No. 814,681. PATENTED MAR. 13, 1906.

W. J. ENNISSON.

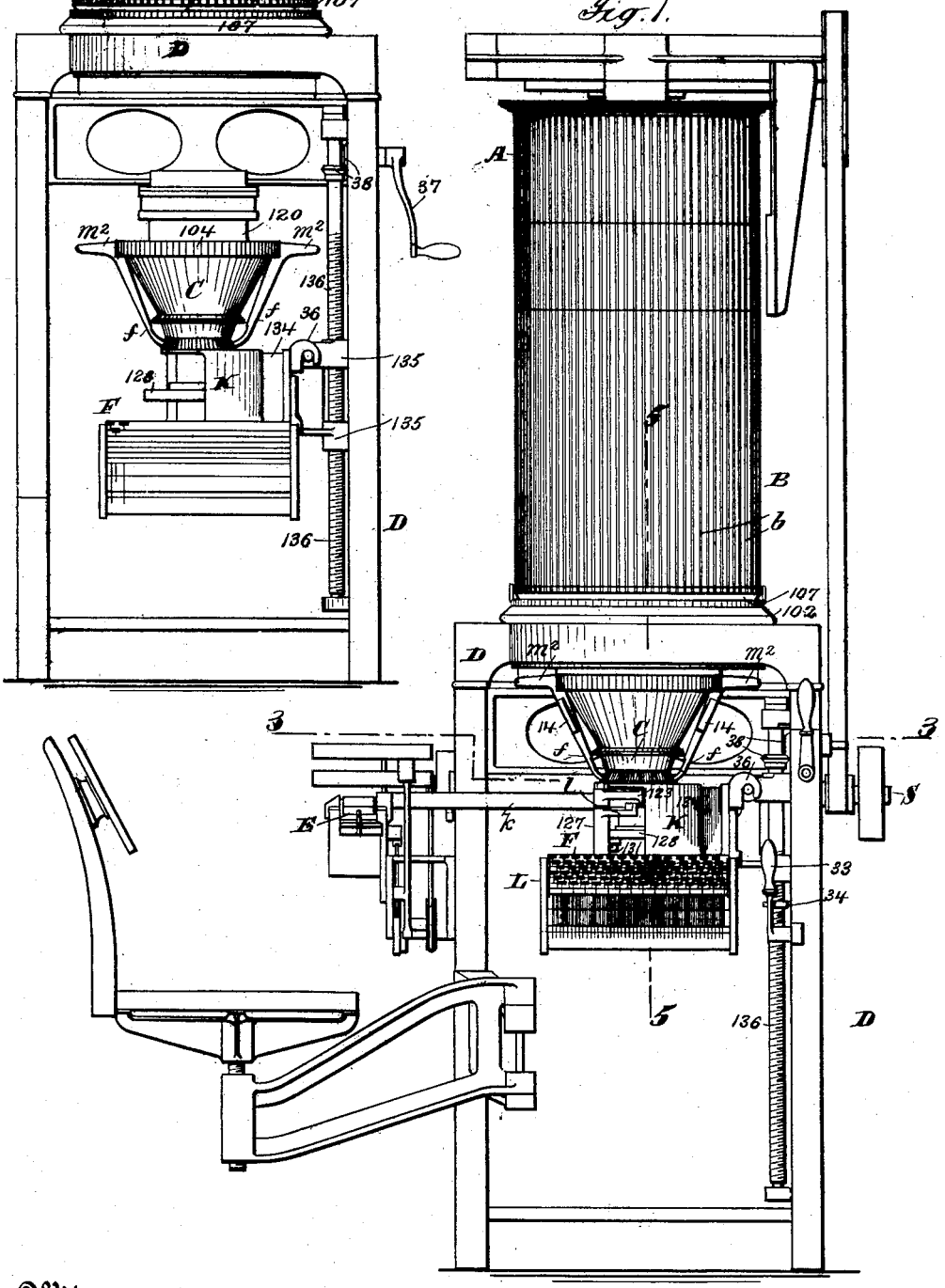
TYPE SETTING MACHINE.

APPLICATION FILED APR. 18, 1902.

10 SHEETS—SHEET 1.

Fig. 1a

Fig. 1.



Witnesses

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10 SHEETS—SHEET 2.

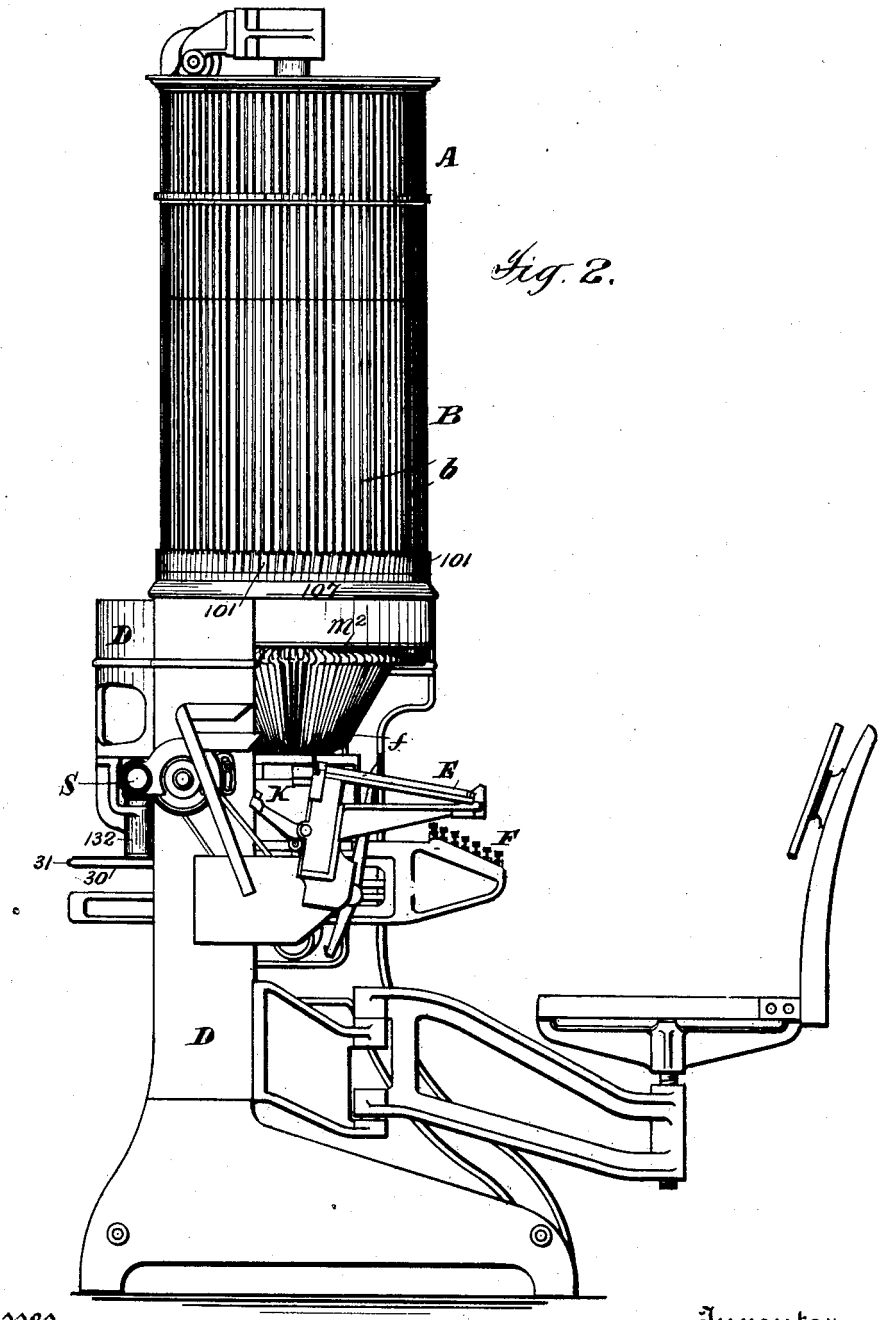

Fig. 2.

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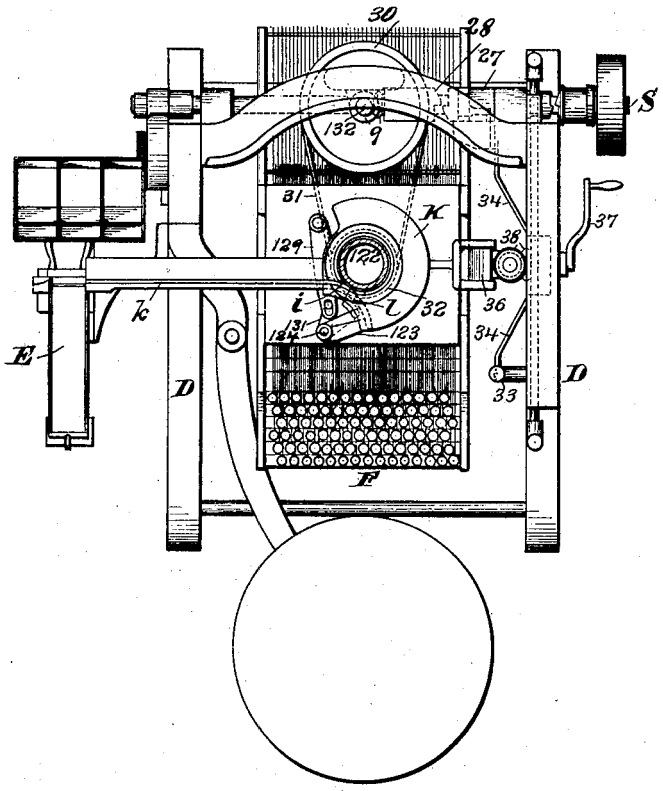
10 SHEETS—SHEET 3.

Fig. 3.



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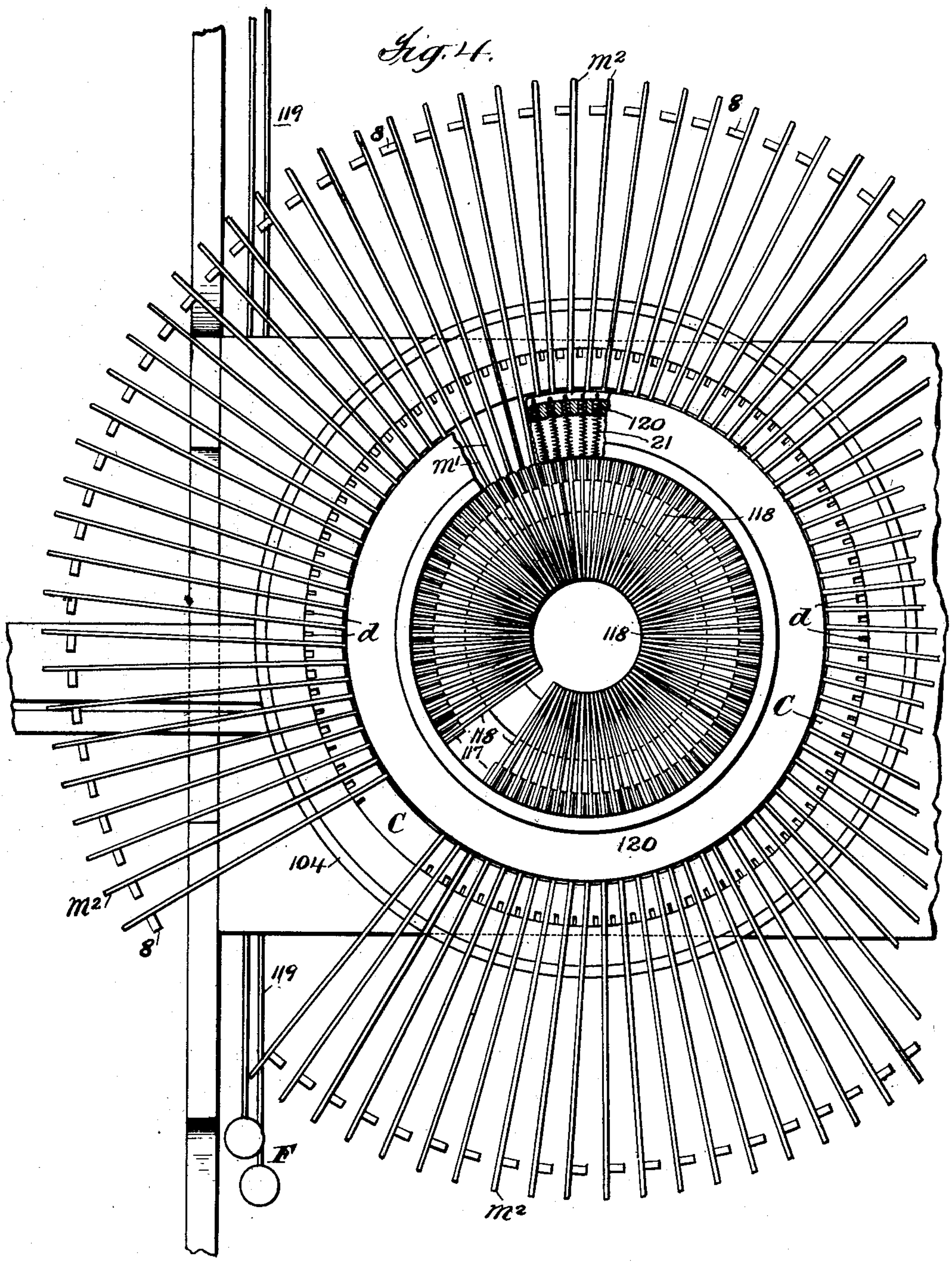

