No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 1.

Fig. 1.

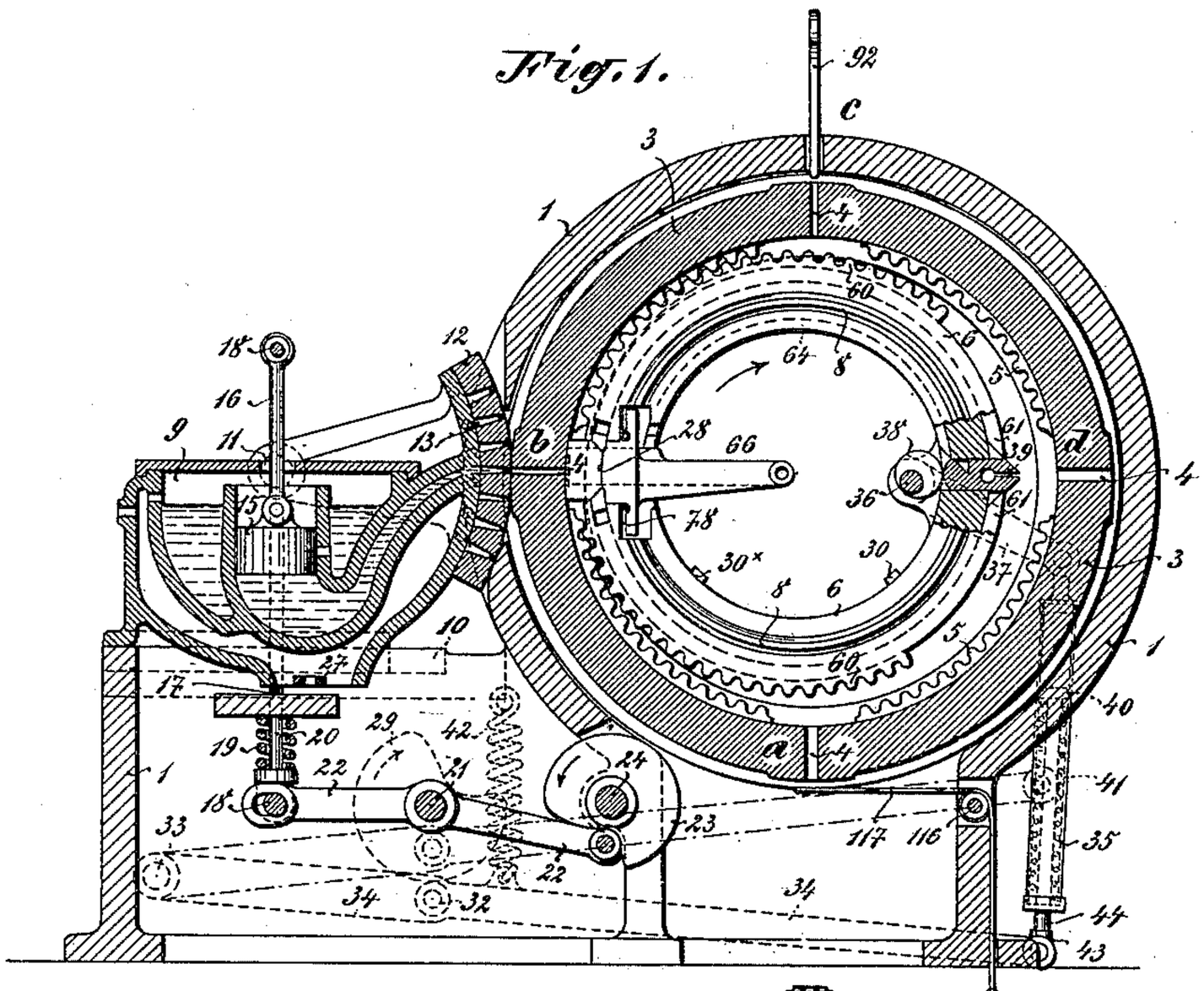

Fig. 2a.

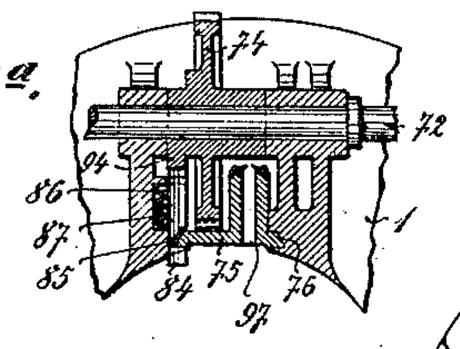

Fig. 2.

Witnesses:
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Attys

No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 2.

Fig. 3.

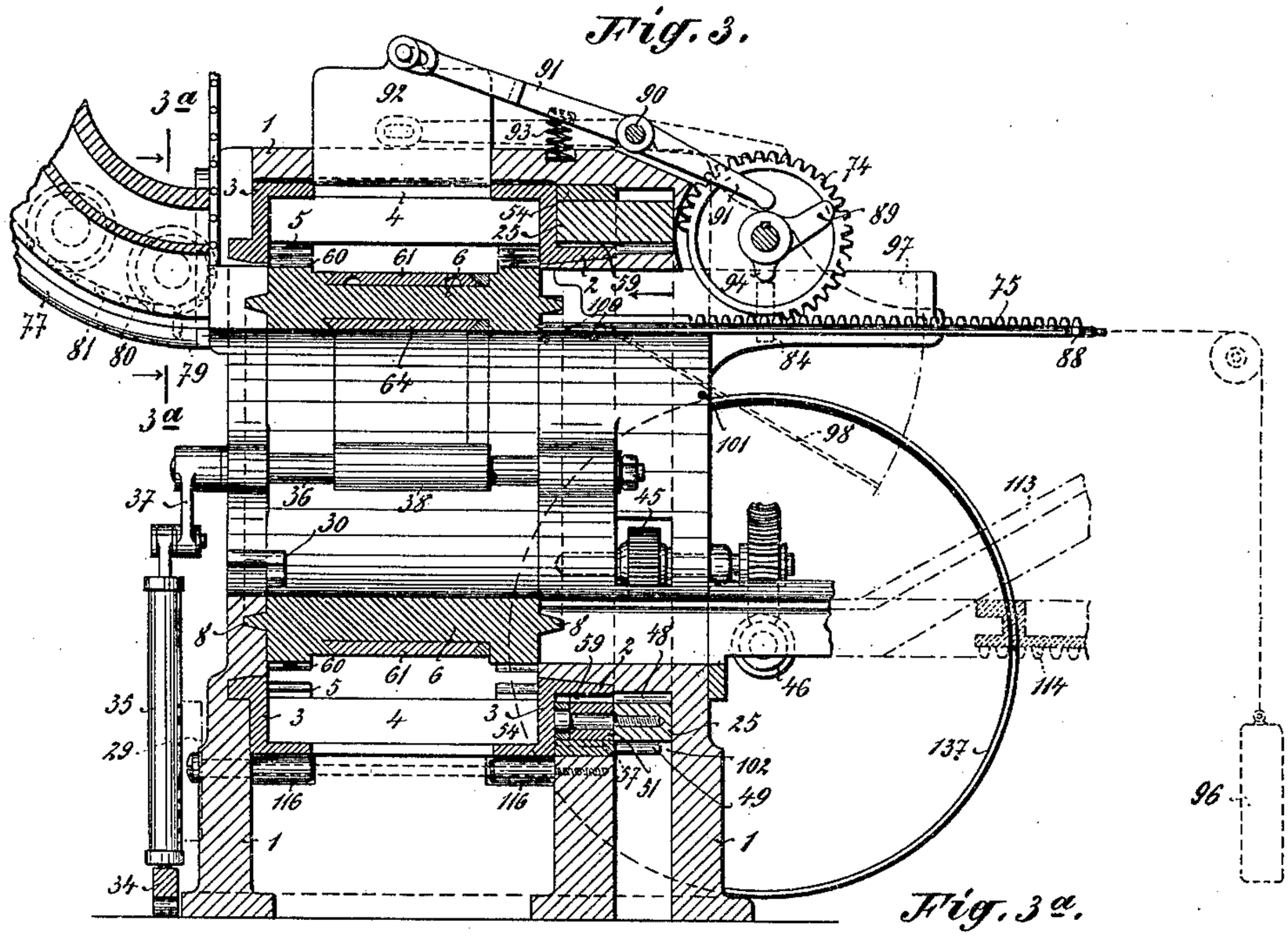

Fig. 3a.

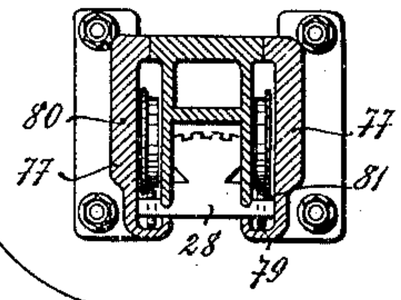

Fig. 5.

Witnesses:
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No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

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Fig. 4.

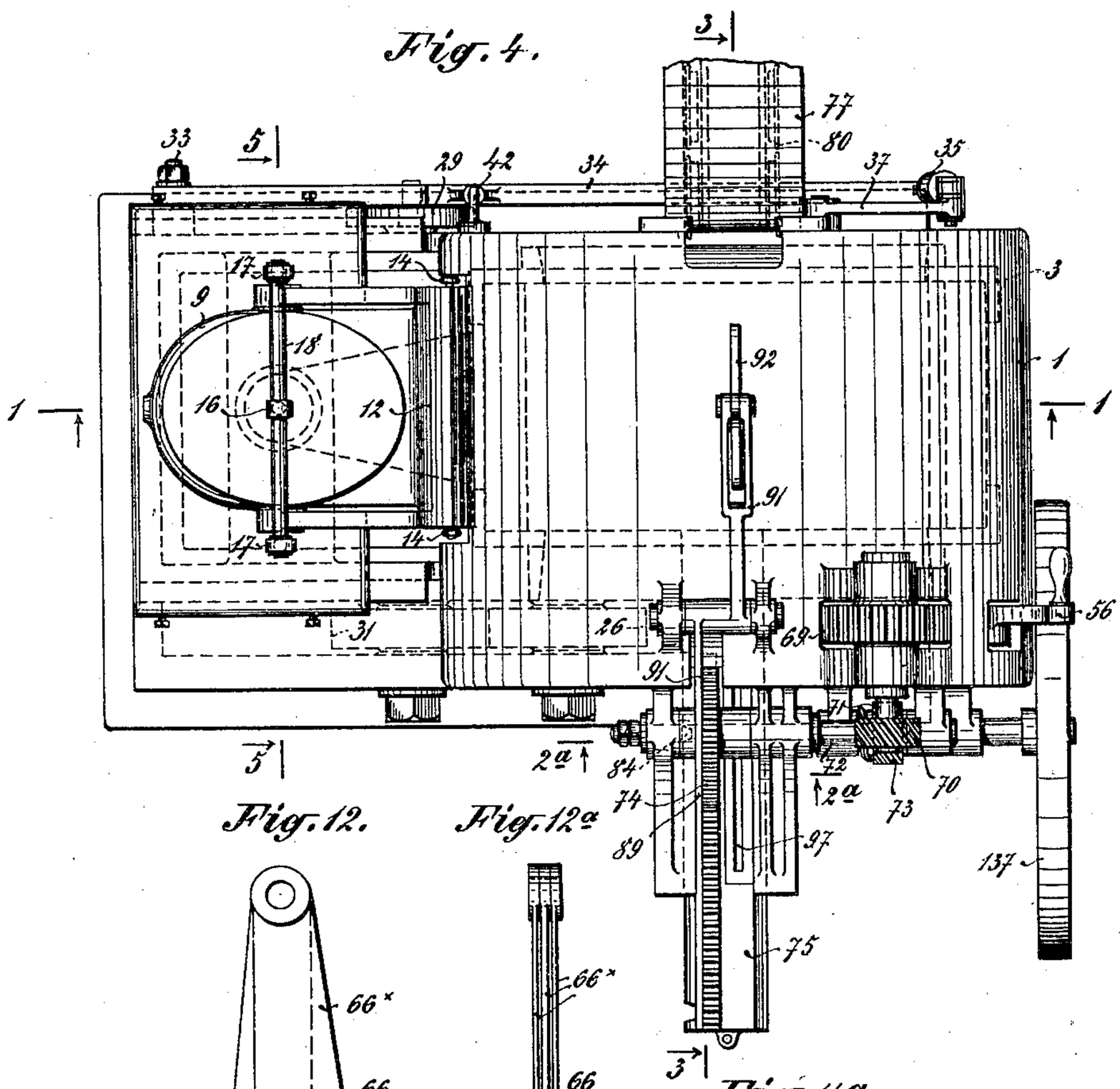


Fig. 12. Fig. 12a

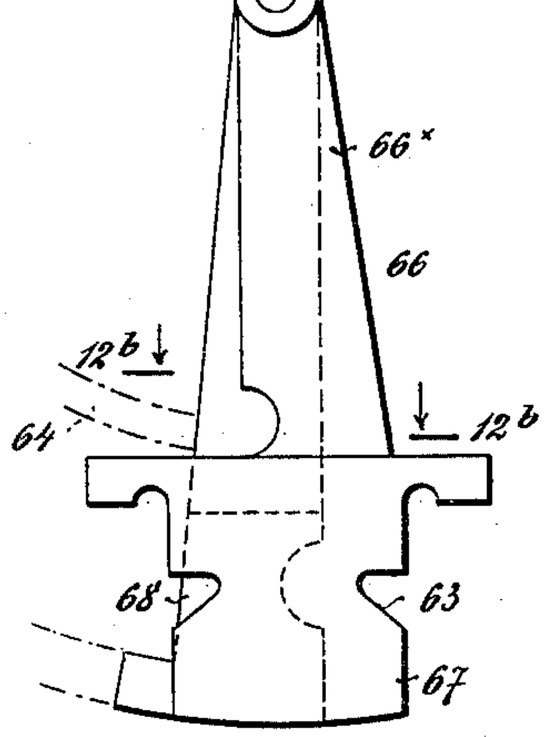
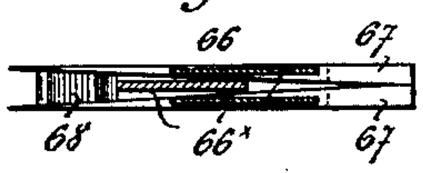


Fig. 12b.



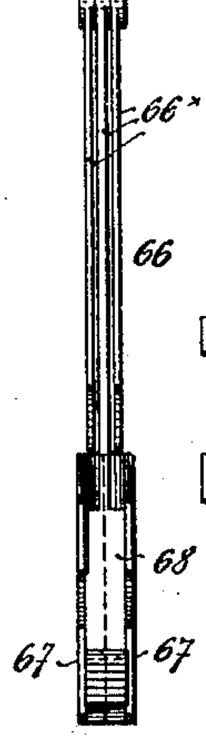


Fig. 11a.

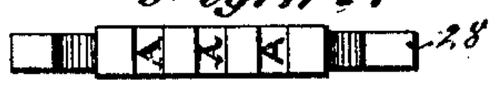


Fig. 11. Fig. 11b.

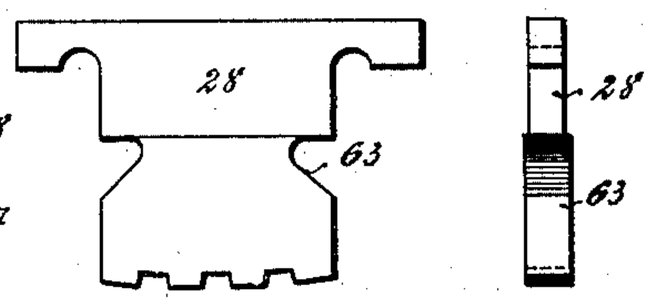
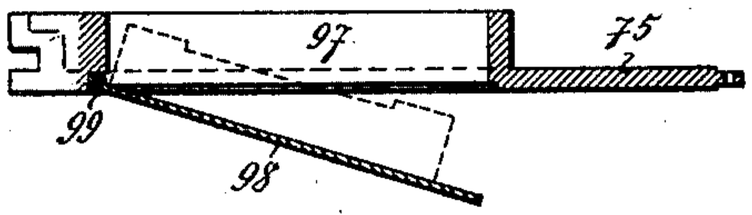


Fig. 13.



Witnesses:
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No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 4.

Fig. 21.

A
A
A

Fig. 7.

