No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 1.

Fig. 1.

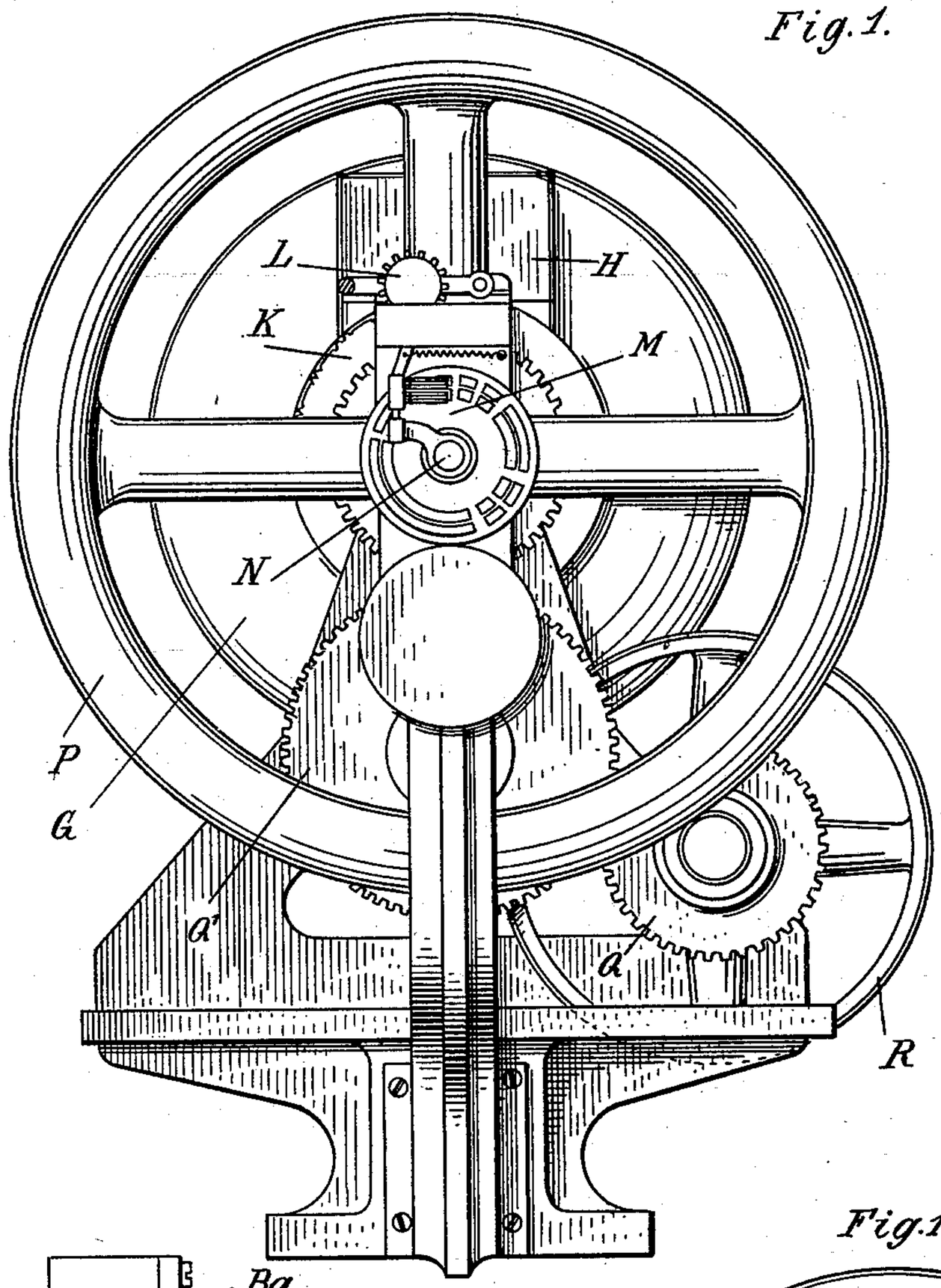


Fig. 13.

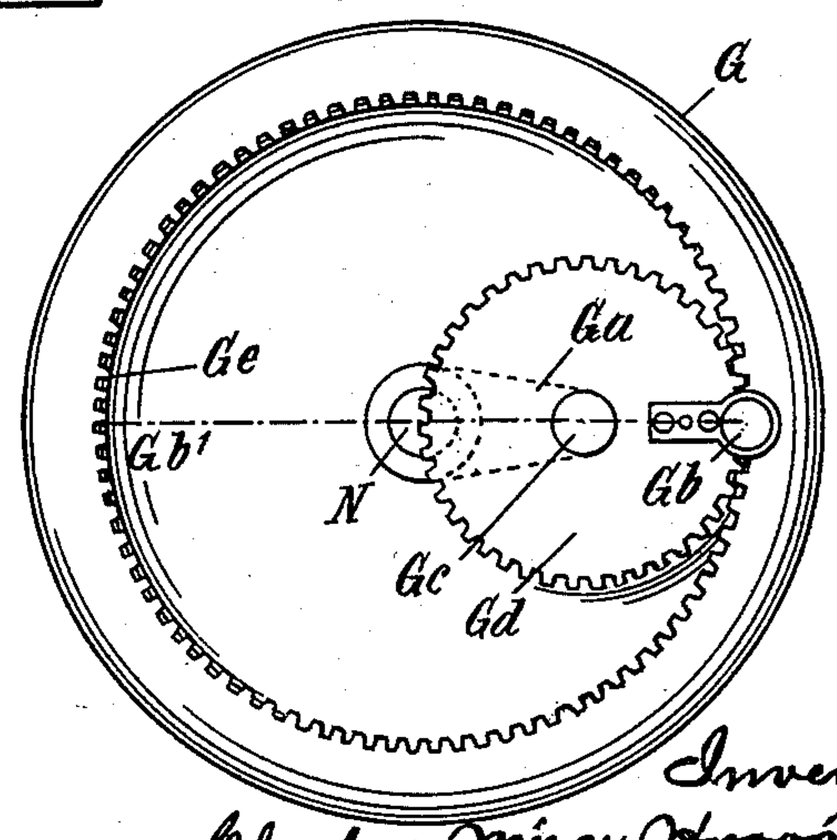
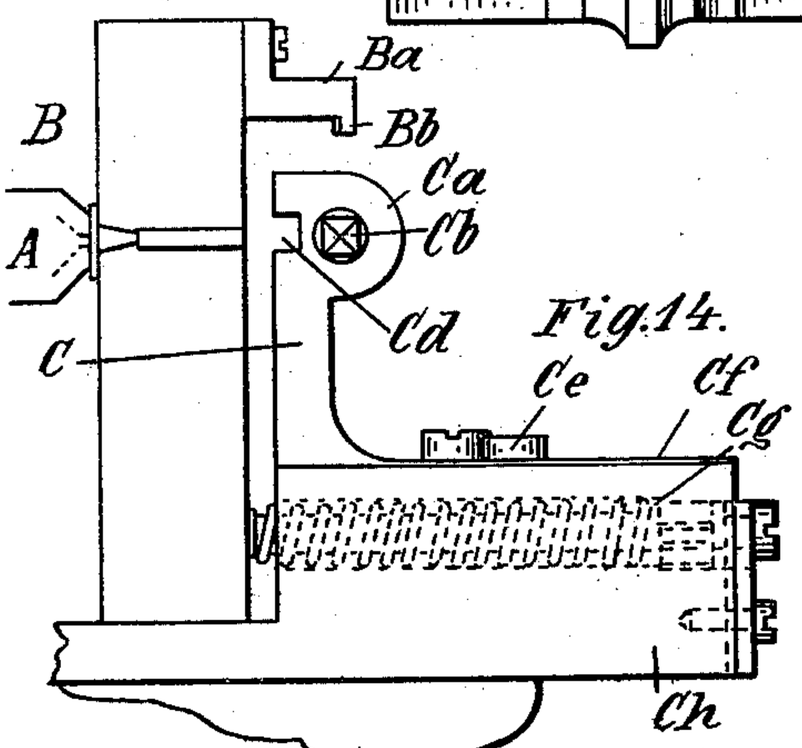


Fig. 14.



Witnesses:
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No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 2.

Fig. 2

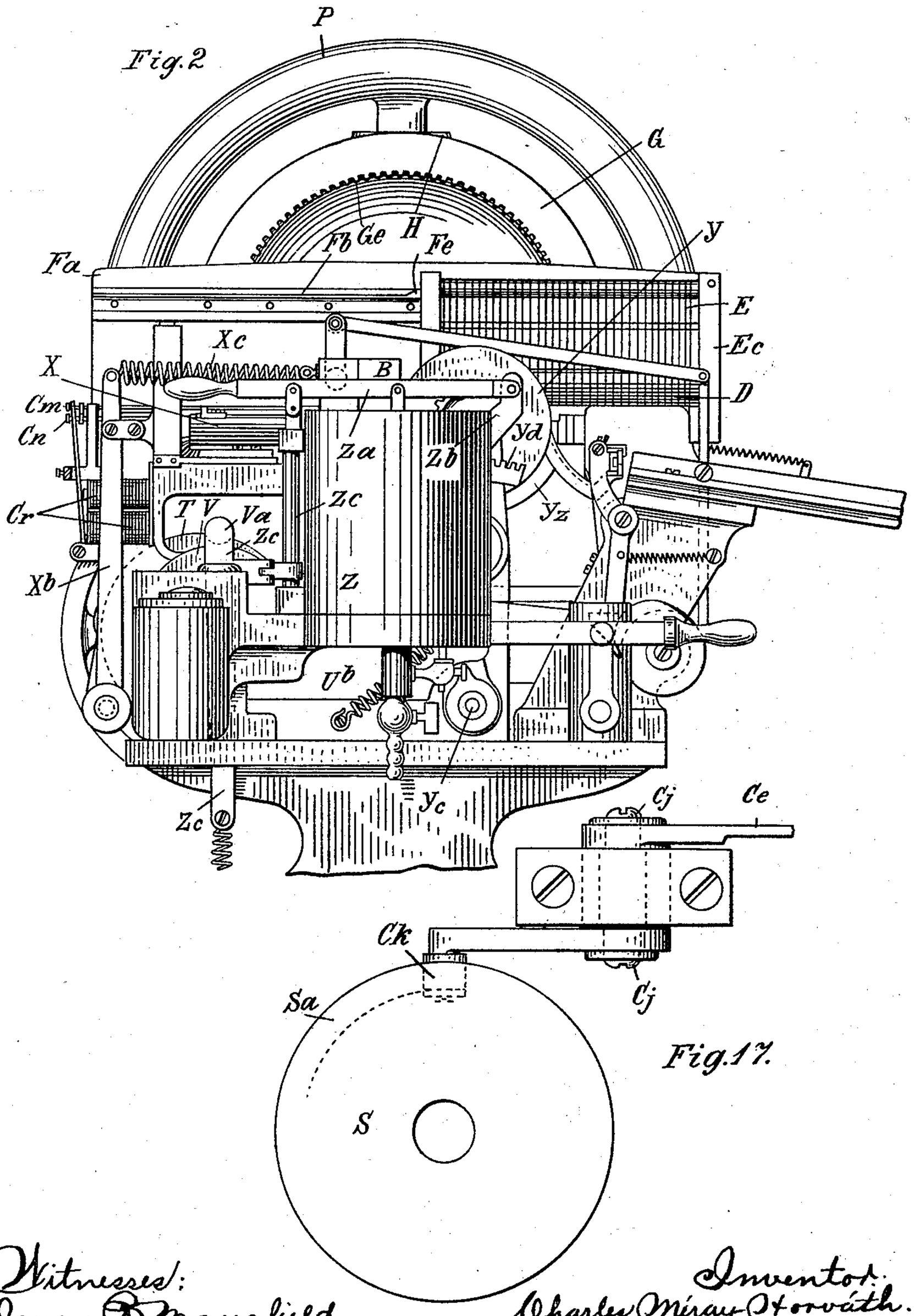

Fig. 17.

Witnesses:
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No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 3.

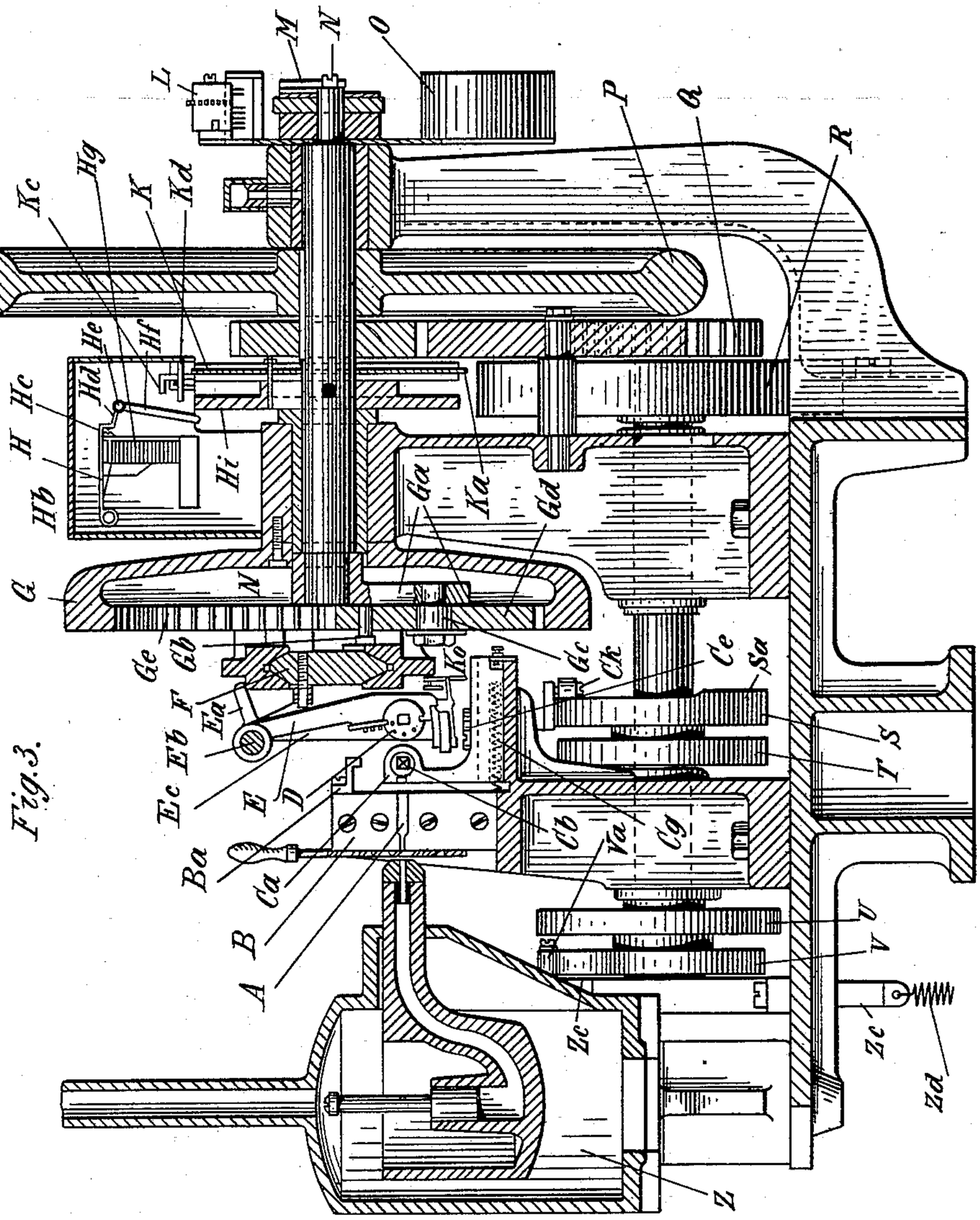

Fig. 3.

Witnesses:
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No. 628,631. Patented July 11, 1899.

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TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 4.

Fig. 4.