Witnesses

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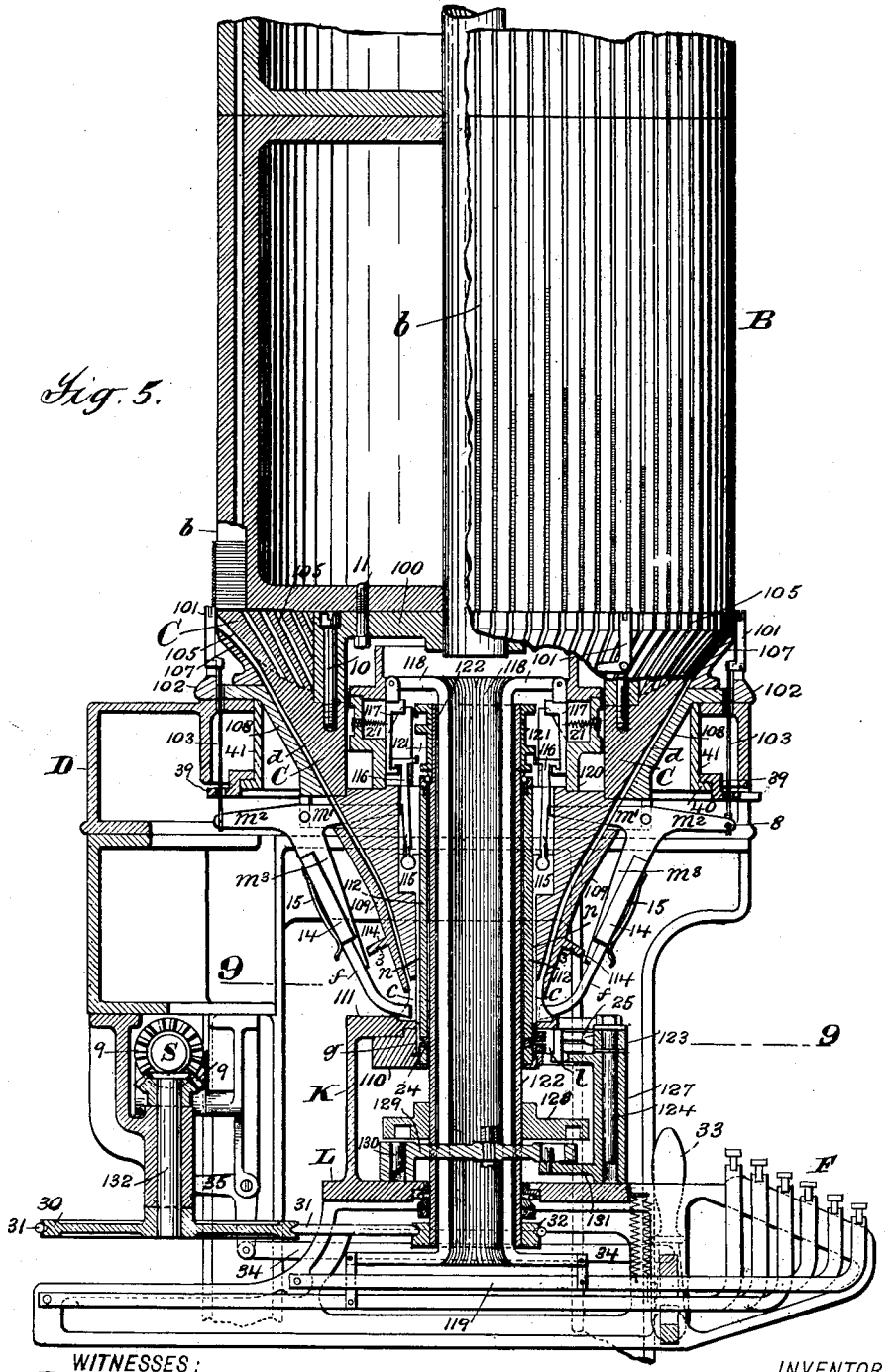
10 SHEETS—SHEET 5.

Fig. 5.



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10 SHEETS—SHEET 6.

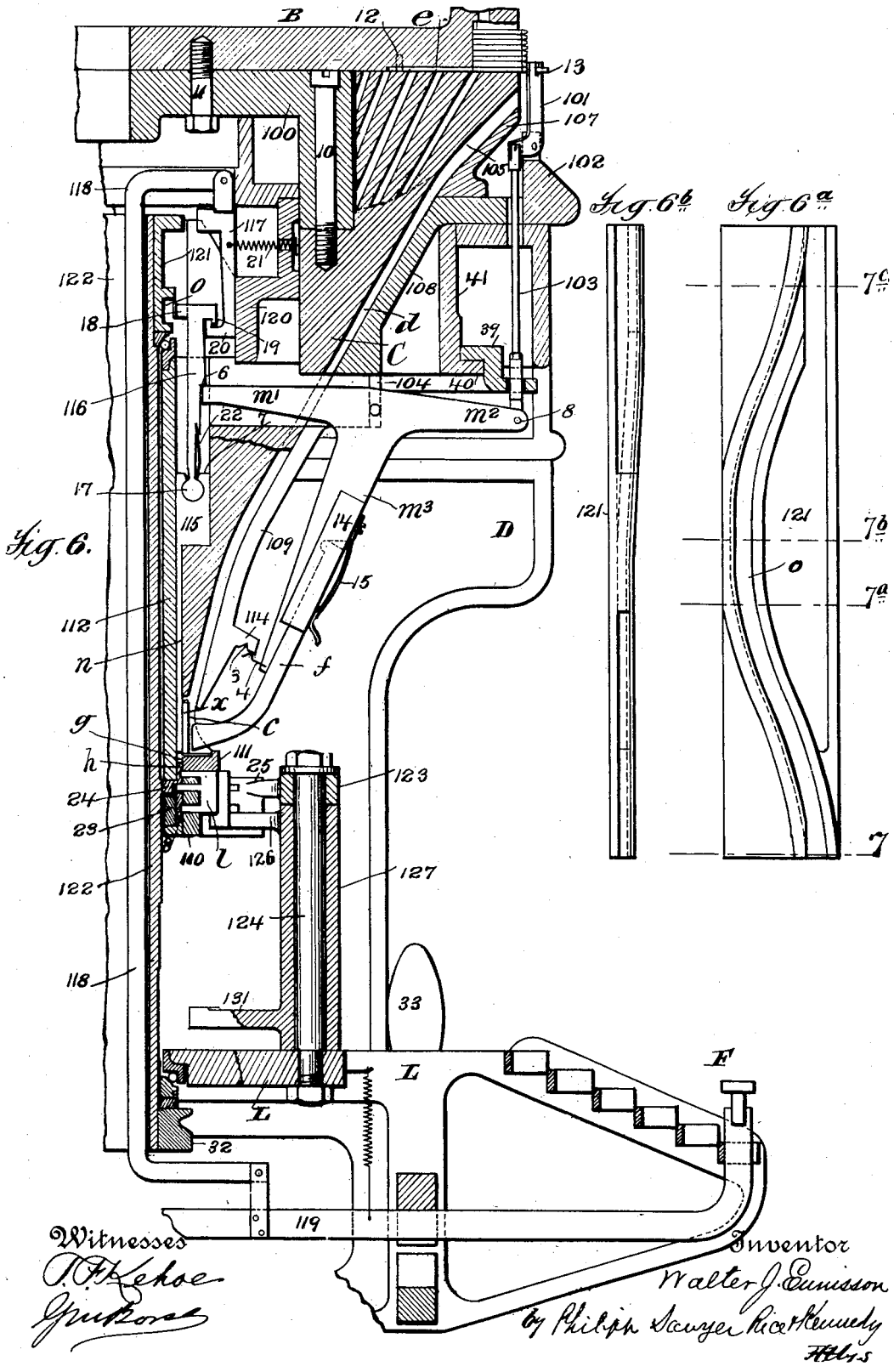

Fig. 6.

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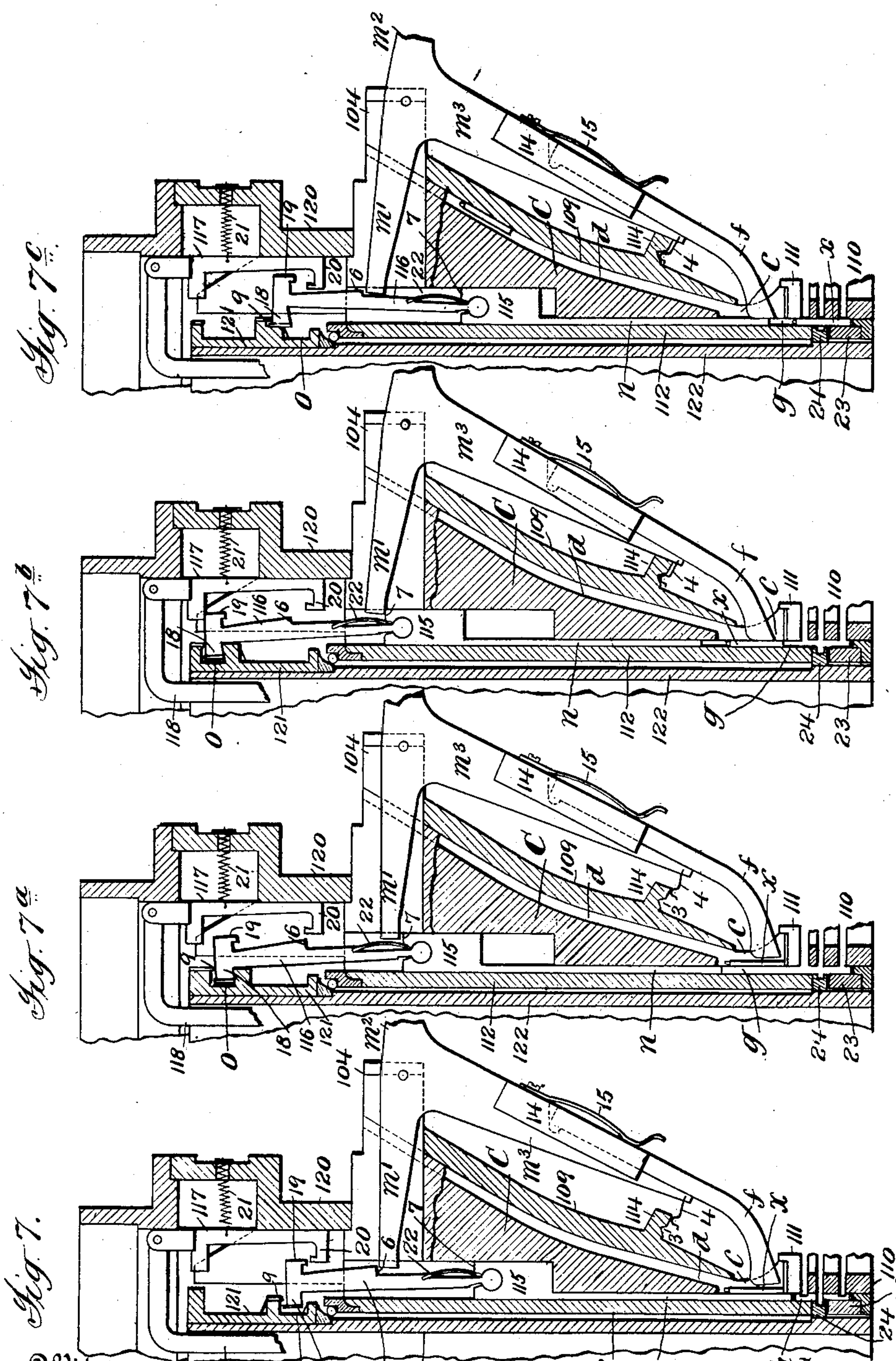

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10 SHEETS—SHEET 8.

Fig. 8.

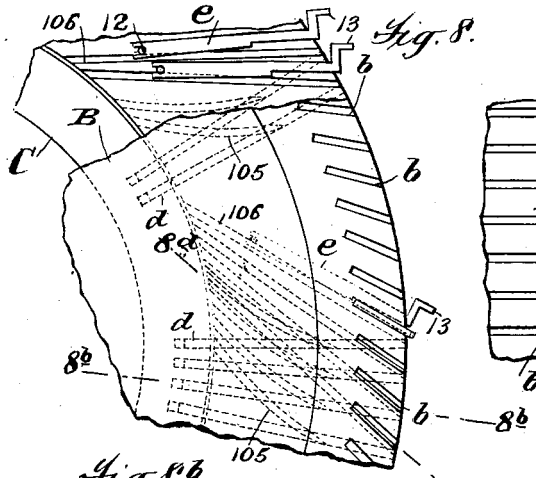


Fig. 8a.

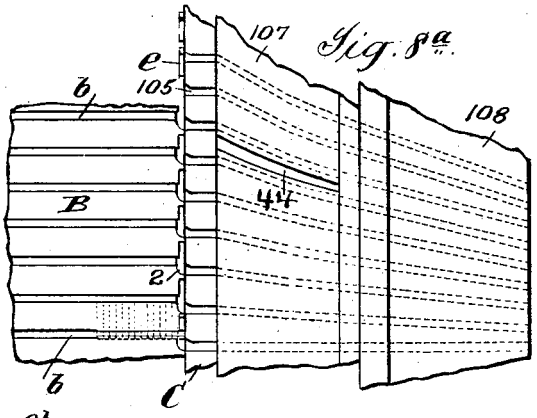


Fig. 8b.