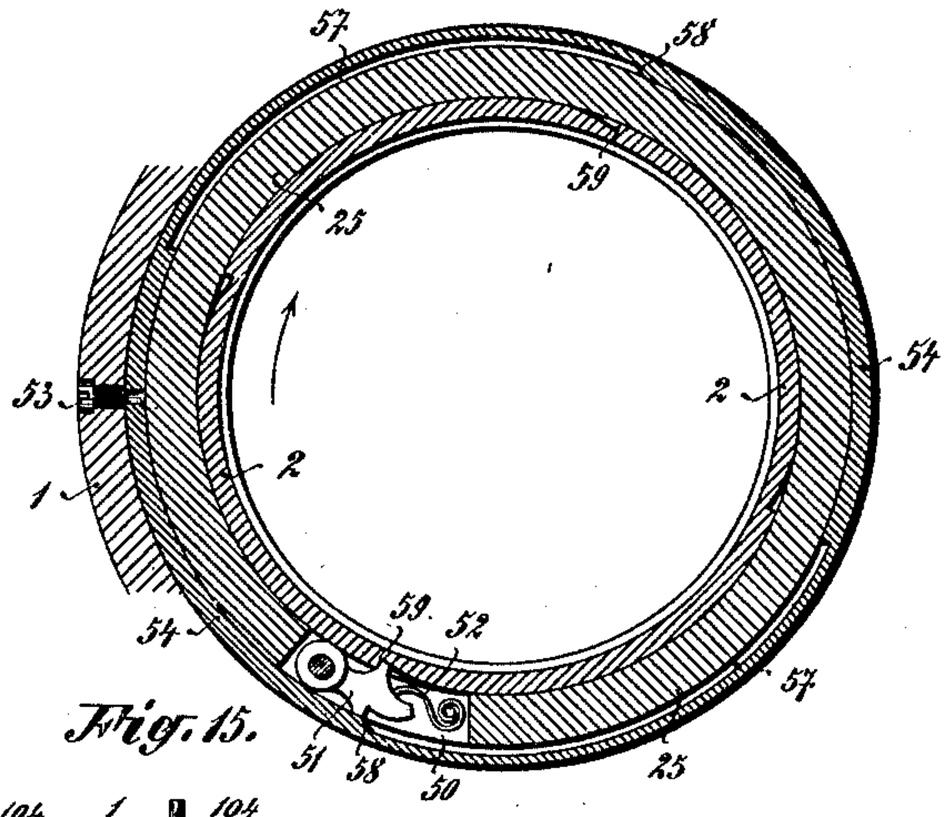

Fig. 14.

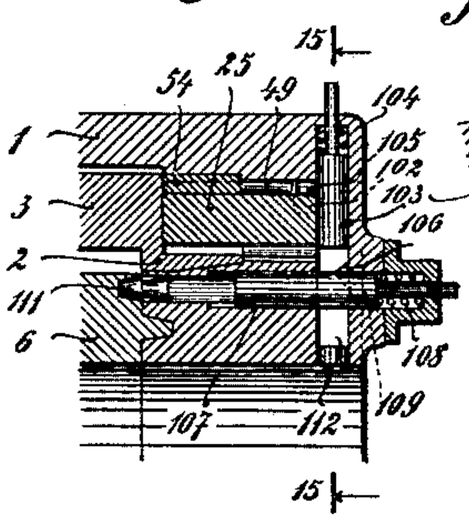

Fig. 15.

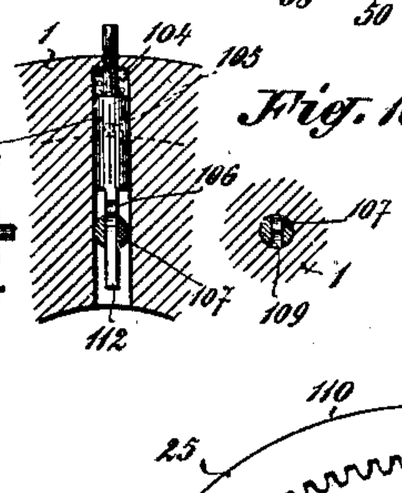

Fig. 16.

Fig. 22.

B
B
B

Fig. 6.

Witnesses:
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No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 5.

Fig. 8.

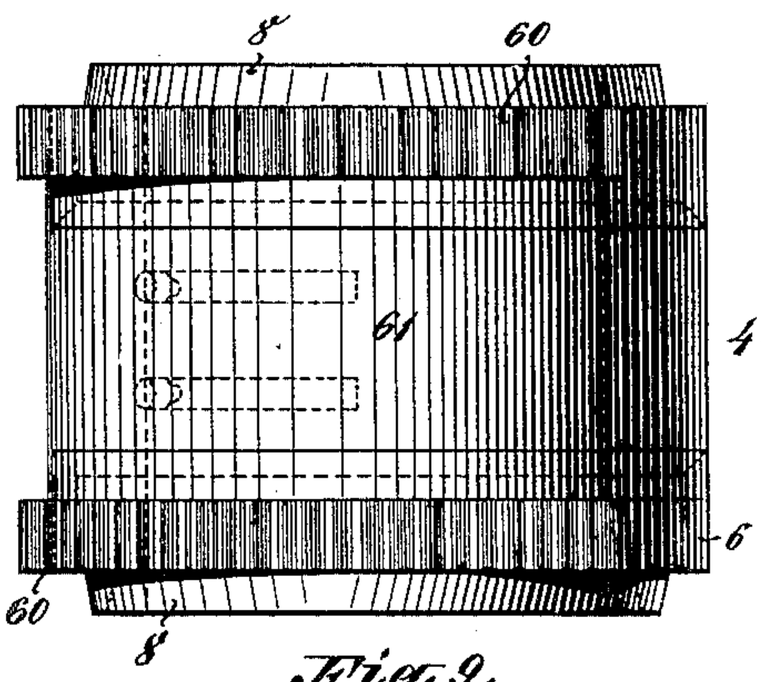


Fig. 17.

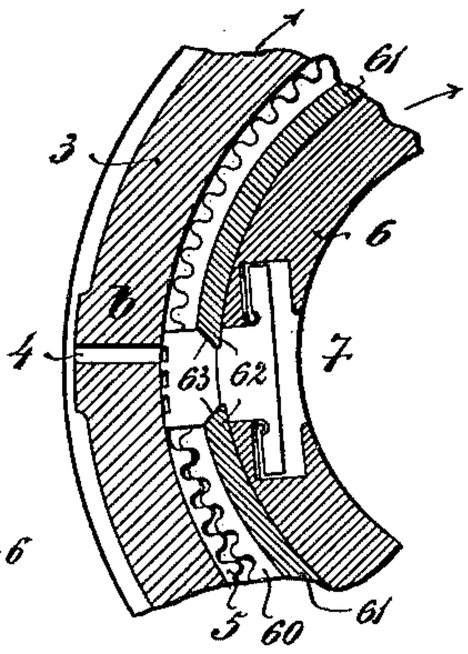


Fig. 9.

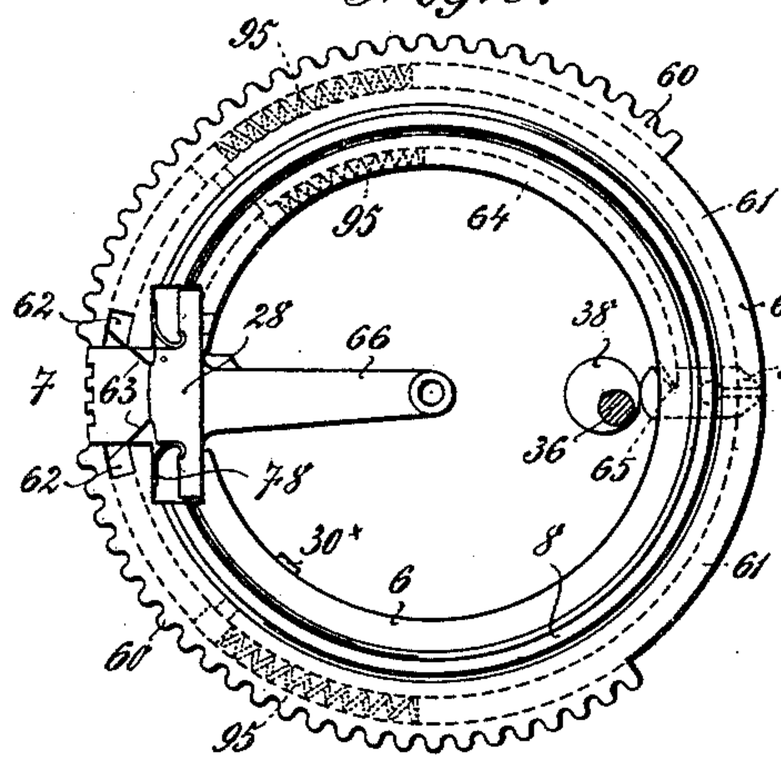


Fig. 18.

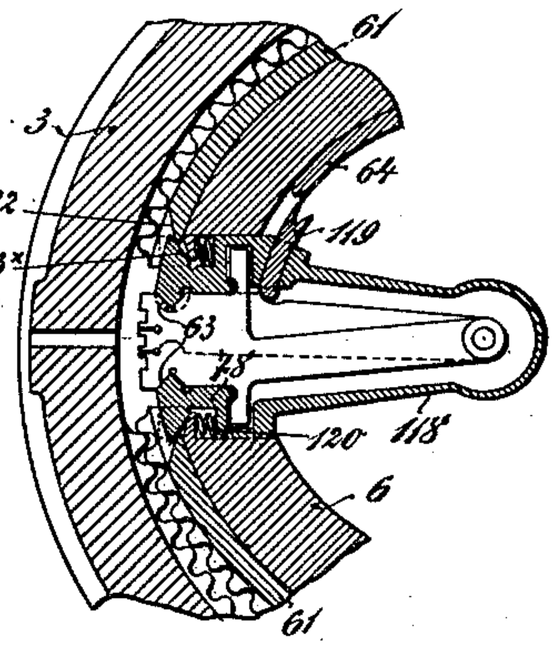


Fig. 10.

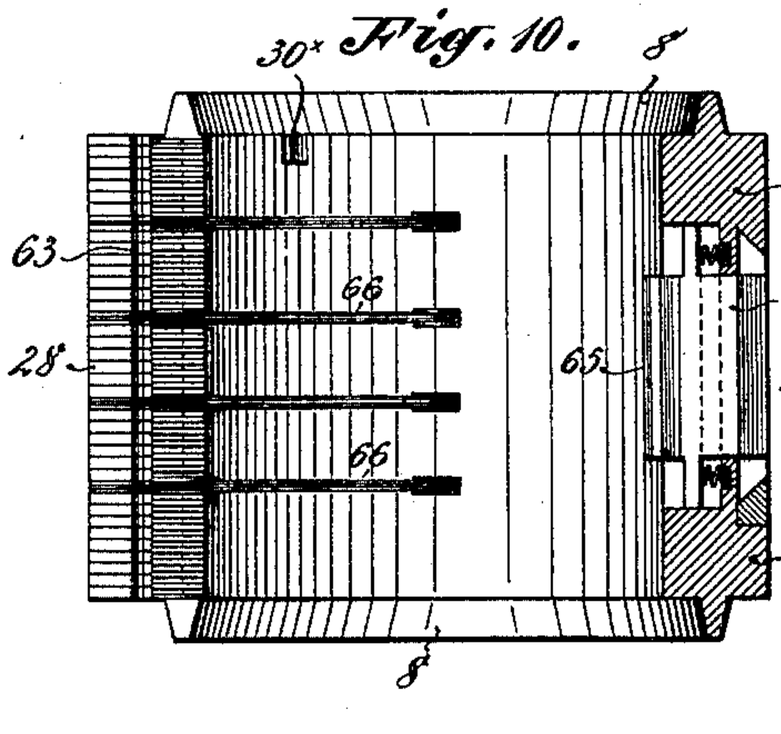
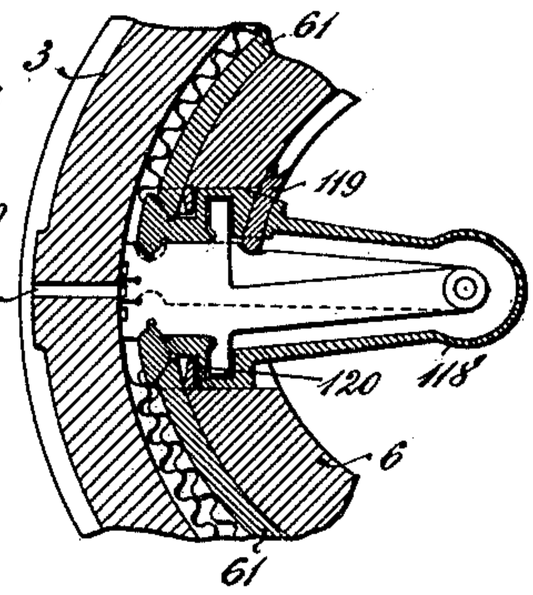


Fig. 19.



Witnesses:
E. Wallace
E. T. Lundy Jr.

Inventor:
Fritz Lucke
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No. 697,859.

Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.)

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Fig. 18a.

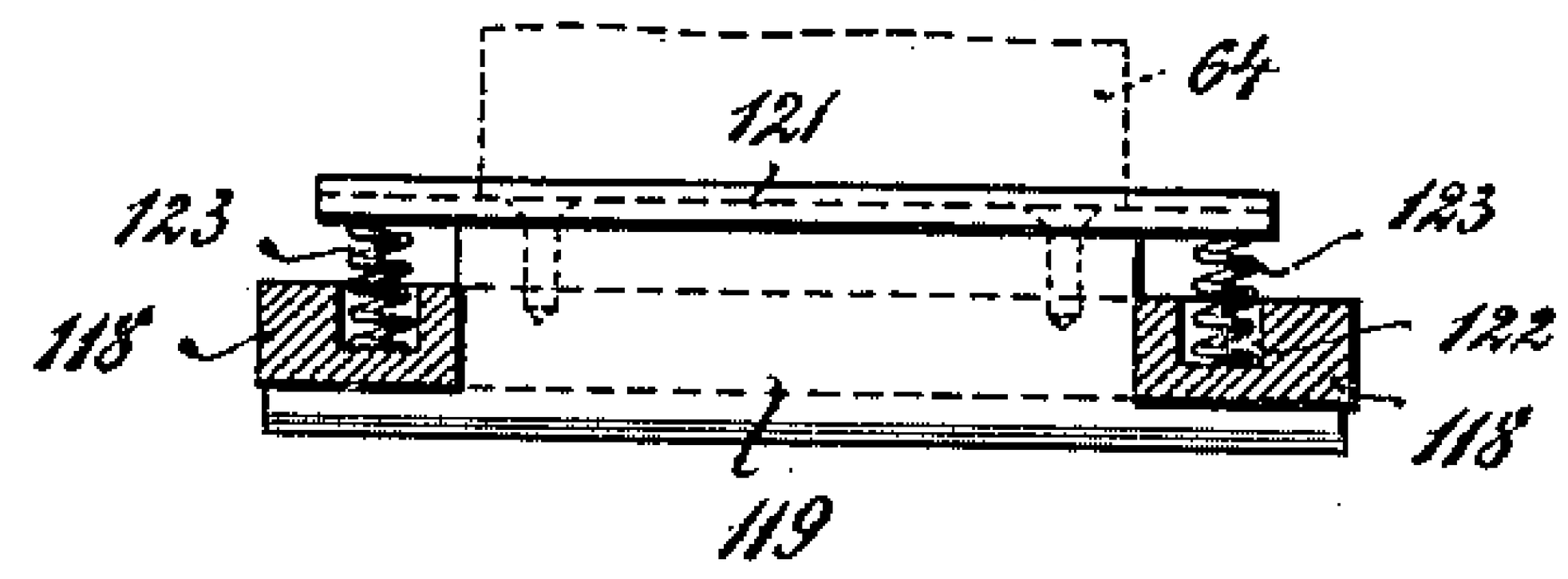


Fig. 20.