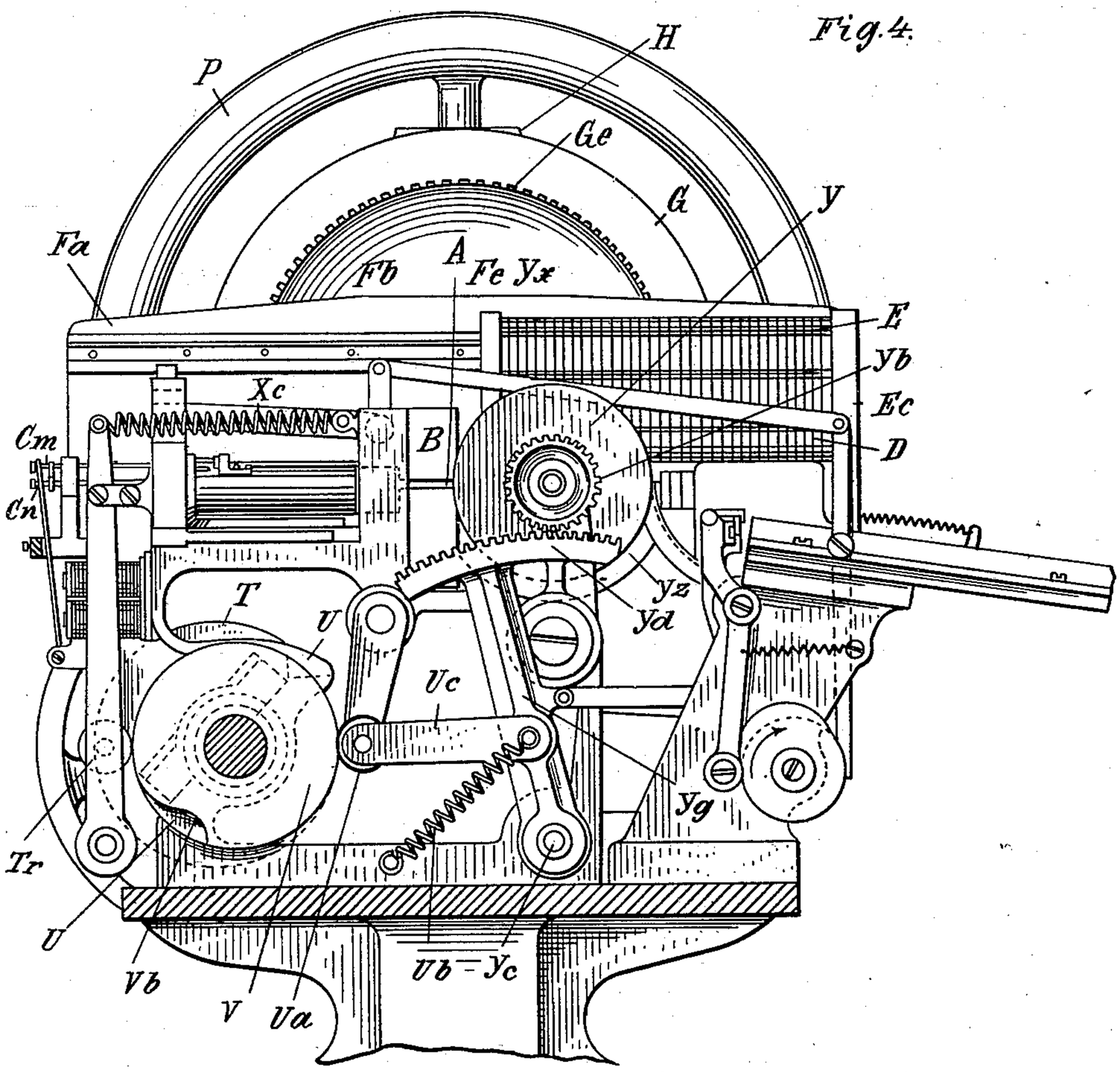
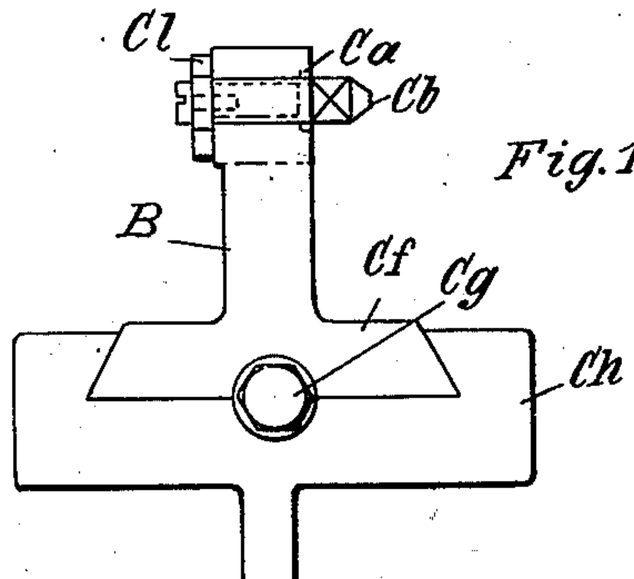


Fig. 15.



Witnesses:
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C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

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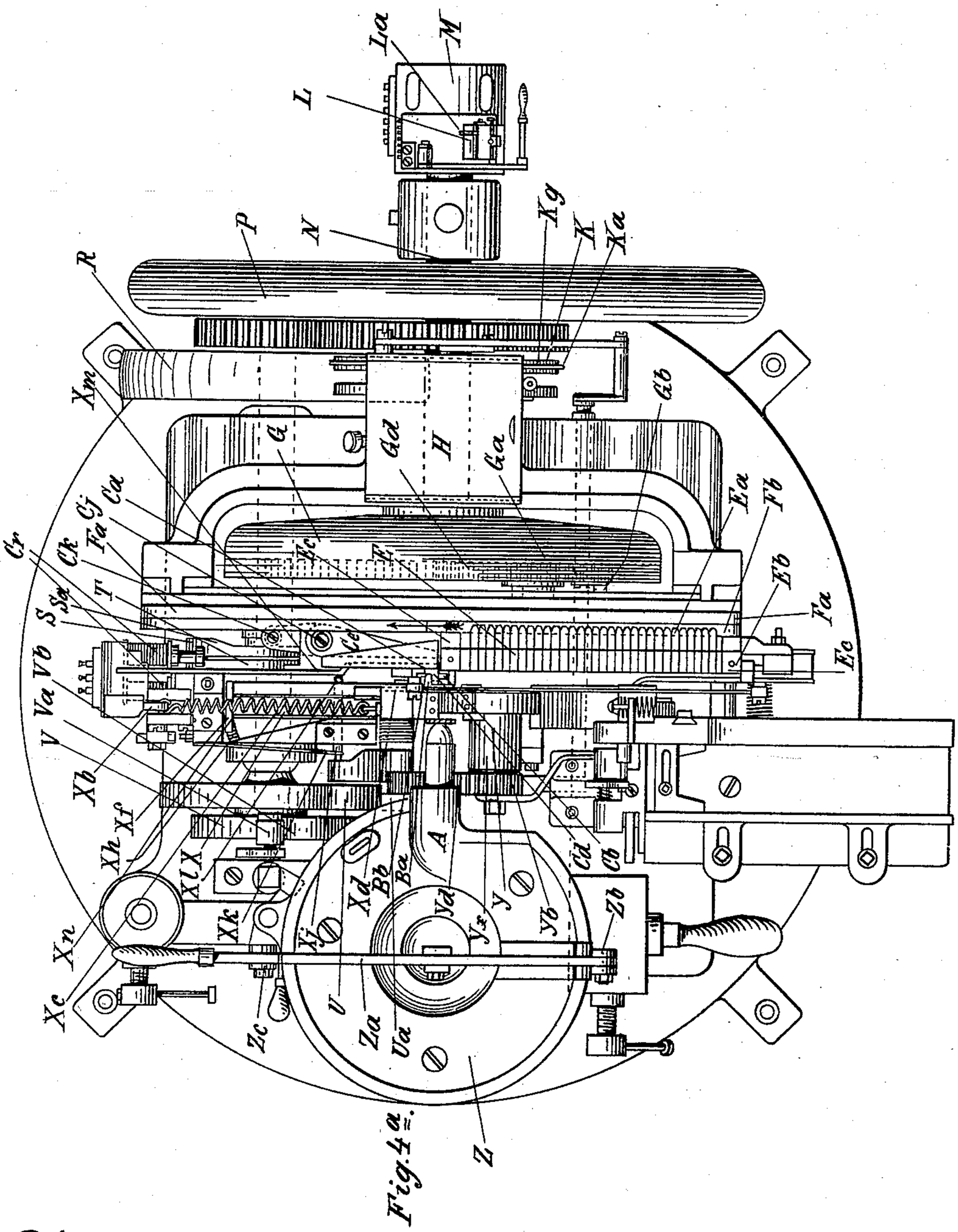

Fig. 4a.

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No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

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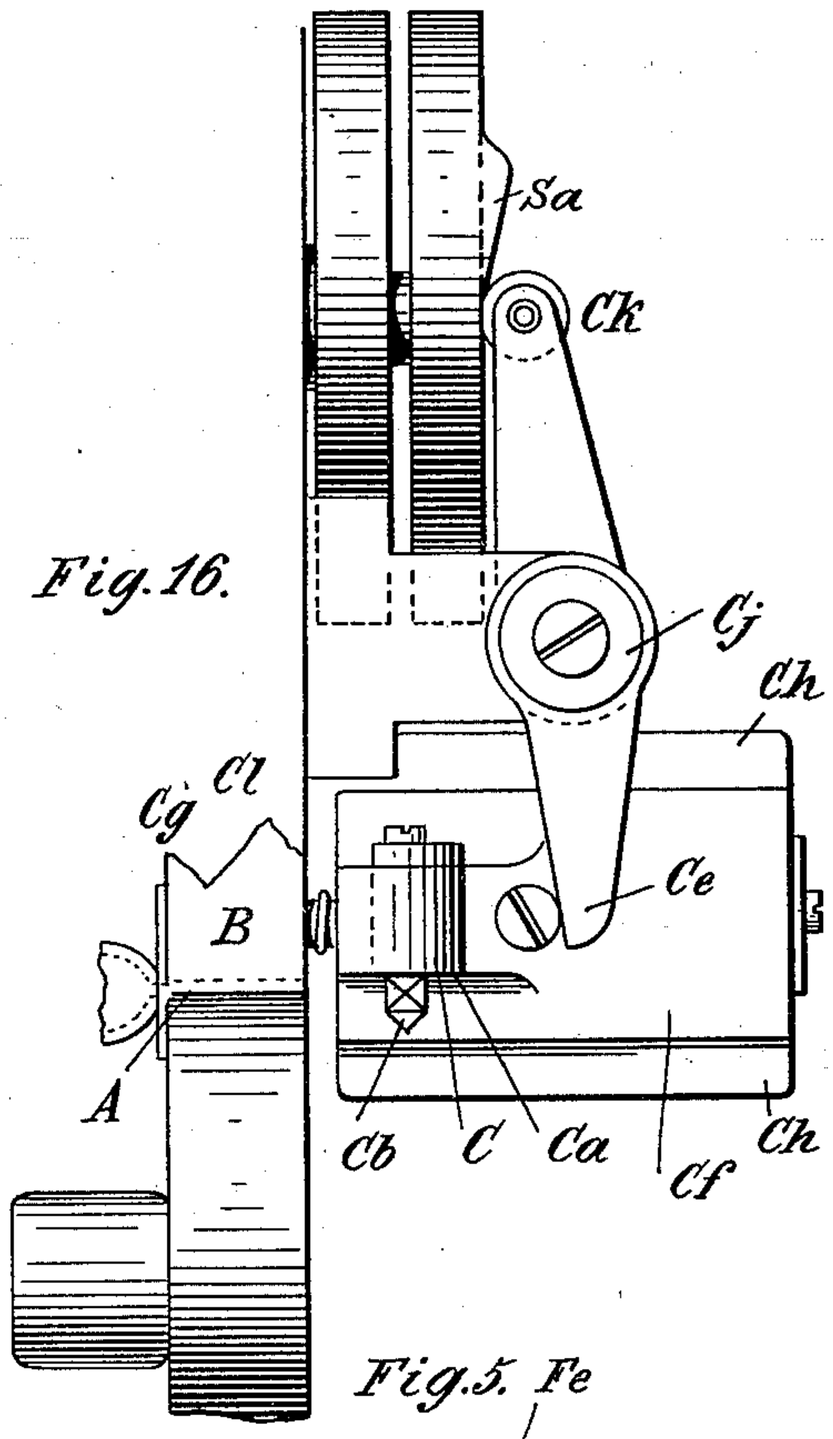
Fig. 16.



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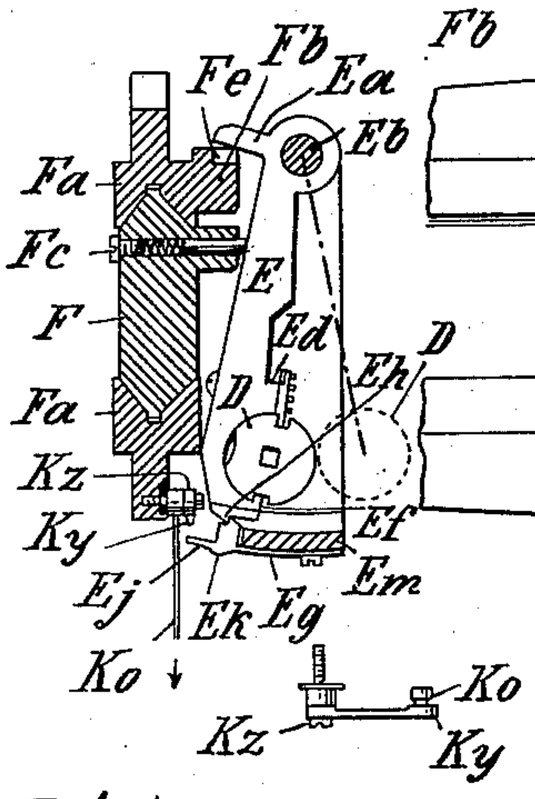
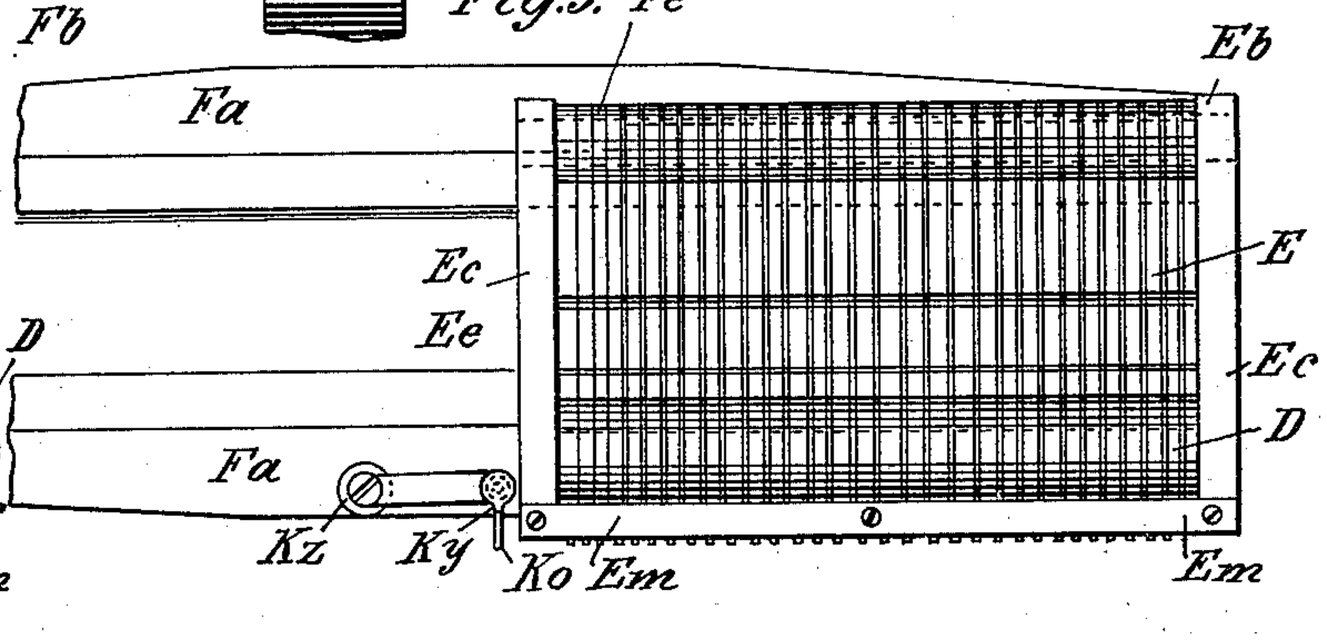


Fig. 5.