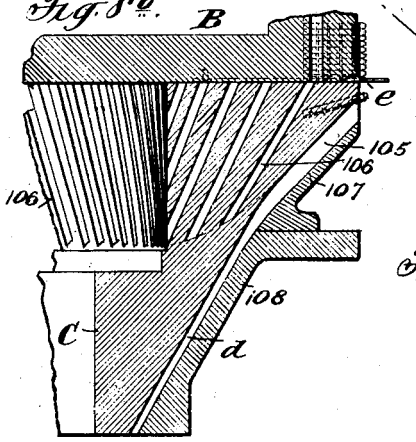


Fig. 8c.

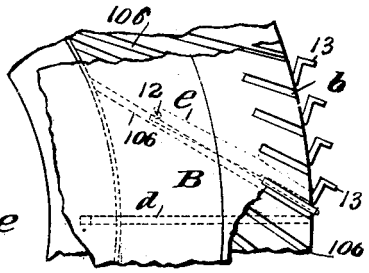


Fig. 8f.

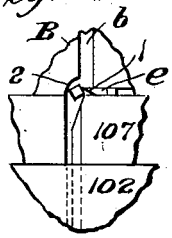


Fig. 8d.

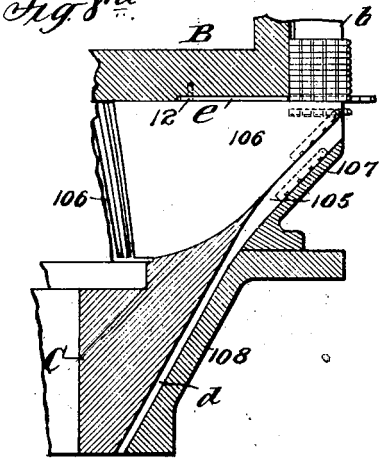
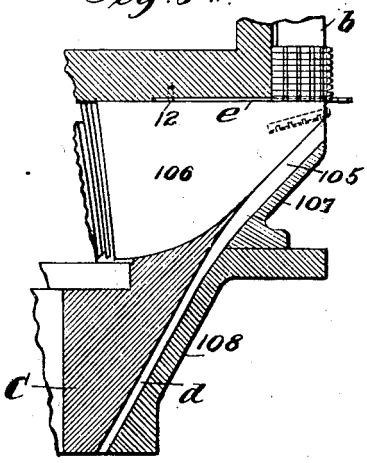


Fig. 8e.



Witnesses

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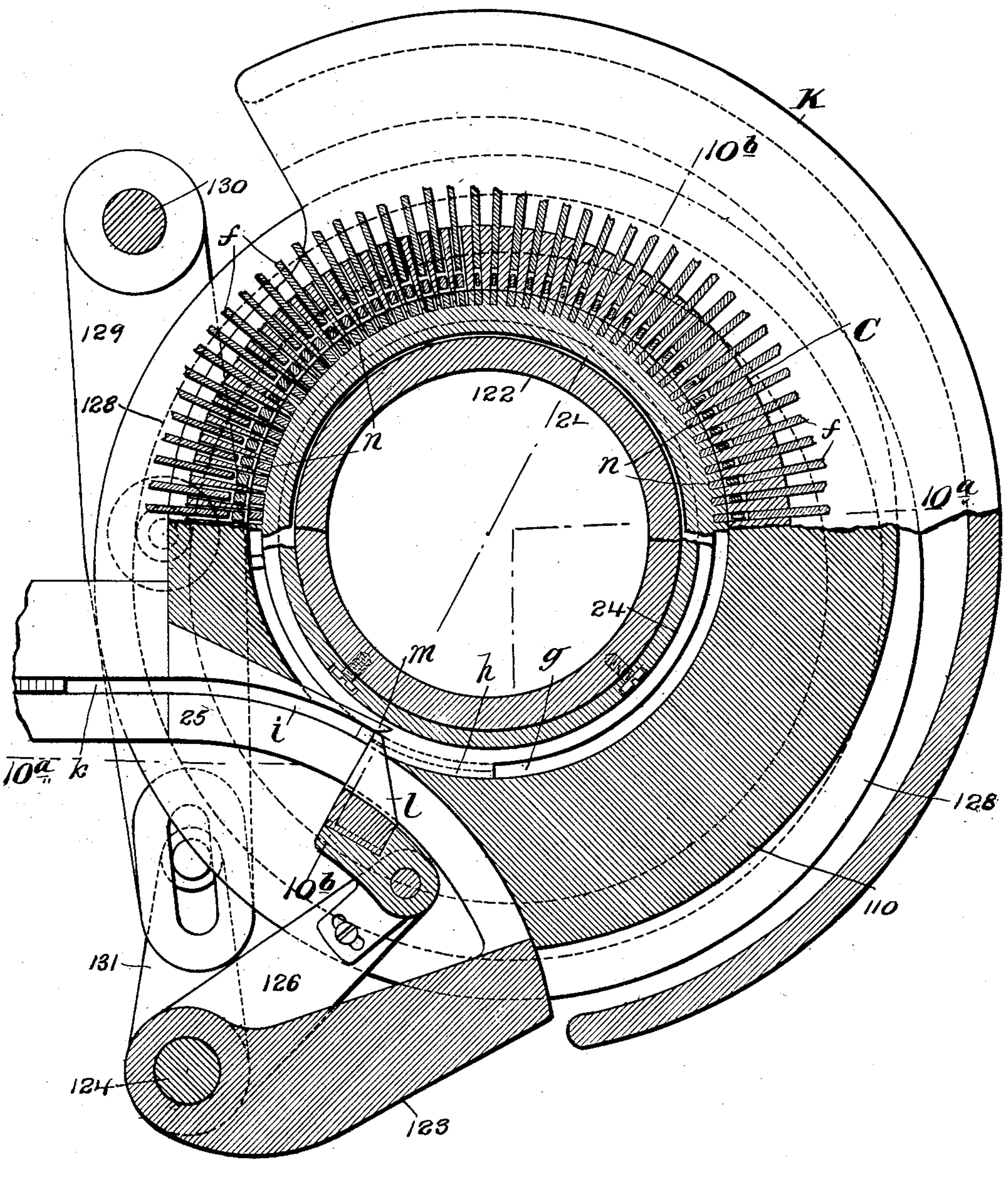
10 SHEETS—SHEET 9.

Fig. 9.



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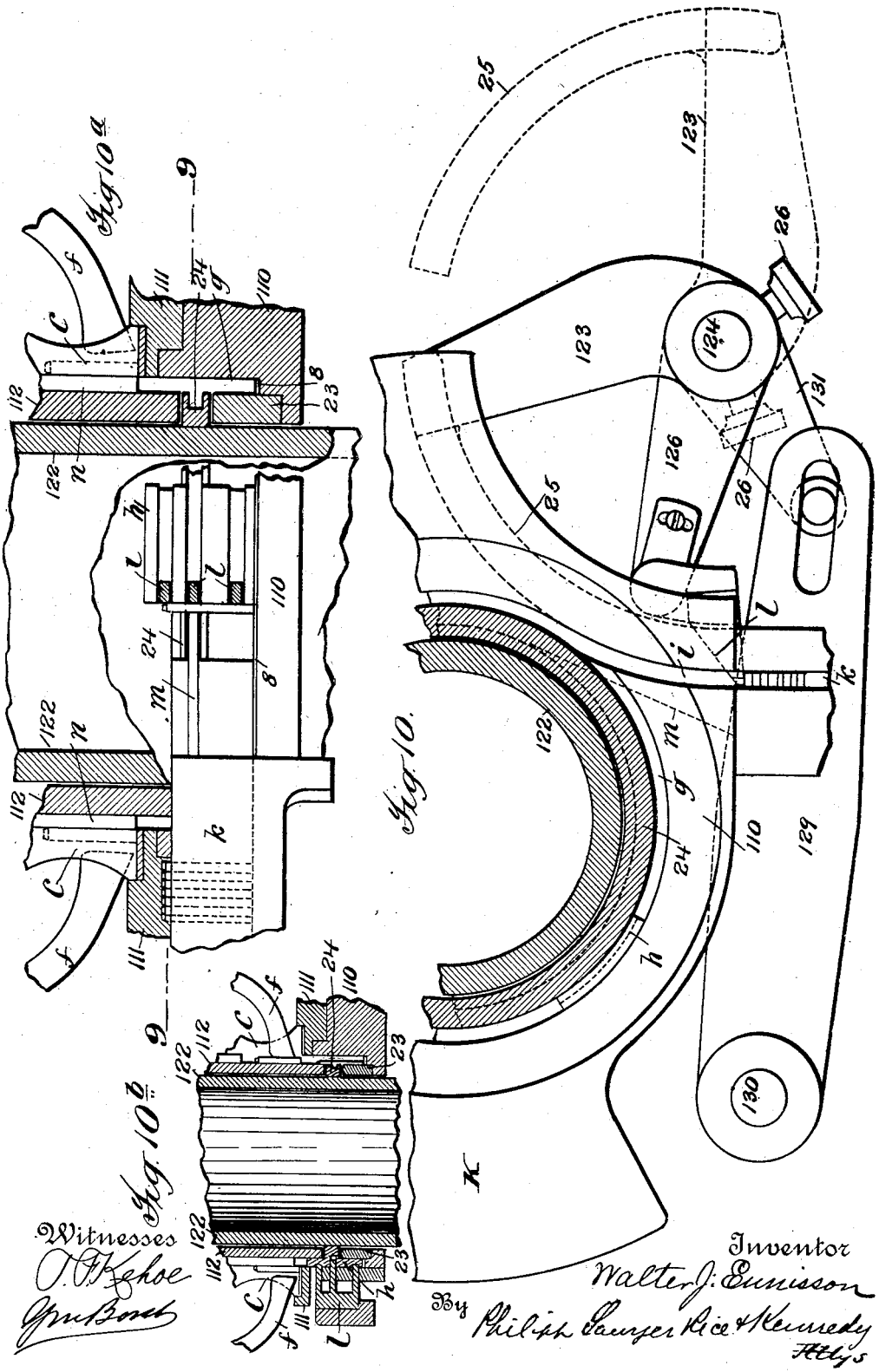
10 SHEETS—SHEET 10.



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By Philip Sawyer Rice & Kennedy
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UNITED STATES PATENT OFFICE.

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TYPE-SETTING MACHINE.

No. 814,681. Specification of Letters Patent. Patented March 13, 1906.

Application filed April 18, 1902. Serial No. 103,491.

To all whom it may concern:

Be it known that I, WALTER J. ENNISSON, a citizen of the United States, residing at New York city, county of New York, and State of New York, have invented certain new and useful Improvements in Type-Setting Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to type-setting machines, its especial object being to provide a machine by which ordinary type may be set accurately and at high speed, as determined by the operator through the instrumentality of the usual keyboard and without injury to the type.

With this object in view I have produced a complete type-setting machine embodying various novel features, many of which are applicable also in other machines, but which are preferably combined, my improved machine in its most complete and preferred form including the following general features: A duplex reservoir system comprising a series of setting-chambers, each of which holds a single type ready for the action of the setter mechanism and standing vertically, and a series of magazine-chambers corresponding to the setting-chambers and each containing a number of type, the corresponding chambers of the two series being suitably connected for the passage of type from the magazine-chambers to the single-type chambers; a duplex system of ejectors coacting to deliver a type from a setting-chamber to the setting mechanism and simultaneously transfer a type from the corresponding magazine-chamber to take the place of the type thus delivered; a raceway adapted to support and guide vertical type which may be considered as comprising two parts or sections—namely, a circular receiving-raceway receiving the type as they are ejected trom the setting-chambers and an assembling-raceway also circular in form, but of reverse curvature to that of the receiving-raceway; a revolving type gatherer or sweep moving within the receiving-raceway and a reciprocating packer moving within the assembling-raceway; means, as a switch coacting with the type-gatherer and packer, to transfer the type from the receiving to the assembling raceway; a typeway or stick of indefinite length which forms a continuation of the assembling-raceway; an actuating mechanism including an ejector-actuating cam and connections for actuating the ejectors, as selected by the keys; an actuating-sleeve within the circle of the receiving-raceway carrying said ejector-actuating cam and the type-gatherer, and means for reciprocating the packer.

The invention includes various broad features of construction and combinations of parts, together with certain more specific features which are important in securing the best results in machines embodying the general features of my invention, all as fully described and particularly claimed hereinafter.

For a full understanding of the invention a detailed description of a machine embodying all the features of the invention in the best form now known to me will now be given in connection with the accompanying drawings, forming a part of this specification, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings, Figure 1 is a front elevation of the machine. Fig. 1^a is a side elevation of a part of the machine, showing the setter-cone and keyboard lowered from the position shown in Fig. 1. Fig. 2 is a side elevation of the machine looking from the side opposite that of Fig. 1^a. Fig. 3 is a horizontal section on the line 3 of Fig. 1, but showing the main framework above the section-line with the bed-plate removed. Fig. 4 is a plan view of the lower cone with its connected parts and showing partially the casing or framework by which the cone is supported. Fig. 5 is a vertical section on the line 5 of Fig. 1, the machine being shown in its normal position of rest. Fig. 6 is an enlarged detail of the lower right-hand portion of Fig. 5, showing a type in a single-type chamber. Fig. 6^a is a diagrammatic flat development of the ejector-actuating cam. Fig. 6^b is an edge projection of the ejector-actuating cam. Fig. 7 is a detail section similar to Fig. 6, but showing the parts in different position; and Figs. 7^a, 7^b, and 7^c are similar views showing the parts in successive positions, these four figures being taken on, respectively, lines 7, 7^a, 7^b, and 7^c of Figs. 6^a and 6^b in the position of the ejector-actuating cam. Figs. 8 to 8^f, inclusive, are details illustrating the type-channels connecting the magazine-chambers

with the single-type chambers and the operation of the type therein. Fig. 8 is a plan view of the outer circle of the base of the setter-cone, a portion of the cylinder being shown thereon. Fig. 8[a] is a projection of Fig. 8 and an elevation of a portion of the cone and cylinder. Fig. 8[b] is a vertical section on the line 8[b] of Fig. 8, showing a type in the upper part of one of the channels. Fig. 8[c] is a plan view corresponding to Fig. 8[b]. Figs. 8[d] and 8[e] are sections on the line 8[d] of Fig. 8, showing the inclined surfaces for changing the position of the type and positions of the type in passing over same. Fig. 8[f] is a detail side view of a portion of the cylinder and channel, showing the type passing from the magazine into the channel. Fig. 9 is an enlarged horizontal section on broken line 9 of Fig. 5, showing in detail the receiving and assembling raceways and the type-driving devices coacting therewith. Fig. 10 is a plan view of the raceways similar to Fig. 9, but showing the parts in different positions. Fig. 10[a] is a vertical section on the line 10[a] of Fig. 9, partly broken away to show the type-driving devices. Fig. 10[b] is a vertical section on the line 10[b] of Fig. 9.