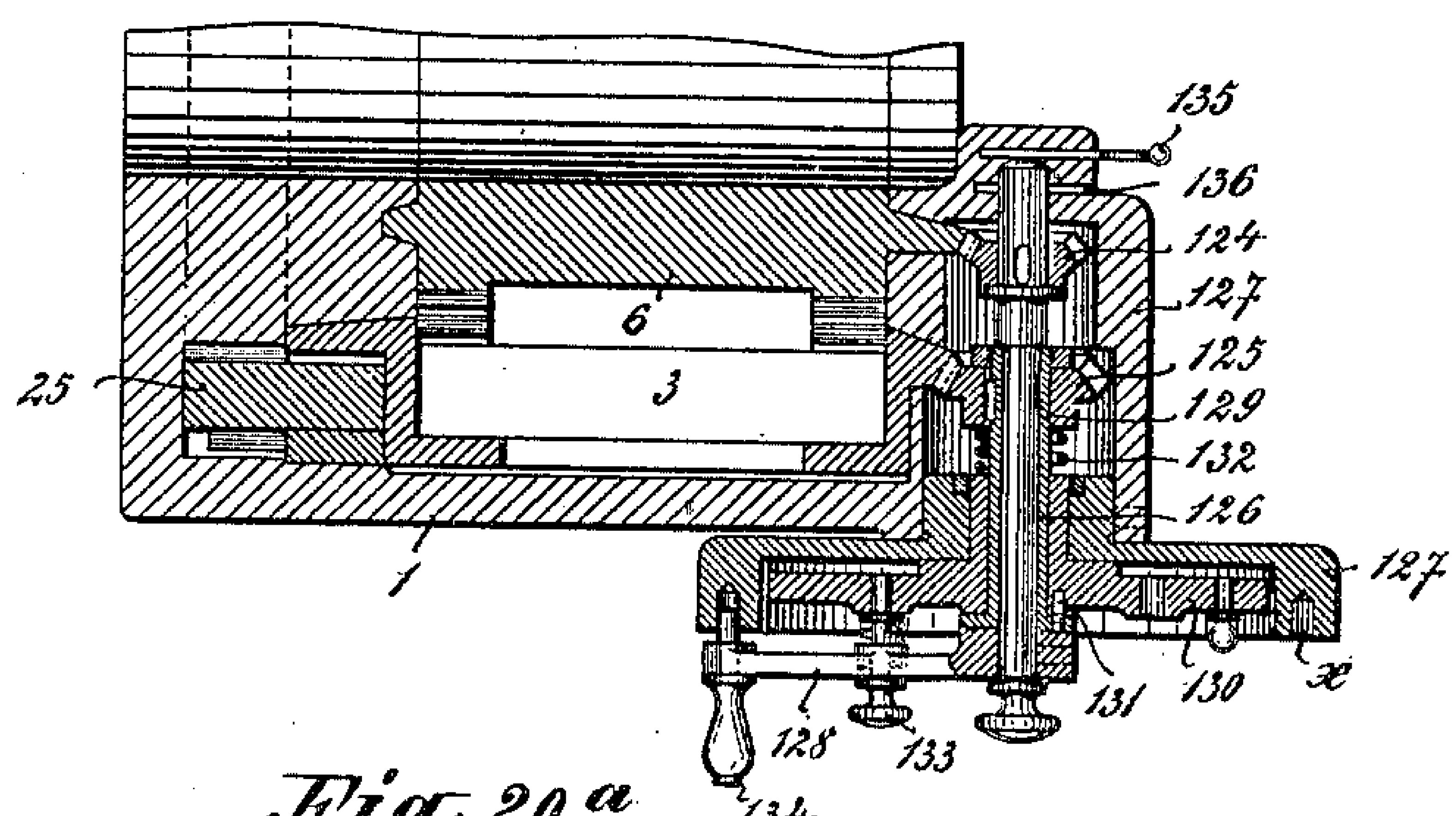
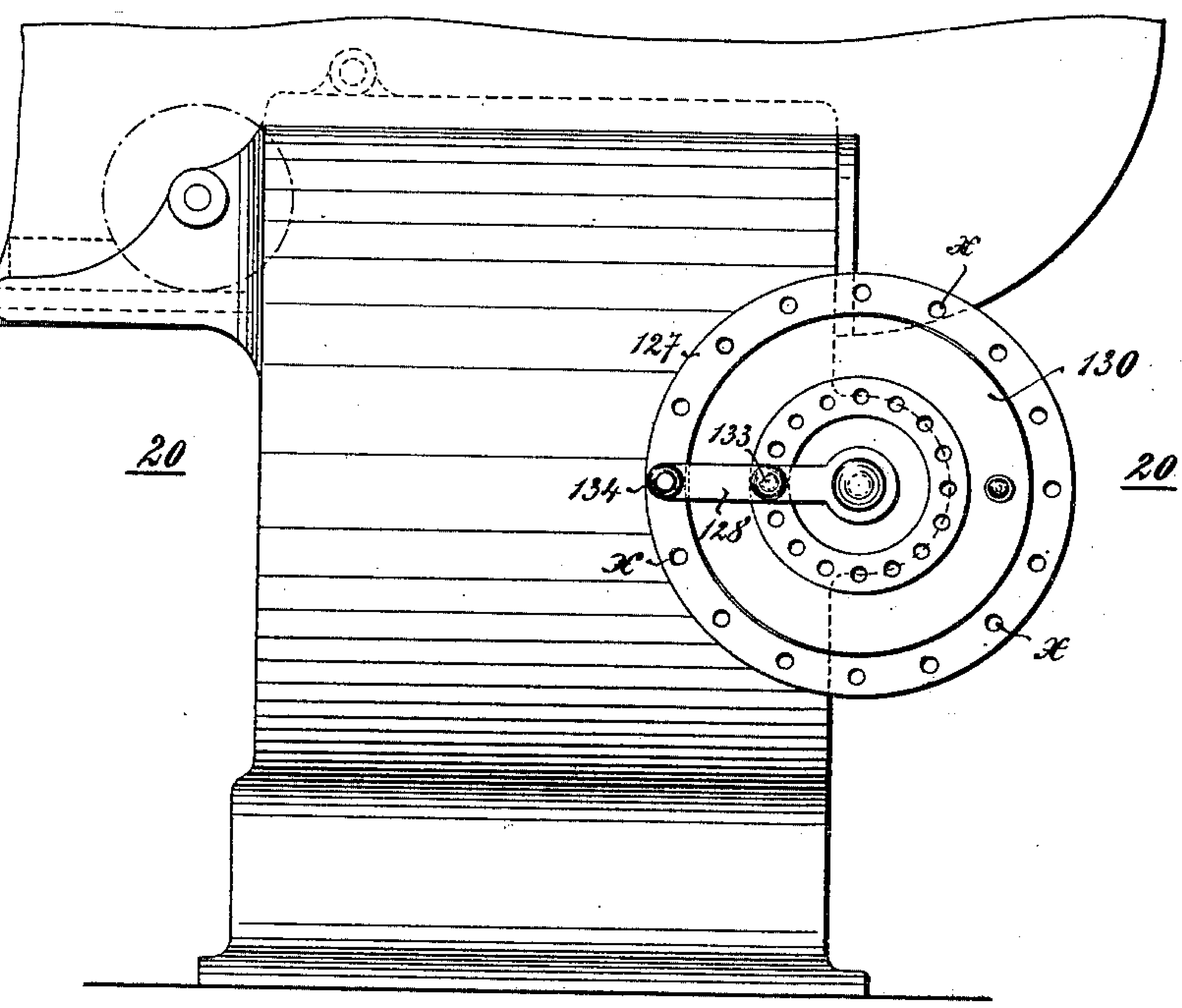


Fig. 20a.



Witnesses:

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Atty.

No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

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Fig. 23.

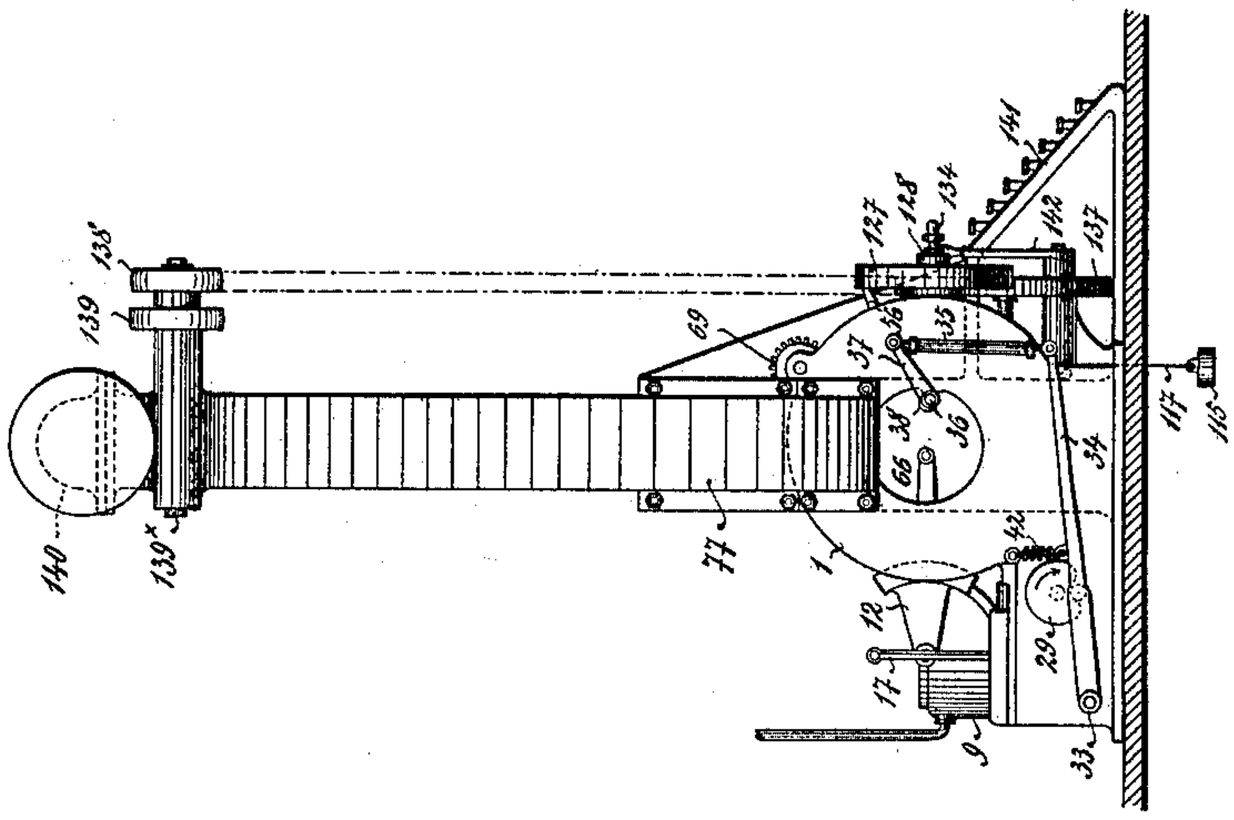
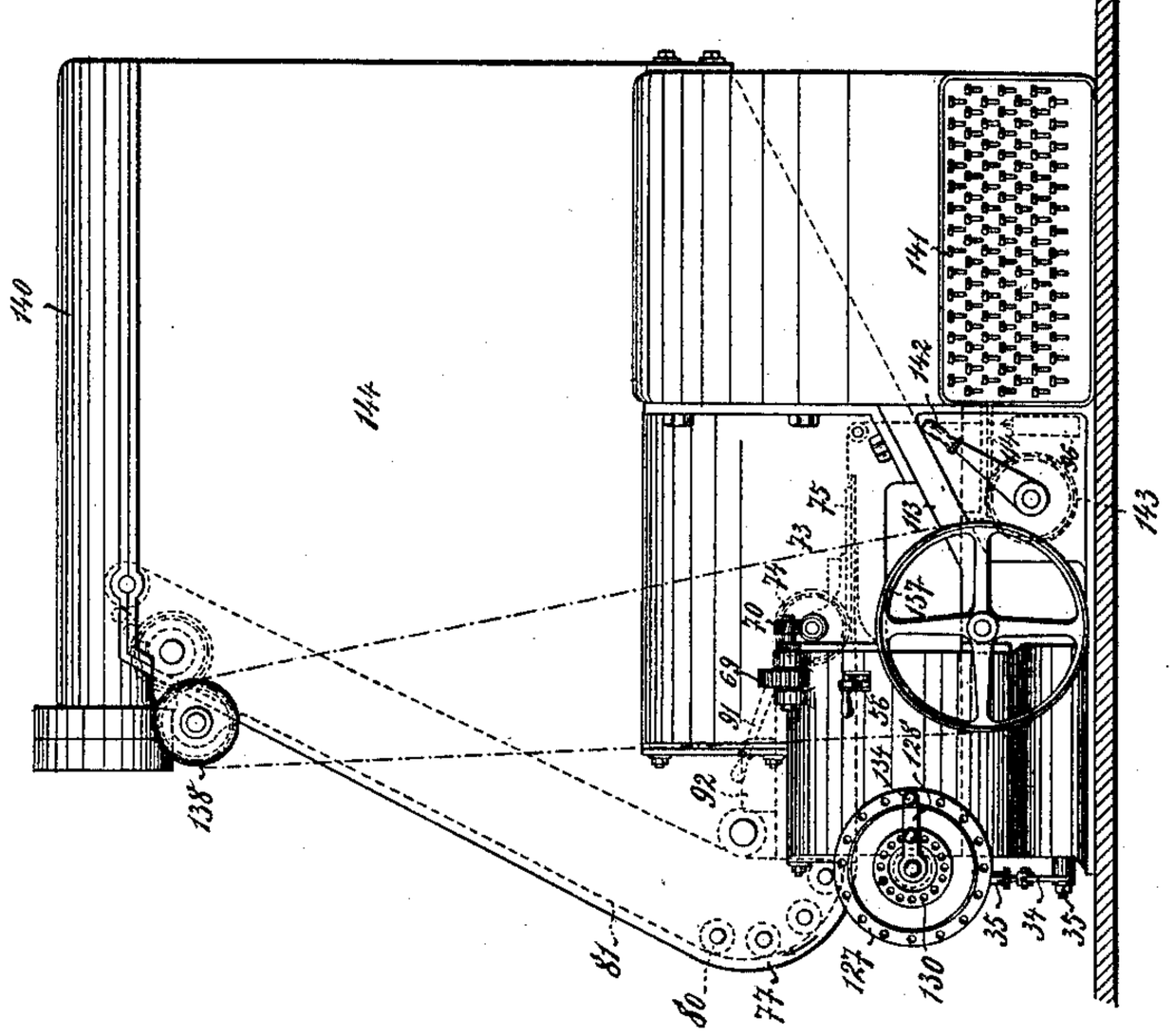


Fig. 24.



Witnesses:
E. Wellington
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No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 8.

Fig. 25.

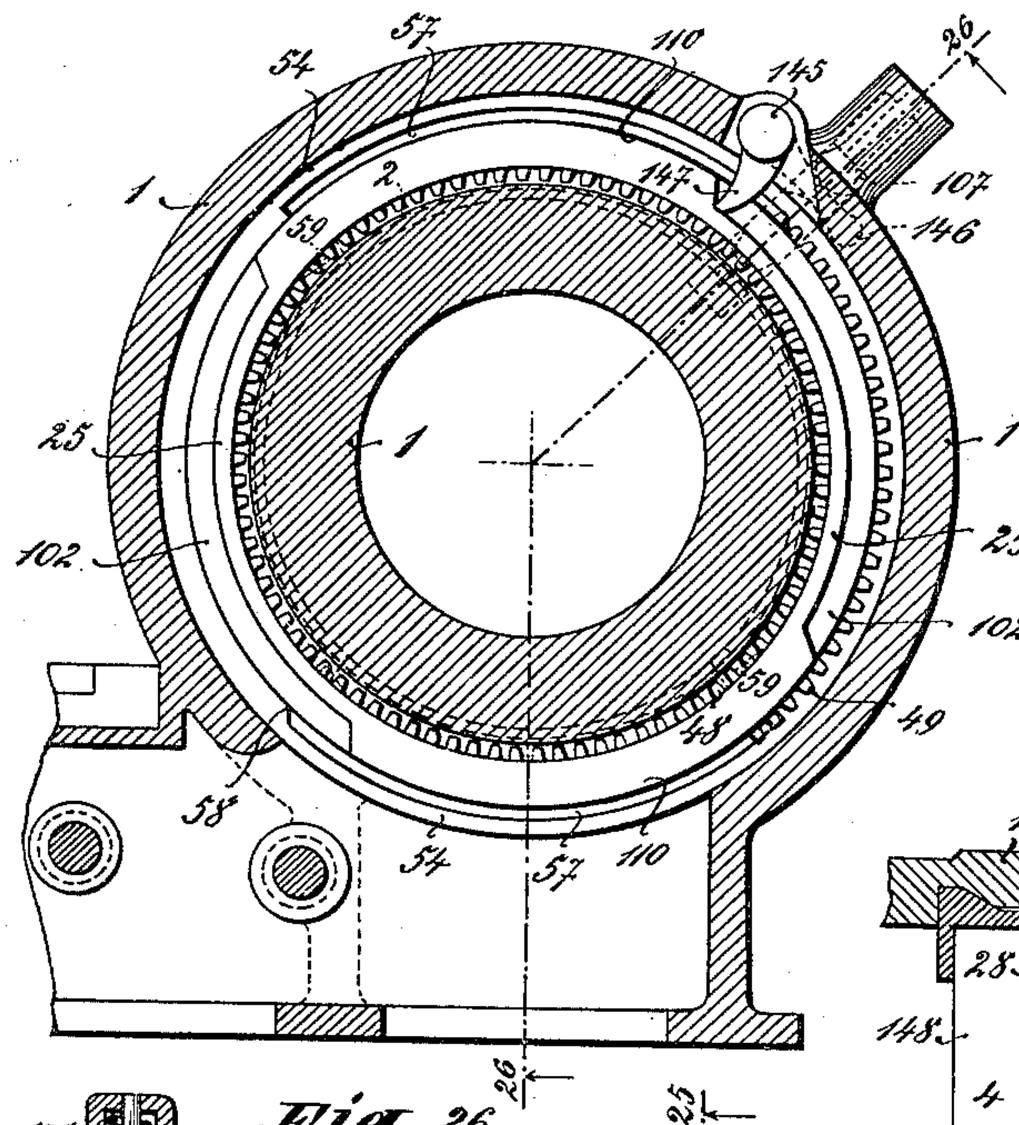


Fig. 26.