Witnesses:
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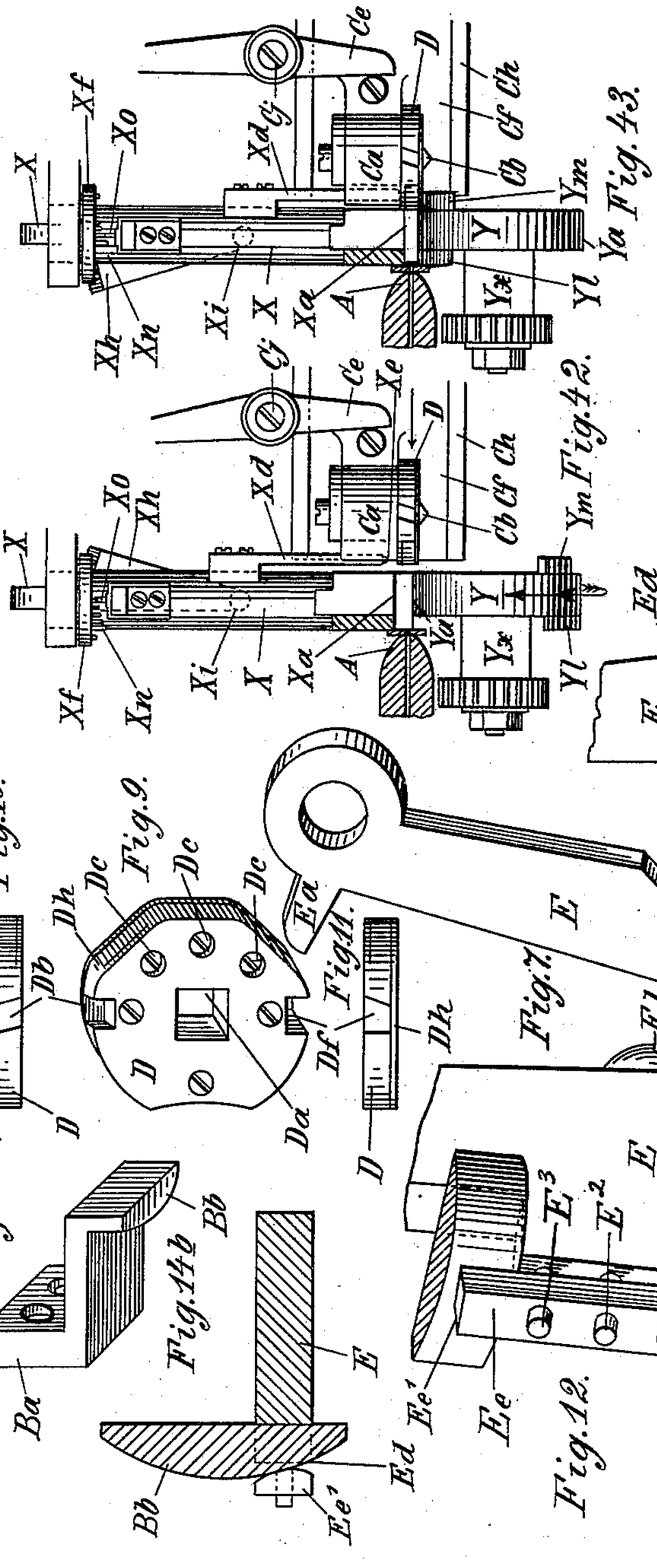
No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 7.



Witnesses:
James E. Mansfield.
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No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 8.

Fig. 18.

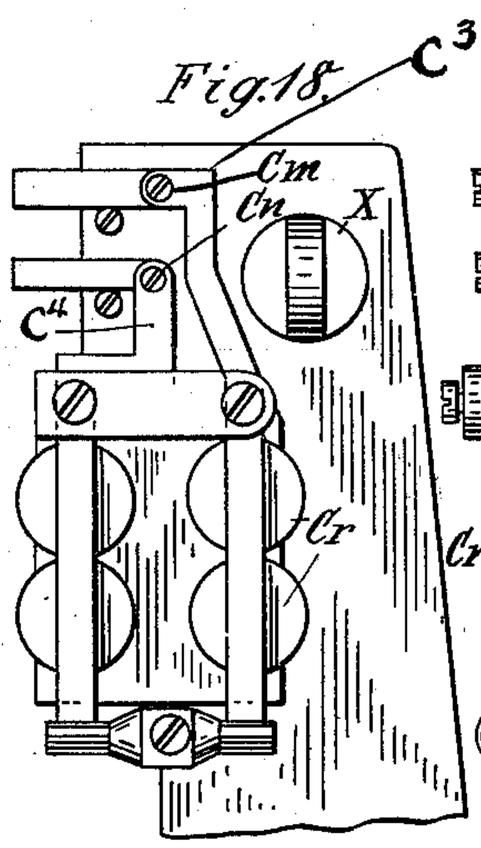


Fig. 19.

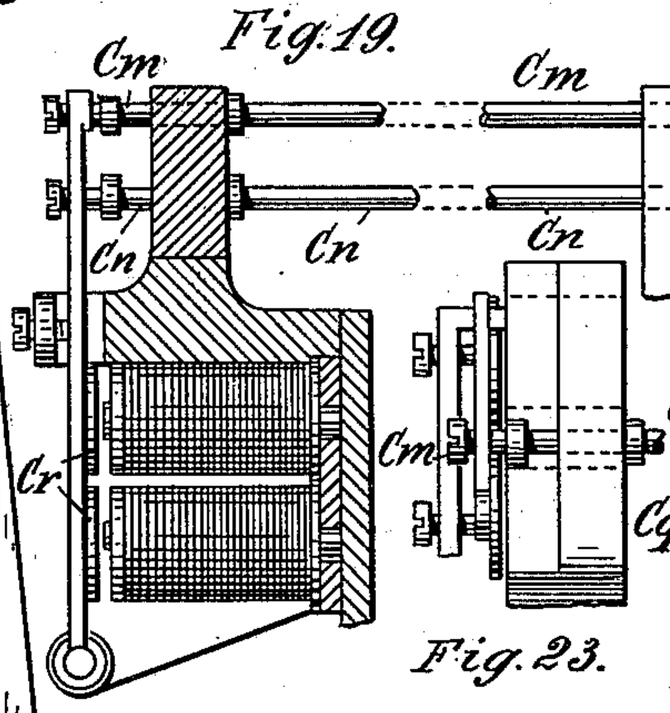


Fig. 20.

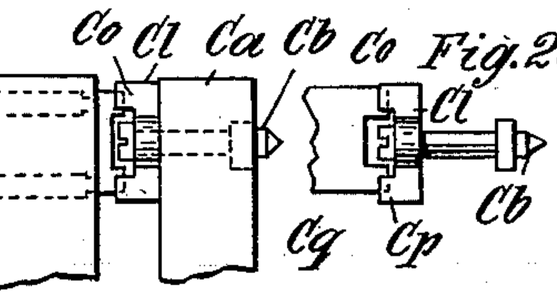


Fig. 23.

Fig. 21.

Fig. 22.

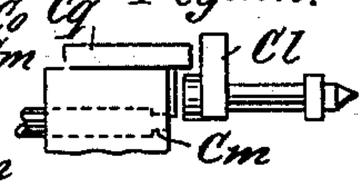
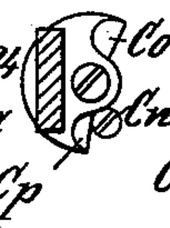


Fig. 24.



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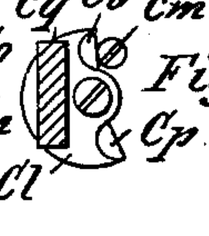

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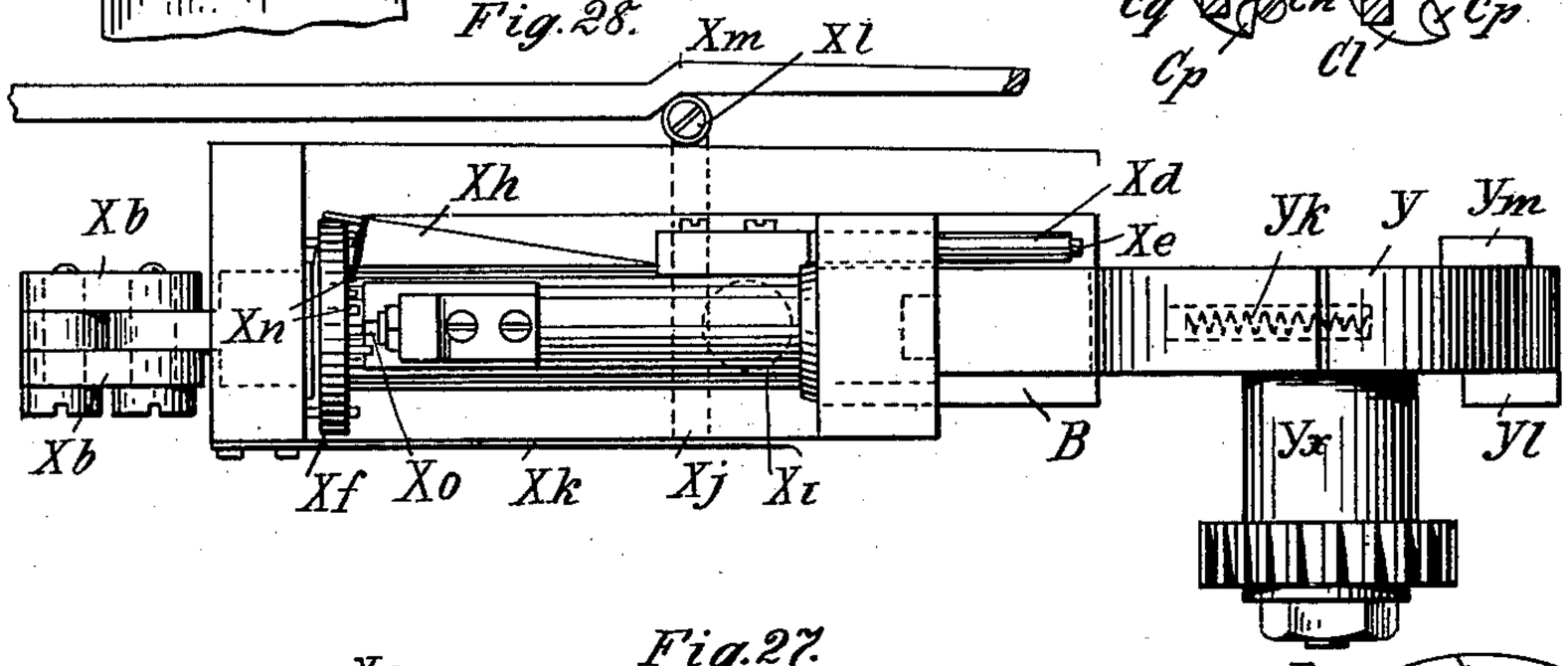

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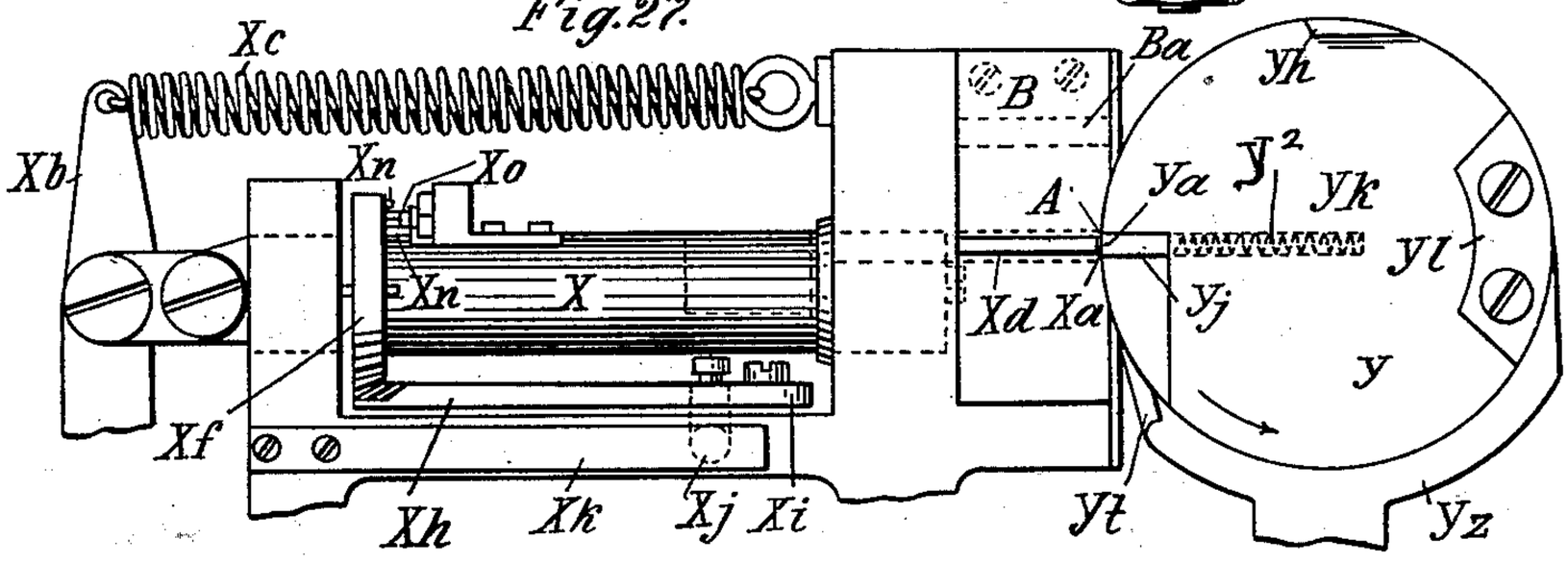

Fig. 33.

Witnesses:
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No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug 20, 1897.)

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Fig. 29.

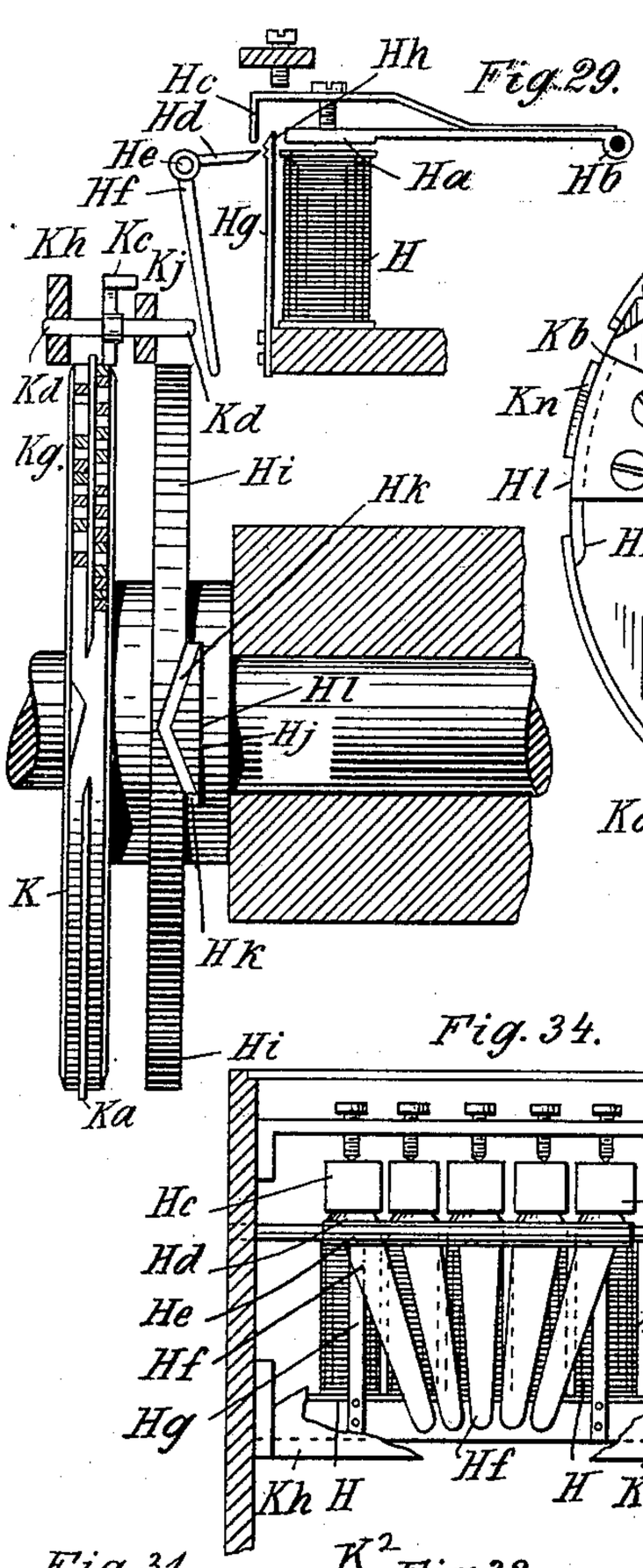


Fig. 30.