The invention has been made in connection with and is shown as applied to a machine similar in general construction to the well-known Thorne type-setting machine, which is fully shown and described in prior Letters Patent, so that a detailed description is not required here. The upper and lower or distributing and magazine cylinders A B of the Thorne machine are used; but the method and means employed for setting type from the bottom cylinder are entirely different from those of the Thorne machine. In my improved machine the lower cylinder B, which, as in the Thorne machine, forms a case for type, is set upon the base of inverted setter-cone C, the lower cylinder being shown as secured to the cone by means of screws 10 11 and anchor-plate 100, which forms a portion of the base of the cone, the cylinders and upper part of the cone being supported by the frame D.

The general features of the machine illustrated include a series of magazine-channels or chambers *b*, arranged circumferentially upon the periphery of the lower cylinder B, running longitudinally thereof; a series of single-type receivers or chambers *c*, also arranged on a circle concentric with but of smaller diameter than that of the magazine series, which series of single-type chambers encircle the inverted cone C near its apex and is contained consequently within a plane beneath that of the other or magazine series; a series of type-conducting grooves or channels *d* in the periphery of the setter-cone, each of which connects a magazine-chamber with a corresponding single-type chamber, the latter forming practically a lower vertical extension of said grooves; a double series of ejectors—the magazine or horizontal ejector *e* and a single-type or vertical ejector *f*—for, respectively, the magazine and single-type chambers, these ejectors being connected together, so that a character may be ejected from a single-type chamber and replaced by a like character simultaneously ejected from a corresponding magazine-chamber; a circular or receiving raceway *g* of a relatively small diameter, into which type are ejected from the single-type chambers; a revolving type gatherer or sweep *h*, adapted to carry type laterally along the channel of the circular race; a supplemental or assembling race *i*, which is a tangential continuation of the circular race, and a "stick" or typeway *k*, practically a prolongation of the assembling-race, terminating in the usual galley E, as shown, or in justifying mechanism, such as is employed with type-setting machines; a packer *l*, which carries the type laterally along said supplemental or assembling race into the typeway, where the line is being composed, the type gatherer and packer being so operated that the type are transferred from the former to the latter at the point where the two raceways unite, a switch *m* being at that point suitably placed to guide the type from the receiving into the assembling race; actuating devices for the ejectors and the type gatherer and packer, and a key system comprising a bank of finger-keys F and key-levers, which are suitably connected with the ejector-actuating devices by means of which the several ejectors are actuated automatically in accordance with the key-action.

Proceeding now to a detailed description of the machine shown, the magazine type-chambers consist of ninety rectangular channels *b*, (the machine illustrated being adapted to handle ninety different character types,) cut in the periphery of the cylinder B equidistant and parallel. In these channels are provided the usual wards in one of the walls, by means of which wards the type are held side to side, face outermost, in vertical alinement in said channels. The bottoms for these channels are conveniently supplied by the base of the inverted cone C at the outer edge, upon which cylinder B rests. The ejectors *e*, belonging to the magazine-chambers, and which I will distinguish by calling them "magazine-ejectors," lie upon the base of the inverted cone above referred to, normally alongside of the bottom type in said channels and swivel upon pins 12, projecting from the bottom surface of the cylinder B, these pins being located upon a circle within that of the channels *b*. The type-contacting surface of the ejector *e* (see Fig. 8[f]) consists of the beveled edge 1, the upper portion of which projects beyond the bottom line of the ejector to enable it to continue pushing the type by its upper portion after the forward edge of

the type has been depressed by the down-guiding surface 2 in the wall of the magazine-channel, thus preventing the type from being locked or bound as it is ejected. Slotted holes (see Fig. 8) are provided instead of the usual round ones, upon which these ejectors turn on pivot-pins 12, which holes are made slightly wider at the point where the pivots enter, thereby allowing the ejectors to be readily removed by a slight outward pull. These ejectors are actuated by bell-crank levers 101, pivoted within vertical slots in the upper flange of a supporting-ring 102, which rests upon the bed-plate of the main framework of the machine. The vertical arm of the bell-crank is provided at its upper extremity with a slotted end, in which is fitted tongue 13 of the ejector *e*. The other arm of this bell-crank extends horizontally and is connected by link 103 to one of the arms m^2 of a three-armed lever having the arms m' m^2 m^3, this circular series of levers being pivoted in a flange 104, surrounding the setter-cone, and arms m' of the levers working in slots in the setter-cone, as described hereinafter.

Into the periphery of the inverted setter-cone C are cut longitudinally thereof a series of rectangular type-conducting grooves or channels *d*. These grooves extend from near the top, which is the base 100, of the inverted cone, where they are indirectly connected with the magazine-channels by means that will be explained later, downwardly toward the conic apex into single-type chambers *c*, cut into the slightly-flaring portion of the cone-surface at the bottom thereof. These single-type chambers constitute, in fact, vertical extensions of the type-conducting grooves *d*, and it is obvious that the circumference of said series of chambers, and likewise the width of the grooves which form them, is governed only by the thickness of the type contained therein, so that the grooves may be of a width only sufficiently greater than the thickness of the type conducted thereby to insure the free passage of the type therein, and they continue along the surface of the cone in the direction of its apex between walls of constantly-diminishing thickness to the point where the separating-partitions have been reduced to a minimum, at which point is formed the circular series of single-type chambers around the periphery of the said cone in a plane parallel to the base thereof. These chambers are radial with the axis of the cone and have an opening toward the center of the cone slightly in excess of the height of the type, through which opening the type can be ejected laterally while standing vertically. The single-type chambers are open at their top to admit the type feet foremost as they descend longitudinally from the grooves *d*, as described, and are closed at the bottom by means of the outer wall of the circular race, which supplies the floor of the type-chambers, as will be more fully described in the proper connection. The grooves *d* are of uniform depth, corresponding to the width pointwise of the type or slightly in excess of the width thereof, but are of varying widths, each one being slightly wider than the thickness of the particular type to be conducted therein. These grooves are provided with openings 105 at their upper ends, adapted to admit lengthwise a single type ejected therein laterally from the inclined guiding-surface 106 next to be described, and the type are thence conducted upon the internal guiding-surfaces, successively, of three cone-casings, of which the uppermost one or top ring 107 is provided with a vertical slot 44, which nearly severs the ring and which is adapted to be revolved to bring the slot to any one of the ninety grooves inclosed thereby. The top ring is supported on the next lower or cone-supporting ring 108, (see Figs. 4 and 5,) and below this is the third or lowermost cone-casing 109, which surrounds the lower part of the cone. These three casings thus form a continuous outer wall or bottom for the grooves *d*.

In the machine shown the magazine-channels *b* are not radial, the invention being shown as applied to the cylinders of the well-known Thorne machine, so that the type are brought into position radially to the cylinder in entering or within the grooves *d*. This result is secured in the present machine as follows: Between the receiving-mouth 105 of each connecting-groove and the bottom of the corresponding magazine-channel *b* is an inclined type-guiding surface 106, upon which the type is ejected from the side of the magazine-channels, over which surface it slides laterally, dropping upon its edge into the grooves *d*. These inclined guiding-surfaces are shown as formed by angular cuts within the base of the cone meeting the tops of corresponding grooves *d*, thereby forming the openings 105. The depth of these cuts into the base of the cone is regulated to allow the type to slide upon the under surface thereof without touching the overhanging surface, while the two surfaces are not so widely separated as to permit a type to turn sidewise or upon its axis therein. The outer portions of the slots are narrower than the inner portions, so that the outer end of the type is retarded in the slots, and the type thus swings on its outer end from horizontal to vertical position, so as to pass into the groove *d* with its foot downward, as well as radially to the cone, as illustrated in Figs. 8 to 8ᵉ.

Surrounding the series of single-type chambers *c* is suspended concentric with said chambers the series of vertical type-ejectors *f*, each of which is adapted to vibrate within the walls of its single-type chamber. These ejectors are practically an extension of the

swinging arms m^3 of the three-armed levers previously described, but are made detachable therefrom, so as to permit the ejectors to be readily removed for inspection of and access to the single-type chambers. For this purpose the lever-arm m^3 has side plates 14, between which the ejector f is held by the projection at its upper end entering a notch in the lever-arm and by the spring 15. By turning the spring 15 to one side on its pivot the ejector may be withdrawn from between the plates 14.

Concentric with the series of single-type chambers c within the circle thereof, but on a plane just below that of the type-chambers, is the circular type-race g, more fully described in another connection, which is cut, as it might be said, out of the circular case-plate 110, which in turn is secured to the under surface of top plate 111, that supports also the inverted cone C. The circular plate 110 thus forms the outer wall of the circular race and the floor of the series of single-type chambers c, the cone C, into which the single-type chambers are cut, resting upon the outer wall of the circular race. Within the cone C and secured thereto is a guide-shell 112, the lower end of which forms an abutting surface, against which the type are ejected from the single-type chambers by the ejectors f, and this shell extends downward below the single-type chambers to form the upper part of the inner wall of the circular race g, so that when type have been carried out of the single-type chambers against said abutting surface they are directly over the channel of the circular race. The ejectors f in carrying type over the circular race g, however, do not actually press the type against the abutting surface of shell 112 opposite the single-type chambers, but the ejectors are stopped at such a point that when the ejectors are at the end of their ejecting movement the type is not pinched, but is free to drop between the ejector end and the shell. The ejectors are therefore stopped by stop-ring 114 upon the cone-casing 109, engaged by lever-arms m^3, which carry the ejectors. When an ejector f has carried a type over the raceway g, it is desirable that the said ejector be held momentarily in that position in order to form a guide-wall for the type as it drops into the raceway, and for this purpose the stop-ring 114 is provided on its under side with the circular groove 3, adapted to receive the V-shaped bends of the flat springs 4 on the ejectors at the end of the type-ejecting movement. The springs act to hold the ejectors in the position to which they have been moved for ejecting the type until the type have dropped down into the circular race g, but release the ejectors on the return pull of the latter.

In the vertical grooves suitably provided at the upper end of the guide-shell 112 are a series of ejector-slides 115, which are provided with thin projections n, forming vertical plungers, which extend downwardly directly over and in line with the race g and on the inner side of the single-type chambers c in their lowest position, and thus form the inner wall of the type-chambers. Each ejector-slide 115 is provided at its upper end with a circular opening which receives the circular head 17 on the lower end of the ejector-actuating bar 116, this ejector-actuating bar being provided at its upper end with two arms 18 19, the former of which is engaged by the actuating-cam hereinafter described, and the other, 19, is hooked to engage the hooked lower end 20 of the latch 117, which is pivoted on and carried by the upper horizontally-bent end of the bar 118, actuated by the key-lever 119. The latch 117 is held in position radially, so as to hold the ejector-actuating bar 116 outward away from its actuating-cam when the hooked ends 19 20 are engaged by the spring 21, and the spring 22 at the lower end of the ejector-actuating bar 116 acts to swing the bar 116 inward on the pivot formed by the head 17, so as to bring the end 18 of the bar into position to be operated by the cam when the ends 19 20 are disengaged. The ejector-actuating bar 116 is cut away at a suitable point of its length to form a shoulder 6, which engages the inner end of arm m' of the three-armed lever, which carries the ejector f on the downward movement of bar 116 and ejector-slide 115 by its inner surface 7 engages this arm m' on the upward movement of the bar 116 and ejector-slide 115, the three-armed lever and ejector f carried thereby being thus operated in opposite directions. The circular series of ejector-slides 115, ejector-actuating bars 116, and latches 117, corresponding to the circular series of ejectors f and single-type chambers c, are guided by suitable slots formed in the cone, guide-shell 112, and in guide-ring 120.

The ejector-actuating cam 121 is carried at the upper end of a vertical actuating-sleeve 122, which incloses the circular series of vertical bars 118, actuated by the key-levers. This vertical actuating-sleeve 122 in the construction shown is mounted on suitable ball-bearings at top and bottom and is actuated by means presently to be described. The ejector-actuating cam 121, as shown in projection in Figs. 6^a and 6^b, is provided with the cam-groove o of proper form to raise and lower such of the ejector-actuating bars 116 as are brought within the action of the cam by the release of the hooked ends 19 20 of bar 116 and latch 117 for actuating the plungers n and ejectors f, and the bottom of the cam-groove o also forms a cam-surface, as shown in Fig. 6^b, of such form as to permit the ends 18 of the ejector-actuating bars 116 to be pressed inward and away from the latches 117 at the proper time by springs 22 and to

press the ejector-actuating bars 116 outward again against the tension of springs 22 for re-latching of the bars, as fully explained hereinafter in describing the operation of the machine.

