix is prepared up to the delivery of the finished plate, the broad claims which are herein made should not be limited to specific details of construction, as many modifications in the arrangement and operation of the operative parts of the machine may be made by a skilled mechanic without departing from the scope of the invention as expressed in said claims.

While the principal scope of the invention is to make all the hereinbefore-described operations automatic, still some of the devices specified in combination in the claims may be used in constructions where some or all of the power supplied to the machine comes through the hands of the operators without departing from the scope of said claims.

The specific details of the plate-finishing mechanism are not claimed in this case, as, in pursuance to a requirement of the Patent Office, I have filed a divisional application for patent to cover the same, which application was filed September 5, 1902, and received the Serial No. 122,180.

Having thus fully described the invention, what is claimed is—

1. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, with mechanism for operating said devices automatically to cast a curved stereotype printing-plate.

2. The combination of devices making up a stereotype-printing-plate-casting apparatus, with mechanism for operating said devices automatically and for continuing said operation to cast successively a plurality of duplicate stereotype printing-plates.

3. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, with mechanism for operating said devices automatically and for continuing said operation to cast successively a plurality of duplicate curved stereotype printing-plates.

4. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, means for holding a flexible matrix therein, and mechanism for operating said devices and means automatically to cast a curved stereotype printing-plate from said matrix.

5. The combination of devices making up a stereotype-printing-plate-casting apparatus, means for holding a flexible matrix therein, and mechanism for operating said devices and means automatically and for continuing said

operation to cast successively a plurality of duplicate stereotype printing-plates.

6. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, means for holding a flexible matrix therein, and mechanism for operating said devices and means automatically and for continuing said operation to cast successively a plurality of duplicate curved stereotype printing-plates.

7. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, and automatically-operating devices for stripping a matrix from the convex type-face of the cast plate.

8. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, and automatically-operating devices for stripping a matrix from the convex type-face of the cast plate and for repositioning the matrix for a succeeding duplicate cast.

9. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, and automatically-operating devices for flexing a matrix to free it from the convex type-face of the cast plate.

10. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, and automatically-operating devices for flexing a matrix to free it from the convex type-face of the cast plate and for repositioning it for a succeeding duplicate cast.

11. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, mechanism for separating the plate from both the core and back of said casting apparatus, a plate-finishing mechanism, and means for conveying the ejected curved stereotype printing-plate to the finishing mechanism.

12. The combination of devices making up a stereotype-printing-plate-casting apparatus, mechanism for separating the plate from both the core and back of said casting apparatus, a mechanism for finishing the back surface of said plate, and means for conveying the ejected stereotype printing-plate to said finishing mechanism.

13. The combination of devices making up a stereotype-printing-plate-casting apparatus, mechanism for ejecting the plate from both the core and back of said casting apparatus, a plate-finishing mechanism including edge-finishing devices and devices for finishing the back surface of the cast plate, and means for conveying the ejected plate to said finishing mechanism.

14. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, means for flexing a matrix to free it from the cast plate, a plate-finishing mechanism, and means for conveying the curved stereotype printing-plate to the finishing mechanism.

15. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, mechanism for operating said de-

vices automatically, means for flexing a matrix to free it from the convex type-face of the cast plate, a plate-finishing mechanism, and means for conveying the curved stereotype printing-plate to the finishing mechanism.

16. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, means for flexing a matrix to free it from the convex type-face of the cast plate, means for ejecting the curved cast plate from the casting apparatus, devices for finishing the edge of the plate, and means for conveying the ejected curved stereotype printing-plate to the same.

17. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, means for flexing a matrix to free it from the convex type-face of the cast plate, means for ejecting the curved cast plate from the casting apparatus, devices for finishing the back surface of the plate, and means for conveying the ejected curved stereotype printing-plate thereto.

18. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, means for flexing a matrix to free it from the convex type-face of the cast plate, means for ejecting the curved cast plate from the casting apparatus, a plate-finishing mechanism including edge-finishing devices and devices for finishing the back surface of the plate, and means for conveying the ejected curved stereotype printing-plate to the finishing mechanism.

19. The combination of devices making up a stereotype-printing-plate-casting apparatus, mechanism for operating the same and for continuing said operation to cast successively a plurality of stereotype printing-plates, means for ejecting the plates from the casting apparatus as each is cast, a plate-finishing mechanism, and means for conveying the ejected plates to said finishing mechanism, arranged so that the plates will be finished, one after the other, and so that both the casting and finishing mechanisms operate at the same time.