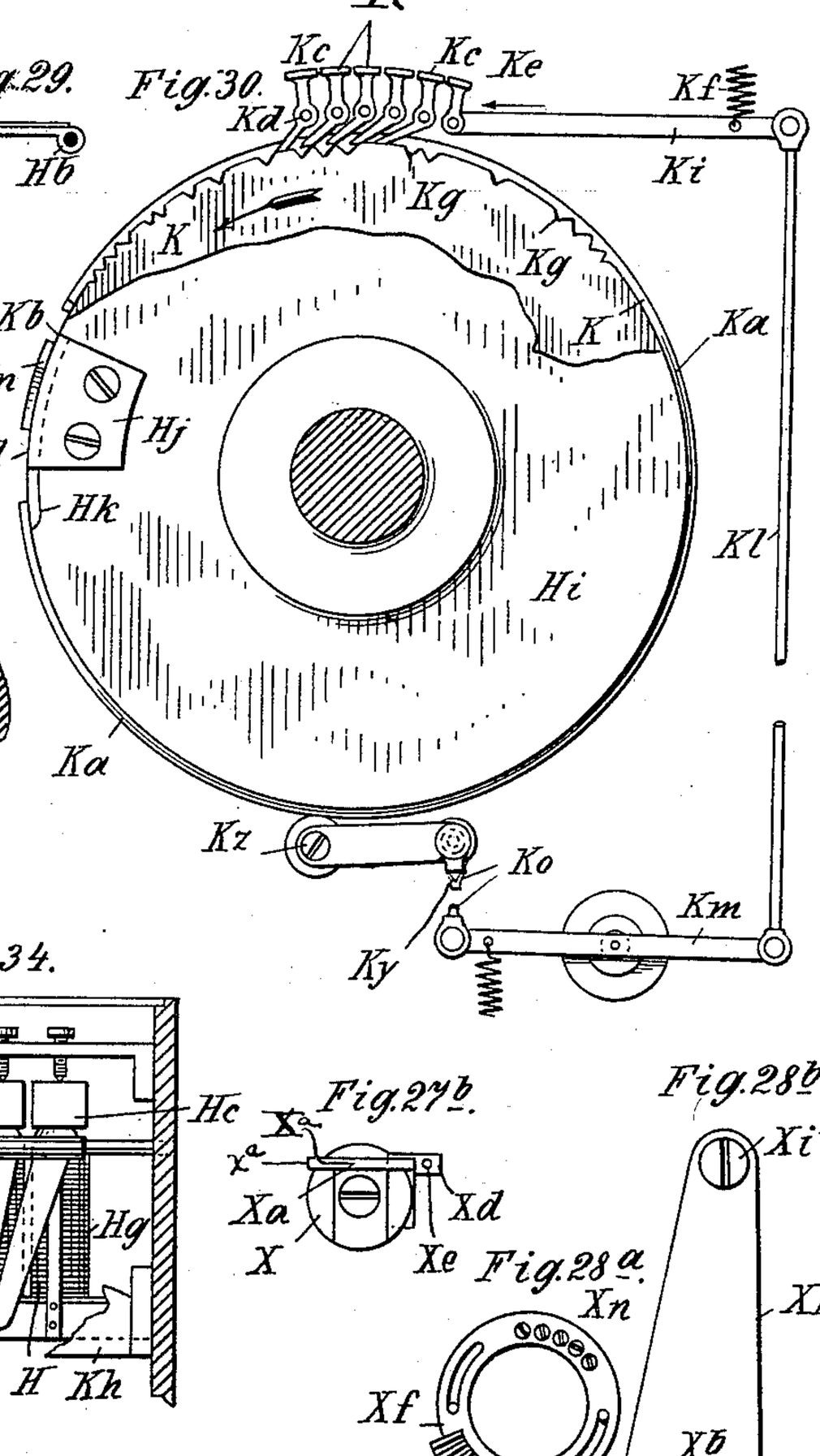


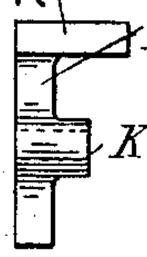
Fig. 34.

Fig. 27b.

Fig. 28b.

Fig. 28a.

Fig. 31.



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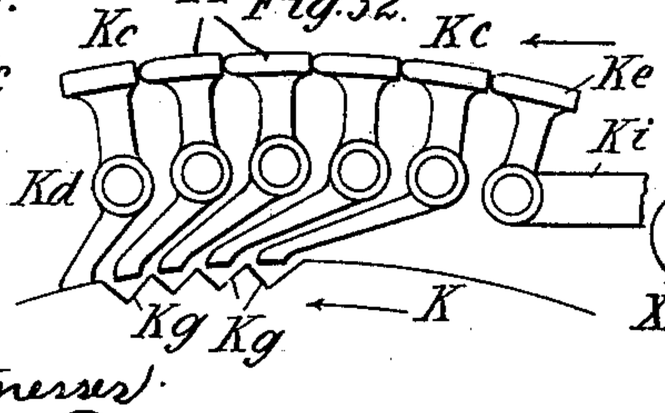
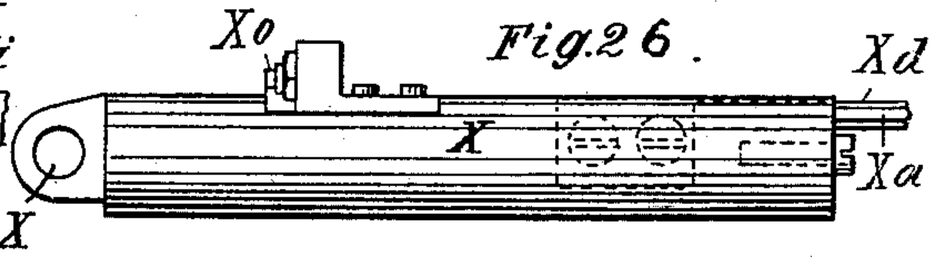


Fig. 26.



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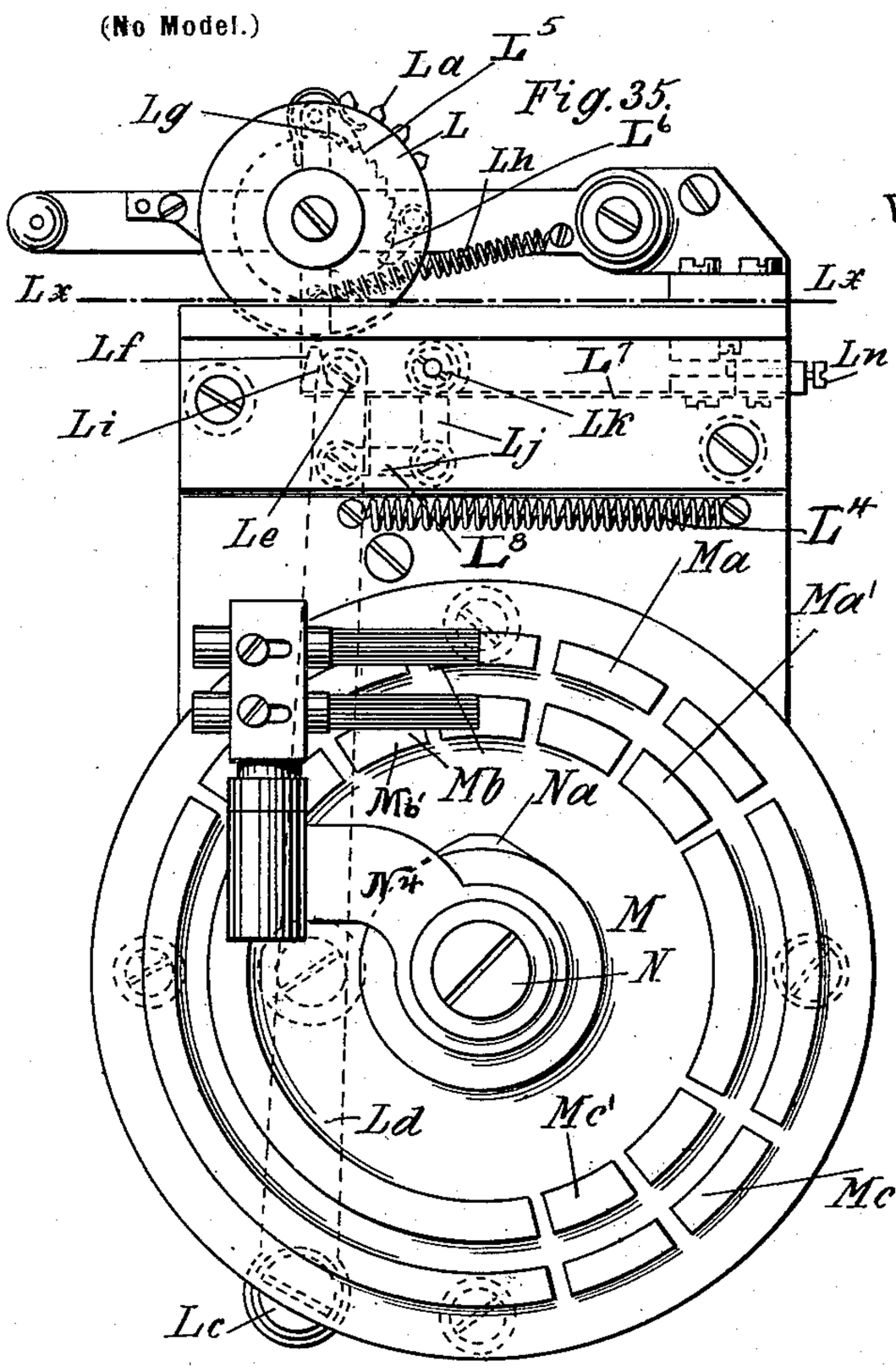
C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 10.



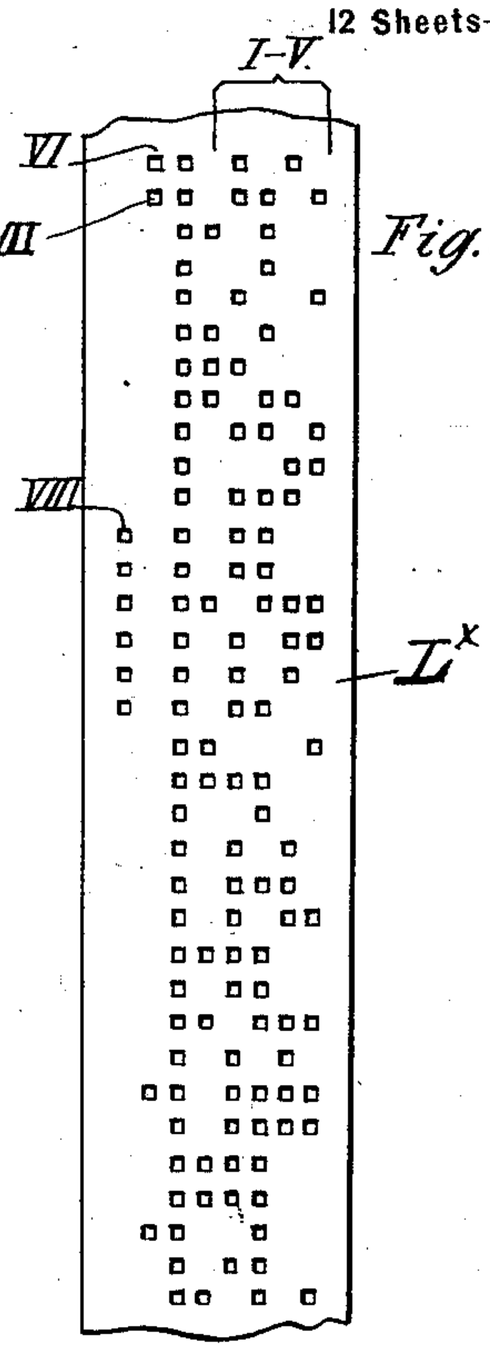
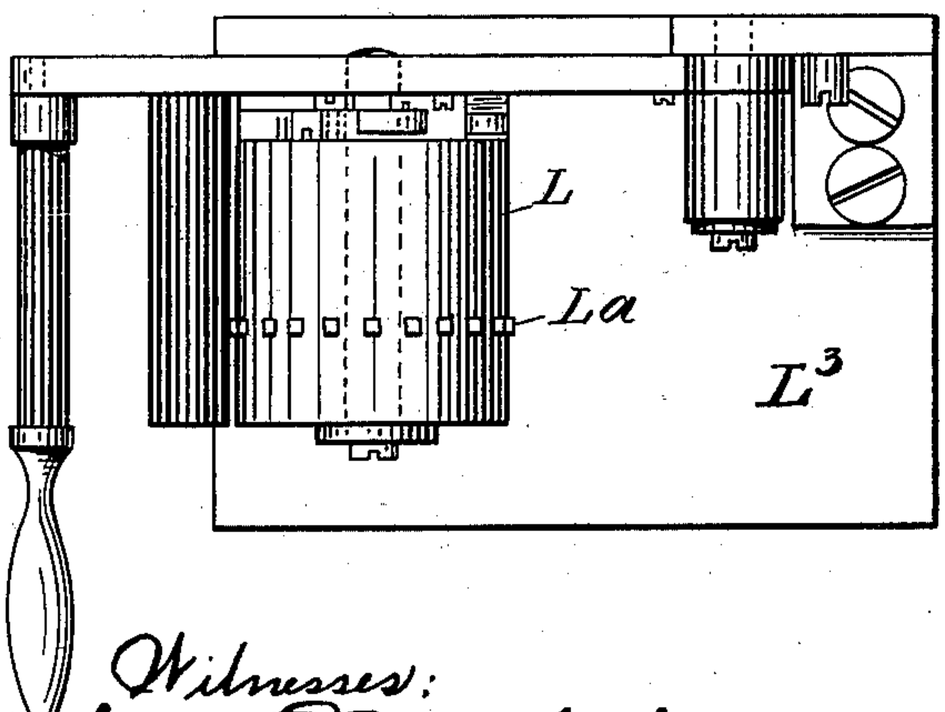
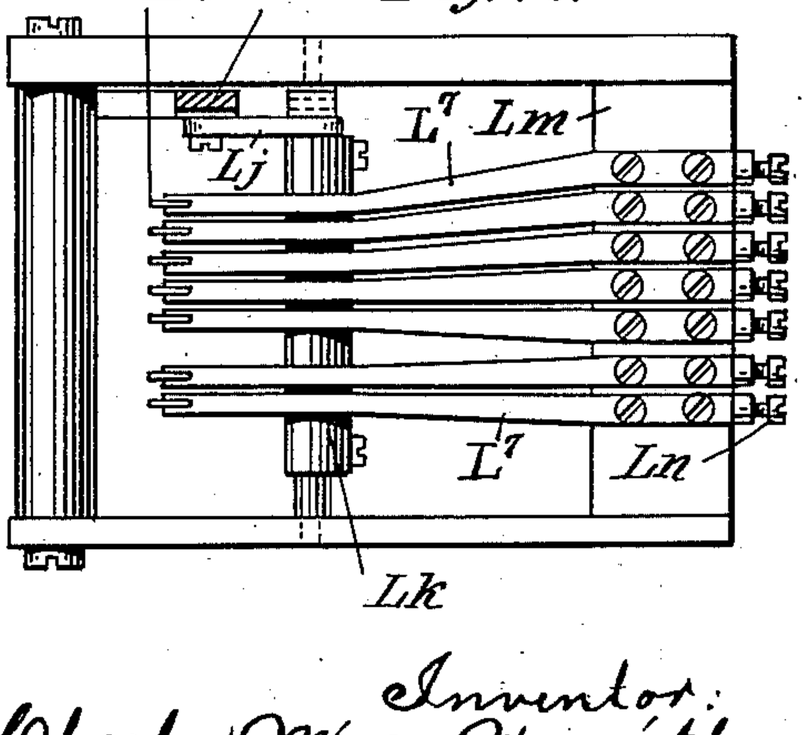


Fig. 39.