The circular receiving-raceway *g*, as already stated, has an outer wall formed by the plate 110, and the upper portion of its inner wall is formed by the lower end of the guide-shell 112. The lower portion of the inner wall of this raceway is formed by the ring 23 inside the lower portion of the circular plate 110. The bottom of the raceway is formed by the plate 110; but for the purpose of reducing the resiliency of the metal bottom a separable bottom consisting of a thin steel ring 8 resting on an underlying felt ring is preferably used, upon which steel ring the type drops vertically. Between the two parts of the inner wall of the raceway *g*, formed by the shell 112 and the ring 23, projects the ring 24 upon the actuating-sleeve 122, the outer end of which ring carries the type gatherer or pusher *h*, this ring 24 filling the space between the lower end of the shell 112 and the ring 23, so as to form with these two parts the practically continuous inner wall of the raceway. The pusher *h*, carried by the ring 24 on sleeve 122, has its forward or type-driving surface of substantially the same width and height as the type to be driven thereby, so that the type are driven through the raceway by the type-gatherer engaging them substantially throughout their rear surfaces. The type collected and advanced in the raceway *g* by the type-gatherer *h* are guided from the raceway at the proper point by switch *m*, and thus diverted into the raceway *i*, the inner wall of which forms a continuation of the outer surface of the switch and of the inner wall of the raceway *g*, but tangential to the latter, this assembling-raceway *i* being curved for a portion of its length oppositely to the curve of the raceway *g* and developing into the straight typeway *k*. The outer wall 25 of the raceway *i* opposite the switch *m* is preferably made readily removable for access to the raceway *i* and for this purpose is shown as supported by swinging arm 123, which is pivotally mounted at the center of the arc of said wall upon the upper end of stud 124, supported on the bed-plate L. A thumb-screw 26 serves to hold the removable wall 25 securely in place on the stud. The removable portion 25 of the wall of raceway *i* is slotted longitudinally to permit the two lower prongs of the three-pronged packer *l* to extend through them into the race, the upper prong of the packer extending into the race above the type-wall 25. The middle prong of the packer *l* is slightly longer than the upper and lower prongs, and the three prongs correspond in position to grooves cut in the outer face of the type-gatherer *h*, so that both the prongs on the packer *l* and the projecting portions of the type-gatherer *h* extend across the raceway *g*, and the packer *l* passes through the type-gatherer *h* in taking the collected type from the latter and advancing them through the collecting-raceway *i*. The cut-away portions of the type-gatherer *h* also permit it to pass the switch *m*.

The packer *l* is carried by a vibrating arm 126, the hub of which consists of sleeve 127, mounted upon the stud 124, previously referred to, and the packer is actuated by packer-cam 128, carried by the actuating-sleeve 122, upon the lower face of which cam is the cam-groove which actuates lever 129, pivoted at 130 on the bed-plate, which lever 129 has a slot-and-pin connection with crank-arm 131 on the sleeve 127, the sleeve 127 thus being rocked to reciprocate the packer *l* in a curved path for advancing the type in the raceway *i* and returning the packer to position. The cam-groove in packer-cam 128, as shown in Fig. 9, is formed so that the packer moves at a high speed during the first part of its forward movement, so as to carry the type away from the type-gatherer *h* as the type reaches the switch *m*, and then moves more slowly as it delivers the type against the type previously packed in raceway *i* and stick *k* and moves the line of type along, so as to avoid shock or pounding of the type, and the packer then returns at a high speed for the next forward or packing movement. Rapidity in the action of the packer is thus secured without danger of injury to the type.

The driving mechanism may be of any suitable character, but as shown consists of a horizontal main driving-shaft S, suitably mounted on the frame and provided with a sliding clutch-jaw 27, splined thereon and adapted to engage or release a clutch-jaw 28, carried by a driving-sleeve loose on the shaft S, which driving-sleeve through bevel-gears 29 drives vertical shaft 132, the lower end of which carries a pulley 30, which drives the actuating-sleeve 122 through belt 31 and pulley 32 on the lower end of the sleeve. The main driving-shaft S also operates the justifier and the type-distributer in the machine shown; but this is immaterial so far as the present invention is concerned.

The engagement of the clutches 27 28 on driving-shaft S is controlled by the hand-lever 33 at the front of the machine within convenient reach of the operator, which, through link 34, operates bell-crank lever 35 at the rear of the machine, which bell-crank lever, through suitable link-and-lever connections, (not shown,) actuates the sliding clutch 27, previously referred to, so as to connect the driving-sleeve carrying the clutch member 28 to and disconnect it from the shaft S.

It will be seen that many of the operating parts of the machine are located within the hollow of the cone C, and for the purpose of ren-

dering these parts readily accessible the cone has been divided into two sections, as previously described, the lower section of which, with the keyboard, and ejectors, may be readily disconnected and drawn downward away from the other part of the cone and the cylinders, so as to give convenient access to all the interior operating parts. The cone C, therefore, really consists of two cone-frustums, the upper one of which is fixed and supports the cylinders, while the lower one is removable downward from the upper part of the cone. The parts of the cone which move downward are those shown in Figs. 7 to 7c. The circular plate 111, on which the lower portion of the cone and the single-type chambers *c* rest, is the top plate of a casing K, within which is mounted the operating parts for the packer *l*, previously described, and the bottom of this casing is formed by the bed plate or frame L, which carries the keyboard and key-levers controlling the ejector mechanism and in which the actuating-sleeve 122 is mounted. The side of the casing K carries a bracket 134, which by means of hooks 36 is removably attached to the cone-supporting screw-blocks 135, mounted on the vertical screw-shaft 136, so that the rotation of the shaft moves the blocks 135 and parts carried thereby up and down, the shaft 136 being shown as rotated by the handle 37 actuating the screw-shaft through bevel-gears 38. For withdrawing the lower part of the cone it is necessary to detach the ejectors *f* from the ejectors *e*, and for this purpose the three-armed levers carrying the ejectors *f* are detached from the links 103, by which they actuate the ejectors *e*. For this purpose the links 103 connect with the arms m^2 of the three-armed levers by pins 8, carried by the arms m^2 and entering loosely holes in the lower ends of the links 103, so that by moving these links 103 sidewise the links will be withdrawn from the pins 8 and detached from the levers. This sidewise motion of the links 103 for withdrawing the pins 8 from their holes in the lever-arms m^2 is secured by the revoluble disconnecting-ring 39, which is supported upon an outward flange 40 of the ring 41, this disconnecting-ring 39 being provided with holes through which the lower ends of the links 103 pass. By revolving the disconnecting-ring 39 slightly, therefore, the pins 8 will be withdrawn from the lower ends of the links 103.

The operation of the machine will be understood from the above with a brief description. The depression of one of the keys F of the keyboard through lever 119 and bar 118 draws down the latch 117 corresponding to the key depressed, so as to draw the hooked end 20 of the latch down below the hooked end 19 of the ejector-actuating bar 116, thus releasing the latter, and upon this release from the latch-bar 116 is thrown inward by the spring 22, so as to bring the projection 18 into the cam-path *o*. The normal position of the parts before the depression of a key is shown in Figs. 5 and 6, and the position of the parts after the depression of a key and the lowering of the latch 117 to release the corresponding ejector-actuating bar 116 is shown in Fig 7. The ejector-actuating cam 121, carried by the constantly-rotating actuating-sleeve 122 now pulls the ejector-actuating bar 116 upward by the engagement of the bottom of the cam-path *o* with the projection 18, the projection being held positively in the cam-path by the undercut form of the bottom of the cam-path and of the projection 18, and thus raises the ejector-slide 115 and plunger *n* carried thereby, thus raising the plunger *n* above the single type *x* in type-chamber *c*, so that the type may be moved inward from the type-chamber into a position over the raceway *g*. The key meanwhile having been released, the key-spring returns the key-lever 119 to normal position, and thus through bar 118 raises the latch 117 to its normal position ready to re-engage the ejector-actuating bar 116 when the latter is returned to normal position. The parts are now in the position shown in Fig. 7a, with the ejector-slide 115 approaching the end of its upward movement. As the slide 115 completes its upward movement it strikes the inner arm *m'* of the three-armed lever, which carries the ejector *f*, and thus rocks that lever from the position shown in Fig. 7a into the position shown in Fig. 7b, thus moving the type inward from the single-type chamber *c* into position against the abutment formed by the lower end of the guide-shell 112, but the ejector being stopped by the stop-ring 114, so as not to press the type against the abutment, but leave it free to drop into the raceway. When the ejector has reached the limit of its movement, the spring 4 catches in the notch 3 in the stop-ring 114, and thus holds the ejector in position to support and form an outer guide for the type as it drops into the raceway. As the arm *m'* of the three-armed lever is thus raised by the slide 115, so as to throw the ejector *f* inward for delivery of a type from the type-chamber *c*, the arm m^2 of the lever, through link 103 and bell-crank 101, engaging the end 13 of the horizontal ejector *e* moves the ejector horizontally, so as to carry the bottom type sidewise from the channel *b* and into position to fall into the inclined slot 106, by which the type is turned into a position radial to the cone and passes through the opening 105 into the top of the channel *d*, so as to slide down the latter into the type-chamber *c* to take the place of the type delivered therefrom. In this transfer of the type into the inclined slot 106 by the ejector *e* the top of the inclined side of the ejector acts upon the type as it is directed downward from the channel *b* by the guiding-surface 2, and thus assures its proper delivery. The operation of deliver-

ing a type from the magazine-channel *b* to the upper end of the groove *d* is fully shown in Figs. 8 to 8[f], a type being shown in different positions in dotted lines. By the operation just described all the parts are brought into the position shown in Fig. 7[b], in which the type is ready to drop from the chamber *c* into the raceway *g*. The rotation of the ejector-actuating cam 121 now moves the bar 116 downward, and at the same time the cam formed by the projecting lower surface of the cam-groove *o* rocks the bar outward on its pivot in the slide 115 against the pressure of spring 22, the projection 18 being held in proper position during this operation by the flanges 9 on the upper wall of the cam-groove and on the top of the projection 18. When the bar 116 has been moved nearly into its outer position, the final portion of its movement is given by the inner surface of the cam-path. By this downward movement of the bar 116 the slide 115, with the plunger *n*, is moved downward, so that the lower end of the plunger *n* follows the type downward toward the raceway *g* and is brought into position to form the rear wall of the chamber *c* and support the next type therein, and by the outward movement of the bar 116 the hook end 19 is brought into position so that on the completion of the downward movement of the bar 116 this hook will take over the hook 20 on the lower end of the latch 117 and hold the bar 116 outward in normal position when released by the cam 121. When the bar 116 has nearly reached the limit of its downward movement, the shoulder 6 thereon engages the top of the arm *m'* of the three-armed lever and rocks this lever so as to move the ejector *f* outward to normal position and permit the next type to enter the chamber *c* from the groove *d*, and through the connections previously described the lever-arm m^2 returns the ejector *e* to normal position. The position of the parts with the bar 116 approaching the limit of its downward movement and just about to engage the lever-arm *m'* to actuate the latter is shown in Fig. 7[c], the type delivered from chamber *c* being shown as having dropped onto the raceway and another type as moving down the groove *d* to take its place in the type-chamber *c* when the parts have reached their normal position. (Shown in Figs. 5 and 6.) The plunger *n*, as will be clear from the above description, does not normally act to move the type downward into the raceway *g*, but the type normally drop into the raceway when moved into position therefor by the ejector *f*. The plunger *n*, however, in addition to serving as the rear wall of the type-chamber *c*, acts to insure the delivery of the type downward to the raceway in case the type should stick for any reason and not drop of itself. The timing of this plunger is such as to assure the delivery of the type to the raceway within proper time to be carried therefrom by the type-gatherer *h*, as presently to be described, and before the ejector *f* is withdrawn, so that the type is supported by the ejector until the plunger assures its delivery to the raceway. One or more type having thus been delivered to the raceway *g*, they are held temporarily in vertical position in the raceway by the circular form and small radius of the latter and are gathered together in the order in which their type-channels *c* are arranged around the raceway by the rotating type-gatherer *h*, and thus collected are moved around in the raceway until they come to the switch *m*, by which they are guided out of the receiving-raceway *g* into the assembling-raceway *i*. Just before the type-gatherer *h* reaches the switch *m* the reciprocating packer *l* on its movement toward the raceway *i* comes opposite and its three fingers pass through the openings in the type-gatherer *h*, so as to take the type from the latter and advance them past the switch *m* and through the raceway *i* into a stick or typeway *k*. While the type gatherer and packer are operated from the same part—that is, the actuating-sleeve 122—as is preferable for accuracy of timing, the driving connections for the packer *l* are such that it is moved at a speed exceeding that of the type-gatherer at the time the packer takes the type, so that the type are carried away from the type-gatherer by the packer and moved in advance thereof at the point where the type passes the switch *m*. This avoids all danger of the type being injured by the edge of the type-gatherer as they leave the raceway *g*.