20. The combination of devices making up a curved stereotype-printing-plate-casting apparatus, automatically-operating devices for flexing a matrix to free it from the convex type-face of the cast plate and for repositioning it for a succeeding duplicate cast, a plate-finishing mechanism, and means for conveying the plates thereto.

21. The combination of devices making up a stereotype-printing-plate-casting apparatus, mechanism for operating the same, which mechanism can be thrown into and out of operation, a plate-finishing apparatus, mechanism for operating the same irrespective of the operation of the casting apparatus, and conveying apparatus for conveying the plates from the casting apparatus to the finishing apparatus.

22. The combination of devices making up a stereotype-printing-plate-casting appara-

tus, a plate-finishing apparatus, mechanism for operating the finishing apparatus, and mechanism for operating the casting apparatus which can be thrown out of operation ir-
 5 respective of the operation of the finishing mechanism but only back into operation in defined relation to the operation of the finishing mechanism.

23. The combination of devices making up
 10 a stereotype-printing-plate-casting apparatus, means for separating a matrix from the surface of a cast plate, means for ejecting the plate from the casting apparatus, a plate-finishing apparatus arranged in line with the
 15 casting apparatus, and means for conveying the plates ejected from the casting apparatus to the finishing apparatus.

24. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 20 ing up a curved casting-chamber, means for holding a flexible matrix, and automatically-operating connections for said holding means so arranged that said matrix can be brought to proper curved casting shape by a move-
 25 ment of the holding means.

25. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, means for holding a flexible matrix, and automatically-
 30 operating connections so arranged that the holding means can be moved to bring said matrix to curved casting shape and to hold it in position during the casting operation.

26. The combination in a stereotype-print-
 35 ing-plate-casting apparatus, of devices making up a curved casting-chamber, means for holding a flexible matrix, and connections for said holding means so arranged that said ma-
 40 trix can be brought thereby to curved shape for casting and flexed to free it from the curved cast plate after casting.

27. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, means for
 45 holding a flexible matrix, and connections for said holding means so arranged that said matrix can be brought thereby to curved shape for casting, flexed to free it from the curved
 50 cast plate after casting, and restored to proper curved shape for a succeeding duplicate cast.

28. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, with means
 55 for successively altering the shape of a flexible matrix to relieve it of the cast and to reposition it for a succeeding duplicate cast.

29. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, with auto-
 60 matically-operating means for bringing a flexible matrix back to proper curved shape for a succeeding duplicate cast.

30. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 65 ing up a curved casting-chamber, with means

for separating a flexible matrix and the convex type-face of the cast plate.

31. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, means for
 70 holding a flexible matrix in curved shape therein for casting and for thereafter separating said matrix and the convex type-face of the cast plate.

32. The combination in a stereotype-print-
 75 ing-plate-casting apparatus, of devices making up a casting-chamber, with means for flexing a matrix to free it from the type-face of the cast plate.

33. The combination in a stereotype-print-
 80 ing-plate-casting apparatus, of devices making up a casting-chamber, with means for flexing a matrix to free it from the type-face of the cast plate and for thereafter bodily separ-
 85 ating said matrix and the plate.

34. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, with means
 90 for flexing a matrix to free it from the convex type-face of the cast plate.

35. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, with means
 95 for holding a flexible matrix in curved shape therein for casting and for thereafter flexing said matrix to free it from the convex type-face of the cast plate.

36. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, means for
 100 flexing a matrix to free it from the convex type-face of the cast plate, and means for thereafter bodily moving said matrix away from the plate.

37. The combination in a stereotype-print-
 105 ing-plate-casting apparatus, of devices making up a curved casting-chamber, means for holding a matrix in curved shape therein for casting for flexing said matrix to free it from the convex type-face of the cast plate and for
 110 thereafter bodily separating said matrix and plate.

38. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a casting-chamber, with means for
 115 stripping a matrix by two of its edges from the surface of the cast plate.

39. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, with means
 120 for stripping a matrix by two of its edges from the convex type-face of the cast plate.

40. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 ing up a curved casting-chamber, with means
 125 for stripping a matrix by two of its edges from the convex type-face of the cast plate and for thereafter separating said matrix and plate.