Fig. 38.



Li La Fig. 40.



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No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

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Fig. 36.

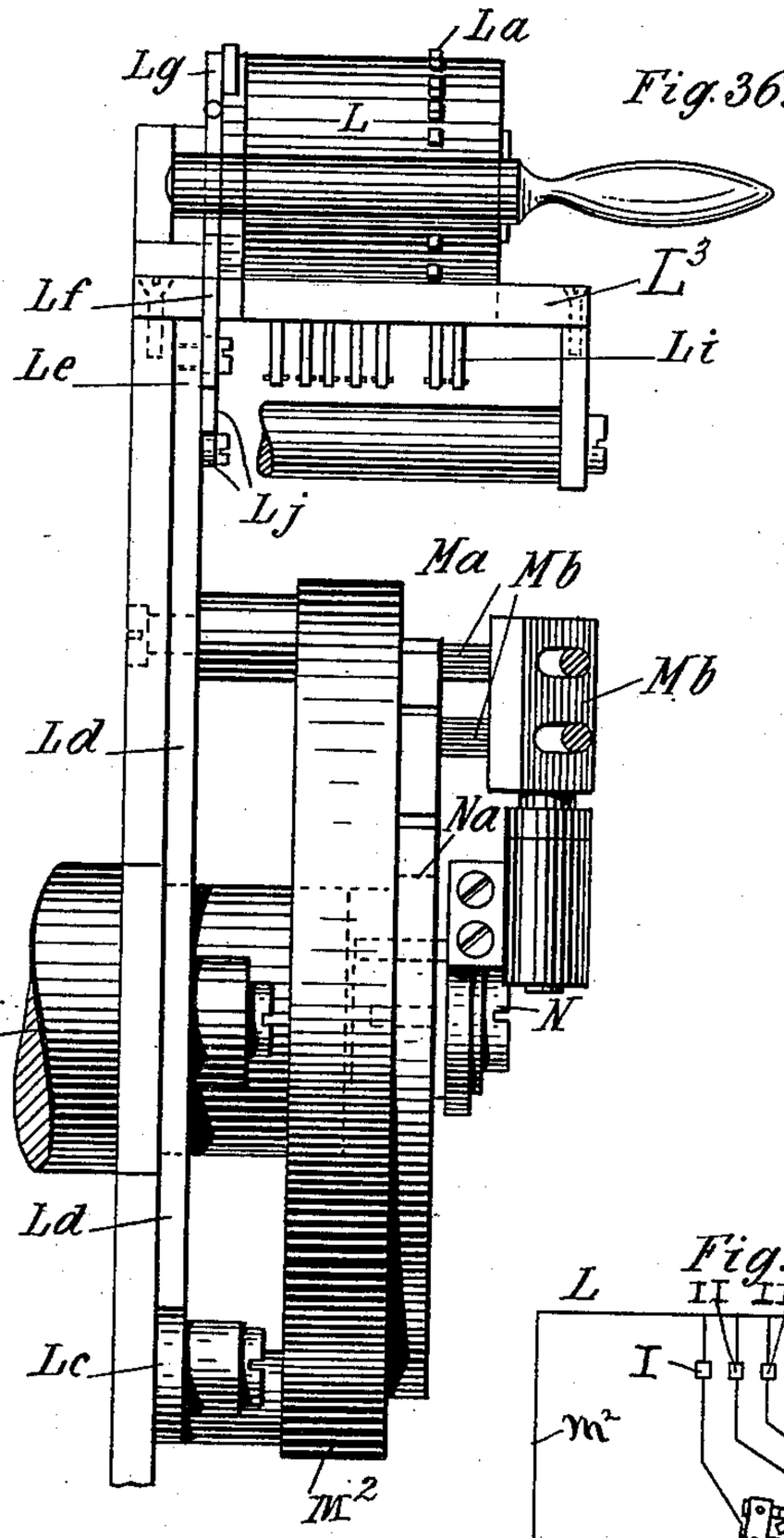


Fig. 37.

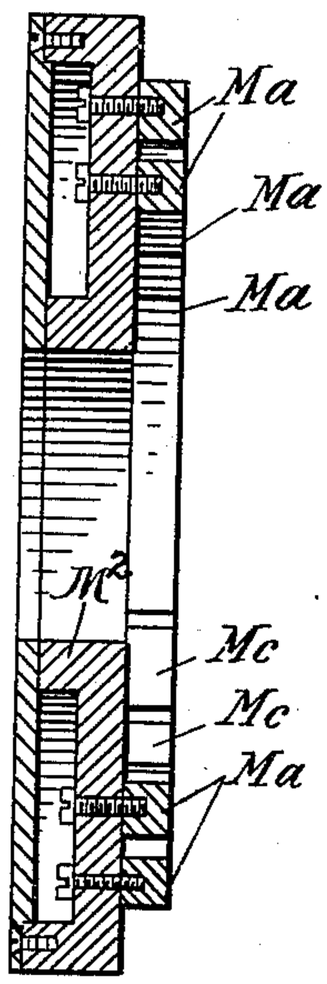
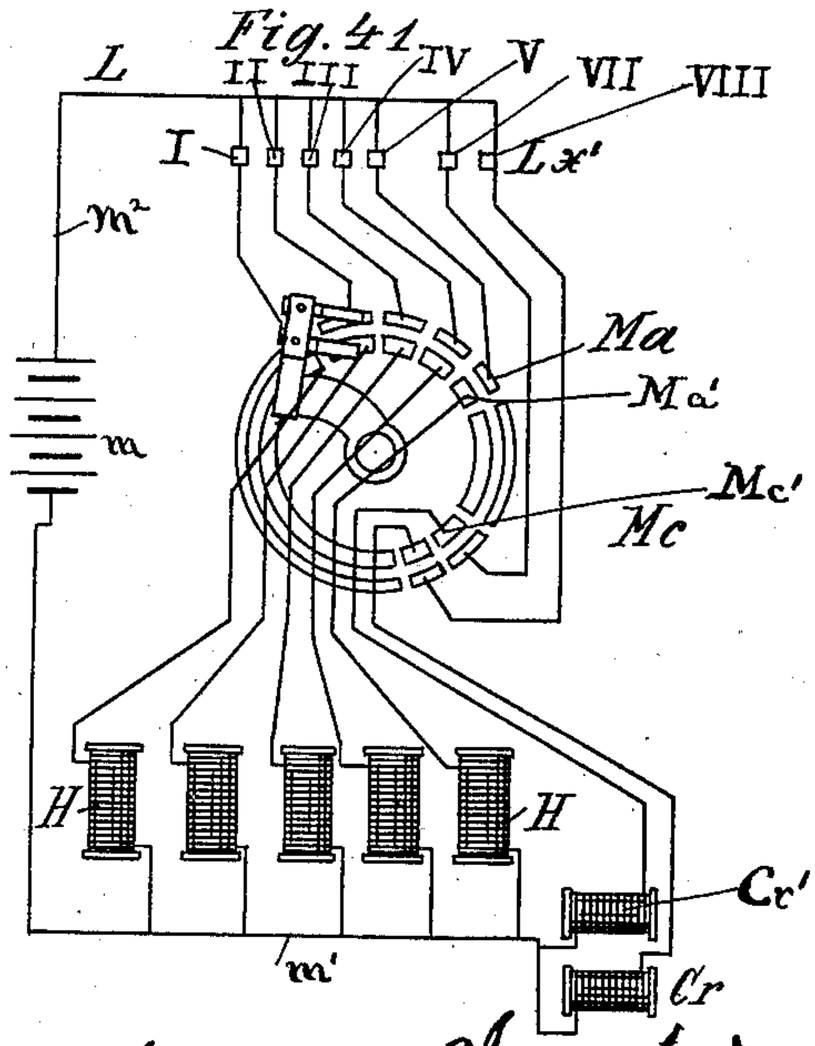


Fig. 41.



Witnesses:
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Wm. L. Sullivan

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By:
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Attorneys:

No. 628,631. Patented July 11, 1899.

C. MÉRAY-HORVÁTH.

TYPE CASTING AND COMPOSING MACHINE.

(Application filed Aug. 20, 1897.)

(No Model.) 12 Sheets—Sheet 12.

Fig. 45.

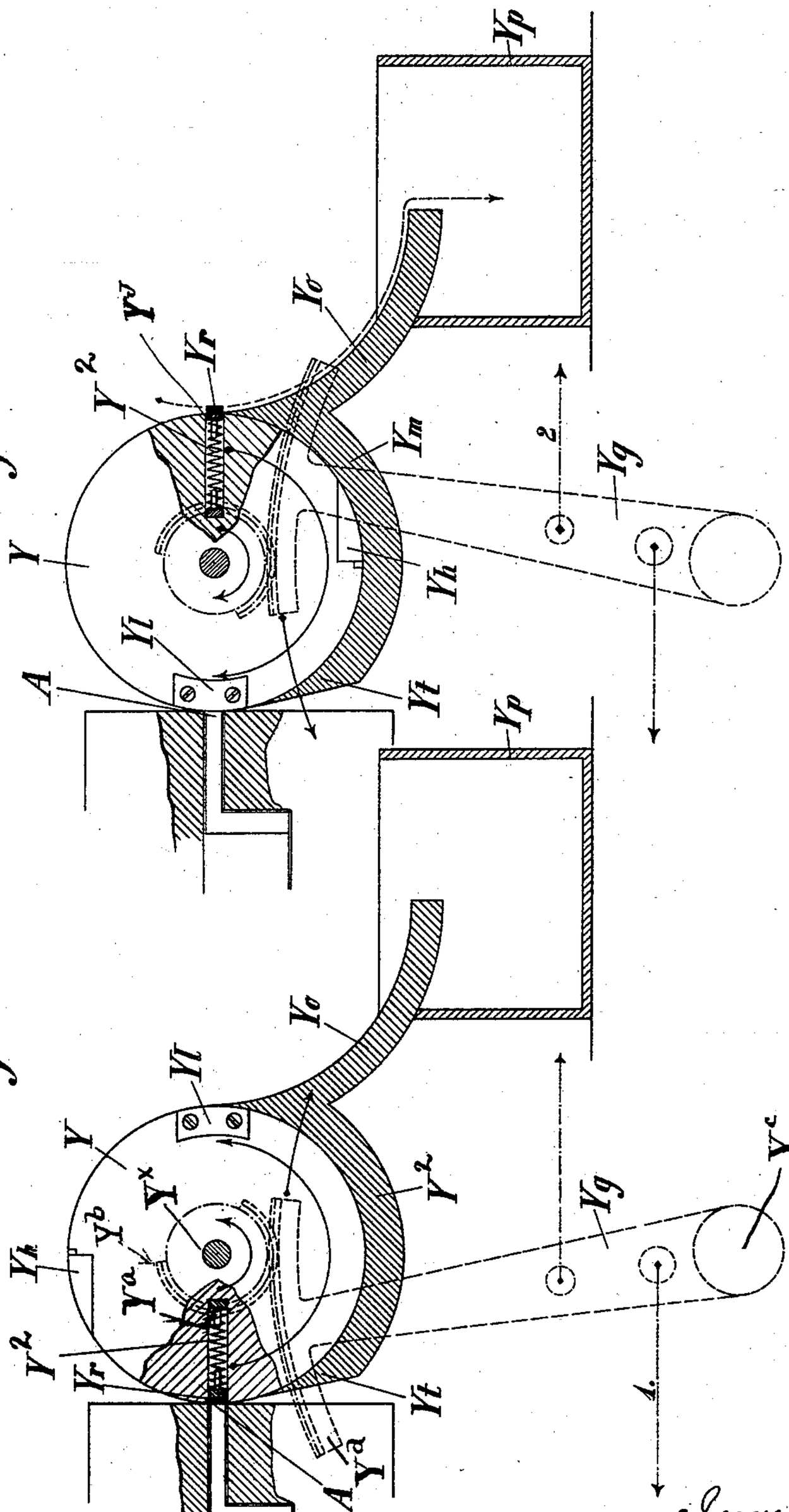

Fig. 44.

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William C. Sullivan.

Inventor:
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UNITED STATES PATENT OFFICE.

CHARLES MÉRAY-HORVÁTH, OF BUDA-PESTH, AUSTRIA-HUNGARY.

TYPE CASTING AND COMPOSING MACHINE.

SPECIFICATION forming part of Letters Patent No. 628,631, dated July 11, 1899.

Application filed August 20, 1897. Serial No. 648,975. (No model.)

To all whom it may concern:

Be it known that I, CHARLES MÉRAY-HORVÁTH, of Buda-Pesth, in the Kingdom of Austria-Hungary, have invented a new and useful Type Casting and Composing Machine, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention is an improvement in machines for casting type and composing the same according to the text to be printed, ready to be locked in forms to be printed from or to be stereotyped. In the present invention each letter is cast separately and subsequently assembled; and the invention consists in the following features: first, in a novel mechanism for bringing the movable matrices into position to have a type cast therefrom; second, in the novel matrix disks or rings each having a plurality of matrices in its periphery which may represent different characters; third, in means whereby the desired matrix may be brought into position for casting a type therefrom; fourth, in novel means for taking any matrix from and returning it to its carrier; fifth, in a novel means for reciprocating the series of matrix-carriers past the holder; sixth, in a novel holder whereby the matrix is presented to the casting-point; seventh, in novel mechanism whereby the size of the type-body mold is automatically varied according to the size of the type character to be cast on such body; eighth, in novel mechanism for trimming and removing the cast type from the mold; ninth, in novel electromechanical devices whereby the various operations of the machine are controlled.

The invention also embraces other details of construction and combinations of parts, hereinafter described.

Although the machine may be operated by means of finger-keys like ordinary linotype-machines or typewriters, yet in order to operate at a higher rate of speed I have shown mechanism whereby the machine can be controlled by means of a perforated strip, the perforations in which are made in such order that the type will be cast in the desired succession, said strip being perforated on the primary machine, which may be such as are now used for printing-telegraphs and other high-speed machines.

The principal object of the present invention is to produce an improved machine wherein the text is not made up and cast in lines, but the types corresponding to the text to be printed are cast separately and successively letter by letter.

To attain the objects in view, I employ matrix-carriers that are traveled constantly to and fro in front of the type-casting mold, and during this travel the proper matrix-rings are successively disengaged from their carriers and presented to the casting-mold, closing the same with the matrix corresponding to the type to be cast while the casting of such type is effected, and then the ring is returned to its carrier and another takes its place in front of the mold, while the type just cast is moved on and composed in a galley or type-line holder.

The invention will be best summarized in the claims following this description, and in the accompanying drawings I have illustrated a complete machine embodying my invention.

In said drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a rear elevation of the same. Fig. 3 is a longitudinal vertical section through the same in the plane of the main shaft. Fig. 4 is a rear elevation of the same with the melting-pot and some minor parts removed. Fig. 4^a is a top plan view of the complete machine. Fig. 5 is a detail elevation of the matrix-carriers. Fig. 6 is a transverse section through Fig. 5. Figs. 7 and 8 are detail views of the matrix-carriers detached. Figs. 9, 10, and 11 are detail views of the matrix. Fig. 12 is a perspective view of a matrix-carrier and matrix placed therein. Fig. 13 is a detail view of the mechanism for reciprocating the matrix-carriers. Figs. 14, 14^a, 14^b, and 14^c are detail views of the device for holding the matrix in the carrier and on the holder. Figs. 15, 16, and 17 are detail views of the mechanism for moving the matrix-holder to and from the mold. Figs. 18 to 25, inclusive, are detail views of the mechanism for causing partial rotation of the matrix-holder. Figs. 26 to 28, inclusive, are detail views of the mechanism for adjusting the size of the mold. Figs. 27 and 28 also show the means for removing the cast type from the mold. Figs. 29 to 34, inclusive, are detail views of the electromechanical devices

whereby the proper matrix is selected by and transferred to the holder. Figs. 35 to 41, inclusive, are detail views of the electromechanical devices whereby the selection of the proper type is controlled by a perforated strip. Figs. 42 and 43 are top views, partly in section, illustrating the casting of a type from a matrix-ring. Figs. 44 and 45 are detail views illustrating the means for removing the cast type from the wheel Y and discharging the same into a suitable collector or receiver.