It will be understood that the type-gatherer *h* at each rotation will collect and transfer to the packer *l* all the type that have been delivered to the raceway *g* since the previous rotation of the type-gatherer and that this type will be collected and delivered to the packer and delivered by the packer to the stick in the order in which the type-chambers *c* are arranged about the circular raceway *g*. Any number of keys of the keyboard, therefore, or, in fact, the entire keyboard, may be struck at the same time, so as to release the catches 117 of all the ejectors and allow the ejector-bars 116 to be thrown into position to be actuated by the actuating-cam 121, and the actuating-cam will then operate on all the ejectors as the cam comes into proper position relatively to the successive ejector-actuating bars. When any two or more keys are thus depressed simultaneously, or nearly so, the type corresponding to these keys will be delivered to the raceway and in like order collected therein and delivered therefrom, so that type will always be delivered and packed in the order in which they are arranged about the raceway, except when they are collected on successive rotations of the type-gatherer. The speed of the machine, therefore, is largely

increased by the fact that the type-chambers may be arranged in the order of the most frequently-occurring combinations of letters, syllables, prefixes, and endings of the language to which the machine is adapted, thus enabling a number of keys to be struck simultaneously, or practically so, and the delivery of the type in proper order still being assured. As a complete revolution of the ejector-actuating cam and the type-gatherer must intervene between the delivery of type into the raceway in a reverse order to that of the arrangement of the type-channels *c* in the circle, the speed at which such a machine will compose type must be governed largely by the speed of the ejector-actuating means and type-gatherer, and a very important feature of the present machine is that the ejector-actuating means and type-gatherer revolve in a comparatively small circle, so that a proportionally higher speed of the machine is attainable as compared with machines in which the type-carrying device moves in a larger circle. By so arranging the machine, therefore, that the type are brought inward to a circular raceway of small diameter a great increase in speed is secured.

It will be understood that many features of my improved machine form parts of the invention independently of other features shown and may be used in combination with other devices in type-setting machines and that the form and arrangement of many of the parts may be changed without departing from the invention.

The form and arrangement of the connections between the magazine-chambers and single-type chambers has resulted somewhat from the type of machine in connection with which the invention has been made, the general construction of machine shown with the vertical distributing and receiving cylinders being that of the well-known Thorne machine. The features forming the invention, however, may be applied also in connection with other types of type-setting machines, although the machine shown forms a very convenient and efficient embodiment of the invention and is the preferred form of my machine.

While I have shown and described the grooves *d* running from the magazine-chambers to the single-type chambers as arranged upon or within a cylinder and a cone, and a very simple and efficient construction may thus be provided, it will be understood that these connecting-grooves between the magazine-chambers and the single-type chambers may be provided in any other suitable manner—as, for instance, by employing separate tubes or chutes for this purpose.

An important feature in the practical construction and operation of machines embodying the broader features of my invention, although not indispensable, is that the raceway holds the type with their pointwise dimension widthwise of the raceway. The raceway will thus properly support and guide all the type of the font, and as the type are advanced setwise in the raceway no turning of the type is necessary to bring them into the line in proper position. The type being moved pointwise to the raceway by the ejectors also, the movement of all the ejectors is the same. This also enables the setting-chambers to be brought closer together, if desired, as the width of the chambers need be only the setwise dimension of the type.

While preferably the magazine-chambers and the setting-chambers, which latter are preferably single-type chambers, will be used, and these are important in securing a machine operating with certainty at a high speed and carrying a large supply of type which may conveniently be renewed by distribution, it will be understood that the type-chambers *c* might be extended vertically or horizontally, so as to form setting-chambers holding more than one type or to form in themselves magazine-chambers, the bottom or inside type in which would be delivered to the raceway and the next type take its place for delivery on the next ejector movement. Many features of the invention, therefore, are not limited to the use of setting-chambers in combination with magazine-chambers.

While the machine shown as embodying the invention is adapted for setting ordinary type, and I have aimed especially at the production of a machine capable of handling such type at high speed with accuracy and with a minimum of wear on the type, it will be understood that the invention is not limited to machines for handling such ordinary type, but may be applied also in handling type, matrices, or the like of any suitable material, and the word "type" is used herein in this broad sense.

What I claim is—

1. The combination with a circular series of type-chambers, of a circular raceway, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

2. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

3. The combination with a circular series of type-chambers arranged to hold vertical type, of a circular raceway adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

4. The combination with a circular series of type-chambers, of a circular raceway arranged within the circular series of chambers,

and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

5. The combination with a circular series of type-chambers, of a circular raceway arranged within the circular series of chambers, and adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

6. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway arranged within the circular series of chambers, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

7. The combination with a circular series of type-chambers adapted to hold single type, of a circular raceway, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

8. The combination with a circular series of type-chambers adapted to hold single type, of a circular raceway adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

9. The combination with a circular series of type-chambers adapted to hold single vertical type, of a circular raceway adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

10. The combination with a circular series of type-chambers adapted to hold single type, of a circular raceway arranged within the circular series of chambers, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

11. The combination with a circular series of type-chambers adapted to hold single type, of a circular raceway arranged within the circular series of chambers and adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

12. The combination with a circular series of type-chambers adapted to hold single vertical type, of a circular raceway arranged within the circular series of chambers adapted to guide vertical type laterally, and a type-gathering device revolving in said raceway and adapted to gather type in said raceway, substantially as described.

13. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type laterally therein, and means for delivering type from said chambers to said raceway and adapted to gather type in said raceway, substantially as described.

14. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway adapted to guide vertical type laterally therein, and means for delivering type from said chambers to said raceway and adapted to gather type in said raceway, substantially as described.

15. The combination with a circular series of type-chambers adapted to hold single vertical type, of a circular raceway, and means for delivering type from said chambers to said raceway and adapted to gather type in said raceway, substantially as described.

16. The combination with a circular series of type-chambers adapted to hold single vertical type, of a circular raceway adapted to guide vertical type laterally therein, and means for delivering type from said chambers to said raceway and adapted to gather type in said raceway, substantially as described.

17. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway adapted to guide vertical type sidewise therein, means for delivering single type from said chambers to said raceway, a type-gathering device revolving in said raceway, and means for guiding type from said raceway and adapted to gather type in said raceway, substantially as described.

18. The combination with a circular series of type-chambers, of a circular raceway and means for delivering type from said chambers into position over said raceway and then downward into said raceway, substantially as described.

19. The combination with a circular series of type-chambers, of a circular raceway within the circle of said chambers, and means for delivering type from said chambers into position over said raceway, substantially as described.

20. The combination with a circular series of type-chambers, of a circular raceway below said chambers adapted to guide vertical type sidewise therein, and means for delivering type from said chambers laterally into vertical position directly over said raceway whereby the type may drop vertically onto said raceway, substantially as described.

21. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway below said chambers adapted to guide vertical type sidewise therein, and means for delivering type from said chambers laterally into vertical position directly over said raceway whereby the type may drop vertically onto said raceway, substantially as described.

22. The combination with a circular series of type-chambers, of a circular raceway below said chambers adapted to guide vertical

type sidewise therein, means for delivering type from said chambers laterally into vertical position directly over said raceway whereby the type may drop vertically onto said raceway, and a plunger for assuring the passage of the type into the raceway, substantially as described.

23. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway below said chambers adapted to guide vertical type sidewise therein, and ejectors delivering type sidewise from said chambers into position directly over said race, substantially as described.

24. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway below and within the circle of said chambers, and means for delivering type from said chambers laterally into vertical position directly over said raceway whereby the type may drop vertically onto said raceway, substantially as described.

25. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway below and within the circle of said chambers adapted to guide vertical type sidewise therein, and ejectors delivering type sidewise from said chambers into position directly over said race, substantially as described.

26. The combination with a circular series of type-chambers adapted to hold vertical type, of a circular raceway, ejectors delivering type sidewise from said chambers into position directly over said raceway, and plungers adapted to move the type downward into the raceway, substantially as described.

27. The combination with a circular series of type-chambers, of a circular raceway, ejectors delivering type sidewise from said chambers into position directly over said raceway, vertical plungers above said raceway closing said type-chambers to the raceway, and means for withdrawing said plungers to permit a type to be moved over the raceway by the ejectors and for returning the plungers to position, substantially as described.

28. The combination with a circular series of type-chambers, of a circular raceway, means for delivering type from said chambers to a position over said raceway, and an abutting surface against which the type are delivered by said means, substantially as described.

29. The combination with a circular series of type-chambers, of a circular raceway below said chambers, ejectors adapted to transfer type from said chambers to position over said raceway, and means for retaining said ejectors temporarily in the ejecting position, substantially as described.

30. The combination with a circular series of type-chambers, of a circular raceway below said chambers, ejectors adapted to transfer type from said chambers to position over said raceway, means for retaining said ejectors temporarily in the ejecting position, and means for forcing said type downward into the raceway while said ejectors are thus retained, substantially as described.

31. The combination with a circular series of type-chambers, of a circular raceway below said chambers, ejectors for transferring type from said chambers to position over said raceway, an abutting surface opposite said ejectors, and means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, substantially as described.

32. The combination with a circular series of type-chambers, of a circular raceway, ejectors for transferring type from said chambers into position over said raceway, an abutting surface opposite said ejectors, means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, and means for retaining the ejectors in ejecting position until the type have moved downward into the raceway, substantially as described.

33. The combination with a circular series of type-chambers, of a circular raceway, ejectors for transferring type from said chambers into position over said raceway, an abutting surface opposite said ejectors, means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, means for retaining the ejectors in retaining position until the type have moved downward into the raceway, and vertical plungers following said type into the raceway while the ejectors are thus retained, substantially as described.

34. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein, ejectors delivering type sidewise from said chambers into vertical position directly over said raceway, vertical plungers above said raceway closing said type-chambers to the raceway, and means for withdrawing said plungers to permit a type to be moved over the raceway by the ejectors and for returning the plungers to position, substantially as described.

35. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein, means for delivering type from said chambers to vertical position over said raceway, and an abutting surface against which the type are delivered by the ejectors, substantially as described.

36. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein below said chambers, ejectors adapted to trans-

fer type from said chambers to vertical position over said raceway, and means for retaining said ejectors temporarily in the ejecting position, substantially as described.

37. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein below said chambers, ejectors adapted to transfer type from said chambers to vertical position over said raceway, means for retaining said ejectors temporarily in the ejecting position, and means for forcing said type downward into the raceway while said ejectors are thus retained, substantially as described.

38. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein below said chambers, ejectors for transferring type from said chambers to vertical position over said raceway, an abutting surface opposite said ejectors, and means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, substantially as described.

39. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein, ejectors for transferring type from said chambers into vertical position over said raceway, an abutting surface opposite said ejectors, means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, and means for retaining the ejectors in ejecting position until the type have moved downward into the raceway, substantially as described.

40. The combination with a circular series of type-chambers, of a circular raceway adapted to guide vertical type sidewise therein, ejectors for transferring type from said chambers into vertical position over said raceway, an abutting surface opposite said ejectors, means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, means for retaining the ejectors in retaining position until the type have moved downward into the raceway, and vertical plungers following said type into the raceway while the ejectors are thus retained, substantially as described.

41. The combination with a type-raceway, of a series of type-chambers, ejectors delivering type sidewise from said chambers over said raceway, and plungers adapted to move the type downward into the raceway, substantially as described.

42. The combination with a type-raceway, of a series of type-chambers, ejectors delivering type sidewise from said chambers over said raceway, an abutting surface against which the type are delivered by the ejectors, and means for retaining said ejectors temporarily in the ejecting position, substantially as described.

43. The combination with a type-raceway, of a series of type-chambers, ejectors delivering type sidewise from said chambers over said raceway, an abutting surface against which the type are delivered by the ejectors, means for retaining said ejectors temporarily in the ejecting position, and means for forcing said type downward into the raceway while said ejectors are thus retained, substantially as described.

44. The combination with a type-raceway, of a series of type-chambers, ejectors delivering type sidewise from said chambers over said raceway, and means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, substantially as described.

45. The combination with a type-raceway, of a series of type-chambers, ejectors delivering type sidewise from said chambers over said raceway, means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, and means for retaining the ejectors in ejecting position until the type have moved downward into the raceway, substantially as described.

46. The combination with a type-raceway, of a series of type-chambers, ejectors delivering type sidewise from said chambers over said raceway, means for stopping the ejectors to prevent their clamping the type against the abutting surface whereby the ejected type are permitted to drop into the raceway, means for retaining the ejectors in ejecting position until the type have moved downward into the raceway, and vertical plungers following said type into the raceway while the ejectors are thus retained, substantially as described.

47. The combination with a circular raceway adapted to guide vertical type sidewise, of a concentric circular series of type-chambers arranged on the upper surface of one of the walls of said circular raceway and adapted to hold single vertical type, substantially as described.

48. The combination with a circular raceway adapted to guide vertical type sidewise, of a concentric circular series of type-chambers arranged on the upper surface of the outer wall of said circular raceway and adapted to hold single vertical type, substantially as described.

49. The combination with a circular raceway, of a circular series of type-chambers arranged to hold vertical type with their pointwise dimensions radial to the raceway, substantially as described.

50. The combination with a circular raceway adapted to guide vertical type, of a circular series of type-chambers arranged to hold vertical type with their pointwise dimensions radial to the raceway, means for delivering type to the raceway with their pointwise dimension transverse to the raceway, and means for advancing the type setwise in the raceway, substantially as described.

51. The combination with a circular raceway adapted to guide vertical type, of a circular series of type-chambers arranged to hold vertical type with their pointwise dimensions radial to the raceway, ejectors for moving the type pointwise from the chambers into position transversely to the raceway, and means for advancing the type setwise in the raceway, substantially as described.

52. In a type-setting machine, a series of type-chambers arranged in circular form and adapted to hold in circular alinement the characters of a font of vertical type arranged side by side and separated by the partition-walls of said chambers, the width of the chambers being such as to hold the type setwise, substantially as described.

53. In a type-setting machine, a series of type-chambers arranged in circular form and adapted to hold in circular alinement the characters of a font of vertical type arranged side by side and separated by the partition-walls of said chambers, the width of the chambers being such as to hold the type setwise, and a circular raceway within the circle of type-chambers adapted to guide the type moving setwise therein, substantially as described.