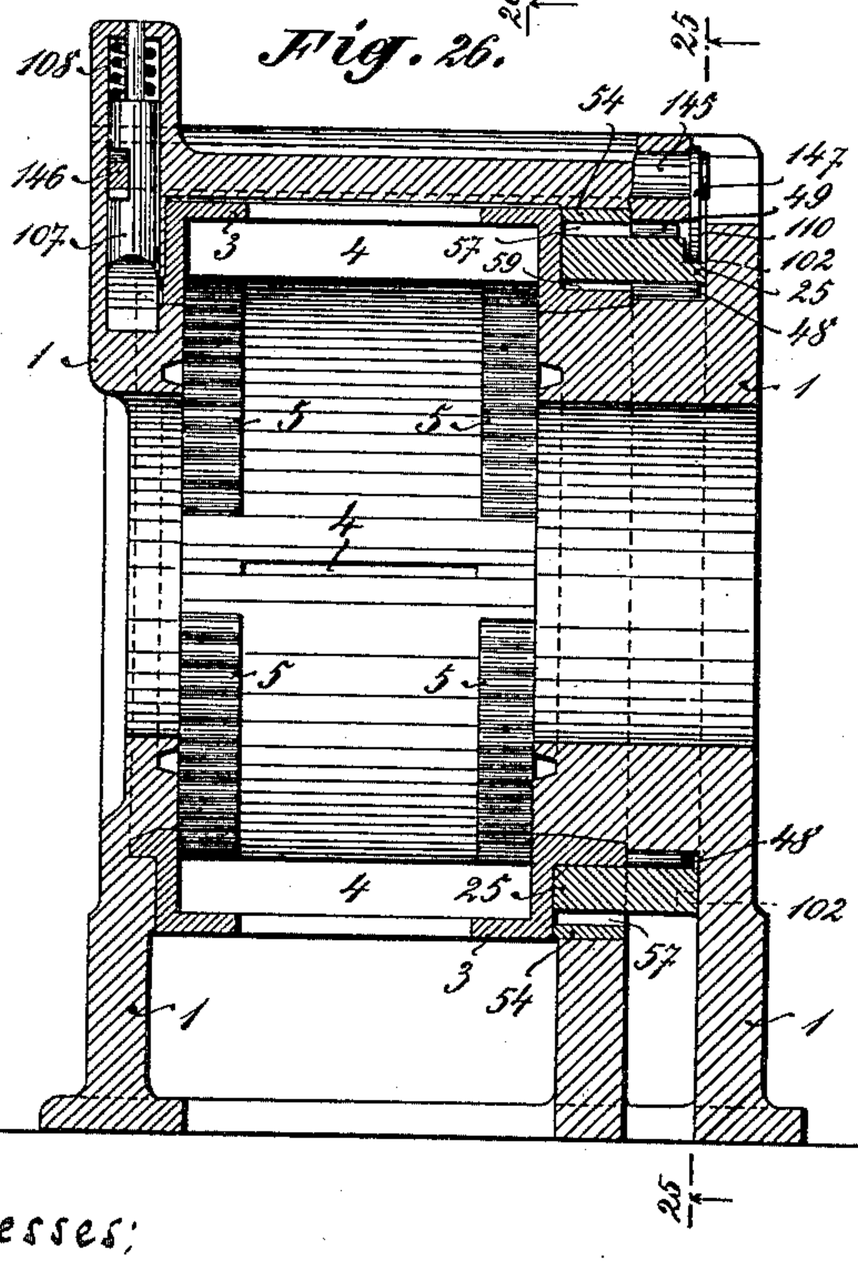


Fig. 31.

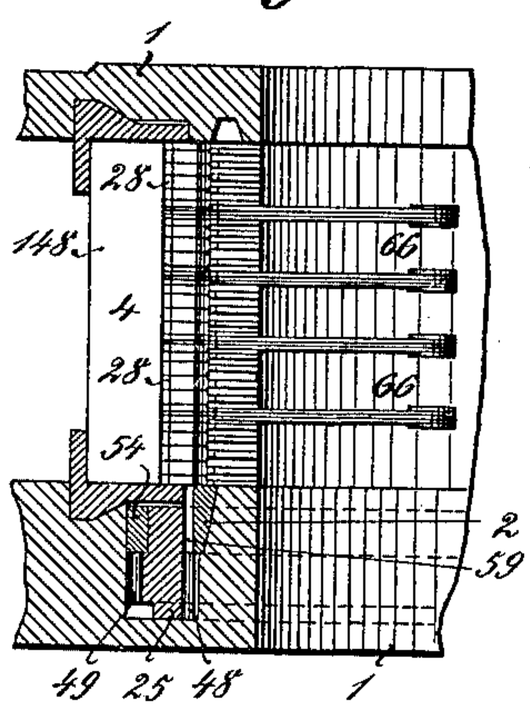
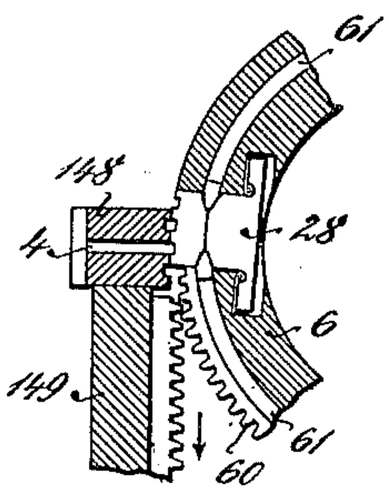


Fig. 32.



Witnesses:
E. W. Leslie
E. K. Lundy Jr.

Inventor:
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by Thurston Bailey Atty

No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 9.

Fig. 27.

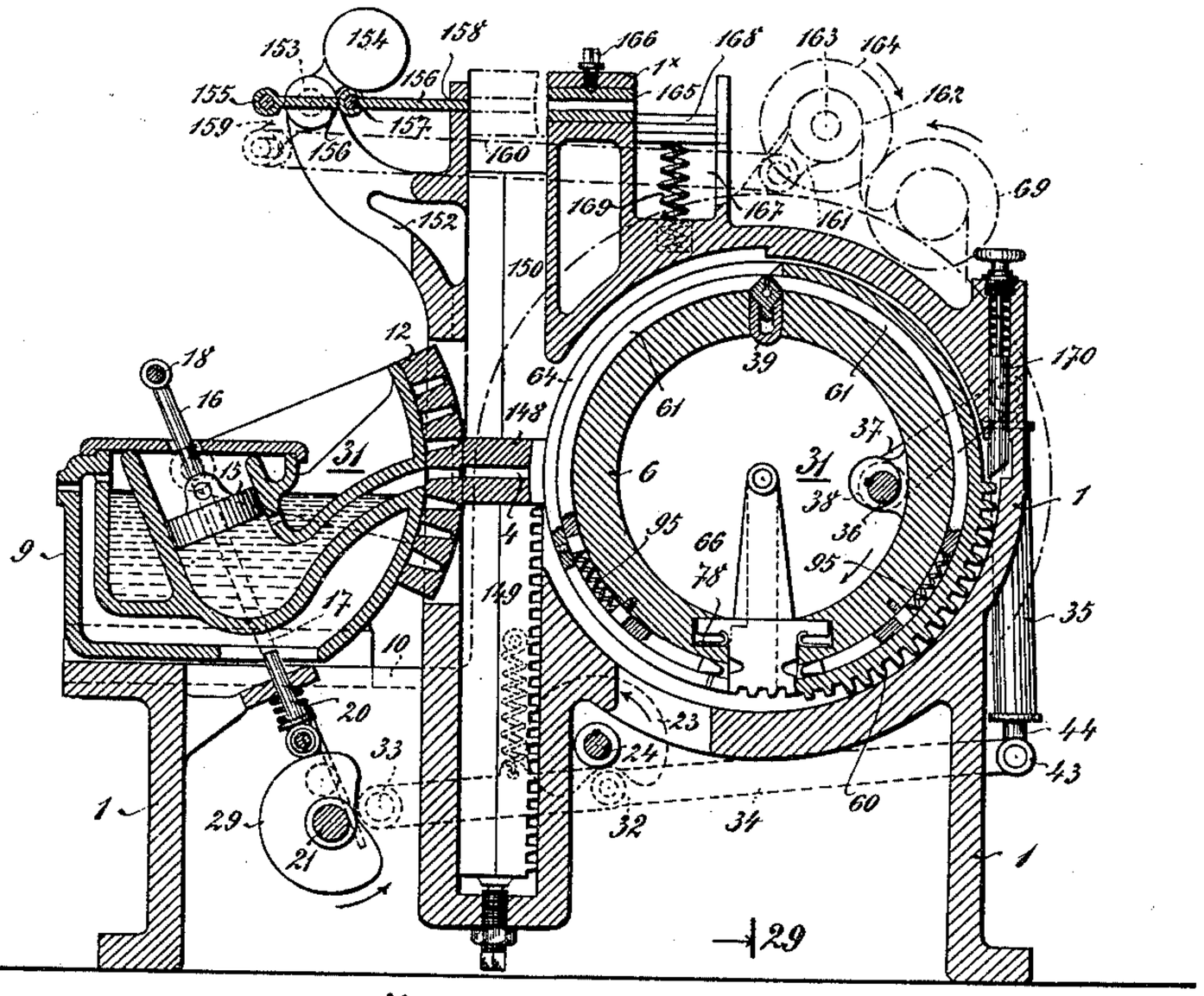
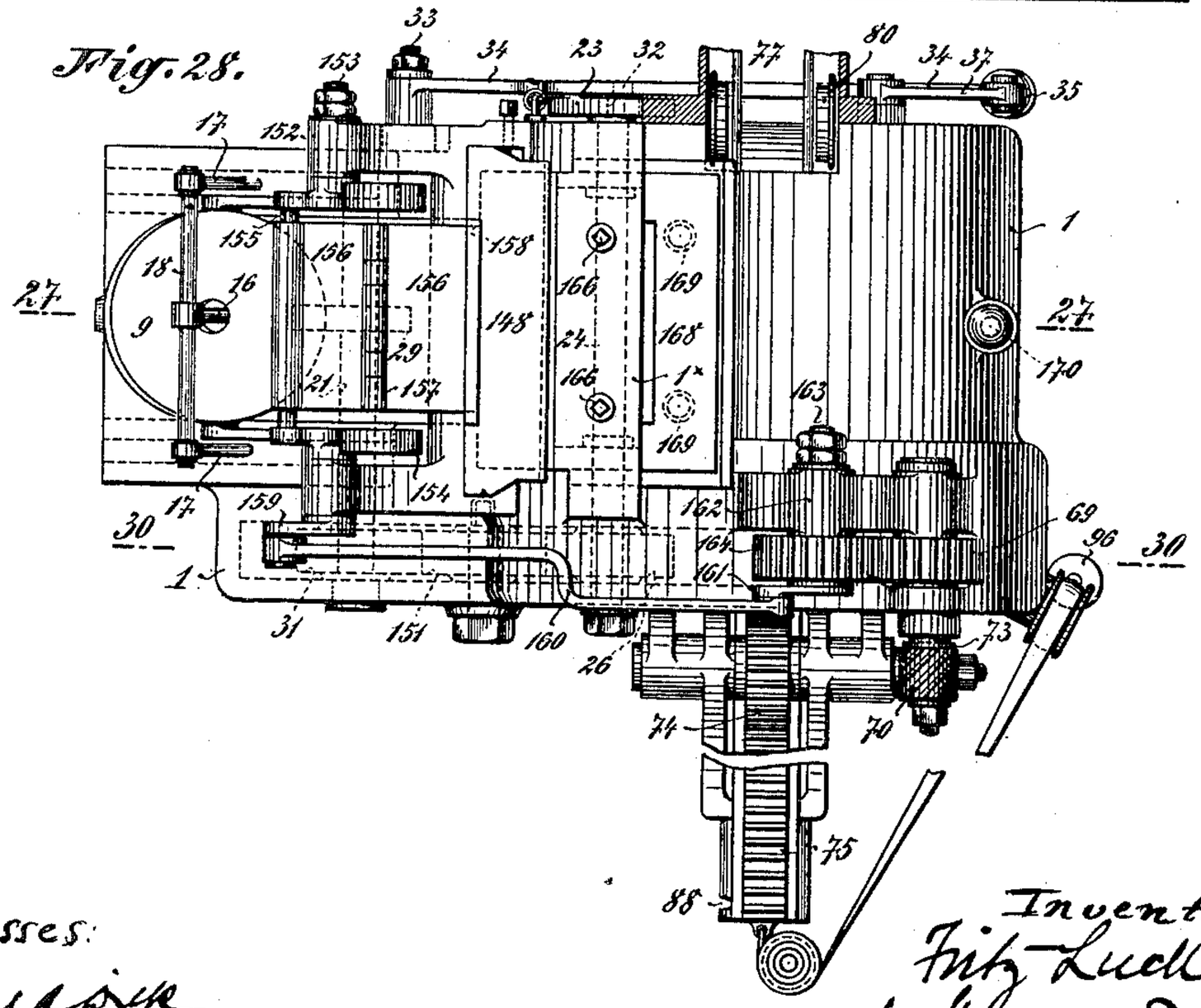


Fig. 28.



Witnesses:
Wm. A. Gill
E. K. Lundy Jr.

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Atty.

No. 697,859. Patented Apr. 15, 1902.

F. LUCKE.

TYPE CASTING MACHINE.

(Application filed May 1, 1900.)

(No Model.) 10 Sheets—Sheet 10.

Fig. 29.