In order to get a clear idea of the various features of the invention, the different mechanisms will be described singly as to their construction and operation, and thereafter the operation of the machine as a whole will be explained.

The matrix mechanism.—The matrix-rings D, Figs. 9 to 12, are placed in carriers E, Fig. 7, which are hung in a frame E*c*, as shown in Fig. 5. This frame E*c* is provided at the top with a rod E*b*, Fig. 6, on which thirty-one carriers E are hung one beside the other. The shape of each carrier is best shown in Figs. 7, 12, and 14^c and the position of the individual carriers in Figs. 5 and 6. Each carrier E is under the influence of a spring-pressed bolt F*c*, which tends to throw the carrier into the position shown by dotted lines, Fig. 6. Each carrier is normally locked by a latch E*k*, Fig. 6, which engages a projecting tooth E*h* on the lower end of the carrier. The carriers are released at the proper time by means of a hammer K*y*, which is effected by depressing a rod K*o*, Fig. 5, as hereinafter explained. Said hammer K*y* will strike the projection E*j* of the latch E*k* of that carrier which at the moment is actually moving past the hammer at the time, and the respective carrier will be released, so as to project into the position shown by dotted lines, Fig. 6, whereupon its ring D will be removed, as hereinafter described.

The matrix-rings.—Each matrix-carrier E has a semicircular cavity in its side, Fig. 7, in which is supported a matrix-ring D, and this ring is lifted out of this cavity in order to bring them before the letter-casting mold and replaced in the cavity after a type is cast.

At the lower end of the semicircular cavity in the carrier E is an upward projection E*f*, and at the top is a movable downwardly-projecting catch E*e*, Fig. 7. The projection E*f* is adapted to enter a notch D*f* in the lower edge of the matrix-ring D, Figs. 9 and 14^c, while the catch E*e* enters notch D*b* in the top of the ring.

In order to securely hold the matrix-ring D in the carrier E and yet to allow its easy removal, the catch E is spring-controlled, being held against the edge of the carrier by a spring E*l*, Fig. 14^c, bearing against the end of a pin E^2, attached to the catch and guided in a recess in the carrier. The catch is further guided by pins E^3 on the projection E*d* of the carrier. The notch D*b* is cut obliquely into the matrix-ring, as shown in Figs. 10 and 11, being somewhat to the rear of the opening D*a*.

An angular catch-trip B*h* is secured to the stationary part B of the main frame, Figs. 4^a and 14, having a projecting lip B*b*, shaped as shown in Figs. 14^a and 14^b. This lip B*b* lies in position to engage the projecting upper end E*e*′ of catch E*e* of any carrier which is released (see Fig. 14^b) and cause the catch to move outward. If now a carrier E moving to the left is released and passes toward the pin C*b* and the trip B*a*, the end E*e*′ of the catch E*e* will strike the lip B*b*, as shown in Fig. 14^b, and force it outwardly, tensioning the spring E*l*. The lower end of the catch E*e* can then pass easily out of the notch D*b* of the matrix-ring D, and the latter will remain upon the pin C*b*, while the empty carrier E will continue to travel with the carriage to the left for the remainder of the stroke. Then when said carrier E (after its said matrix-ring has been used to close the casting-mold) returns on the backward travel to the right the catch E*e* will be pressed outwardly again by means of the lip B*b* of the trip B*a*, so that the lower extremity of the catch E*e* will enter the notch D*b* of the ring. When the lip E*e* has entered sufficiently into the notch D*b*, the trip will release the catch, which is thrown back by its spring, so that the matrix-ring is again securely held in its arm or carrier, as in Figs. 12 and 14^c. The notches D*b* D*f* are closed on one side of the ring by plate D*h*, as shown, so that the ring will be picked up by the carrier on its return stroke, while the open ends of the notches enable the projection E*f* and the lip E*e* to enter and leave the same.

Each matrix-ring D is provided with three matrices, as shown in Figs. 9 to 12. Thus the capital letters, small letters, as well as the usual letter-signs, numerals, &c., are provided for in the thirty-six matrices. When a matrix-ring is brought before the casting-mold, it is automatically shifted so as to present the proper matrix to the mold and close the same, whereupon the casting of the proper letters is effected. Each matrix-ring has a central angular hole D*a*, Figs. 9 and 14^c, by which it is caught and suspended on the holder C*b*, hereinafter described, and each matrix-ring has holes D*c* in its sides, by which the thickness of the body of the type is determined, as will be more fully described hereinafter.

The matrix-carriage.—The frame E*c*, with the carriers E, carrying the matrix-rings D, Fig. 5, is constantly horizontally reciprocated in the guide F*a*, Figs. 4^a, 5, and 6. The frame E*c* is rigidly connected to a carriage F, Fig. 6. A rod E*b* is fixed in the two ends of frame E*c*, and the thirty-one carriers E are suspended from the rod. All these carriers thus travel with the carriage to and fro. Fig. 5 shows the extreme position of the carriage toward the right. The extreme left position is at the same distance from the middle line.

As more fully described hereinafter, any matrix-carrier may be released from its spring-latch E*k* when at one particular point of its travel to the left with the carriage, and this is effected by a hammer K*y*, when the carriage F is depressed once for each stroke of the carriage and only at the instant when the projection E*j* of the latch E*k* of the carrier carrying the desired matrix comes under the same. The hammer K*y* can be depressed at any one of thirty-one different positions of the carriage during the motion thereof from right to left, so that any one of the thirty-one carriers may be released during such stroke of the carriage.

In order to automatically return the carriers to their original locked position when the carriage makes its forward stroke, they are provided with projections E*a* on their upper ends, Fig. 6, which slide on a rail F*b*, which has one portion F*e* higher than the other, the part F*e* extending about the length of carriage F from the right. (See Fig. 5.) If any one of the carriers E during the motion of the carriage from right to left is released, when the carriage returns toward the right the projection E*a* of said carrier rides up the inclined surface of the rail at F*e*, so that the carrier E is thrown back from its displaced position (shown in dotted lines, Fig. 6) into its original position, (shown in full lines, Fig. 6,) and its latch E*k* engages its tooth E*h* and locks it. The carrier is thus moved back to first position after it has taken up its matrix from holder C.

The motion of the matrix-carriage.—Motion is imparted to the carriage-frame E*c* from the principal shaft L by the following means: In Fig. 13 an internal gear G is shown rigidly connected to the main frame of the machine. Through the axes of gear G passes the main shaft N, carrying an arm G*a*, provided with a crank-pin G*c*, parallel to the shaft N, and carries a cog-wheel G*d*, engaging the teeth G*e* of the internal gear G.

It is evident from the above description that the wheel G*d* while turning upon its axis G*c* also rotates around the shaft N. The radius of wheel G*d* is exactly one-half of the internal radius of gear G. Therefore the crank-pin G*b* on wheel G*d* will move horizontally in a straight line to and fro. The carriage F is connected to pin G*b*, Fig. 3, and consequently will travel from point G*b* to the point G*b'*, Fig. 13, and thus have a rectilinear reciprocating motion.

The matrix-ring transfer.—The matrix-carriers are reciprocated with the carriage F, the carriers moving with them the matrix-rings D. While the matrix-carriers are locked in the position shown in full lines, Fig. 6, they do not strike any obstacle. However, when the tooth E*k* of any carrier is disengaged by releasing its tooth E*h* it is projected into the position shown in dotted lines, Fig. 6, and its matrix-ring will strike a pin or holder C*b*, secured to an arm or bracket C*a*, Figs. 3, 4ª, 12, 14, 14ᶜ, 15, 16, 17, 18, 19, 20, 21, and 22. This holder C*b* enter the opening D*a* of the matrix-ring and suspends the latter thereon. (See Figs. 42 and 43.) The pin C*b* is directly opposite the casting-mold A, Figs. 3 and 42, and can be moved toward and from the same. When a matrix-carrier E is in the dotted position, Fig. 6, and moving to the left, its matrix-ring D, Fig. 12, will strike the holder C*b*, and the ring will remain upon said holder while the carrier continues to travel with the others the full length of the stroke to the left. The holder C*b* is mounted on a movable arm or bracket C*a*, Figs. 3, 14, and 16, which is of such a shape that the matrix-carriers E can easily pass thereby while the matrix-rings are caught on the pin.

Presenting of the matrix to the mold.—When a matrix-ring is caught upon the holder C*b*, the surface of the matrix-ring is still a short distance from the mold, Fig. 42, and it must then be moved toward the mold in order to present the matrix to the head of the mold. To effect this movement, a device is used, as shown in Figs. 14 to 17 and 42 and 43. The slide C*a*, carrying holder C*b*, has a dovetail base C*f*, guided in a like groove in a fixed guide C*h*, Figs. 15 and 42. A spring C*g*, Figs. 3 and 14, interposed between the base C*f* and frame B, tends to keep the holder away from the mold; but at the proper times the holder is moved toward the mold by a lever C*e*, Figs. 14 to 17, which acts against said spring. The lever C*e* has its fulcrum at C*j* on a fixed support, and said lever is operated by a cam S*a* on a disk S, which is constantly revolving with the main shaft. (See Figs. 3, 16, and 17.) When lever C*e* presses the slide C*a*, with the holder C*b* and the matrix-ring thereon, toward the mold A, the matrix-ring closes the mold, and simultaneously the liquid metal is injected therein.

The automatic adjustment of the matrix-rings for producing caps, numerals, &c.—As shown in Figs. 9 and 12, each matrix-ring carries three different matrices. One may represent a capital letter, the second a small letter, and the third a numeral or other sign. When the holder C*b* is in normal position, the central matrix on any matrix-ring will be brought against the mold; but the holder is capable of being rocked slightly in one or the other direction, so as to bring one or the other of the two end matrices into operative position.

By referring to Figs. 19 to 25 it will be seen that on the left-hand end of the holder C*b* is a segment C', and directly opposite said segment are a pair of rods C*m* and C², parallel with the holder and respectively slightly above and below it. The rods C*n* and C*m* can be moved so as to obstruct the movement of segment C*l* when the slide and holder are moved toward the mold, Figs. 19, 20, and 21, said rods being respectively connected to the armatures C³ and C⁴ of electromagnets C*r* and C*r'*. Ordinarily the inner ends of these rods

do not interfere with the movement of segment C*l*, but are a little to the left thereof, as indicated in Fig. 19 by dotted lines.

When the holder and matrix-ring are moved toward the mold, as described, the holder remains in position to present the center matrix to the mold, unless one of the rods C*m* or C*n* is shifted so as to obstruct segment C*l*, and thereby cause it to rock the holder forward or back. The direction of motion of the holder toward the mold is indicated in Fig. 21 by the arrow. In order to fully understand the partial revolution of the holder C*b* and matrix-ring, we will suppose that both rods C*n* and C*m* were pushed forward by their electromagnets so that their ends are in the way of the segment C*l*. In this case the two ends of the rods C*m* C*n* would prevent an advance of the pin and of the disk C*l*, and either this disk or the ends of the rods C*m* and C*n* would have to break; but both rods are never simultaneously moved forward, but only one at a time can be moved in position to contact with the segment. If the rod C*m* is advanced, Fig. 25, it obstructs the segment C*l* when the same is moved in the direction of the arrow, Fig. 21. Consequently the upper part, Fig. 25, is stopped and causes the holder, with the matrix-ring thereon, to turn so far backward that the lower matrix, Fig. 9, is brought into position to close the mold; but if the lower rod C*n* is advanced the lower part of the segment C*l*, Fig. 24, will be retained during the advance of the holder in the direction of the arrow, and the holder and matrix-ring will turn so far forward that the upper matrix, Fig. 9, is brought into position to close the mold. The turning of the matrix-rings thus depends on the position of the rods C*m* C*n*. It will be explained hereinafter how the electromagnets C*r* C*r'* are energized. It is of course necessary to return the holder and matrix-rings to normal position after the type is cast, so that the matrix-ring can be picked up by its carrier. To this end the segment is provided with projections C*o* C*p* on its upper and lower ends, Figs. 20 and 21, which when the holder is in normal position, or as it returns to normal position, engage a fixed stop-piece C*q* and return and keep the holder and matrix-ring in normal position. The ends of the rods C*m* and C*n* operate in front of these projections C*o* C*p*, Figs. 20, 21, 22, 24, and 25. When the segment C*l* moves away from this stop C*q*, it can be turned according to the position of the rod C*m* or C*n;* but when it returns to normal position, if it has been shifted by either rod, either the projection C*o* or C*p* will strike the stop C*q*, so that in all cases the holder and matrix-ring will be returned to their first position.

Different thicknesses of letters.—In order to vary the size of the type-body to suit the character to be cast thereon, the body of the mold is made adjustable, as follows: The top and bottom of the mold are formed by a horizontal slot A in the stationary part B, Figs. 27 and 28; but the opposite sides of the mold are formed by a slide X*a* and the periphery of a rotary disk *y*, respectively. The slide X*a* is attached to a movable bar X, Fig. 26, and according to its position more or less to the right or to the left, Fig. 27, leaves a space broader or narrower for the mold, thus determining the thickness of the letters. The slide X*a* is always brought, at a certain point of the revolution of the main shaft, to the outermost position by means of a lever X*b*, Figs. 4, 27, and 28, which is thrown outward by a cam-disk T, Figs. 3 and 4. While the slide is in this outermost position, a matrix-ring is caught upon the holder. Then the cam T frees the lever X*b*, and a spring X*c*, Fig. 27, which is connected to the lever, moves the slide X*a* onward toward the disk *y*. If no matrix-ring is on the pin, the slide moves inward until its end contacts the disk, Figs. 27 and 43, and the mold is completely closed; but when a matrix-ring is on the holder the mold cannot be closed completely, because a finger X*d*, Figs. 27[b], 28, 42, and 43, on bar X passes the holder, and its point X*c*, Fig. 27[b], enters one of the holes D*c* in the matrix-ring D, Fig. 9. (See also Figs. 42 and 43.)

By reference to Fig. 9 it will be seen that each matrix-ring has a hole D*c* in its side opposite each matrix, and these holes vary in depth, being exactly proportionate in depth to the desired body of the type character which the matrix represents. Thus for each numeral or other sign the relative hole D*c* in the matrix-ring is of such depth that the finger X*d*, with its pin X*e*, can enter only a predetermined extent, and the pin X*e* will hold the slide X*a* away from the cylinder Y a distance exactly equal to the thickness of the body of the particular type to be cast. Thus the thickness of each particular type is regulated by the holes D*c* in the matrix-rings.