54. In a type-setting machine, a series of converging tubes or channels arranged longitudinally, as upon the periphery of a cone, the internal dimensions of such tubes or channels being of a width and depth substantially that of the respective set and point wise dimensions of the type and adapted to hold type end to end therein, substantially as described.

55. In a type-setting machine, an inverted conical type-case having upon its periphery and extending longitudinally thereof type-channels, the lower ends of which terminate in type-chambers adapted to hold a single vertical type and means for delivering vertical type sidewise from said chambers, substantially as described.

56. The combination with a circular type-raceway, of a series of radial converging tubes or channels of a width and depth substantially that of the respective set and point wise dimensions of the type and adapted to hold vertical type end to end therein and means for delivering vertical type sidewise from the bottom of said channels, substantially as described.

57. The combination with a circular type-raceway, of a series of radial converging type-channels adapted to hold vertical type end to end therein and means for delivering vertical type sidewise from the bottom of the channels, substantially as described.

58. The combination with a circular type-raceway, of a series of radial converging type-channels adapted to hold vertical type end to end therein, and chambers at the lower ends of said channels adjacent to the raceway adapted to hold a single type and means for delivering type from said chambers to said raceway in vertical position, substantially as described.

59. The combination with a circular type-raceway, adapted to guide vertical type sidewise, of a series of radial converging type-channels adapted to hold vertical type end to end therein, and chambers at the lower ends of said channels adjacent to the raceway adapted to hold a single vertical type and means for delivering single type from said chambers to said raceway in vertical position, substantially as described.

60. The combination with a circular type-raceway, of a type-pusher revolving in said raceway, substantially as described.

61. The combination with a circular type-raceway adapted to guide vertical type sidewise therein, of a type-pusher revolving in said raceway, substantially as described.

62. The combination with a circular type-raceway adapted to guide vertical type sidewise therein, of a type-pusher revolving in said raceway, said driving device being of substantially the full height and width of the type, substantially as described.

63. The combination of a circular type-raceway having a slotted wall and adapted to guide vertical type sidewise, of a type-pusher projecting through the slotted wall and revolving within the raceway, said pusher being of substantially the full height and width of the type, substantially as described.

64. The combination of a circular type-raceway, a type-driving device revolving therein, a series of type-chambers and corresponding type-ejectors, and ejector-actuating means including a revolving ejector-actuating cam, substantially as described.

65. The combination of a circular type-raceway, a type-driving device revolving therein, a series of type-chambers and corresponding type-ejectors, ejector-actuating means including a revolving ejector-actuating cam, and an actuating-sleeve carrying said ejector-actuating cam and type-gathering device, substantially as described.

66. The combination of a circular type-raceway, a type-driving device revolving therein, a series of type-chambers and corresponding type-ejectors, and ejector-actuating means including an ejector-actuating cam mounted to revolve within said series of ejectors, substantially as described.

67. The combination of a circular type-raceway, a circular series of type-chambers concentric therewith, a circular series of ejectors adapted to transfer type from said chambers to said raceway, a type-pusher revolving in said raceway and a circular series of key-actuated ejector-controlling devices, substantially as described.

68. The combination of a circular type-raceway, a circular series of type-chambers concentric therewith, a circular series of ejectors adapted to transfer type from said chambers to said raceway, a circular series of key-actuated ejector-controlling devices, and an ejector-actuating cam mounted to revolve within said series of ejector-controlling devices, substantially as described.

69. The combination with a circular series of type chambers and ejectors, of a circular raceway inside said circle of type-chambers, and ejector-actuating means including a revolving ejector-actuating cam, substantially as described.

70. The combination with a circular series of type chambers and ejectors, of a circular raceway inside said circle of type-chambers, and ejector-actuating means including a revolving ejector-actuating cam mounted to revolve within said series of ejectors, substantially as described.

71. The combination with a circular series of type chambers and ejectors, of a circular raceway inside said circle of type-chambers, a type-driving device revolving in said raceway, and ejector-actuating means including a revolving ejector-actuating cam mounted to revolve within said series of ejectors, substantially as described.

72. The combination with a circular series of type chambers and ejectors, of a circular raceway inside said circle of type-chambers, a type-driving device revolving in said raceway, ejector-actuating means including a revolving ejector-actuating cam mounted to revolve within said series of ejectors, and a revolving sleeve carrying said cam and type-driving device, substantially as described.

73. The combination with a circular series of type-chambers and corresponding ejectors, of an ejector-actuating cam, and a keyboard and connections for controlling selected ejectors to secure their actuation by the cam, substantially as described.

74. The combination with a circular series of type-chambers and corresponding ejectors, of an ejector-actuating cam, a keyboard and connections for positioning selected ejectors to be actuated by said cam, and means for connecting and disconnecting the ejectors with and from the cam and keyboard connections, substantially as described.

75. The combination with a circular series of type-chambers and corresponding ejectors, of power-driven ejector-actuating devices, a keyboard, means controlled from said keyboard for connecting said ejectors and actuating devices, and means whereby said ejector-actuating devices are automatically disconnected after the ejectors have been operated, substantially as described.

76. The combination with a raceway and series of type-chambers and corresponding ejectors, of ejectors for delivering type from said chambers over said raceway, plungers for securing the movement of said type downward to said raceway, power-driven ejector and plunger actuating devices, a keyboard, means controlled from said keyboard for connecting said ejectors and plungers to the actuating devices, and means whereby said ejectors and plungers are automatically dis connected from the actuating devices after the ejectors have been operated, substantially as described.

77. The combination with type-ejectors and plungers for moving the type after delivery by the ejectors, of power-driven actuating devices, and actuating connections between the plungers and ejectors, substantially as described.

78. The combination with type-chambers and type-ejectors, of plungers forming a part of said chambers, means for withdrawing said plungers for the delivery movement of the ejectors and returning them to position, and connections for actuating the ejectors by said plungers, substantially as described.

79. The combination with a raceway and type-chamber, of an ejector delivering type sidewise from said chamber into position over the raceway, and a plunger adapted to move the type downward into the raceway, substantially as described.

80. The combination with a type-chamber, of a raceway, an ejector delivering type from said chamber into position over the raceway, a vertical plunger above said raceway normally closing the type-chamber, and means for withdrawing said plunger to permit a type to be moved over the raceway by the ejector and for returning the plunger to position, substantially as described.

81. The combination with a type-chamber adapted to hold vertical type, of means for delivering type from said chamber sidewise and in a vertical position, and an abutting surface against which the vertical type are delivered, substantially as described.

82. The combination with a type-chamber, of an ejector adapted to deliver type sidewise from said chamber, and means for retaining said ejector temporarily in ejecting position, substantially as described.

83. The combination with a type-chamber, of an ejector adapted to deliver type sidewise from said chamber, means for retaining said ejector temporarily in ejecting position, and means for forcing the ejected type downward while the ejector is thus retained, substantially as described.

84. The combination with a type-chamber adapted to hold vertical type, of an ejector for transferring type sidewise from said chamber in vertical position, an abutting surface opposite said ejector, and means for stopping the ejector to prevent its clamping the type against the abutting surface, whereby the ejected type is permitted to drop endwise, substantially as described.

85. The combination with a type-chamber, of an ejector for transferring type sidewise from said chamber, an abutting surface opposite said ejector, means for stopping the ejector to prevent its clamping the type against the abutting surface, whereby the ejected type is permitted to drop, and means for retaining the ejector in ejecting position until the type has moved downward, substantially as described.

86. The combination with a type-chamber, of an ejector for transferring type sidewise from said chamber, an abutting surface opposite said ejector, means for stopping the ejector to prevent its clamping the type against the abutting surface, whereby the ejected type is permitted to drop, means for retaining the ejector in ejected position until the type has moved downward, and a vertical plunger following the type downward while the ejector is thus retained, substantially as described.

87. The combination with a circular type-raceway, of a supplemental curved type-raceway tangential thereto, and means for delivering type from said circular raceway to said supplemental raceway, substantially as described.

88. The combination with a circular type-raceway, of a supplemental type-raceway tangential thereto, a type-gathering device revolving in said circular raceway, and a type-driving device moving in said supplemental raceway, substantially as described.

89. The combination with a circular type-raceway, of a curved supplemental type-raceway tangential thereto, and a type-driving device mounted to reciprocate in said supplemental raceway on an arc struck from the center of said raceway, substantially as described.

90. The combination with a circular type-raceway, of a supplemental type-raceway, a type-gathering device revolving in said circular raceway, and a type-driving device reciprocating in said supplemental raceway, substantially as described.

91. The combination with a circular raceway adapted to guide vertical type laterally, of a supplemental raceway, and means for guiding type from said circular raceway into said supplemental raceway, substantially as described.

92. The combination with a circular raceway adapted to guide vertical type laterally, of a supplemental raceway, a type-driving device revolving in the circular raceway, a switch for guiding type from said circular raceway into said supplemental raceway, and a type-driving device moving in said supplemental raceway, substantially as described.

93. The combination with a circular raceway adapted to guide vertical type laterally, of a supplemental raceway, a switch for guiding type from said circular raceway into said supplemental raceway, a type-gathering device revolving in said circular raceway, and a type-driving device reciprocating within said supplemental raceway and extending into the circular raceway to take type from the gathering device, substantially as described.

94. The combination with a circular type-raceway, of a circular series of type-chambers and ejectors for delivering the type to said circular raceway, a type-gathering device moving in said circular raceway, a supplemental raceway, a type-driving device, a switch for guiding type from the circular raceway to the supplemental raceway, and means for actuating the ejectors, type-gathering device and type-driving device, substantially as described.

95. The combination with a circular type-raceway, of a circular series of type-chambers and ejectors for delivering the type to said circular raceway, a type-gathering device moving in said circular raceway, a supplemental raceway and type-driving device moving therein, an actuating-sleeve carrying said type-gathering device and a cam on said sleeve for actuating said type-driving device, substantially as described.

96. The combination with a circular type-raceway, of a circular series of type-chambers and ejectors for delivering the type to said circular raceway, a type-gathering device moving in said circular raceway, a supplemental raceway and type-driving device moving therein, an actuating-sleeve carrying said type-gathering device, and a cam on said sleeve for actuating said ejectors, substantially as described.

97. The combination with a circular type-raceway, of a circular series of type-chambers and ejectors for delivering the type to said circular raceway, a type-gathering device moving in said circular raceway, a supplemental raceway and a type-driving device moving therein, an actuating-sleeve carrying said type-gathering device, and cams on said sleeve for actuating said type-driving device and ejectors, substantially as described.

98. The combination with a circular type-raceway and type-gathering device revolving therein, a curved supplemental raceway tangential to said circular raceway and type-driving device reciprocating in said supplemental raceway, a circular series of type-chambers concentric with said circular raceway, and a circular series of ejectors for transferring type from said chambers to said

circular raceway, ejector-actuating devices, an actuating-sleeve carrying said type-gathering device, and cams on said sleeve for actuating said ejector-actuating devices and said type-driving device, substantially as described.

99. In a type-setting machine, the combination with a series of setting type-chambers, of a series of magazine-chambers and type-transferring means connecting the two series of chambers, substantially as described.

100. In a type-setting machine, the combination with a series of setting type-chambers, of a series of magazine-chambers and type-channels connecting the two series of chambers, substantially as described.

101. In a type-setting machine, the combination with a series of setting type-chambers adapted to hold vertical type, of a series of magazine-chambers adapted to hold horizontal type, and type-transferring means connecting the two series of chambers, substantially as described.

102. In a type-setting machine, the combination with a series of setting type-chambers adapted to hold vertical type, of a series of magazine-chambers above said setting-chambers adapted to hold horizontal type, and channels connecting said magazine-chambers with said setting-chambers and provided with guiding-surfaces for changing the type from horizontal to vertical position, substantially as described.

103. In a type-setting machine, the combination with a circular series of setting type-chambers adapted to hold vertical type, of a circular series of magazine-chambers above said setting-chambers and non-radial thereto, type-channels for connecting the two series of chambers and arranged radially to the setting-chambers, and guiding-surfaces for turning the type from said magazine-chambers into position radial to the setting-chambers, substantially as described.

104. The combination with a series of setting type-chambers, of a series of magazine-chambers, type-channels connecting the two series of chambers, key-controlled ejectors for said chambers, and connections between said ejectors whereby the movement of a key secures the delivery of a type from one of the setting-chambers for setting and the delivery of type from a magazine-chamber to said setting-chamber, substantially as described.

105. The combination with a circular series of setting-chambers adapted to hold vertical type, a corresponding circular series of magazine-chambers above said setting-chambers, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, and key-controlled mechanism for delivering type from said setting-chambers for setting and from the magazine-chambers to the channels, substantially as described.

106. The combination with a circular series of setting-chambers adapted to hold vertical type, a corresponding circular series of magazine-chambers adapted to hold horizontal type one upon the other above said setting-chambers, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, and key-controlled mechanism for delivering type from said setting-chambers for setting and from the magazine-chambers to the channels, substantially as described.

107. The combination with a circular series of setting-chambers adapted to hold vertical type, a corresponding circular series of magazine-chambers adapted to hold horizontal type one upon the other above said setting-chambers, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, key-controlled mechanism for delivering type from said setting-chambers for setting and from the magazine-chambers to the channels, and a distributing mechanism for distributing type into said magazine-chambers, substantially as described.

108. The combination with a series of type-chambers each adapted to hold a single type, of a series of magazine-chambers, type-channels connecting the two series of chambers, and ejector mechanism for delivering type from said setting-chambers for setting and from the magazine-chambers to the setting-chambers, substantially as described.