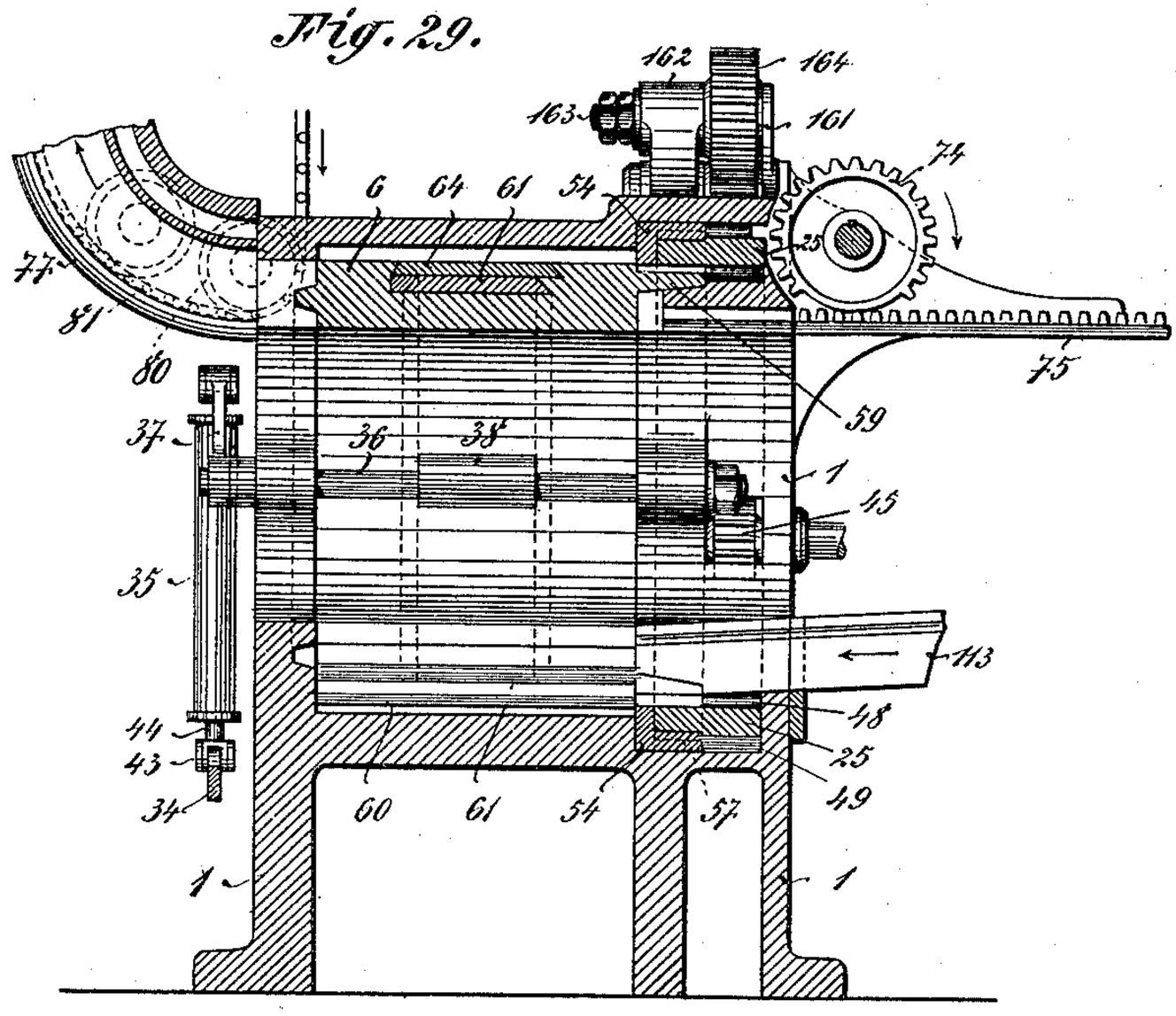
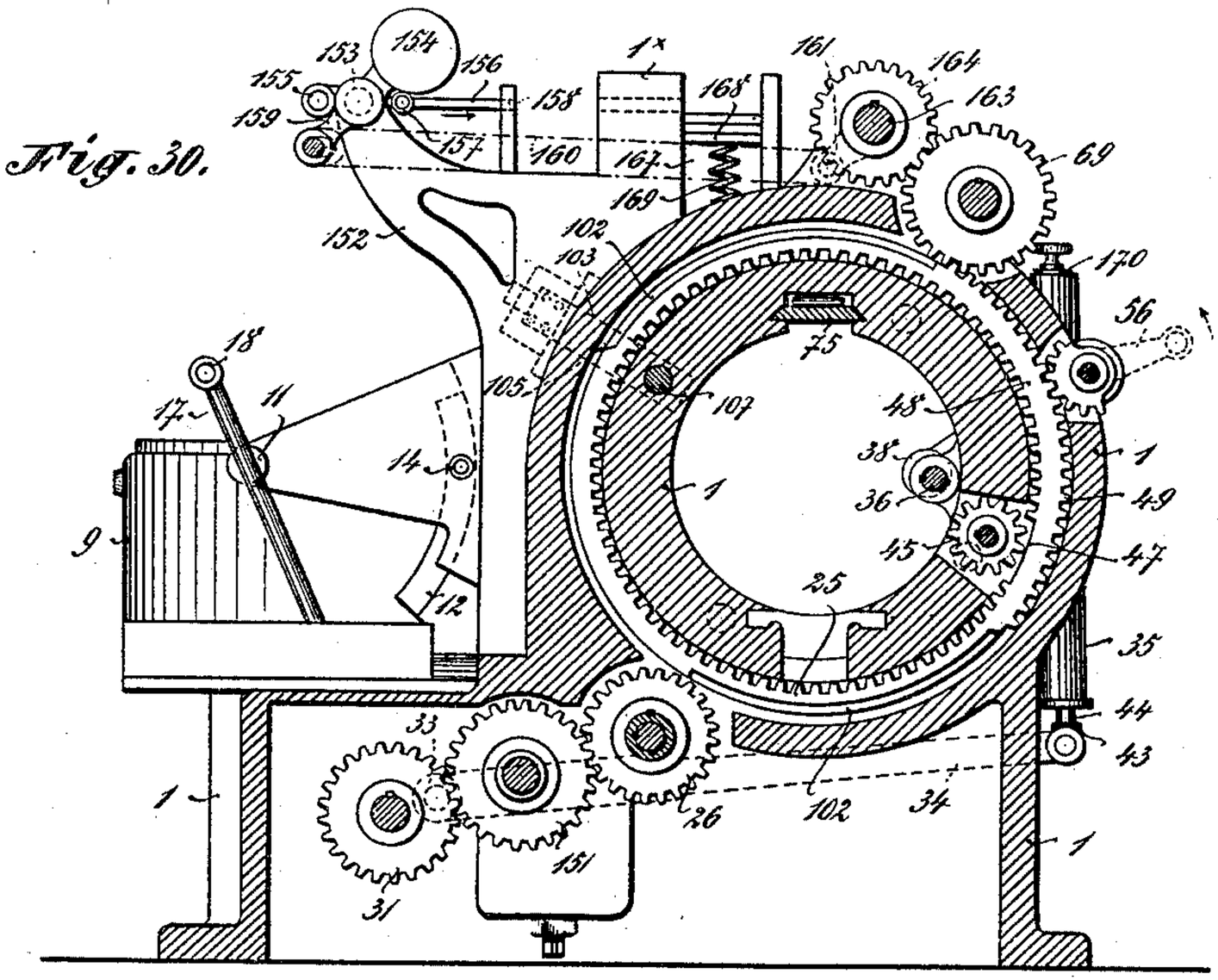


Fig. 30.



Witnesses:
E. L. Lundy Jr.

Inventor:
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by Marcellus Bailey
Atty

UNITED STATES PATENT OFFICE.

FRITZ LUCKE, OF BERLIN, GERMANY.

TYPE-CASTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 697,859, dated April 15, 1902.

Application filed May 1, 1900. Serial No. 15,101. (No model.)

To all whom it may concern:

Be it known that I, FRITZ LUCKE, engineer, a subject of the King of Prussia, Emperor of Germany, residing at Berlin, in the Empire of Germany, have invented new and useful Improvements in and Relating to Type-Casting Machines, of which the following is a specification.

This invention has for its object to provide a machine for casting lines of various kinds or styles of type—such, for instance, as thick and fine type—without the necessity of removing the type-matrix from the machine and replacing the same by a matrix of a different kind of type or of removing parts of the machine.

By the term "type-matrix" I desire to cover not only separate-letter matrices, but also any signs, syllables, or words.

In carrying the invention into practice I provide each type-matrix with type or impressions of several different kinds, and I place each line of type-matrices in a ring or carrier which is in geared connection with a casting-mold and which, together with this latter, can be moved from the receiving or charging position into the positions for casting and for removing the matrices and the cast line of type. The text of one and the same line is therefore always set up in the machine in several sizes or varieties of type, and if it is then required to cast a line of different character, so as to render it conspicuous when in print, it is only necessary to disengage the gearing between the casting-mold and the ring or carrier containing the matrices and to turn such ring through a distance equal to the distance from center to center of the different types. In this manner a line of the same matter, but composed of a different kind of type, may be brought in front of the slot in the casting-mold, and the gear between the said parts may then be reëstablished. Besides the use of distinctive characters or heavy or light type, a line may, as previously stated, be rendered conspicuous in print by forming it of a different height. To this end there are provided in the casting-mold of this machine slots of various sizes against which the ring or carrier with the matrices can be adjusted. This adjustment can only be carried out effectually by providing the ordinary casting-font with a feed-sector having feed slots or conduits of various sizes, which sector can be adjusted so as to bring any desired slot into operative position. If for a small size of type a large outlet-slot is used, there will be cast wide lines, and the lines when printed will appear "spaced."

The casting-mold may be of circular form or it may be straight. In the former case the ring or carrier containing the type-matrices and provided with teeth on only a portion of its circumference is arranged eccentrically to the geometrical axis of the casting-mold in a casing in such a manner that when the carrier and the casting-mold are sufficiently revolved in the direction of the hands of a clock the toothed engagement will be interrupted and enable the necessary adjustment to be effected between the carrier and the matrices. When, however, the casting-mold is straight, it will be advantageous to connect it with a vertical rack-bar, which by its teeth is in gear with the teeth of the ring or carrier for the matrices, the gear being so arranged as to allow of the resetting of the matrices.

In order to press the matrices tightly against the wall of the casting-mold when in the casting position and at the same time to effect the justifying or spacing of the line, the carrier containing the matrices is furnisned with slides having inclined or beveled ends and acting in corresponding inclined or beveled surfaces of the type-matrices and also on those of the justifier-plates arranged with the former in the same carrier. These justifying-plates consist of three wedge-shaped parts, the middle one of which is pushed by the above-named slides between the two outer ones, so that the type-matrices are thereby subjected to pressure in the longitudinal direction of the line only and are therefore not injured or damaged. Furthermore, the type-matrices and the justifiers may be protected by a spring cap or casing.

The movement of the casting-mold, together with the ring or carrier for the type-matrices, from the receiving or recharging position, where the matrices are inserted, into the casting position and from this latter position to the delivery position for ejecting the type-matrices and also the newly-cast type bar or block is obtained through the inter-

vention of an operating-ring, which also actuates the slides for the type-matrices, the casting-font, and other devices for arresting the casting-mold and the carrier in the various positions and which eventually effects the delivery after use of the type-matrices and the ejection of the newly-cast type-bar from the machine. The said operating-ring is provided with internal teeth engaging with a driving-pinion and is further provided with a spring-controlled catch which moves the casting-mold and the carrier from the receiving position into the casting position and again after a certain interval into the delivery position. The operating-ring is provided with peripheral projections and recesses and also with teeth extending over a portion of the periphery. The projections and recesses actuate the device for temporarily arresting or locking the casting-mold, and with it the type-matrices and the carrier, in the receiving, the casting, and the delivery positions.

In the casting position the external teeth of the operating-ring are brought into gear with toothed wheels which impart motion, through the intervention of intermediate mechanisms, first to the slides in the carrier and then to the casting-font which delivers the melted material into the corresponding slot of the casting-mold. When the operating-ring has moved the casting-mold and the carrier into the delivery position and then locked the latter, the said operating-ring moves alone, and its teeth then act upon the mechanism for ejecting the type-matrices and the newly-cast type-bar. The operating-ring now unlocks the casting-mold or the carrier and then rotates into its position of rest, while the casting-mold and the type-matrices or the carrier are returned by the action of a weight into the position for the reception of fresh matrices.

In addition to simplicity of construction and reliability of action the present machine possesses the advantage of an increased output and a considerable saving in the quantity of type to be stored, as each type-matrix contains the same matter in several different kinds of type arranged one above another.

The invention will be readily understood by reference to the accompanying drawings, in which—

Figure 1 is a cross-section taken through the machine-casing, casting-font, the carrier, and the ring-shaped casting-mold on the line 1 1 of Fig. 4. Fig. 2 is a side elevation of Fig. 1, partly in section. Fig. 2^a is a section on the line 2^a 2^a of Fig. 4, showing the locking device for the slide-rack which is used for pushing out the type-matrices and for conveying the newly-cast type-bar from the machine. Fig. 3 shows a vertical section on the line 3 3 of Fig. 4. Fig. 3^a is a cross-section through the outlet-channel for the cast type-bars, taken on the line 3^a 3^a of Fig. 3. Fig. 4 is a plan of Fig. 2. Fig. 5 is a vertical section through the casting-font, taken on the line 5 5 in Fig. 4. Fig. 6 shows a front elevation of the operating-ring. Fig. 7 shows a section of the said operating-ring. Figs. 8, 9, and 10 show a plan, a front elevation, and a horizontal section, respectively, of the ring or carrier containing the matrices. Figs. 11, 11^a, and 11^b are three separate detail views of a type-matrix. Figs. 12, 12^a, and 12^b show a side elevation, front elevation, and horizontal section, respectively, of a triplet justifying device. Fig. 13 is a vertical section through the slide for ejecting the matrices and for receiving the cast type-bar. Figs. 14, 15, and 16 are sections of a device for locking the carrier and the casting-mold. Fig. 17 is a partial cross-section showing how the position of the carrier may be altered with respect to the slot of the casting-mold in order to enable a line with different type to be cast. Figs. 18, 18^a, and 19 are partial sections taken through the casting-mold and carrier, showing how the matrices composed into a line may be protected by surrounding them with a spring cap or casing. Fig. 20 is a horizontal section on the line 20 20 of Fig. 20^a, showing a device for facilitating the readjustment of the carrier and casting-mold. Fig. 20^a is a side elevation of the same. Figs. 21 and 22 show how a type-matrix for any special letter may be provided with three distinct forms of such letter of varying heights. Figs. 23 and 24 show a front and end elevation of the general arrangement of the machine. Fig. 25 is a cross-section taken on the line 25 25 of Fig. 26, showing a modified form of the locking device for locking the casting-mold instead of the carrier in the various positions. Fig. 26 is a section taken on the line 26 26 of Fig. 25. Fig. 27 is a cross-section taken on the line 27 27 of Fig. 28, showing a constructional form of type-casting machine provided with a straight casting-mold in lieu of a ring-shaped mold. Fig. 28 is a plan of the machine. Fig. 29 is a vertical section taken on the line 29 29 of Fig. 27, and Fig. 30 is a vertical section taken on the line 30 30 of Fig. 28. Fig. 31 is a horizontal section through the straight casting-mold and carrier, taken on the line 31 31 of Fig. 27, showing the parts in their casting position. Fig. 32 is a cross-section showing how in case of the straight casting-mold the change may be effected in the toothed-gear connection with the carrier for producing distinctive type or characters.

The type-casting machine constructed according to this invention comprises a casing 1, Figs. 1 to 5, within which is held in position by means of end flanges 2 a revolving ring-shaped casting-mold 3, which by way of example may be formed with four casting-slots or jet-holes 4 and which at its inner periphery is furnished with teeth 5, an operating-ring or annular gear hereinafter described being adapted to revolve the said casting-mold into any required position, in which it may be secured by a suitable locking device.

The teeth 5 of the casting-mold 3 are in gear with the teeth of a transporting ring or carrier 6, which receives the type-matrices forming the line in a recess or opening 7. (See Fig. 9.) The type-matrices in their position for casting are tightly pressed against the casting-mold by slides, and such slides may also be utilized for actuating the justifying devices, and after the casting operation has been effected the matrices and the type-bar cast therefrom are carried into the position from which they are removed from the carrier and mold.

The carrier 6 is formed with flanges 8, by which it is retained in the casing 1, so as to be capable of participating in the rotary motion of the casting-mold 3 by the engagement of its teeth with those of the said mold.

In order to obviate the necessity of having to remove either the casting-font 9 or the casting-mold 3 or carrier 6 for the purpose of withdrawing the type-bar from the casting-mold 3 or the matrices from the carrier and also for placing another line of matrices in position, the carrier 6 is arranged eccentrically to the geometrical axis of the casting-mold, as clearly shown in Fig. 1.

At the side of the casing 1 is arranged the casting-font 9, adapted to slide in guides 10. The font is provided with a feed-adjusting quadrant 12, pivoted at 11 and formed with a number of slots of various sizes, which quadrant can be retained in position by means of a set-screw or screws 14. By mounting the font as represented in Figs. 1, 2, and 5—that is to say, upon the guides 10—it is possible to easily and correctly adjust the position of the font to suit the size of quadrant being employed, the font being properly held in place by set-screws after it is adjusted. This construction also permits the entire removal of the font whenever this may be desirable. The plunger 15 of the casting-font is connected with link mechanism 16 17 in conjunction with an upper and a lower cross-bar 18, Fig. 5, and springs 19, mounted upon bolts 20, fixed to the lower cross-bar 18 and guided in holes in the casing 1. These means tend constantly to force the plunger 15 downward. Upon the shaft 21, Fig. 1, is loosely mounted a lever 22, engaging, by means of slot in one arm, with the lower cross-bar 18, the opposite arm of the lever engaging with a cam-disk 23, fast on the shaft 24 and having about a fourth of its periphery cut away, as shown.

When the casting-mold 3, with the transporting ring or carrier 6, has been moved by the operating-ring, hereinafter described, from the position *a*, Fig. 1, at which the composed line or matrix is introduced, into the position marked *b* in the drawings—that is to say, into the casting position—the operating-ring 25, Fig. 6, will by means of a toothed wheel 26 cause the shaft 24 to be rotated to such extent as to bring the cam-disk 23 into the position shown in Fig. 1. In this position the lever 22 will yield to the pressure of the springs 19, which by means of the link mechanism 16 17 18 will force the plunger 15 into the casting-font 9, thereby causing the type-metal, which is kept in a liquid condition by means of a suitable frame arranged at 27, to be forced under great pressure through the slot of the feed-quadrant into the cavities of the type-matrices. While the cam-disk 23 is slowly rotated and the lever 22 returns the link mechanism 16 17 18 and plunger 15 against the pressure of the springs 19, the operating-ring 25, for the reason hereinafter described, remains inactive as regards the casting-mold 3 and the transporting ring or carrier 6. As the cam-disk 23 rotates it imparts motion to another disk 29 on the shaft 21 by means of the toothed wheel 26, which engages with a similar toothed wheel 31 on the shaft 21. The disk 29 is also provided with a recess in its periphery similar to the cam-disk 23 and acts upon a roller 32 of a lever 34, pivoted at 33. To the free end of this lever is connected a spring-casing or elastic connection 35, attached to an arm 37 upon a shaft 36, and upon this latter is keyed an eccentric 38, adapted to force inward into the carrier 6 a slide 39, this operation being effected just before casting takes place, for the purpose hereinafter explained. The spring-casing 35, Fig. 1, is used to prevent overstraining and injury of the parts of the mechanism, and to this end it is provided with a piston 40, which in its downward movement compresses a spring 41. In the upward movement of the lever 34, which is effected by a spring 42, connected at one end to the said lever 34 and at its other end to the casing 1, a collar 43 upon the rod 44 communicates motion to the lever 37, and so returns the eccentric to its initial position. The cam-disks 23 and 29 are so set as to first effect the insertion of the slide 39 into the carrier 6 and to then cause the lever 22 to effect the casting of the type-bar.