In order to prevent the injected metal spreading the mold during the casting of a type, means are provided to prevent backing of the slide X*a*, as follows: A ring X*f*, Figs. 28 and 28[a], is mounted on one end of bar X and is free to revolve thereon, while the bar can slide in the ring inwardly or outwardly. The ring has a toothed segment X*g* on its front face, the teeth of which mesh with the teeth of a sector X*h*, (represented separately in Fig. 28[b],) which is fulcrumed at X*i* on a stationary support below the bar and when oscillated turns the ring X*f*. The sector is oscillated by means of a rod X*j*, Figs. 27 and 28, pivoted to the under side of the sector, one end of said rod having a roller X*l*, which runs against a spring cam-rail X*m*, which is secured at one end to the matrix-carrier carriage F, so that it moves therewith. This spring-rail X*m* has a cam-bend which contacts roller X*l* at the proper time during the travel of the carriage and causes the rod X*j* to move rearward and oscillate the sector H*h*, and thereby partially revolve the ring X*f*. The rod X*j* is pressed toward rail X*m* by a

spring X*k*. (See Figs. 27 and 28.) The ring X*f* has a number of steps or pins X*n* of different heights on its front face, which change position during the revolution of the ring. The bar X carries an adjustable stop-pin X*o*, Fig. 28, adapted to contact with one of the pins X*n*. When the bar X is in its farthest outward position, the ring X*f* is shifted to such a position that the stop-pin X*o* will not contact any of the pins X*n*, the sector X*h* then being in the position shown in Fig. 42; but if the pin X*e*, by entering the recess D*c* of the matrix-ring, has determined the position of the slide X*a* and of the thickness of the type the bend-spring of the rail X*m* acts on the roller X*l* and causes rod X*j* to move the sector X*h* so as to turn the ring X*f*. The rotation of ring X*f* is limited or regulated by pins X*n* and pin X*o*, which projects in the path of pins X*n*, so that more or less of pins X*n* can pass pin X*o*, according to the adjustment of slide X*a*—*i. e.*, the thickness of the type-body. The last pin X*n* which could pass pin X*o* will be stopped in line with pin X*o*, because the next longer pin X*n* will strike the side of pin X*o* and stop the rotation of the ring X*f*. (See Figs. 28 and 43.) In Fig. 43 the slide X*a* is shown advanced so far inwardly that the longest or highest pin X*n* of ring X*f* strikes against the stop X*o*, and the pin X*n* second in length being then directly opposite the stop-pin X*o* will prevent the backing of the slide X until the type is cast. According to the required thickness of letters one of the shorter pins might strike against the stop-pin X*o*, and the subsequent pin would then arrest the slide by leaning against the stop-pin X*o*. The spring-bar X*m* will yield, if necessary, when ring X*f* is arrested. When the carriers are moved back toward first position, the spring X*j* will cause sector X*h* to return ring X*f* to normal position, allowing the bar X and slide X*a* to be moved fully back out of the way.

The casting of the type.—The rear end of the mold communicates with the melting-pot Z, Figs. 2, 3, and 4ª. This pot is constructed in the ordinary well-known manner, being provided with an interior pump having a piston for injecting the liquid metal. The pump-piston is moved by a lever Z*a*, one end of which is pivoted at Z*b*. The other end is mediately connected to a rod Z*c*, which is provided with a roller V*a*, Figs. 2 and 3, bearing on a cam V. A spring Z*d* is arranged to hold the roller V*a* against the cam and to draw down lever Z*a* when the cam permits—*i. e.*, when the roller V*a* strikes the sink V*b* of the cam, Fig. 4. The injection of the metal takes place at the moment in which the matrix-ring is pressed against the mold.

The removal of the cast type.—The disk *y*, Figs. 27 and 44, has a plate Y*l* secured to its edge, adapted to close the wall of the mold when a type is to be cast. Diametrically opposite the plate is a slot Y*a* for removing the type, in which is a follower Y*j*, normally pushed outward by a spring Y². Intermediate the slot Y*a* and plate Y*l* is a knife or scraper Y*h* for cleaning the type. On the other face of the disk opposite plate Y*l* is a lug Y*m* for holding the matrix-ring against the action of pin X*d*. During the casting the plate Y*l*, Figs. 2, 4, 27, 28, and 44, forms the side or surface in the mold opposite to the slide X*a*, Fig. 27. The lug Y*m*, Figs. 28 and 43, of the disk assists in holding the matrix-ring in position at the moment of casting at the side opposite the pin X*d*. The disk *y* is fixed on a shaft Y*x*, Figs. 4 and 44, which carries a gear-wheel Y*b*, (see also Fig. 28,) meshing with a sector Y*d*, which is fulcrumed at Y*c* below the shaft. This sector Y*d* and gearing rocks the disk *y* to and fro a half-revolution, so that the parts Y*a* and Y*l* of the disk take alternately the same positions. Thus alternately Y*l* and Y*a* close the mold. The disk remains stationary for a moment in both of these positions, this being effected in one direction by a spring U*b*, connected to sector Y*g* in the opposite direction, and by a cam U, Figs. 3 and 4, acting against the roller U*a* on the end of a link U*c*, pivoted to sector Y*d*. During the casting the part Y*l* of the disk forms one wall of the mold. After the type is cast the disk turns and the knife Y*h* scrapes the type smooth on its front side, whereupon the cylinder takes the position shown in Fig. 27, with the slot Y*a* opposite the letter, which fits exactly in the slot and is pushed therein. The follower Y*j* in said slot Y*a* is pressed outwardly by a spring Y². After the matrix-ring D is removed, so that there is no longer any resistance to the slide X*a*, the latter is moved farther inward by spring X*c*, so far that it ejects the cast type from the mold into the slot Y*a* of disk *y*. The disk is then revolved and draws the type (which now revolves with it) across the fixed knife-blade Y*t*, which dresses its opposite side, and the slide Y*j* presses it constantly against the inner wall of the stationary semicircular guide Y*z*, Figs. 27 and 44. Having passed beyond this semicircular guide, the spring Y*a* pushes slide Y*j* forward, and thus ejects the letter outwardly into a suitable receiver.

In Figs. 44 and 45 I have shown simply the means for removing the cast type from the disk. Fig. 44 shows the type Y*r* just being moved from the mold into the slot Y² of the disk *y*. This disk is then rotated, so as to present the type to the knife Y*t*, after which it is carried around the guide Y*z* until it reaches a position opposite the mold, in which position it is free of the guide and can be ejected by the spring Y² from the slot onto a guide Y*o*, by which it is directed into a receptacle Y*p*.

Recapitulation.—In order to cast the type in the desired succession corresponding to the text to be printed, it is necessary to select successively the proper matrix-rings. As above described, the several matrix-rings are in individual carriers E on the frame E*c*, and

the matrix-ring of any released carrier is caught upon the holder C*b* in the manner already explained. Of the thirty-one matrix-rings only that one is brought into operation whose carrier is disengaged from its latch E*k*, Fig. 6. This disengagement is effected by the hammer K*y*, Figs. 6 and 30, at such a moment in relation to the passing carriers that the desired carrier is released, as shown in Figs. 3 and 6. The point of the hammer K*y* is just above the row of latches, so that a slight blow is sufficient to disengage one of them from the carrier. The hammer acts at the moment when the proper latch E*k* comes below the same, the proper one of the thirty-one carriers being right opposite the hammer K*y* at the moment of its stroke. This hammer may be controlled by key-and-lever mechanism operated by hand; but for greater rapidity of operation I employ an electromechanical selecting mechanism, by which the machine can be controlled by a perforated strip, as hereinafter described.

Matrix-selecting mechanism.—The time for each blow of the hammer K*y* is determined by a rotary disk K and coöperating devices. This disk K is mounted on the main shaft N, Figs. 3 and 4[a], and its periphery (see Figs. 29, 30, and 33) is divided by a circumferential rib K*a*, cut away at one point K*b*. In the periphery of the disk K, on each side of rib K*a*, are a series of notches K*g*, Figs. 30 and 33, extending over about one-third of the periphery. The circumference of the disk K is shown developed in Fig. 33. The shaded parts indicate the notches, which are also shown in Figs. 30 and 32. Five double-arm levers or feelers K*c*, Figs. 3 and 29 to 32, are fixed on stub-shafts K*d* above disk K, their lower ends leaning against the circumferences of the disk, as shown in Figs. 30 to 32. The tops of these feelers have enlarged heads K[2], which lie successively in line and touch each other. A lever K*e*, with a similar head, is placed in front of the first five feelers, with its head pressing against the heads of the first feeler. The lever K*e* exerts a pressure on the feelers in the direction of the arrow, Fig. 32, which is transmitted through the heads of the feelers. The lever K*e* forms an angle or bell-crank lever with the arm K*i*, which latter is pulled upward by a spring K*f*, Fig. 30, the pressure of said spring being transmitted to the heads of the feelers K*c* and keeping the lower ends of the levers constantly pressed against the periphery of the disk K. The lower members of the feelers K*c* lie ordinarily on the same side of the rib K*a* and pressed against the periphery of disk K, and when the disk turns under the feelers their lower members fall into the notches K*g*, Fig. 32. If the periphery of the disk was provided at one place with five consecutive notches, all the feelers could drop, simultaneously giving way under the pressure of spring K*f* in the direction of the arrow. When the feelers thus drop into the notches, the arm K*i* is lifted by spring K*f*, and as arm K*i* is connected by rod K*l*, Fig. 30, to one end of an oscillating lever K*m*, the other end of which is connected by a rod K*o* to the hammer K*y*, said hammer is turned upon its fulcrum K*z*, so that its point gives a quick slight blow upon the projection E*j* of the latch E*k* of a carrier E, which is at that instant opposite the hammer. Fig. 33 shows, however, that nowhere are five consecutive notches formed in one or the other of the two circumferential divisions of the disk K, and if any one of the feelers is held up by not finding a notch under its lower end—as, for instance, the last feeler in Fig. 32—it is evident that the whole row is upheld and none of the feelers can fall into the notches, and therefore no blow can be obtained from the hammer K*y*. Practically, therefore, the hammer will be operated only when all five feelers give way together—*i. e.*, when every one of them finds a notch under its lower end, thus allowing the lever K*e* to follow, whereupon the parts operating the hammer can act.

In the machine shown thirty-one combinations of notches are formed in the periphery of disk K, whereby all five feelers can drop simultaneously into notches. These thirty-one combinations are obtained by the circumferential division of the disk and by automatically shifting one or the other of the feelers K*c* from one division of the rim to the other. This shifting of the feelers is effected at the point K*b*, Figs. 29, 30, and 33, where the rib K*a* is broken. The shifting of one or the other of the feelers to the other side of rib K*a* admits of numerous combinations in the indicated manner, and the desired number can easily be obtained.

The lateral shifting of the feelers K*c* is easily effected, as the feelers are fixed on their shafts K*d*, which latter are journaled in the stationary bearings K*h* and K*j*, Fig. 29, so that the feelers can rock in their bearings and also move laterally. If, therefore, pressure is exerted on the end of any of the shafts K*d* at the side of bearing K*j*, such feeler, with its shaft, will be shifted toward bearing K*h* and to the other side of the rib K*a* when the open place K*b* passes the feelers. The heads of the feelers are made so wide, as shown in Fig. 31, that they remain in contact even when one or the other of the feelers is shifted laterally, as described. By thus shifting some one or more of the five feelers to the other side of the rib K*a* there will always be during each revolution of the combination-disk a certain moment at which all five feelers can drop into notches and at that time the hammer is operated. By observing the arrangement of the notches in Fig. 33 it will be seen that any given combination of notches for the five feelers occurs but once, so that each one of the thirty-one combinations of notches occupies a distinct point of the circumference of the disk and that the notched portion of the disk must assume thirty-one

different positions to enable the hammer to release the thirty-one different matrix-ring carriers.

Each different combination of notches and feelers and relative particular position of the disk is related to a particular carrier E, and that particular carrier will be selected whenever that particular combination of notches and feelers is effected and the disk assumes that particular position.

After each operation of the hammer K*y* and at each revolution of disk K all the displaced feelers K*c* are returned to normal position at one side of the rib K*a*, as shown in Fig. 30, by means of a cam-lug K*n* on the periphery of disk K opposite the break K*b* in rib K*a*.

The feelers are shifted laterally by the devices shown in Figs. 3, 29, and 34. Five electromagnets H, one for each feeler, are provided above them. (See Figs. 3, 29, and 34.) The electromagnets are used to determine what position the several feelers shall occupy relatively to the divisions of the rim of the disk K—that is, which of the five feelers should be shifted from the normal position to the other side of the rib K*a*. Each electromagnet has an armature H*a*, fulcrumed at H*b*, said armature carrying a tappet H*c*, which when the armature is attracted by the magnet strikes the short arm H*d* of a bell-crank lever pivoted at H*e* above the feelers K*c*, the longer arm H*f* of said lever depending beside the projecting end of the shaft K*d* of one of the feelers, as shown in Fig. 29, so that when the short arm of the lever is depressed its longer arm strikes the shaft K*d* and pushes the attached feeler forward, shifting it to the other side of rib K*a* on disk K. When any electromagnet is energized, its armature is therefore drawn down and its tappet H*c* strikes one end of the relative bell-crank lever H*d*, turning on shaft H*e*, and the depending arm H*f* of said lever shifts the relative feeler K*c*. Fig. 34 shows the arrangement of the magnets and five bell-crank levers, each lever being held in normal position by a spring H*g*, which has a notch H*h*, that catches the horizontal arm H*d*, Fig. 29. When the arm H*d* is pressed down by tappet H*c*, spring H*g* yields and the arm goes down and the pending arm H*f* of the respective bell-crank lever swings out, shifting the feeler, and its lower end comes in contact with the side of a revolving disk H*i*, mounted on shaft N below the levers. This disk H*i*, Fig. 29, is provided with a boss or projection H*j* on one side. In the periphery of the disk H*i* and its projection H*j* is an angular or V-shaped slot H*k*. When the arms H*f* are in their normal position, they will not be struck by projection H*j*; but if any one of the bell-crank levers is swung out by action of the electromagnets the lower end of its arm H*f* will enter the groove in said projection and the lower end will be guided in and moved by the angular slot H*k* of the same, so that such arm H*f* is first moved farther forward, and consequently the respective feeler K*c* is positively shifted to the other side of the dividing-rib K*a* of disk K. The slot H*k* comes directly opposite the opening K*b* of the rib K*a*, so that this shifting of the feelers is effected instantly without obstruction. The arms H*f* remain but an instant in this projected position, as the angularity of the slot H*k* throws them immediately back into the original position, and the upper arm H*d* catches into the notch H*h* of the spring H*g*, Fig. 29.

It is evident from the above description that the selection of the matrix-rings depends on the combination of feelers which the electromagnets are caused to operate and that the combination of feelers depends upon the order in which the electromagnets H are energized, Figs. 29 to 34. It is further to be remembered that the use of the first or third matrix on any matrix-ring depends upon the energizing of the magnets C*r* C*r'*, Figs. 18 and 19.

The means for regulating the energizing of the magnets.—As stated, the production of any particular letter depends on which electromagnets are energized. The energizing of the proper electromagnets may be determined by diversions of the electric currents effected by switches controlled by a keyboard. Instead of such a keyboard, however, I have illustrated means whereby the energizing of the electromagnets is controlled by a perforated strip which controls the switching of the electric currents in much the same way that such strips are employed in printing-telegraphs and other machines for transmitting electric signals at very high speed. Fig. 39 shows a paper strip which has been perforated in a suitable machine. Each transverse row of holes corresponds to one certain letter or type character. Each one of the five vertical rows of perforations at the right-hand side of the strip controls one of the five magnets H corresponding to the feelers K*c*. The next vertical line of continuous perforations to the left of said groups I to V is to guide the paper strip upon the contact-cylinder L, to be described hereinafter. The groups VII and VIII, respectively, control the operation of the magnets C*r* C*r'*, which produce, by means of the rods C*n* C*m*, the partial revolution of the matrix-rings when on the holder, so as to present the matrices for caps, numerals, &c. This paper strip is guided through a contact device and automatically controls the energizing of the electromagnets H and C*r* C*r'*, so that the proper matrices for the desired letters are brought successively before the mold and a type cast. The front elevation Fig. 1 and the section Fig. 3 indicate the contact devices L*i* L, which are represented in Figs. 35 to 40 in detail. The perforated strip and current-switching device consists of a cylinder L, provided with a circumferential row of pins or teeth L*a*, which enter the continuous row of holes VI in the paper strip, so that the latter is

properly fed and guided. The strip Lx is supported by a table L^3, as indicated in Fig. 35 by a dotted line. The lower part of the cylinder L lies in a transverse slot in the table L^3, and the strip Lx is depressed in said slot partly around the periphery of the cylinder, so that the strip can be presented by the cylinder to the contact-pieces Li.