109. The combination with a circular raceway, of a circular series of setting type-chambers each adapted to hold a single type, a corresponding series of magazine-chambers, type-channels connecting the two series of chambers, and ejector mechanism for delivering type from the setting-chambers to the raceway for setting and from the magazine-chambers to the setting-chambers, substantially as described.

110. The combination with a circular raceway, of a circular series of setting type-chambers each adapted to hold a single type, a corresponding series of magazine-chambers, type-channels connecting the two series of chambers, an ejector mechanism for delivering type from the setting-chambers to the raceway for setting and from the magazine-chambers to the setting-chambers, and a type-gathering device revolving in said raceway, substantially as described.

111. The combination with a series of setting type-chambers each adapted to hold a single vertical type, of a series of magazine-chambers, type-channels connecting the two series of chambers, and ejector mechanism for delivering type from the setting-chambers for setting and from the magazine-chambers to the type-channels, substantially as described.

112. The combination with a series of set-

ting type-chambers each adapted to hold a single vertical type, of a series of magazine-chambers adapted to hold horizontal type, type-channels connecting the two series of chambers, and ejector mechanism for delivering type from said setting-chambers for setting and from the magazine-chambers to the type-channels, substantially as described.

113. The combination with a series of setting type-chambers each adapted to hold a single vertical type, of a series of magazine-chambers above said setting-chambers adapted to hold horizontal type, type-channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, and ejector mechanism for delivering type from said setting-chambers for setting and simultaneously delivering type from the magazine-chambers to the type-channels, substantially as described.

114. The combination with a circular series of setting type-chambers each adapted to hold a single vertical type, of a corresponding circular series of magazine-chambers adapted to hold horizontal type one upon the other above said setting-chambers, type-channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, and ejector mechanism for delivering type from said setting-chambers for setting and simultaneously delivering type from the magazine-chambers to the type-channels, substantially as described.

115. The combination with a circular series of setting type-chambers each adapted to hold a single vertical type, of a corresponding circular series of magazine-chambers adapted to hold horizontal type one upon the other above said setting-chambers, type-channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, an ejector mechanism for delivering type from said setting-chambers for setting and simultaneously delivering type from the magazine-chambers to the type-channels, and a distributing mechanism for distributing type into said magazine-chambers, substantially as described.

116. The combination with a circular raceway adapted to guide vertical type sidewise therein, and a type-gathering device revolving in said raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a corresponding circular series of magazine-chambers, type-channels connecting the two series of chambers, and key-controlled ejector mechanism for simultaneously delivering type from the setting-chambers to the raceway for setting and from the magazine-chambers to the setting-chambers, substantially as described.

117. The combination with a circular raceway adapted to guide vertical type sidewise therein, and a type-gathering device revolving in said raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a corresponding circular series of magazine-chambers above said setting-chambers adapted to hold horizontal type, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, and key-controlled ejector mechanism for simultaneously delivering type from the setting-chambers to the raceway for setting and from the magazine-chambers to the setting-chambers, substantially as described.

118. The combination with a circular raceway adapted to guide vertical type sidewise therein, and a type-gathering device revolving in said raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a corresponding circular series of magazine-chambers above said setting-chambers adapted to hold horizontal type one upon the other, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, and key-controlled ejector mechanism for simultaneously delivering type from the setting-chambers to the raceway for setting and from the magazine-chambers to the setting-chambers, substantially as described.

119. The combination with a circular raceway adapted to guide vertical type sidewise therein, a type-gathering device revolving in said raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a corresponding circular series of magazine-chambers above said setting-chambers adapted to hold horizontal type one upon the other, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, key-controlled ejector mechanism for simultaneously delivering type from the setting-chambers to the raceway for setting and from the magazine-chambers to the setting-chambers, and a distributing mechanism for distributing type into said magazine-chambers, substantially as described.

120. The combination with a circular raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a series of magazine-chambers above said setting-chambers, type-channels connecting the two series of chambers, said type-channels being radial to the setting-chambers and converging from the magazine-chambers, ejector mechanism for delivering type from the setting-chambers for setting and from the magazine-chambers to the type-channels, substantially as described.

121. The combination with a circular raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a series of magazine-chambers above said setting-chambers, channels for conducting type vertically and endwise from said magazine-chambers to said setting-cham-

bers, said channels being arranged as upon the surface of a cone with its base at the magazine-chambers, ejector mechanism for delivering type from the setting-chambers for setting and from the magazine-chambers to the type-channels, substantially as described.

122. The combination with a circular raceway, of a circular series of setting type-chambers each adapted to hold a single vertical type, a series of magazine-chambers above said setting-chambers adapted to hold horizontal type one above the other, channels for conducting type vertically and endwise from said magazine-chambers to said setting-chambers, said channels being arranged as upon the surface of a cone with its base at the magazine-chambers, ejector mechanism for delivering type from the setting-chambers for setting and from the magazine-chambers to the type-channels, substantially as described.

123. The combination with a series of setting type-chambers each adapted to hold a single vertical type, of a series of magazine-chambers above said setting-chambers adapted to hold horizontal type, and channels connecting said magazine-chambers with said setting-chambers and provided with guiding-surfaces for changing the type from horizontal to vertical position, substantially as described.

124. The combination with a circular series of setting type-chambers each adapted to hold a single vertical type, of a circular series of magazine-chambers above said setting-chambers and non-radial thereto, type-channels connecting the two series of chambers and arranged radially to the setting-chambers and provided with guiding-surfaces for turning the type from said magazine-chambers into position radially to the setting-chambers, substantially as described.

125. The combination with a series of setting type-chambers each adapted to hold a single vertical type, of a series of magazine-chambers, type-channels connecting the two series of chambers, and key-controlled ejector devices for delivering a type from one of the setting-chambers for setting and simultaneously delivering a type from the magazine-chamber to said setting-chamber, substantially as described.

126. The combination with a cylindrical type-case having vertical channels adapted to hold horizontal type, of an inverted conical composing-case provided with inclined type-channels connecting with the type-chambers of the type-case and means for selecting and delivering type from said composing-case, substantially as described.

127. The combination with a cylindrical type-case having vertical channels adapted to hold horizontal type, of an inverted conical composing-case provided with inclined type-channels connecting with the type-chambers of the type-case, means for selecting and delivering type from said composing-case and guiding-surfaces for turning the type from horizontal to vertical position in said channels, substantially as described.

128. The combination with a cylindrical type-case having vertical type-channels of the pointwise width of the type and of a depth substantially the length of the type, of an inverted conical composing-case having upon its periphery vertical inclined type-channels corresponding in location and number to the channels of the cylindrical type-case and being of a width and depth substantially equal, respectively, to the pointwise and setwise dimensions of the type and means for selecting and delivering type from said composing-case, substantially as described.

129. In a type-setting machine, an inverted setter-cone consisting of two cone-frustums, one of said frustums being mounted for withdrawal from the other, substantially as described.

130. In a type-setting machine, a vertical inverted setter-cone consisting of two cone-frustums and means for raising and lowering the lower frustum, substantially as described.

131. The combination with a cylindrical type-case, and a setter-cone below said type-case, of means for separating the cylinder and cone for access to the parts inside the cone, substantially as described.

132. The combination with the single-type chamber *c* for vertical type, of the vertical channels *b* for horizontal type, converging channels *d* for conducting type endwise, and means for delivering type from the channels *b* to the channels *d*, substantially as described.

133. The combination with the single-type chamber *c* for vertical type, of the vertical channels *b* for horizontal type, converging channels *d* for conducting type endwise, horizontal ejectors for delivering type from the channels *b*, and slots for guiding the type from the channels *b* to the channels *d*, substantially as described.

134. The combination with the circular series of single-type chambers *c* for vertical type, of the circular series of vertical type-channels *b* for horizontal type, said channels being non-radial to the chambers *c*, converging vertical type-channels *d* arranged radially to the type-chambers *c*, and slots 106 for guiding type from the channels *b* to vertical position in the radial channels *d*, substantially as described.

135. The combination with the type-channel *b*, of horizontal ejector *e* for delivering type sidewise from said channel and having the beveled edge 1, and curved surface 2 for guiding the type downward as it is ejected from the channel, substantially as described.

136. The combination with a single-type chamber *c* for vertical type, of a magazine-chamber *b* for horizontal type, channel *d* connecting the chambers, vertical ejector *f* for the single-type chamber, horizontal ejector *e* for the magazine-chamber, levers for actuating said ejectors, and connections between said levers for securing the joint action of the ejectors, substantially as described.

137. The combination with actuating mechanism, of ejector-actuating bar 116, latch 117 normally holding said bar out of position to be actuated, and a key and connections for moving said latch to release the bar for its movement by the actuating mechanism, substantially as described.

138. The combination with ejector-actuating cam 121, of ejector-actuating bar 116, hooked latch 117 for holding said bar normally out of position to be actuated by the cam, and a key and connections for actuating said latch to release the bar for its movement by the cam, said cam being constructed to return the bar to position to be engaged by the latch at the end of the ejecting movement, substantially as described.

139. The combination with the ejector-slide 115, of swinging ejector-actuating bar 116 carried thereby, cam 121 for actuating said bar, latch 117 normally holding said bar out of position to be actuated by the cam, and a key and connections for releasing said bar from the latch, and an ejector actuated by the cam through said bar 116, substantially as described.

140. The combination with the ejector-slide 115, of swinging ejector-actuating bar 116 carried thereby, cam 121 for actuating said bar, latch 117 normally holding said bar out of position to be actuated by the cam and a key and connections for releasing said bar from the latch, and a pivoted ejector actuated by the cam through said bar 116, substantially as described.

141. The combination with the ejector-slide 115, of swinging ejector-actuating bar 116 carried thereby, cam 121 for actuating said bar, latch 117 normally holding said bar out of position to be actuated by the cam, a key and connections for releasing said bar from the latch, and magazine and setting chamber ejectors actuated by the cam through said bar 116, substantially as described.

142. The combination with the ejector-arm m^3 having side plates 14, of ejector *f* held between said plates by spring 15, substantially as described.

143. The type-raceway *i* having the portion 25 of its side wall movable for access to the raceway, substantially as described.

144. The curved type-raceway *i* having the swinging portion 25 of its side wall movable for access to the raceway, substantially as described.

145. The curved type-raceway *i* and type-driving device *l* reciprocating therein, said type-raceway having the portion 25 of its side wall mounted to swing concentrically with said raceway for opening the latter, substantially as described.

146. The curved type-raceway *g* in combination with type-raceway *i* tangential thereto and having portion 25 of its side wall opposite the junction of the two raceways movable to open the raceways, substantially as described.

147. The curved type-raceway *g* in combination with type-raceway *i* tangential thereto, switch *m* at the junction between the two raceways, and movable portion 25 of the side wall of raceway *i* opposite the switch for opening the raceways, substantially as described.

148. A reciprocating type-driving device in combination with actuating means therefor, constructed and arranged to move the type-driving device less rapidly at the end of its type-advancing movement than in the previous part of its movement, substantially as described.

149. The combination with a moving type-gathering device, of a type-driving device arranged to take type from the type-gathering device and means for moving the said type-driving device at a higher speed than the type-gathering device in taking type from the latter and for moving said type-driving device slowly at the end of its type-advancing movement, substantially as described.

150. The combination with the circular raceway *g* and revolving type-gathering device *h* therein, of raceway *i* tangential to said raceway *g*, type-driving device *l* in said raceway *i* and arranged to pass through the raceway *g* and type-gathering device *h* at the intersection of the raceways, and means for moving said type-driving device *l* at a higher speed than type-gathering device *h* in transferring type from raceway *g* to raceway *i*, substantially as described.

151. The combination with the circular raceway *g* and revolving type-gathering device *h* therein, of raceway *i* tangential to said raceway *g*, type-driving device *l* in said raceway *i* and arranged to pass through the raceway *g* and type-gathering device *h* at the intersection of the raceways, and means for moving said type-driving device *l* at a higher speed than type-gathering device *h* in transferring type from raceway *g* to raceway *i* and for moving said type-driving device *l* slowly at the end of its type-advancing movement, substantially as described.

152. In a machine for handling type, a type-raceway having a false bottom onto which the type are dropped, substantially as described.

153. In a machine for handling type, a type-raceway having a false bottom formed of a metal plate on yielding material and onto

which the type are dropped, substantially as described.

154. The combination with a circular series of type-chambers, of a circular raceway, a type-pusher revolving in said raceway, a series of key-controlled ejectors, and actuating mechanism timed to actuate the selected ejector or ejectors and then actuate the pusher to advance the type ejected.

155. The combination with a circular series of type-channels, of a circular raceway inside said circle, a series of key-controlled ejectors, and actuating mechanism timed to actuate the selected ejector or ejectors and then actuate the pusher to advance the type ejected.

156. The combination with a circular series of type-channels adapted to hold vertical type, of a circular raceway inside said circle of type-chambers adapted to guide vertical type sidewise therein, a series of key-controlled ejectors for delivering type from said channels to said raceway, a type-pusher revolving in said raceway, and actuating mechanism timed to actuate the selected ejector or ejectors and then actuate the pusher to advance the type ejected.

157. The combination with a circular type-raceway, of a supplemental type-raceway, a type-gathering device revolving in said circular raceway, and means for moving the type in said supplemental raceway, substantially as described.

158. The combination with a circular type-raceway, of a supplemental type-raceway, a type-gathering device revolving in said circular raceway, and a type-driving device moving in said supplemental raceway, substantially as described.

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

WALTER J. ENNISSON.

Witnesses:
C. J. SAWYER,
T. F. KEHOE.