41. The combination in a stereotype-printing-plate-casting apparatus, of devices mak-
 130

ing up a curved casting-chamber, with means for separating a flexible matrix and the convex type-face of the cast plate and for restoring said matrix to its original casting position for a succeeding duplicate cast.

42. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a casting-chamber, with means for holding a flexible matrix in curved shape therein for casting for separating said curved matrix and the convex type-face of the cast plate and for restoring said flexible matrix to its original casting position for a succeeding duplicate cast.

43. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a casting-chamber, with means for flexing a matrix to free it from the type-face of the cast plate and for restoring said matrix to its original casting position for a succeeding duplicate cast.

44. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a casting-chamber, with means for flexing a matrix to free it from the type-face of the cast plate for bodily separating said matrix and plate and for restoring said matrix to its original casting shape for a succeeding duplicate cast.

45. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for flexing a matrix to free it from the convex type-face of the cast plate and for restoring said matrix to its original casting shape for a succeeding duplicate cast.

46. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for holding a flexible matrix in curved shape therein for casting for flexing said matrix to free it from the convex type-face of the cast plate and for restoring said matrix to its original casting shape for a succeeding duplicate cast.

47. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for stripping a matrix from the convex type-face of a cast plate by two of its edges simultaneously.

48. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for stripping a matrix by two of its edges simultaneously from the convex type-face of the cast plate and for restoring said matrix to its original casting shape for a succeeding duplicate cast.

49. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for flexing a matrix to free it from the convex type-face of the cast plate and for restoring it to its original casting shape without losing control of the same.

50. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for holding a flexible matrix, and connections for said holding means, whereby said matrix can be stripped from the convex type-face of the cast plate and restored to its original casting shape by said holding means without losing control of said matrix.

51. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for stripping a matrix from the convex type-face of the cast plate progressively from the edge.

52. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, with means for stripping a matrix progressively by two of its edges from the convex type-face of the cast plate.

53. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for separating the core and back to open the casting-chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate.

54. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, and means for simultaneously separating the core and back and flexing a matrix to free it from the convex type-face of the cast plate.

55. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for opening and closing said chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate when the chamber is opened and for restoring said matrix to its original casting shape therein.

56. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for opening and closing said chamber, means for flexing a matrix to free it from the convex type-face of the cast plate simultaneously with the opening of the chamber and for restoring said matrix to its original casting shape as the chamber closes.

57. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for opening and closing said chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate when the chamber is opened and for restoring said matrix to its original casting shape therein simultaneously with the closing of the chamber.

58. The combination in a stereotype-print-

ing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for moving the segmental back away from the core to open the casting-chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate.

59. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for opening the casting-chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate while the plate is on the core.

60. The combination in a stereotype-printing-plate-casting apparatus, of parts forming a casting-chamber, means for opening and closing the casting-chamber, and means for flexing the matrix from the surface of the cast plate without removing the matrix from the casting-chamber.

61. The combination in a stereotype-printing-plate-casting apparatus of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for opening the chamber, and means for flexing the matrix to free it from the surface of the cast plate without removing the matrix from the casting-chamber.

62. The combination in a stereotype-printing-plate-casting apparatus of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for separating the core and back to open the casting-chamber, and means for flexing the matrix from the surface of the cast plate without removing the same from a position between said core and back.

63. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for opening and closing said chamber, means for injecting metal into the casting-chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate.

64. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for opening and closing the chamber, means for positioning a matrix therein and for flexing the same to free it from the convex type-face of the cast plate, and means for injecting metal into the chamber.

65. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for successively flexing a matrix to shape and reshape it in said chamber for a plurality of duplicate casts, and means for injecting metal into the casting-chamber.

66. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for injecting metal into the casting-chamber, and means for opening the chamber and simultaneously flexing a matrix to free it from

the type-face of the cast plate and for closing the chamber and reshaping said matrix for a succeeding cast.

67. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for flexing a matrix to position it in said chamber, and means for freeing the cast plate from the core and back of said casting apparatus after the casting operation.

68. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for flexing a matrix to free it from the convex type-face of the cast plate, and means for ejecting the curved cast plate from the casting-chamber.

69. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for ejecting the plate from the casting-chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate and for restoring the same to casting shape for a succeeding duplicate cast.

70. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for opening and closing said chamber, means for ejecting the plate from the casting-chamber, and means for flexing a matrix to free it from the convex type-face of the cast plate and for restoring the same to casting shape for a succeeding duplicate cast.

71. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a curved casting-chamber, means for simultaneously opening the chamber and flexing a matrix to free it from the cast plate and for simultaneously closing the casting-chamber and restoring said matrix to casting shape therein, and means for ejecting the plate between the opening and closing of the chamber.

72. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a casting-chamber, and matrix-holding means to which the matrix can be secured connected to the apparatus so that the matrix can be flexed from the convex type-face of the cast plate and thereafter restored to position and shape in the casting-chamber for a succeeding duplicate cast without disconnecting said matrix-holding means from the apparatus or the matrix from the holding means.

73. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a casting-chamber, and matrix-holding means connected to the back to which the matrix can be secured so that the matrix can be flexed from the convex type-face of the cast plate and

thereafter restored to position and shape in the casting-chamber for a succeeding duplicate cast without disconnecting said matrix-holding means from the apparatus or the matrix for the holding means.

74. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a casting-chamber, means for opening and closing the casting-chamber, and matrix-holding means to which the matrix can be secured connected to the apparatus so that the matrix can be flexed from the convex type-face of the cast plate and thereafter restored to position and shape in the casting-chamber for a succeeding duplicate cast without disconnecting said matrix-holding means from the apparatus or the matrix from the holding means.

75. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a curved casting-chamber, with means for freeing the matrix from the curved cast plate along the curved edge of the matrix.

76. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a curved casting-chamber, with means engaging the matrix on the inside of its curved edge which open out to help free the matrix from the curved cast plate.

77. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a curved casting-chamber, with means for freeing the matrix from the curved cast plate along the two curved edges of the matrix.

78. The combination in a stereotype-printing-plate-casting apparatus for casting curved stereotype printing-plates from a flexible matrix, of a core and segmental back, the annular space between the two forming a curved casting-chamber, with means engaging the matrix on the inside of its two curved edges which open out to help free the matrix from the curved cast plate.

79. A matrix-holding device consisting of two side members, each having means for engaging the edge of a flexible matrix, and flexible means connecting said members.

80. A matrix-holding device consisting of two side members, each having means for engaging the edge of a flexible matrix, and spring-strips connecting said members.

81. A matrix-holding device consisting of two side members, each having means for engaging and carrying a flexible matrix, spring-

strips connecting said members, and a stopping-piece carried by said device.

82. A matrix-holding device constructed to engage and hold a flexible stereotype-matrix, and means whereby said device is connected to a stereotype-printing-plate-casting apparatus to bring the flexible matrix into defined relation thereto so that it may be positioned, stripped and repositioned for successive duplicate casts.

83. A matrix-holding device provided with means for engaging and clamping a flexible stereotype-matrix by two of its edges, and means whereby said device with the matrix held thereby is connected to a stereotype-printing-plate-casting apparatus to bring the flexible matrix into defined relation thereto so that it may be positioned, stripped and repositioned for successive duplicate casts.

84. A stereotype-matrix-holding device provided with means for engaging and holding a flexible stereotype-matrix, and means whereby the same is connected to the segmental back of a curved stereotype-printing-plate-casting apparatus so that the matrix may be positioned, stripped and repositioned for duplicate casts.

85. A flexible matrix-holding device consisting of two members having means whereby the edges of a flexible matrix may be secured thereto, independently of the casting mechanism and provided with means whereby the same are connected to a stereotype-printing-plate-casting apparatus to bring the matrix into defined relation thereto for successive casts.

86. The combination in a stereotype-printing-plate-casting apparatus, of a core, and a segmental back made in a plurality of curved sections.

87. The combination in a stereotype-printing-plate-casting apparatus, of a core, and a segmental back made in two articulated curved sections.

88. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two curved sections, and means for operating the sections to open and close the casting-chamber.

89. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two curved sections pivoted together, and means for operating the sections on their pivot.

90. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two sections, means for parting the sections, and means for bodily separating the sections and the core.

91. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two sections pivoted together, means for rocking the sections on their pivot, and means for moving the sections bodily relatively to the core.

92. The combination in a stereotype-print-

ing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, means for attaching a flexible matrix to the segmental back, and means for operating the back to strip the matrix from the convex type-face of the cast plate.

93. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, means for attaching a flexible matrix to the segmental back, and means for operating the back to strip the matrix from the convex type-face of the cast plate and to reposition the matrix for a succeeding duplicate cast.

94. The combination in a stereotype-printing-plate-casting apparatus, of a core, and a segmental back made in two sections, each section carrying a matrix-holding device.

95. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two sections, each section carrying a matrix-holding device, and means for operating the two sections to free the matrix from the surface of the cast plate.

96. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two sections pivoted together, each section carrying a matrix-holding device, and means for rocking the sections on the pivot to free the matrix from the cast plate.

97. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two sections pivoted together, each section carrying a matrix-holding device, means for rocking the sections on the pivot, and means for moving said pivot.

98. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back made in two sections, each section carrying a matrix-holding device, an operating-shaft, cams on said shaft for rocking the sections on their pivot, and cams on said shaft for moving the sections to open and close the chamber and manipulate the flexible matrix.

99. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, an end ring, and means for moving said end ring away from the end of the cast plate.

100. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, an end ring, and means for automatically moving said end ring to relieve the end of the cast plate.

101. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, an end ring, and cam mechanism for moving said end ring away from the end of the cast plate.

102. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, and an end ring stopping off the

end of the casting-chamber, said ring being free to move away from the end of the plate.

103. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a core, a segmental back, and an end ring secured to the framing independent of the core and back.

104. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, means for moving the back away from the core, and supports arranged to support the plate after the back is moved away therefrom.

105. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, means for separating the core and segmental back, means for stripping a matrix from the surface of the cast plate, and supports for supporting the plate during the stripping operation.

106. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, supports for the plate concentric with said core, and means for turning the core on the axis of said supports.

107. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, non-rotatable supports, and means for turning the core so that said supports will serve as guides for the plate.

108. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a core, a segmental back, end rings secured to the framing, and means for turning the core so that said end rings will serve as guides for the plate.

109. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, and an end ring secured in place with a spring relief.

110. The combination in a stereotype-printing-plate-casting apparatus, of a core, a segmental back, and two end rings, one secured in place with a spring relief, and means for moving the other end ring slightly to relieve the plate.

111. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a core, a segmental back, half-rings attached to the framing forming the ends of the casting-chamber, and means for turning the plate out of said half-rings to eject the plate from the casting-chamber.

112. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a core, a segmental back, half-rings attached to the framing, and means for turning the core with the plate attached thereto to bring the plate into position clear of said half-rings.

113. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, a stopping-piece to stop off one side of the casting-chamber immovably secured to the segmental back, and means for opening said chamber

and moving the stopping-piece clear of the edge of the plate.

114. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, a spout extending into one side of the casting-chamber, and means for moving the segmental back relatively to the core to open and close the casting-chamber, the edge of the segmental back engaging the edge of the spout when the chamber is closed.

115. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back arranged in horizontal position, means for holding a flexible matrix in position between the core and segmental back, and a pump connected by a spout to one side of the casting-chamber.

116. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, means for opening and closing the chamber, means for flexing a matrix to free it from the surface of the cast plate and reposition it for a succeeding duplicate cast, a pump connected to the casting-chamber, and means for operating said parts.

117. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, a pump for forcing metal into said chamber, connections for operating said pump, and a spring relief in said connections.

118. The combination in a stereotype-printing-plate-casting apparatus, of devices forming a casting-chamber, means for forcing molten metal into said casting-chamber, means for opening and closing said chamber, and a mechanism arranged to cool the plate after the same has been cast.

119. The combination in a stereotype-printing-plate-casting apparatus, of a core and back, means for injecting molten metal, and mechanism arranged to supply water automatically to the inside of the core to cool the plate so soon as the plate is cast.

120. The combination in a stereotype-printing-plate-casting apparatus, of a core and back arranged in horizontal position, and means for automatically circulating water through the core as soon as the plate is cast.

121. The combination in a stereotype-printing-plate-casting apparatus, of a core having a hub, a water-inlet passing through said hub and means for turning the core thereon.

122. The combination in a stereotype-printing-plate-casting apparatus, of a core having a hub, a water-outlet passing through said hub and means for turning the core thereon.

123. The combination in a stereotype-printing-plate-casting apparatus, of a core having hubs, a water-inlet passing through one of said hubs, a water-outlet passing through the

other of said hubs and means for turning the core thereon.