45 designates the driving-pinion of the machine, which in the arrangement shown, by way of an example, in Figs. 2, 3, and 6 of the drawings receives continuous motion by means of a worm-gear 46, driven by hand or by power, as may be most convenient, the object being to cause the operating-ring 25 to move the casting-mold 3 and the ring 6 at the required times into the proper positions for effecting the various operations.

The operating ring or gear (shown in detail in Figs. 6 and 7) consists of a ring 25, arranged in the casing 1 and surrounding the guide-flange 2 of the casting-mold 3. (See Fig. 3.) This ring 25 is provided with internal peripheral teeth 48, interrupted for a short distance at 47, and with external teeth 49, covering about a quarter of its circumference. The said operating-ring is formed with an opening 50, in which is located a catch 51, which by a spring 52 is held against the inner surface of a steel ring 54 in the interior of the casing 1, in which it is secured by a screw 53, Fig. 7.

55 designates a starting-pinion, which is only partially provided with teeth and which gears with the teeth 49 of the operating-ring 25. By rotating the pinion 55 by means of the crank-lever 56 in the direction of the arrow inner teeth 48 of the operating-ring will be brought into gear with the continuously-rotating driving-pinion 45, while the teeth of the starting-pinion 55 are disengaged from the teeth 49, thus allowing the crank-lever 56 to fall by its own weight into its initial position.

The inner periphery of the ring 54 is formed with recesses and projecting portions 57 and 58 alternately, which projecting portions in certain positions of the operating-ring cause the catch 51 to engage in notches 59, provided in the flange of the casting-mold 3, which then moves along with the operating-ring 25. After the movement from one position to another the catch 51 by the pressure of its spring 52 is forced into a recess 57 of the ring 54 and is then disengaged from the notch 59 of the casting-mold 3, leaving the operating-ring 25 to continue its rotation alone until another projecting portion 59 brings the catch 51 again into engagement with a notch 59. As will be seen from Fig. 6, intermittent movement is imparted to toothed wheels 26 and 31, and thus to the cam-disks 23 and 29, by reason of the arrangement of the interrupted external teeth 49 on the ring 25.

In Fig. 1 the starting position in which the matrices are introduced into the carrier 6 is marked *a*, while *b* denotes the position for casting, *c* the position at which the type-matrices 28 are removed and the cast type-bars ejected, while *d* denotes the position of the operating-ring 25 as it rotates alone, in which this latter starts a working operation, as will hereinafter be fully described.

The transporting ring or carrier 6, receiving the matrices, is shown separately in Figs. 8, 9, and 10 and is provided with teeth 60 at or near its ends, and around the said carrier there are arranged in grooves or guideways two slides 61, which serve to press forward the type-matrices 28 and which at the front are of the same width as the ring or carrier, while their rear portion is narrower.

In Fig. 9 the slide 39, hereinbefore referred to and which is split at the front in order that its ends may be somewhat elastic, is shown as being acted upon by the eccentric 38, so as to wedge the said slide between the two slides 61 and cause the latter by means of their inclined ends 62 to act against corresponding inclines 63 of the type-matrices 28, and thus press the same against the casting-mold with sufficient force to resist the pressure resulting from the casting operation. The slides 61 also act at the same time upon type-justifying devices 66 and press the same between the matrices 28, so that the said matrices in the longitudinal direction are tightly pressed between the sides of the casting-mold 3. This will be more clearly understood from Fig. 31, hereinafter referred to. In the forward motion of the type-matrices 28 the springs 78, arranged between the shoulders of said matrices and a notch in the carrier 6, are compressed, as shown in Fig. 9, in such a manner as to effect the return of such matrices.

The slides 61 are provided with recesses in which are arranged springs 95, acting against fixed bolts of the carrier 6, which springs are compressed by the action of the wedge-slide 39 upon the aforesaid slides 61. After the casting of the type has taken place and during the further motion of the casting-mold 3 and carrier 6 the wedge-slide 39 is withdrawn by the action of its springs, which are shown at the right-hand side, Fig. 10, the slides 61 being then returned to their original positions by means of the springs 95. At the inner side of the carrier 6 there is arranged a third slide 64, also subject to the action of a spring $95^{\times}$, and which when operated by the inclined surface 65 of the wedge 39 forces the justifying devices 66 still farther between the type-matrices 28.

Figs. 11, 11^{a}, and 11^{b} show a type-matrix having, for example, three recessed types.

Figs. 12, 12^{a}, and 12^{b} show a type-justifying device 66, consisting of three parts, the two outer ones 67 of which are at their front ends or heads of the same form as the type-matrix and having inner sides tapered to correspond with the wedge-shaped middle portion 68, which by the action of the slides 61 64 is forced between the outer parts 67. By this means these outer parts 67 are separated in the longitudinal direction of the line by a slight inward movement of the slides, so that the type-matrices 28 are only subjected to a side pressure, but not to great friction and rapid wear. The tail portions $66^{\times}$ of the justifying device extend to the geometrical axis of the carrier 6.

The operation of ejecting and removing the cast type-bar from the casting-mold and transporting the matrices to the magazine is effected in the following manner: After the casting operation has been completed the toothed wheel 69, Figs. 2, 3, 4, and 6, which, with the worm 70, is rigidly keyed to a shaft 71, arranged in bearings upon the casing 1, is engaged by the teeth 49 of the operating-ring 25. The worm 70 gears with a worm-wheel 73, fast on a shaft 72, at the front of the machine, and thus imparts motion to a spur-wheel 74 at the other end of such shaft. This latter wheel gears with a toothed rack 75, which it moves in the direction of the arrow in Fig. 3 into the recess of the carrier 6. This causes the type-matrices 28, which at this moment are inverted, to be ejected from the carrier 6 into the curved channel 77, leading to a taker-off mechanism. The ejection of the type-matrices is rendered possible by the eccentric disposition of the rotary casting-mold 3 and carrier 6, which have moved from *b* to *c* and which by the aid of the springs 78 separate them from the cast line or type.

The type-matrices are conveyed along the channel 77 by means of tappets 79, provided on an endless chain 81, passing over rollers 80, and the curvature of the channel is such that by the time the type-matrices reach the take-off mechanism they are again in the correct position. The wheel 74 is provided upon a portion only of its periphery with teeth and is of such a diameter that when it has rotated through two-thirds of a revolution the rack 75 will be in its end position and the type-matrices will be fully ejected. At this point the teeth of the wheel 74 are omitted, so that it no longer gears with the rack 75, and the latter will then stop. The locking of the rack is effected by means of a bolt 84, arranged vertically within the casing 1, Figs. 2 and 2ª, and formed with a notch 85, with which is adapted to engage the guide 76 of the rack 75. The said bolt is fitted with a projection 86, against which a spring 87 acts with a constant tendency to force the bolt upward. In the end position of the rack 75 a notch 88 in the guide comes opposite the bolt 84, the lower part of which latter is then forced by the spring 87 into the said notch 88. (See Fig. 3.) The wheel 74 now revolves freely, and thus causes a cam 89, formed upon its hub, to engage with one arm of a lever 91, pivoted at 90, Fig. 3, and having its other arm connected to an ejector 92. By this means the ejector 92 is caused to enter the slot in the casting-mold and to push the cold cast-type bar into the slot 97 of the rack 75. (See Figs. 3 and 13.) When the cam 89 has moved out of contact with the arm 91 of the lever, this latter together with the ejector 92 are returned to their original position by the force of a spring 93, while another cam 94 upon the hub 74, but arranged in a different position to that of the cam 89, forces the spring-bolt 84 downward, so as to withdraw its lower end from the notch 88 of the rack 75. The rack 75 is furnished at its upper edges with steel plates screwed thereto, Fig. 2, the sharp cutting edges of which are adapted to remove the bur from the type-bar as it passes between them. The return motion of the rack 75 is effected by the action of a weight 96, connected by a cord or the like to the outer end of the rack and passing over a suitable pulley. (See Fig. 24.) The rack 75 is separately shown in Fig. 13. It is formed with a vertical longitudinal slot 97, which is longer than the cast line of type, so as to enable the latter to slide out freely. The bottom 98 of the rack 75 is hinged at a point 99 and is tightly forced into its closed position when moving inward by pins 100, provided on the casing 1. When the weight 96, Fig. 4, pulls the rack-slide outward, the bottom 98 falls down upon a pin 101, fixed to the casing 1, and thus forms an incline down which the cast type-bar slides into a receiver, (not shown in the drawings,) where it takes its place in the row of previously-finished type-bars.

Figs. 14, 15, and 16 show clearly how the carrier 6 and also the casting-mold 3 are for greater safety locked during the introduction of the matrices at the position *a*, Fig. 1, during the casting operation at position *b*, and during discharge of the matrices and of the cast type-bar at position *c*. The operating-ring 25 (see also Fig. 6) is at its periphery provided with recesses 102, and in the casing 1 there is arranged a radially-sliding bolt 103, which is acted upon by a spring 104 in such a manner that a pin 105 on the said bolt is always pressed against the periphery of the operating-ring 25. The bolt 103 has at its inner end a flat portion with an angular-shaped notch 106, and such flat end passes through a slot of a locking-bolt 107, movably disposed in the casing 1 and having a shoulder at its outer end, against which acts a spring 108, while its inner end is tapered. The outer end of the slot is formed with an angular portion 109. If, as in Fig. 14, the cross-pin 105 of the bolt 103 has been moved out of one of the notches 102 in the operating-ring 25 and has arrived upon a projection 110, Fig. 6, then the angle-shaped recess 106 of the bolt 103, which is adjacent to the projection 109 of the bolt 107, has thereby moved this latter bolt outwardly, so as to withdraw its conical end from the corresponding hole 111 in the carrier 6. The bolt 107 is now kept in this position by the straight end 112 of the bolt 103, which has moved in front of the projection 109. If, on the contrary, the cross-pin 105 of the bolt 103 enters a recess 102 in the mold-operating ring 25, the projection 109 of the bolt 107 engages with the recess 106 in the bolt 103 and so locks the carrier 6.

The action is as follows: When the casting-mold 3 and the carrier 6 have arrived at the position for the reception of the type-matrices, as indicated at *a*, Fig. 1, the composed line of type-matrices, previously set up by a key-operated composing mechanism or linotype-machine, slides through a chute 113 (see Figs. 3 and 24) and is then pushed into the carrier 6 by a pusher 114, while the operating-ring 25, by the aid of the starting device 55 56, is brought into gear with the driving-pinion 45. The operating-ring 25 continues to rotate, and the locking-catch 51, by means of the projection 58, is forced into the recess 59 of the casting-mold 3, thus causing this latter, together with the carrier 6, to participate in the rotation. At the end of a quarter of a revolution the catch 51 will be caused to drop into the recessed portion 57 of the fixed ring 54 and to be disengaged from the recess 59 in the casting-mold by the spring 52, so that the operating-ring 25 now rotates alone through the second quarter, allowing the carrier 6, and consequently also the casting-mold 3, to be arrested and locked in the manner described with reference to Figs. 14 to 16. The first quarter of the revolution of the oper-

ating-ring 25, casting-mold 3, and carrier 6 corresponds to the distance *a* to *b* in Fig. 1. In the position *b* the external teeth 49 of the operating-ring have engaged the toothed wheel 26, Figs. 2 and 6, which latter, as already stated, is in gear with a toothed wheel 31 of equal size. The diameter of these two toothed wheels is such that they will make a complete revolution while in gear with the teeth 49 upon one-quarter of the periphery of the operating-ring 25. During the same time the cam 29, in conjunction with the intermediate mechanism described, effects the justifying as well as the securing in the carrier of the type-matrices, and immediately afterward the cam 23 effects the casting of the type-bar. Meanwhile the operating-ring 25 has completed half a revolution, and after the release of the carrier 6 (see Figs. 14 to 16) it operates the casting-mold 3 and the carrier as far as the position *c*, where they are locked by the bolt 107, Figs. 14 to 16. The operating-ring has now passed through three-quarters of a revolution and occupies the position *d*, and the teeth 49 on the periphery of the said ring now engage the wheel 69 and impart to the same a single revolution. During this rotation of the wheel 69 the type-matrices are pushed from the carrier 6 into the curved way or track 77 and the type-bar is discharged. By this time the operating-ring has completed the last quarter of the revolution, and the part 47, Fig. 6, where the teeth 48 are cut away, is now opposite to the driving-pinion 45, thus causing the operating-ring to stop. At the same time the casting-mold 3 is disengaged and, with the carrier 6, is returned to the initial position *a* by means of a weight 115, attached to a cord or the like 117, passing over a pulley 116, Fig. 1, and connected to the said mold, and thereby bringing the striking-pin 30× of the carrier 6 into contact with a stop 30, rigidly attached to the casting 1. The same cycle of operations is repeated. The operations, briefly stated, are therefore, first, the traveling together of the operating-ring 25, casting-mold 3, and carrier 6 from position *a* to position *b* and the locking of the parts; second, the moving of the operating-ring 25 alone from *b* to *c*, motion of the cams 23 and 29—that is to say, the line-justifying—pressing of the matrices against the casting-mold, casting operation, and disengagement of the parts; third, the traveling together and moving of the casting-mold 3 with the carrier 6 into position *c* and the operating-ring into the position *d*, then again locking the parts 3 and 6; fourth, the moving of the operating-ring 25 alone from *d* to *a* and the delivery of the type-bar by means of the wheel 69 while disengaging the carrier and the casting-mold; fifth, the arresting of the operating-ring 25 owing to the cut-away portion 47 of its inner teeth 48 coming into a position adjacent to the driving-pinion 45 and the return of the casting-mold 3 and carrier 6 from the position *c* to the position *a* through the action of the weight 115, while this movement is limited by means of tappet 30× and stop 30.

It should be mentioned that the locking of the carrier 6 by means of the recesses 102, formed in the periphery of the operating-ring, is always effected at the time when the catch 51 of the operating-ring engages in the notch 57 in the stationary ring 54.

Fig. 17 illustrates how another style of type-matrix can be set for casting without the necessity of removing the casting-mold 3 or the carrier 6 from the casing 1. As will be noticed, the pitch of the teeth of the casting-mold and carrier is equal to the distance from center to center of the types in the matrix 28. If in lieu of the middle type it is desired to place the upper one, for example, in front of the casting-slot 4, it is necessary to turn the casting-mold 3, together with the carrier 6, from the casting position *b* in the direction of the arrow into the position *d*. In this movement the teeth of both parts by reason of the eccentric arrangement of the carrier 6, provided with teeth only upon part of its periphery, become disengaged and enable the carrier to be alone displaced through a distance of one tooth in the required direction. To this end it is advantageous to omit the inner teeth in the casting-mold 3 for a certain distance on each side of the casting slot or port. Both parts are afterward returned to the position for casting, care being taken to insure the correct engagement of the teeth.

In the construction shown in Figs. 8, 9, 10, and 17 the slides 61 and 64 exert the necessary pressure for forcing the type-matrices 28 against the casting-mold 3 and for pressing the type-justifying devices 66 between the type-matrices. In the same manner the springs 78 act direct against the shoulders of the type-matrices, and thus it may easily happen that burns are formed or that other deformations occur which interfere with the proper working. To obviate this defect, I provide, as shown in Figs. 18, 18ª, and 19, the type-matrices 28 and justifying devices for the entire width of the composed line with an elastic cap or casing 118, fitted with a spring-controlled plate 119. In Fig. 18 all the parts are shown in their rearward position. Fig. 18ª shows a section through the casing 118 and its plate 119, while in Fig. 19 the type-matrices 28 and the justifying device 66 are firmly pressed into their operative position. The spring cap or casing 118 has its internal surfaces so formed as to exactly suit the contour of the type-matrices. At its outer end the cap or casing is provided with inclines 63×, against which the correspondingly-shaped inclined ends 62 of the slides 61 act, while spring 78× act against shoulders 120 of the said casing 118. The section Fig. 18ª clearly shows how the plate 119, which at its lower end is of the same width as the matrices, is arranged in a transverse slot in the casing

118, while its upper end is fitted with a bar 121, projecting from the sides of the plate. In recesses 122 in the cap 118 are arranged springs 123, which at their opposite ends press against the projecting ends of the bar 121. When the slides 61 act on the inclines $63^{\times}$ of the cap 118, so as to press it, together with the type-matrices 28 and justifying device 66, against the casting-mold 3, while at the same time pressing the said justifying device between the type-matrices, the slide 64 begins to act on the plate 119 and presses it downward against the action of the springs 123. In this manner the justifying devices 66 are still further pressed between the type-matrices and the composed line of matrices completely secured, Fig. 19. If the slide 64 is now withdrawn, it allows the springs 123 to return the plate 119 into its initial position, Fig. 18.

The device for facilitating the readjustment of the carrier 6 and casting-mold 3 for the purposes of introducing different type, as shown in Figs. 20 and 20^{a}, is arranged in the interior of a hollow shell or casing fixed to the main casing 1 of the machine.

The carrier 6 and casting-mold 3 have their guide-flanges provided with teeth which gear with beveled wheels 124 and 125, the former of which is fast on a shaft 126, centrally disposed in the shell or casing 127 of the device and fitted at the front with a crank-handle 128. The beveled wheel 125 is keyed to a sleeve 129, loosely mounted upon the shaft 126. The said sleeve is connected with a rotary horizontal disk 130, arranged in the interior of the shell or casing 127 by means of a pin 131 in such a manner as to cause both parts to rotate together. The shaft 126, with the sleeve 129 and beveled wheels 124 and 125, can be drawn outward against the tension of a spring 132 when the pin 131, rigidly connected to the sleeve 129, slides in a recess in the disk 130. This arrangement is adopted in order to prevent the device from having to run idly with the casting-mold 3 and carrier 6 after having effected their correct adjustment.

In the crank-handle 128 there are provided two spring-controlled bolts, one, 133, engaging in a hole in the disk 130, and the other, 134, engaging a hole in the flange of the shell or casing 127. The disk 130 and the flange of the casing are each provided, for example, with sixteen holes, and as the division, as well as the pitch of the teeth on the carrier and on the casting-mold from center to center, corresponds to the various kinds of type it will be evident that by this device various styles of type can be brought into use. It must of course be assumed that a number of type-matrices are kept in stock. As the toothed gear of the carrier 6 and that of the casting-mold 3 are of different diameters, it is evidently necessary to so calculate the number of teeth and the diameters of the beveled wheels so as to impart a uniform speed to both the carrier 6 and casting-mold 3. In order to avoid mistakes in effecting the correct adjustments, the holes x in the disk 130 and the flange of the shell may be marked with an appropriate descriptive word or sign. Moreover, the proportions are such as to cause one revolution of the crank 128 to correspond to one-quarter revolution of the casting-mold 3 and carrier 6.

If it is now desired to cast a line with distinctive type, the bolt 134 is withdrawn, and by rotating the crank-handle 128 the casting-mold 3 and carrier 6 are placed in the position d, Fig. 1, thereby disengaging the teeth 5 and 60 of these two parts. The bolt 133 is then withdrawn from the hole x and the crank 128 adjusted to the hole in the disk 130 or in the casing 127, corresponding to the particular type it is desired to cast, the bolt 133 being then forced by its spring into such holes. The beveled wheels 124 125 are thus again rigidly connected together, and by suitably rotating the crank 128 the carrier 6 and the casting-mold 3 are returned to the proper feeding or charging position a, Fig. 1. The spring-bolt 134 is then allowed to enter the corresponding hole in the casing, and the shaft 126, sleeve 129, and the beveled wheels 124 and 125 are drawn outward against the tension of the spring 132, so as to disengage the said wheels from the teeth of the carrier 6 and the casting-mold, respectively. Thus during the subsequent working of the said carrier and casting-mold 3 the resetting device need not uselessly rotate therewith, as has already been stated. The shaft and crank are retained in the disengaged position by inserting the slide 135 into the slot 136, so that the inner end of the shaft 126 rests against such slide. When the distinctive type of the type-matrices are of a different height, as indicated in Figs. 21 and 22, it will be necessary to use a corresponding slot 4 of the casting-mold 3, which is effected by resetting this latter.

Figs. 23 and 24 show the general arrangement of the machine. The belt-pulley 139, fast on the shaft $139^{\times}$, is operated by any suitable motor and is adapted to actuate the distributing mechanism (not shown in the drawings) arranged in the interior of the casing 140 and the mechanism for driving the conveyer-chain 81, carrying the matrices. Upon the shaft $139^{\times}$ is keyed another pulley 138, which operates the pulley 137, giving motion to the worm-gear 46, Fig. 2. The type-matrices are by means of keys 141 assembled or composed into a line, as is well known, and they then slide down the incline 113 in front of the pusher 114. This latter is provided with teeth on its lower side which gear with a toothed wheel 143, on the shaft of which is keyed a hand-lever 142, which can be so operated as to cause the composed line to be moved by the pusher 114 into the carrier 6. The other details (shown in Figs. 23 and 24) will be clearly understood by ref-

erence to the remaining figures of the drawings.

Figs. 25 and 26 show a modified form of locking arrangement, in which the casting-mold 3 is locked instead of the carrier 6, as in the arrangement shown in Figs. 14 to 16. This modified form of locking arrangement consists of a shaft 145, carried in the upper part of the casing 1 and provided at its end with finger-pieces and pawls 146 and 147, respectively. The pawl 147 is operated by the recess 102 and projecting portion 110 in the same manner as that described with reference to Figs. 14 to 16. When the finger or pawl 147 is raised by the projection 110, it raises the finger or pawl 146 at the opposite end of the shaft 145, and so causes its end engaged in a slot in the bolt 107 to move this latter upward against the force of the spring 108, and thereby disengage it from the casting-mold 3. When the finger or pawl 147 engages in a recess 102 in the operating-ring, the spring 108 forces the bolt 107 back into its original position. In this constructional form the casting-mold 3 is provided with notches 59 and is rotated as required through the intervention of the catch of the operating-ring 25. (See Fig. 7.)

From the example shown in Figs. 27 to 32 it will be noticed that the cylindrical casting-mold may be replaced by a straight casting-mold without materially affecting the action of the machine, as previously described.

In the arrangement shown in Fig. 27 in lieu of the casting-mold a block 148, with slot 4, is provided, and such block is removably secured to the top of an interchangeable rack 149, so as to enable blocks with various-sized slots to be employed without having to remove the rack itself. The teeth on the rack-bar 149 are adjustable and gear with the teeth 60 of the carrier 6, Fig. 27. The rack 149 and block 148 are disposed in a guide-box 150, provided in the casing 1. The link mechanism of the inclined piston 15 of the casting-font 9 is operated directly by the cam-disk 29, and this latter is driven, as shown in Fig. 30, by means of an intermediate toothed wheel 151 in gear with the previously-mentioned toothed wheels 31 and 26. Owing to the form of the block 148 the ejecting device for ejecting the matrices must be modified so as to act in a horizontal direction.

In a bracket 152 integral with the guide-box 150 there is journaled a shaft 153, furnished with two weighted arms 154. These arms are made with lugs 155 for carrying the reciprocatory ejector, consisting of two plates 156, hinged together at 157, of which the inner one is arranged to slide in a slot 158 in the box 150. To one end of the shaft 153 there is secured a crank-arm 159, Figs. 27, 28, to which is articulated a bar 160, secured to another arm 161. This latter is mounted upon a shaft 163, carried in a lug 162 on the casing 1, and upon the said shaft there is keyed a toothed wheel 164, driven by the toothed wheel 69. This toothed wheel 69, as already stated in connection with the previously-described constructional forms, is periodically rotated by the teeth of the operating-ring 25, and thus the ejecting of the type-bar is effected at the required time.

Opposite the slot 158 in the guide-box 150 there is in an extension $1^{\times}$ of the casing 1 an interchangeable slotted block 165, held by a screw 166, so that said block can be replaced by a block with a larger or smaller slot to conform to the slot 4 in the block 148. When the toothed rack 149 has been moved by the carrier 6 into its highest position, as indicated by dot-and-dash lines in Fig. 27, the slot of the block 148 is in line with the pusher or ejector 156 and also with the slot in the block 165. The ejector 156 is then moved inward by the action of the intermediate wheel 164 in conjunction with the rotation of the toothed wheel 69, and thus the type-bar is ejected from the slot of the block 148 into the slotted piece 165. From this latter the type-bars are pushed in successive order upon the plate 168 in a separate inclosure 167, the said plate being supported by a spring 169, which is depressed according to the weight of the type-bars. When the space 167 is filled, the type-bars are removed.

In Fig. 27 the carrier 6 is shown in the position for receiving the matrices. To insure that the carrier 6 on its return motion shall always occupy exactly the same position, the casing 1 is provided with a spring-controlled pin 170. In Figs. 28 and 29 the rack 75 is shown for ejecting the matrices from the carrier 6 and delivering them into the channel 77, leading to the storing-department. Fig. 29 also shows the inclined chute 113 for introducing the matrices into the carrier 6. In Fig. 30 the driving-pinion and the operating-ring are shown, while Fig. 31 shows the carrier 6 in the position for casting. Fig. 32 shows how the toothed connection between the rack 149, carrying the molding-block, and the carrier 6 may be altered for the purpose of casting a different type. To this end the carrier 6, with toothed rack 149, is moved backward, as indicated by the arrow, until both parts are disengaged. The rack 149 is then moved up or down through the distance of one tooth, as may be required. This resetting corresponds to the distance from center to center of the type-matrices 28, so that a different kind of type may now be cast. Fig. 32 shows the parts arranged for casting the lower type of the matrix.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a movable mold provided with a casting-slot, a carrier for the matrices normally movable with the mold, means for moving the mold and carrier together, and independent means for moving the carrier rela-

tive to the mold to change the position of the matrices transversely of the casting-slot, substantially as set forth.

2. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a carrier for the matrices, a casting-mold, the said mold and carrier being provided with teeth which mesh together whereby they are united, and means for moving the carrier and mold together from one position to another, substantially as set forth.

3. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a mold provided with a casting-slot, a carrier for the matrices, means for moving the carrier to bring them into casting position opposite the slot in the mold, other means for moving the carrier in order to adjust the matrices transversely relative to the casting-slot, means for connecting the carrier and the mold, and means for moving them together when connected, substantially as set forth.

4. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a carrier for the matrices of cylindrical form, a casting-mold connected with the said carrier whereby they move simultaneously, and means for moving the mold and the carrier into casting position, and from there to the position for discharging the bar of type and matrices, respectively, substantially as set forth.

5. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a carrier for the matrices of cylindrical form, a mold of hollow cylindrical form surrounding the said matrix-carrier, and means for moving the said carrier and mold to the casting position and to the discharge position, substantially as set forth.

6. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a carrier for the matrices of cylindrical form, a casting-mold of hollow cylindrical form surrounding the said casting-mold, the said carrier and mold being provided, respectively, with intermeshing projections whereby they are caused to move together, and means for moving them, substantially as set forth.

7. In a machine for casting a type-bar from a previously-arranged line of matrices, the combination of a carrier for the matrices of cylindrical form, means for imparting a rotary movement to the carrier, a casting-mold arranged eccentrically to the carrier, and means for connecting the mold and carrier whereby they are caused to move together during portions of the rotation of the carrier, and whereby they may be separated or disconnected during other parts or portions of the rotation thereof, substantially as set forth.

8. In a machine for casting a type-bar from a previously-composed line of matrices, the combination of a carrier for the matrices of cylindrical form, a casting-mold of hollow cylindrical form surrounding the said carrier, the said parts being mounted eccentrically relative to each other, and being provided with projections adapted to intermesh and hence cause the said parts to move together during part of their rotation, and being adapted to become disconnected when the parts are moved into certain positions, substantially as set forth.

9. In a machine for casting a type-bar, the combination of the matrices each provided on its face with a plurality of type impressions differing one from the other, a carrier for the matrices, a casting-mold, means for connecting the mold and carrier whereby they move together, and means for adjusting the mold and carrier relative to each other whereby any one of the series of type impressions in the matrices may be brought opposite to the casting-opening in the mold, substantially as set forth.

10. In a machine for casting type-bars, the combination of a series of matrices each formed with a plurality of type impressions differing one from the other, a carrier for the said matrices, a casting-mold, a series of teeth or projections carried respectively by the mold and the carrier adapted to intermesh, whereby these parts are united and are caused to move together, and means for adjusting the mold and carrier relative to each other whereby the different type impressions upon the matrices may be brought opposite the casting-opening in the mold, substantially as set forth.

11. In a machine for casting type-bars, the combination of a series of matrices, a carrier for the matrices, a casting-mold, means for tightly securing and holding the matrices in the carrier, means for uniting the mold and the carrier whereby they are caused to move together, and means whereby the carrier and mold may be adjusted relative to each other without distributing the matrices secured in the carrier, substantially as set forth.

12. In a machine for casting type-bars, the combination of a series of matrices, each provided with a plurality of type impressions differing one from the other, a carrier for the matrices of cylindrical form, a casting-mold of hollow cylindrical form surrounding the carrier and mounted eccentrically thereto, teeth or projections carried by the said carrier and mold adapted to intermesh and unite these parts, the teeth on one of the parts being interrupted whereby when moved into certain positions, the said parts are disconnected, means for moving one of said parts relative to the other one when thus disconnected in order to change the position of the matrices relative to the casting-opening in the mold, and means for moving the carrier and mold when connected, substantially as set forth.

13. In a machine for casting a bar of type, the combination of a series of the matrices adapted to be arranged in line with each other,

each matrix having in its face a plurality of type impressions, a carrier for the matrices, a mold having a casting slot or opening adapted to be brought opposite the matrices, teeth carried respectively by the mold and the carrier and adapted to intermesh, the distance between adjacent teeth being equal to the distance between the different characters on a matrix, means for disconnecting the said teeth, and means whereby one of the said parts (the carrier and the mold) may be adjusted to change the relation of the intermeshing teeth whereby the position of the line of matrices relative to the casting-opening in the mold may be changed, substantially as set forth.

14. In a machine for casting a type-bar from a previously-arranged line of matrices, the combination with the line of matrices and the justifying devices therefor, of a carrier for receiving and holding the line of matrices, and mold having a casting-opening, means for moving the carrier to bring the line of matrices opposite the casting-opening, a slide arranged to move the line of matrices close to the mold, another slide substantially parallel with the slide just referred to for operating the justifying devices, and a single operating member for acting upon the said slides, substantially as set forth.

15. In a machine for casting a type-bar from a previously-arranged line of matrices, the combination with a line of matrices, a carrier therefor, a mold having a casting-opening, means for moving the carrier to bring the line of matrices opposite to the opening in the mold, and inclined or wedge-like devices arranged to act simultaneously upon opposite sides of the line of matrices to force it bodily toward the face of the mold, substantially as set forth.

16. In a machine for casting type-bars, the combination of a line of matrices, a carrier therefor, a mold provided with a casting-opening opposite to which the line of matrices is arranged, means for moving the mold and carrier simultaneously into casting position, and then for moving them simultaneously away therefrom, means for gradually moving the line of matrices toward the face of the mold as the parts approach the casting position and for gradually moving it away from the mold as they move from the casting position, and means for moving the line of type bodily against the face of the mold after the parts have come into casting position, substantially as set forth.

17. In a machine for casting type-bars, the combination of a cylindrical carrier for a line of matrices, a hollow cylindrical mold having a casting-opening opposite to which the line of matrices is arranged, the mold and carrier being mounted eccentrically relative to each other, and being so disposed that the line of matrices are brought close to the face of the mold when the parts are moved to molding position, and are gradually moved away from the face of the mold as the parts approach the position for discharging the cast bar of type and the line of matrices, substantially as set forth.

18. In a machine for casting type-bars, the combination of a line of matrices, the matrices being provided with inclines or cam-shaped surfaces, a carrier for the matrices, a mold having a casting-opening opposite to which the matrices are moved, a bar or slide arranged to be moved into engagement with the inclined surfaces of the matrices, and to thereby force them bodily toward and against the face of the mold, and means for moving the said bar or slide, substantially as set forth.

19. In a machine for casting type-bars, the combination of a line of matrices formed with inclined side edges 63, a carrier for the matrices, a mold having a casting-opening opposite to which the matrices are placed, a slide 61 adapted to engage with the inclined edges 63 of the matrices to force them bodily toward the face of the mold, and means for moving the slide, substantially as set forth.

20. In a machine for casting type-bars, the combination of a line of matrices, each provided upon its opposite edges with inclined surfaces 63, 63, a carrier in which the matrices are placed, a mold having a casting-opening opposite to which the matrices are moved, two slides arranged upon opposite sides of the line of matrices and adapted to engage with the inclined surfaces 63 thereof, and means for moving the said slides into engagement with the matrices simultaneously, whereby the matrices are bodily moved toward the face of the mold, substantially as set forth.