124. The combination in a stereotype-printing-plate-casting apparatus, of a core and back arranged in horizontal position, and water inlet and outlet pipes connected to said core, said water-outlet pipe extending down within the core close to the lowest point thereof.

125. The combination in a stereotype-printing-plate-casting apparatus, of devices forming a curved casting-chamber, including a core having hubs, an inlet-pipe passing through one hub, and an outlet-pipe passing up and through the other of said hubs and having a downward extension forming a siphon in said core.

126. The combination in a stereotype-printing-plate-casting apparatus, of devices forming a casting-chamber, including a core with hubs, an inlet-pipe passing through one hub, an outlet-pipe passing through the other hub, means for timing the flow through said core and means for turning the core on said hubs.

127. The combination in a stereotype-printing-plate-casting apparatus, of devices forming a curved casting-chamber, including a core, an inlet-pipe, an outlet-pipe having a downward extension in said core to form a siphon, valves in said inlet and outlet pipes, and means for operating said valves.

128. The combination in a stereotype-printing-plate-casting apparatus of devices making up a casting-chamber, a pump connected to supply molten metal to the casting-chamber, means for cooling the cast plate, and means for operating the pump arranged to keep the cast under pressure during the cooling operation.

129. The combination in a stereotype-printing-plate-casting apparatus, of a back, and a plurality of casting-surfaces for successive cooperation with said back.

130. The combination in a stereotype-printing-plate-casting apparatus, of a back, a plurality of casting-surfaces, and means for automatically bringing said casting-surfaces into successive cooperation with said back.

131. The combination in a stereotype-printing-plate-casting apparatus, of a back, two core-surfaces, and means for alternately using each of said core-surfaces.

132. The combination in a stereotype-printing-plate-casting apparatus, of a back, a plurality of core-surfaces, and automatically-operating means for bringing said surfaces successively into operation.

133. The combination in a stereotype-printing-plate-casting apparatus, of a back, two core-surfaces, and means for moving one surface in as the other surface moves out of operative position relatively to said back.

134. The combination in a stereotype-printing-plate-casting apparatus, of a segmental back, means for holding a flexible matrix in position in said back, and a plurality of core-

surfaces successively cooperating with said back and matrix.

135. The combination in a stereotype-printing-plate-casting apparatus, of a segmental back, a matrix-manipulating mechanism for holding a matrix in position therein during casting for stripping the same from the surface of the cast plate and for repositioning the same for a succeeding duplicate cast, and a plurality of core-surfaces for successive cooperation with said matrix.

136. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a semicylindrical casting-chamber, and supports for said core arranged in line with the axis of the semicylindrical casting-chamber, whereby said core can be turned about the axis of said chamber to eject the plate therefrom.

137. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a semicylindrical casting-chamber, supports for said core arranged in line with the axis of the semicylindrical casting-chamber, and means for turning said core about the axis of said chamber to eject the plate therefrom.

138. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, and means for turning the core part of a revolution so that plates may be cast upon different portions of said core.

139. The combination in a stereotype-printing-plate-casting apparatus, of a core, a back cooperating therewith, means for separating the core and back, and means for turning the core on its central axis.

140. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, a spout connected to one side of the casting-chamber, and means for moving the plate away from the spout.

141. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, devices cooperating therewith to form a casting-chamber, and means for imparting a half-turn to the cylinder about its central axis.

142. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, parts cooperating with the lower side of the cylinder to form a curved casting-chamber, and means for giving the cylinder a half-turn to move a cast plate out of the casting-chamber and invert the same from the position in which it was cast and to bring the other half of said cylinder into position to have a succeeding plate cast thereon.

143. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, and mechanism for turning the core with a slow starting and stopping motion.

144. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices

cooperating therewith to form a casting-chamber, and a crank-actuated mechanism for turning the core.

145. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, devices cooperating therewith to form a casting-chamber, and a crank-actuated mechanism arranged to turn the cylinder part of a revolution.

146. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, devices cooperating therewith to form a casting-chamber, and means for imparting half-turns to the cylinder in the same direction.

147. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, devices cooperating therewith to form a casting-chamber, means for intermittently turning the cylinder, and a locking mechanism arranged to hold the cylinder in its various positions.

148. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, means for moving these devices to open the chamber, matrix-holding means operating to free the matrix from the surface of the cast plate, and means for turning the core to move the cast plate from the casting-chamber.

149. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, a back, the space between the cylinder and back forming a casting-chamber, matrix-holding means, means for opening and closing the chamber, means for operating the matrix-holding means to free the matrix from the surface of the cast plate, and means for imparting a half-turn to the cylinder when the chamber is open and the matrix freed from the plate.

150. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a cylinder having hubs projecting in line with its central axis journaled in said framing, and devices cooperating therewith to form a casting-chamber.

151. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a cylinder having projecting axial hubs journaled in said framing, devices cooperating with said cylinder to form a casting-chamber, and a gear on one of said projecting hubs for turning said cylinder.

152. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a cylinder having projecting axial hubs journaled in said framing, devices cooperating therewith to form a casting-chamber, a vibrating segment, and connections therefrom to the cylinder.

153. The combination in a stereotype-printing-plate-casting apparatus, of a framing, a cylinder having projecting axial hubs journaled therein, a pinion loosely mounted on one of said hubs, a ratchet-plate carried by said pinion a pawl-arm secured to said hub,

having a pawl engaging said ratchet-plate, and a crank-actuated pivoted sector engaging said pinion.

154. The combination in a stereotype-printing-plate-casting apparatus of devices making up a casting-chamber, means for automatically opening and closing the casting-chamber, means for stopping the casting operation, and means for exposing each plate to the inspection of the operator.

155. The combination in a stereotype-printing-plate-casting apparatus, of devices making up a casting-chamber, means for stripping the matrix from the cast without removing the matrix from the chamber, and means for delivering the plates from the casting-chamber under the inspection of the operator.

156. The combination of a stereotype-printing-plate-casting apparatus, means for automatically operating the same, a plate-finishing mechanism, and means for passing the plates to the finishing mechanism arranged so that the operator can inspect each plate between the casting and finishing operations.

157. The combination in a stereotype-printing-plate-casting apparatus, of devices cooperating therein to form a curved casting-chamber, and automatically-operating means for separating the plate and the core.

158. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a curved casting-chamber, means for moving the casting-surface of the core from the casting-chamber to carry the plate out of said chamber, and means for detaching the plate from the core.

159. The combination in a stereotype-printing-plate-casting apparatus, of a core and back arranged in horizontal position, means for turning the core to eject the plate from the casting-chamber, and means for removing the plate from the core.

160. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, means for turning the core to carry the plate from the casting-chamber, and a detaching mechanism for separating the plate by its edges from the periphery of the core.

161. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, arranged so that the plate will be cast with a working shoulder near one edge, means for moving the core to carry the plate from the casting-chamber, and detaching devices arranged to engage one edge and said shoulder of the plate to remove the same from the core.

162. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, means for turning the core to carry the plate out of the casting-chamber, a lifter arranged on each side of the core, and means for simultaneously operating said lifters to

separate the cast plate from the periphery of the core.

163. The combination in a stereotype-printing-plate-casting apparatus, of a core, devices cooperating therewith to form a casting-chamber, means for turning the core to eject the plate from the casting-chamber, lifting mechanism for separating the plate from the periphery of the core and conveying devices for removing the plate from the lifting mechanism.

164. The combination in a stereotype-printing-plate-casting apparatus, of a cylinder, devices cooperating therewith to form a casting-chamber, means for imparting a half-turn to the cylinder, and detaching means for separating the plate from the cylinder.

165. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a casting-chamber, means for moving the core to eject the plate from the casting-chamber, a detaching mechanism, and a cam operating said detaching mechanism so that the core can move the plate past the same and so that said detaching mechanism will thereafter separate the plate from the core.

166. The combination in a stereotype-printing-plate-casting apparatus, of a core and segmental back, the annular space between the two forming a curved casting-chamber, means for separating the plate cast therein from both the back and the core, a plate-finishing mechanism, and means for conveying the plate to the plate-finishing mechanism.

167. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, means for freeing the plate from the casting mechanism, and a traveler having plate-engaging means for removing the plates.

168. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, means for freeing the plate from the casting mechanism, plate-finishing mechanism, and a traveler having plate-engaging means to take the plates from the casting to the finishing mechanism.

169. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, means for freeing the plate from the casting mechanism, plate-finishing mechanism, and conveying mechanism arranged to carry plates successively from the casting mechanism to the finishing mechanism and to eject the same from the finishing mechanism.

170. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, means for freeing the plate from the casting mechanism, plate-finishing mechanism, and a reciprocating traveler having a plurality of plate-engaging means.

171. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, a plate-conveyer, and a mechanism for

operating said conveyer so that the same will have a gradual starting and stopping motion.

172. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, means for freeing the plate from the casting mechanism, a plate-conveyer, and a crank-actuated mechanism for reciprocating the conveyer.

173. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, plate-finishing mechanism, a reciprocating traveler having a plate-engaging lug and a plate-engaging pawl.

174. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, means for freeing the plate from the casting mechanism, plate-finishing mechanism, ways extending from the plate-casting mechanism to the plate-finishing mechanism, and a conveyer for sliding the plate along said ways.

175. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism, plate-finishing mechanism, a delivery-horse, and conveying mechanism for conveying plates from the casting mechanism through said finishing mechanism and out onto the delivery-horse.

176. In a stereotype-printing-plate-casting apparatus, the combination of plate-casting mechanism, means for freeing the plate from the casting mechanism, plate-finishing mechanism, ways or skids between the two for engaging the plates by the edges thereof, and conveying mechanism for moving the plates on said ways.

177. In a stereotype-printing-plate-casting apparatus, the combination of casting mechanism arranged so that the curved plate will have smooth edges along its straight sides, ways extending from the plate-casting mechanism along which said plate can slide on said smooth edges with its convex face uppermost, means for moving the plates along said ways, a saw for removing a strip from one straight edge of the plate, and a mechanism for finishing the inside of said plate arranged in line with said ways.

178. The combination of a curved stereotype-printing-plate-casting mechanism, a pumping device arranged at one side thereof, and a finishing mechanism arranged substantially in axial line therewith.

179. The combination of a curved stereotype-printing-plate-casting apparatus, a melting-pot arranged at one side thereof, a pump arranged in the melting-pot and connected to the casting apparatus, and a plate-finishing mechanism arranged substantially in axial line with the casting apparatus.

180. The combination of a curved stereotype-printing-plate-casting apparatus, a metal-supplying device arranged at one side thereof, a plate-finishing mechanism, and a delivery-horse arranged substantially in axial line therewith.

181. The combination of an automatic stereo-

reotype-printing-plate-casting apparatus, an automatic plate-finishing apparatus arranged to cooperate therewith, a shaft for operating said plate-casting apparatus, another shaft for operating the plate-finishing apparatus, and means for connecting and disconnecting said shafts.

182. The combination of an automatic stereotype-printing-plate-casting apparatus, an automatic finishing apparatus arranged to cooperate therewith, a conveyer mechanism, a constantly-driven shaft for operating the finishing and conveying mechanism, a shaft for operating the casting apparatus, and means for connecting and disconnecting said shafts.

183. The combination of an automatic stereotype-printing-plate-casting mechanism, an automatic plate-finishing mechanism, and means to stop the casting mechanism without stopping the finishing mechanism.

184. The combination of an automatic stereotype-printing-plate-casting mechanism, an automatic plate-finishing mechanism, and automatically-operating means for stopping the casting mechanism without stopping the finishing mechanism.

185. The combination of an organized stereotype-printing-plate casting and finishing mechanism, driving connections therefor, and a stopping mechanism which can be adjusted to stop the operation of the casting mechanism when the desired number of plates has been cast without stopping the operation of the finishing mechanism.

186. The combination of an automatic stereotype-printing-plate-casting mechanism, with means for stopping the same when a predetermined number of plates has been cast.

187. The combination of an automatic stereotype-printing-plate-casting mechanism, a shaft having connections to operate the same, a clutch for connecting said shaft to a source of power, and an automatic stopping mechanism arranged to disconnect said clutch.

188. The combination of an automatic stereotype-printing-plate-casting mechanism, and an adjustable stopping mechanism for disconnecting the operation of said casting mechanism when the desired number of plates has been cast.

189. The combination of an automatic stereotype-printing-plate-casting mechanism, a clutch for connecting the same to a source of power, a disk driven from the casting mechanism having a series of holes, a pin which can be inserted in any one of said holes, and connections from said pin to said clutch.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

H. A. WISE WOOD.

Witnesses:

HENRY W. COZZENS, Jr.,
LOUIS W. SOUTHGATE.