21. In a machine for casting type-bars, the combination of a line of matrices, a carrier therefor of cylindrical form, a mold having a casting-opening opposite to which the matrices are moved, slides 61 mounted in the carrier for the matrices and arranged to engage with the matrices to force them toward and against the face of the mold, and means for moving the slides, substantially as set forth.

22. In a machine for casting type-bars, the combination of a series of matrices, a carrier therefor of cylindrical form, a mold, a pair of slides 61 mounted in the matrix-carrier and arranged to engage with the line of matrices and to move it bodily against the face of the mold, a slide 39 arranged to be moved between the ends of the slide 61 to move them into engagement with the matrices, and means for moving the slide 39, substantially as set forth.

23. In a machine for casting type-bars, the combination of a line of matrices, a carrier therefor, a mold, means for moving the line of matrices bodily toward and against the face of the mold, and springs for moving the line of matrices away from the face of the mold, substantially as set forth.

24. In a machine for casting type-bars, the combination of a line of matrices, a carrier

therefor, a mold, means for moving the line of matrices into casting position and away therefrom, means for moving the line of matrices bodily toward and against the face of the mold when the parts are in casting position, and springs for moving the line of matrices away from the mold after the casting has been completed, substantially as set forth.

25. In a machine for casting type-bars, the combination of a line of matrices, a carrier having a seat or opening in which the line of matrices is arranged, a mold, means for moving the carrier so as to bring the line of matrices opposite the mold in casting position, means for moving the line of matrices bodily outward in its seat in the carrier toward the face of the mold, and springs arranged between the carrier and the matrices and tending to move the line of matrices inward in its seat, substantially as set forth.

26. A justifying device for use in a type-bar-casting machine consisting of three members arranged side by side, and having tail portions which are pivotally connected, and head portions arranged to be inserted between the type-matrices, the inner or middle member of the device being wedge shape and arranged to be moved between the outer members to crowd them apart, substantially as set forth.

27. In a machine for casting type-bars, the combination of a line of matrices, a carrier therefor of cylindrical form, a justifying device placed between certain of the matrices consisting of a plurality of members arranged side by side and having tail portions which extend to the axis of the carrier-cylinder, where they are pivotally united, the adjacent faces of the parts or members of the justifying device being inclined, whereby when the parts of the justifying device are moved into line with each other the line of matrices is justified, substantially as set forth.

28. In a machine for casting type-bars, the combination of a line of matrices, justifying devices, a carrier for the matrices and justifying devices, a mold, means for moving the carrier so as to bring the matrices into casting position, means for moving the line of matrices bodily toward the face of the mold, means for operating the justifying devices, the last said means being in operative relations only after the line of matrices has been bodily moved close to the mold, but being out of operative relation when the line of matrices is moved away from the face of the mold, substantially as set forth.

29. In a machine for casting type-bars, the combination of a line of matrices, justifying devices, a carrier for the matrices and justifying devices, a mold, means for moving the carrier to bring the matrices into casting position opposite the mold, slides which engage with the line of matrices and the justifying devices, and move them bodily toward the face of the mold and operate the justifying devices, and another slide which engages with and operates the justifying devices after the parts have been moved by the first-mentioned slides, to complete the justifying of the line, substantially as set forth.

30. In a machine for casting type-bars, the combination of a line of matrices, justifying devices, a carrier therefor, in the form of a hollow cylinder, a mold, slides 61, 61 arranged on the outside of the said cylindrical carrier which engage with the matrices and move them bodily toward the face of the mold, and also engage with the justifying devices and operate them, another slide 64 arranged on the inside of the said hollow cylindrical carrier and arranged to engage with and complete the movement of the justifying devices after the parts have been moved against the face of the mold, and means for operating the said slides, substantially as set forth.

31. In a machine for casting type-bars, the combination of a line of matrices, and justifying devices, an elastic cap or casing 118 in which the said matrices and justifying devices are arranged, and a carrier in which the cap or casing and the matrices and justifying devices are mounted, substantially as set forth.

32. In a type-bar-casting machine, the combination of a carrier for the matrices, a gear having a continuous cycle of movement for driving the carrier, an intermittently-acting connection between the said gear and the carrier, whereby the latter is moved into the casting position and there allowed to rest, and is then moved to the discharging position for the cast line of type, substantially as set forth.

33. In a machine for casting type-bars, the combination of a carrier for the line of matrices, a gear for driving the carrier having a continuous cycle of movement, connecting means between the gear and carrier through which the gear moves the carrier, and means for disconnecting the carrier from the gear temporarily when it arrives at the casting position, whereby the carrier is given an intermittent motion without requiring the gear to stop in its movement, substantially as set forth.

34. In a machine for casting a bar of type and ejecting the same after casting operation, the combination of a carrier for a line of matrices adapted to move the matrices into the casting and the ejecting positions, a gear for driving the carrier, intermittently-acting connections between the gear and carrier, means for disconnecting such connections when the parts are in the casting position and the type-bar-ejecting position, and means independent of the gear for restoring the carrier to its initial position after the bar of type has been ejected, substantially as set forth.

35. In a machine for casting type-bars, the combination of a carrier for a line of matrices, a gear for driving the same, adapted to have a complete cycle movement, a continuously-running gear for giving motion to the carrier-driving gear, means under the control of the

operator for starting the carrier-driving gear, and intermittently-operated connections between the said driving-gear and the carrier, whereby the latter is given an intermittent motion during the continuous cycle movement of its driving-gear, substantially as set forth.

36. In a machine of the class described, the combination of a part to be driven of cylindrical shape, a driving-gear therefor substantially concentric therewith, means for giving to the gear a continuous cycle of motion, a connecting-piece carried by the gear and adapted to engage with the part to be driven, and means for intermittently moving the said connecting-piece into and out of engagement with the part to be driven, whereby the latter is intermittently moved, substantially as set forth.

37. In a machine of the character described, the combination of a cylindrical member to be driven, a ring-shaped driving-gear concentric with a portion of the said cylindrical member, a catch 51 carried by the said ring-shaped gear and adapted to engage with the member to be driven, and a cam device for intermittently forcing the said catch into engagement with the body to be driven, substantially as set forth.

38. In a machine of the character described, the combination with a member to be driven having a cylindrical part such as the flange 2, a ring-shaped driving-gear concentric with the said flange, a catch-piece 51 carried by the said gear and adapted to engage with the said cylindrical flange, a stationary cam device 54 for moving the catch into engagement with the said flange, a spring tending to move it out of engagement therewith, and means for rotating the ring-like driving-gear, substantially as set forth.

39. In a machine for casting type-bars, the combination with a carrier for a line of matrices, molding devices for the cast bar of type, and the matrices, of a driving-gear for the carrier having a continuous cycle of movement, intermittently-operated connections between the said gear and the carrier, whereby the latter is brought to rest in the casting and ejecting positions, gearing for operating the casting devices arranged to be operated by the said driving-gear when the carrier is at rest in the molding position, and gearing for operating the ejecting devices, also driven by the said driving-gear arranged to operate when the carrier is at rest in the ejecting position, substantially as set forth.

40. In a type-bar-casting machine, the combination of a part to be driven having a cylindrical flange 2, a ring-like driving-gear 25 arranged concentric to the said flange, and provided with a set of internal teeth 48, cut away or interrupted as at 47, and with a set of external teeth 49, a driving-pinion 45 adapted to engage with the said teeth 48 and drive the gear 25, connections between the flange 2 and the gear 25, and casting and ejecting devices operated by the external gear-teeth 49, substantially as set forth.

41. In a type-bar-casting machine, the combination of matrices and justifying devices, a carrier therefor, a driving-gear for the carrier having a continuous cycle of movement, connections between the gear and the carrier, means for intermittently disconnecting or breaking such connections, whereby the carrier is brought to rest in the casting position, mechanism for operating the justifying devices, and gearing for the last said operating mechanism arranged to be put into motion by the said driving-gear when the carrier comes to rest in the casting position, substantially as set forth.

42. In a machine for casting type-bars, the combination of a carrier for the matrices of cylindrical form, a driving-gear therefor, having a continuous cycle of movement, intermittently-operated connections between the driving-gear and the carrier, whereby the latter is intermittently moved, a sliding locking-bolt for locking the carrier when it comes to rest, and means operated by the said driving-gear for moving the said locking-bolt when the carrier is disconnected from the gear and comes to rest, substantially as set forth.

43. In a machine for casting type-bars, the combination with a carrier for the matrices, of a lock therefor, comprising a sliding bolt 107, a spring for forcing the said bolt in one direction, a controlling-bolt 103 for moving the sliding locking-bolt in the other direction, a driving-gear constituting part of the driving mechanism for the carrier having a continuous cycle of movement provided with raised and depressed portions with which a projection from the bolt 103 engages, whereby the latter is reciprocated, and intermittently-operated connecting means between the carrier and the said gear, substantially as set forth.

44. In a machine for casting type-bars, the combination with the molding devices and the ejecting devices for the cast type-bar, of a cylindrical carrier for the matrices, a cylindrical mold having a casting-opening opposite to which the matrices are arranged, the mold and carrier being mounted eccentrically relative to each other and so disposed that the surfaces of the mold and carrier are closest together when the parts are in casting position and are somewhat separated when they are in the ejecting position, substantially as set forth.

45. In a machine for casting type-bars, the combination of a carrier for the matrices, a mold in which the bar of type is cast, means for connecting the mold and the carrier, whereby they move together from the casting to the discharging position, a slide for forcing the matrices out of the carrier provided with a receiver for the cast type-bar, and means for forcing the cast type-bar out of the mold upon the receiver of the said slide, substantially as set forth.

46. In a machine for casting type-bars, the combination of a carrier for the matrices, a mold, means for moving the carrier and the mold away from the casting position, a sliding receiver for the bar of type provided with a pivoted bottom 98 adapted to constitute a chute or incline for discharging the type-bar, means for moving the said receiver, and means for forcing the cast bar-type out of the mold onto the said pivoted bottom of the receiver, substantially as set forth.

47. In a machine for casting type-bars, the combination of a carrier for the matrices, a mold having a casting-recess, means for moving the mold and the carrier from the casting position, a receiver for the cast bar of type arranged to be moved adjacent to the casting-recess in the mold, and having a pivoted swinging bottom, means for forcing the cast bar of type out of the mold and upon the said pivoted bottom of the receiver, means for moving the receiver, pins 100 with which the swinging bottom of the carrier engages when in position to receive the cast bar of type, and by which it is held up in line with the carrier, and stops or pins 101 with which the swinging bottom is adapted to engage when the receiver is withdrawn to discharge the bar of type, and by which the said bottom is held in an inclined position so as to constitute a chute for the discharge of the type-bar, substantially as set forth.

48. In a machine for casting type-bars, the combination of a carrier for the matrices, a mold in which the type-bar is cast, a slide arranged to force the matrices out of the carrier and also to receive the cast type-bar, means for forcing the cast type-bar from the mold upon said slide, a lock for holding the slide in position while the type-bar is being forced out of the mold, and means for releasing the lock and for withdrawing the slide, substantially as set forth.

49. In a machine for casting type-bars, the combination of a cylindrical carrier having a recess for the line of matrices, a hollow cylindrical mold having a casting-recess opposite to which the line of matrices is arranged, means for connecting the mold and the carrier, whereby they move together, a sliding rack 75 adapted to be moved into the recess in the carrier and force therefrom the matrices after the casting has been effected, a wheel 74 having an interrupted toothed portion arranged to drive the said sliding rack, an ejector 92 arranged to enter the casting-recess in the mold and discharge therefrom the cast bar of type, a lever for operating the ejector, and a cam 89 for operating the lever, the cam being arranged on the same shaft with the wheel 74, and means for withdrawing the sliding rack, substantially as set forth.

50. In a machine for casting type-bars, the combination with the mold, the font for containing the molten metal and means for forcing the metal from the font to the mold, of a movable member having a series of openings through which the molten metal may be forced arranged between the font and the mold, and means for moving and securing the same in different positions, whereby one or the other of the openings therein is brought into use, substantially as set forth.

51. In a machine for casting type-bars, the combination with the mold, the font for containing the molten metal and means for forcing the metal from the font to the mold, of a movable member arranged between the font and the mold and provided with a series of openings through which the molten metal is forced to the mold, the said openings being of different sizes, and means for adjusting and securing the said member in different positions for bringing one or another of the said openings into use, substantially as set forth.

52. In a machine for casting type-bars, the combination of a mold having a plurality of casting-recesses of different sizes, a font in which the molten metal is arranged, a feed member arranged between the font and the mold provided with a plurality of openings of different sizes through which the molten metal is forced from the font to the mold, and means whereby the mold and the said feeding member may be adjusted to bring the feeding-openings and casting-recesses of proper size opposite to each other, substantially as set forth.

53. The combination with a mold, a font in which the molten metal is arranged and means for forcing the metal from the font into the mold, of a pivoted feeding-sector 12 arranged between the discharge-opening of the font and the mold and provided with a series of openings 13 adapted to register with the casting-opening in the mold and the discharge-opening of the font, and means for adjusting the said sector so as to bring one or the other of its openings 13 into position for use, substantially as set forth.

54. In a machine for casting type-bars, the combination of a carrier for the matrices, a mold, means connecting these two parts whereby they are caused to move simultaneously, means whereby the parts may be disconnected, and means for moving one of these parts relative to the other when they are disconnected whereby their relative position may be changed, substantially as set forth.

55. In a machine for casting type-bars, the combination of a carrier having a recess adapted to receive a line of matrices, a mold having a casting-recess, means for uniting the mold and carrier whereby they move together, automatic means for moving the mold and carrier into and away from the casting position, means under the control of the operator for disconnecting the mold and carrier, and for changing the relative position of the mold and carrier and then connecting them, substantially as set forth.

56. In a machine for casting type-bars, the combination of a carrier for the line of matrices of cylindrical form, a hollow cylindrical

mold having a casting-opening opposite to which the line of matrices is arranged, means for uniting the mold and carrier whereby under normal conditions they move together, means under the control of the operator for disconnecting the mold and the carrier, and means for changing the relative positions of the mold and carrier, substantially as set forth.

57. In a machine for casting type-bars, the combination of a carrier for a line of matrices of cylindrical form and arranged to turn about its axis, a hollow cylindrical mold arranged outside of the carrier and mounted to turn on its axis, the mold and the carrier being eccentric to each other, interlocking projections carried by the mold and carrier, respectively, arranged to unite these parts and cause them to move together under normal conditions of operation and also arranged to separate, by reason of the aforesaid eccentric mounting of the parts when moved into an unusual position, means under the control of the operator for moving the mold and carrier into an unusual position to disconnect their interlocking projections, and means whereby one of the parts may be partly turned relative to the other to change their angular relation, substantially as set forth.

58. In a machine for casting type-bars, the combination of a cylindrical carrier for the line of matrices, a cylindrical mold, the carrier and mold being provided, respectively, with gear-teeth, means for normally connecting the carrier and mold, means whereby they may be at the will of the operator disconnected, gear-wheels meshing with the said gear-teeth of the mold and carrier, means for uniting the said gear-wheels whereby they move together, and means for moving one of the wheels without moving the other, whereby the angular relations of the carrier and mold may be varied, substantially as set forth.

59. In a machine for casting type-bars, the combination of a cylindrical carrier for a line of matrices arranged to be turned about its axis, a cylindrical mold arranged to be turned about its axis, means for connecting the mold and carrier under normal conditions of operation whereby they are caused to move together, adjusting-gear under the control of the operator arranged to be brought into engagement with the said mold and carrier to change their angular relations, and means for holding the said adjusting-gear out of engagement with the mold and carrier under normal conditions of operation, substantially as set forth.

60. In a machine for casting type-bars, the combination of the carrier 6 for the matrices of cylindrical form, a hollow cylindrical mold 3 surrounding the carrier, the said mold and carrier being provided with toothed flanges, means for connecting the carrier and mold under normal conditions whereby they will move together, gear-wheels 124 and 125 arranged to mesh with the toothed flanges of the carrier and mold, respectively, a shaft and sleeve upon which the said gear-wheels are respectively mounted, means for connecting the shaft and sleeve whereby they are caused to turn together and means for disconnecting them whereby one may be moved independently of the other to move either the mold or the carrier without a corresponding movement of the other part, substantially as set forth.

61. In a machine for casting type-bars, the combination of a carrier for the matrices, a mold, a gear having a continuous cycle movement for moving the parts into positions for casting, and for discharging the cast type-bar and the matrices, intermittently-operated connecting means between the said gear and the carrier and mold whereby the latter are brought to rest at the casting and the discharging positions respectively, and a weight for restoring the carrier and mold to their initial positions, after the discharging of the type-bar and the matrices has been effected, substantially as set forth.

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

FRITZ LUCKE.

Witnesses:
WOLDEMAR HAUPT,
HENRY HASPER.