The cylinder L is operated from the main shaft N of the machine as follows: On the end of shaft N is a small cam Na, which operates a vertical lever Ld (pivoted at Lc) at each revolution. The lever Ld is held to the cam by a spring L^4, and its upper end presses at each revolution of the shaft N against an arm Lf, pivoted on the shaft of cylinder L and carrying a pawl Lg, engaging a ratchet L^5 on the shaft of cylinder L, a pawl L^6 preventing backlash of cylinder L and a spring Lh returning arm Lf to normal position. Thus the cylinder is moved one pin and strip Lx shifted one row of perforations at each revolution of shaft N. The cylinder L moves the paper strip so that the transverse rows of holes are successively passed under the cylinder L and over the contact-points Li. (See Figs. 35, 36, and 40.) The points Li are mounted on insulated spring-fingers L^7, each of which forms part of a separate electrical circuit between a battery or other source of electrical energy and one of the electromagnets. The cylinder L and the contact-points Li are made of conducting material, and wherever a hole in the paper strip passes over a point Li the latter instantaneously contacts the cylinder and closes the electric circuit of one of the electromagnets; but unless a contact-point finds a hole in the strip Lx it remains insulated from the cylinder and the circuit for the respective electromagnet remains open. The contact-points Li are carried by springs L^7 and are pressed against the cylinder L only when it and the paper strip are at rest.

When the cylinder is rotated to move the paper strip, the points Li are lowered by the following means: The lever Ld is connected by a link L^8 to an arm Lj on the end of an eccentric cylinder Lk, Fig. 35, overlying the spring-arms L^7. As often as the lever Ld is moved and the paper strip is advanced this eccentric cylinder is caused to press down the springs L^7, thereby moving the contact-points Li from the paper strip and cylinder L; but when the paper and cylinder are at rest the cylinder Lk is moved so as to permit the spring-arms L^7 to rise and point Li to contact the cylinder through holes in the strip. The several contact-springs L^7 are connected to the segments Ma and Mc of a commutator M. The segments Ma and Mc are arranged concentrically around the end of shaft N, Figs. 35 to 41, and exterior to an inner row of segments Ma' and Mc', the segments Ma' being respectively electrically connected to the magnets H and segments Mc are respectively connected to the magnets Cr and Cr', Fig. 41. All these magnets are connected to a common return or negative wire m', leading to a battery m or other source of electrical energy, while cylinder L is connected to the lead or positive pole of the battery by a wire m^2, Fig. 41. On the end of shaft N is a brush-holder N^4, carrying two electrically-communicating brushes Mb Mb', respectively, adapted to contact the outer segments Ma Mc and the inner segments Ma' and Mc'. These brushes are adapted to close the circuit between the two related segments Ma and Ma' or Mc and Mc' as the shaft N rotates at the proper moment of time, so that when any piece Li contacts the cylinder L one of the magnets is energized.

The segments Ma, Mc, Ma', and Mc' are preferably secured to an ebonite disk M^2, Figs. 35 and 37. The connection between the inner and outer segments is effected by the brush. In this manner each electromagnet receives the full strength of the current. (See diagram Fig. 41.)

The five pairs of segments Ma Ma' control the selection of the matrix-rings, and the two pairs of segments Mc Mc' control the revolution of the matrix-rings to effect the change to capital letters or numbers, Figs. 18 and 19.

It was stated with relation to the matrix-rings that one of the two rods Cm Cn must be advanced to effect the turning of the matrix-ring in one or the other direction. This motion of the rods Cm Cn inwardly is effected by two double electromagnets Cr, one pair controlling the lower rod Cm and the other the upper rod Cn, Figs. 18 and 19, when a hole is presented in the rows VII and VIII of the paper strip, Fig. 39.

The current-diagram.—The current starts from a battery and passes into the cylinder L, Figs. 35, 36, and 38. Lx' are holes in the paper strip, and through every one of these holes the current passes into one of the outer sector-plates Ma or Mc of the commutator. This sector is connected at the proper moment by the brushes Mb Mb' with a corresponding inner sector Ma' or Mc', so that an electromagnet H or Cr Cr', Figs. 29, 34, 18, and 19, is energized. Thereupon the current passes through a common conductor back into the battery. At each revolution of the shaft N of course any number of these electromagnets can be energized.

Summary of the operation of the apparatus.—In order to work the machine, a contact-strip L, punched according to the text to be printed, Fig. 39, is brought into the machine and the same is set in motion. At each revolution of the main shaft N some of the electromagnets H or Cr Cr', Fig. 41, will be energized, according to the combination of holes punched in the contact-strip. To give an example, we will suppose that a type carrying the letter "R" should be cast, and it is supposed that to produce this letter it would be necessary to energize the second and third magnets H from the right, Fig. 41, and also the lower electromagnets Cr. The armatures

Ha of the two energized magnets H, Fig. 29, are attracted and the respective bell-crank levers swing with their lower ends Hf against the edge of disk Hi and in the above-described manner the corresponding feelers Kc are pushed to the other side of rib Ka. As a consequence of this motion the lower ends of the feelers Kc, Fig. 30, will drop into notches Kg of the disk K while the main shaft is revolved, and at this very instant the spring Kf, by means of the parts Ki, Kl, Km, and Ko, will pull down the hammer Ky, which strikes the latch Ek of the proper carrier E, carrying the matrix-ring, with the letter "R." This carrier then swings into the position shown in Fig. 6 in dotted lines and the matrix-ring D is caught upon the holder Cb, Fig. 42, while the matrix-carriers continue their motion to the end of their left-hand stroke. All the carriers pass beyond the hammer Ky before they reach their extreme position at the left, and any one of the thirty-one matrix-carriers can be disengaged by the single hammer. During the time that the matrix-ring D is being shifted upon the holder Cb, Fig. 42, the cylinder Y has turned so far that its part Yl, Fig. 43, forms one longitudinal side of the mold. The second longitudinal side opposite the cylinder Y being formed by the slide X, which now approaches the cylinder Y as nearly as holes in the side of the matrix-ring and rod Xd will permit, the space between the cylinder Y and the slide X then exactly corresponds to the thickness requisite for the letter "R." Before the slide X arrives at its innermost position the matrix D is pressed against the mold, after having been properly turned by means of the rod Cm, Fig. 19. When the parts are in the position shown in Fig. 43, the liquid metal is forced through the opening A and the casting of the letter "R" is effected. The parts return thereupon to their original positions and the new-made type is transported by the cylinder Y in the above-described manner to a channel, where it is assembled with the other type in the order of the letters in the text to be printed. At each revolution of the main shaft the same operations are repeated, and at each forward stroke of the matrix-carriage a matrix-ring is placed upon the holder Cb, and after the type is cast the holder is returned to its original position during the back stroke of the matrix-carriage.

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

1. In a type-casting machine, the combination of a laterally-reciprocating matrix-carrier movable at right angles to its plane of travel, a removable matrix supported in the carrier, and a relatively stationary matrix-holder adapted to take the matrix from the carrier when displaced and present it to the mold and return it to the carrier during the return stroke thereof, substantially as described.

2. In a type-casting machine, the combination of a laterally-reciprocating series of matrix-carriers, removable matrix-rings supported in the carriers, means for displacing a carrier in the series during the reciprocation thereof and a relatively stationary matrix-holder adapted to take a matrix-ring from the displaced carrier as the latter is moving in one direction with the series and surrender it thereto on its return stroke, substantially as described.

3. In a type-casting machine, the combination of a series of parallel matrix-carriers and removable matrices carried thereby and a stationary matrix-holder; with means for reciprocating the series of carriers past the holder, and means whereby any carrier may be displaced in the series so as to cause it to surrender its matrix to the holder as the series of matrices is reciprocated in one direction, and to take the matrix from the holder on its return stroke of the series, and means for returning the displaced carrier into line on the return stroke, substantially as described.

4. In a type-casting machine, the combination of a matrix-holder adapted to present a matrix to the casting-point; with a series of matrix-carriers, a matrix-ring having a plurality of matrices for different characters detachably supported on each carrier, and means for reciprocating the carriers past the holder, with means whereby any carrier may be displaced from the line during its reciprocation so as to surrender its matrix-ring to the holder when moving in one direction and to receive the same on its return stroke, and means for shifting the holder so as to present the proper matrix of the ring to the mold, substantially as described.

5. In a type-casting machine, the combination of a mold, a holder adapted to receive a matrix and present the same to the mold, with a series of matrix-carriers, detachable matrix-rings mounted on the carriers, each ring having a plurality of matrices for different characters, means for automatically displacing any carrier so that it will surrender its matrix to the holder on one stroke and take it therefrom on its return stroke, means for returning any displaced carrier to normal position after it has taken up its matrix, and means for shifting the holder so as to present the proper matrix of the ring to the mold, substantially as described.

6. In a type-casting machine, the combination of a mold, a rocking holder adapted to receive a matrix and present the same to the mold, with a series of matrix-carriers, detachable matrix-rings mounted on the carriers, each having a plurality of matrices for different characters, means for automatically displacing any carrier so that it will surrender its matrix to the holder on one stroke and take it therefrom on its return stroke, means for rocking the holder if necessary so that it would present the proper matrix of the ring to the mold, and means for restoring any dis-

placed carrier to normal position after it has taken up its matrix, substantially as and for the purpose described.

7. In a type-casting machine, the combination of a series of matrix-carriers, each provided with a detachable matrix, and means for simultaneously laterally reciprocating said carriers; with means whereby any carrier may be selected and displaced in the series during its reciprocation, means whereby its matrix may be removed from such selected carrier, presented to the casting apparatus and returned to such carrier and means whereby the displaced carrier is returned to position in the series during one reciprocation of the carriers, for the purpose and substantially as described.

8. In a type-casting machine, the combination of the mold, the matrix-rings each having a plurality of characters, the rocking matrix-holder, and means for moving the holder to and from said mold; with mechanism for successively supplying matrix-rings to and removing them from said holder, substantially as and for the purpose described.

9. In a type-casting machine, the combination of a mold, a matrix-holder opposite said mold, matrix-rings each having a plurality of matrices for different characters in its periphery, and means for supplying said matrix-rings to and removing them from the holder; with means whereby said holder may be shifted so as to present the desired character-matrix on the ring to the mold, substantially as described.

10. In a type-casting machine, the combination of a mold, a rocking matrix-holder opposite said mold, and a series of matrix-rings each having a plurality of matrices in its periphery; and means for moving said matrix-holder toward said mold; with means for successively supplying the matrix-rings to said holder, and means whereby said holder may be rocked if necessary as it is moved so as to present the desired matrix to the mold.

11. The combination of a mold, a matrix-holder movable to and from the mold and rotatable on its axis; a series of matrix-rings each having a plurality of matrices in its periphery and means for supplying said matrices singly or one at a time to, and removing them from the holder; with means whereby the holder may be rocked as it is moved toward the mold so as to present the proper matrix thereto, and means whereby the mold is automatically varied in size to suit the type character to be cast.

12. The combination of a mold, a matrix-holder movable to and from the mold and rotatable on its axis; with a series of plurality of character-rings each having a matrix in its periphery and lateral recesses in its side for regulating the size of the mold and consequent size of the body of the type; and means for supplying said matrices singly or one at a time to, and removing them from the holder, substantially as and for the purpose described.

13. For a type-casting machine, a matrix-ring having a plurality of matrices in its periphery and a recess in its side opposite each matrix to regulate the size of the body of the type, substantially as described.

14. In a type-casting machine, the combination of an adjustable mold, having a slide provided with a finger or rod, with a matrix-ring having a plurality of matrices in its periphery and a lateral hole in its side opposite each matrix adapted to be entered by said fingers and thus to regulate the size of the mold and body of the type, for the purpose and substantially as described.

15. In a type-casting machine, the combination of a matrix-holder, and a series of matrix-pieces each having a plurality of matrices, and a recess in its side beside each matrix, and means for supplying these matrix-pieces to, and removing them from the holder, with a mold to which the matrix-pieces are presented, said mold having a movable side provided with a finger or rod, adapted to enter the recess in the side of the matrix-piece and thus regulate the size of the mold according to the type character to be cast.

16. In a type-casting machine, the combination of a mold having an adjustable side formed by a slide, a rocking matrix-holder opposite said mold adapted to receive a matrix-ring and present it to the mold, while the type is being cast therefrom; with a series of matrix-rings each having a plurality of matrices in its periphery and a lateral recess in its side opposite each matrix, and a rod or finger attached to said slide adapted to engage a recess in the matrix-ring and thus regulate the size of the mold; with means for rocking the holder when necessary, substantially as and for the purpose described.

17. The combination with a mold, of a matrix-holder movable to and from said mold and rotatable on its axis, and a series of matrix-rings each having a plurality of matrices in its periphery; with means for successively supplying said matrix-rings to and removing them from the holder, and means substantially as described whereby said holder may be automatically rocked on its axis as it is moved toward the mold, for the purpose and substantially as described.

18. The combination with a mold, of a matrix-holder movable to and from said mold and rotatable on its axis, and a series of matrix-rings each having a plurality of matrices in its periphery, with adjustable stops substantially as described whereby said holder may be caused to rock either forward or backward as it is moved toward the mold and thus present the desired matrix on the ring to the holder.

19. The combination with a mold, of a matrix-holder movable to and from said mold and rotatable on its axis, and a series of matrix-rings each having matrices in its periphery; with the movable stop-rods and the electromagnets controlling said rods whereby said holder may be caused to rock either forward

or backward as it is moved toward the mold and thus presenting the desired matrix on the ring to the holder.

20. The combination of the laterally-reciprocating and swinging carrier E having a recess in one edge for the reception of a matrix-ring, and a spring-controlled catch on the carrier adapted to secure the matrix-ring thereon; with a matrix-ring adapted to fit in said recess and notched for the engagement of said catch, for the purpose and substantially as described.

21. The combination of the holder adapted to present a matrix to the mold, and reciprocating carriers E each having a recess for the reception of a matrix-ring, and a spring-controlled catch on each carrier adapted to secure the matrix-ring thereon; with the matrix-rings notched for the engagement of said catch, and a stationary trip beside the holder adapted to disengage the catches from the matrix-rings, for the purpose and substantially as described.

22. The combination of the carriers E and their catches E^2 and the matrix-holder C*b;* with the notched matrix-rings D having central perforations D*a* whereby they can be suspended on the holder.

23. The combination of the carriers E and their catches E^2 and the matrix-holder C*b;* with the notched matrix-rings D having central perforations D*a* whereby they can be suspended on the holder, and the stationary trip beside the holder adapted to disengage the catches from the matrix-rings, for the purpose and substantially as described.

24. The combination of the carrier E and its catch E^2, and the matrix-holder C*b;* with the matrix-ring D having central perforation D*a* whereby it can be suspended on the holder, and a peripheral notch for the engagement of the catch E*e;* and the fixed trip B*a* secured above the holder adapted to operate the catch E*e*, substantially as and for the purpose described.

25. The combination of the reciprocating frame, a series of matrix-carriers thereon and reciprocated therewith; the catches adapted to hold the carriers in normal position on the frame, and means for displacing any carrier whose catch is disengaged; with means for reciprocating said carriers, and means for disengaging the catches from the carriers, substantially as and for the purpose described.

26. The combination of the reciprocating frame, a series of swinging matrix-carriers E suspended thereon and reciprocated therewith; and the catches adapted to hold the carriers in normal position on the frame, with springs for displacing any carrier whose catches are disengaged, means for reciprocating said carriers, and a stationary hammer adapted to trip the catches of the carriers, substantially as and for the purpose described.

27. The combination of the reciprocating frame, a movable matrix-carrier thereon and reciprocated therewith, the catches adapted to hold the carriers in normal position on the frame, and means for displacing any carrier whose catch is disengaged; and a matrix for each carrier, detachably held thereon, substantially as described; with means for reciprocating said carriers; means for tripping the catches thereof, and a matrix-holder adapted to remove the matrix from any displaced carrier and present it to the casting-point and then return it to the carrier, for the purpose and substantially as described.

28. The combination of the reciprocating frame, a series of swinging matrix-carriers suspended thereon and reciprocated therewith, the catches adapted to hold the carriers in normal position on the frame, springs for displacing any carrier whose catch is disengaged, and a matrix-ring for each carrier, detachably held thereon, substantially as described; with means for reciprocating said carriers, a stationary hammer adapted to trip the catches of the carriers, and a matrix-holder adapted to remove the matrix from any displaced carrier and present it to the casting-point and then return it to the carrier, for the purpose and substantially as described.

29. In a type-casting machine, the combination of the mold, having an adjustable slide forming one side thereof and a rotatable annulus provided with stop-pins of different lengths adapted to engage a stop on the slide and prevent backward movement thereof during the casting of a type, for the purpose and substantially as described.

30. In a type-casting machine, the combination of the mold, having one side formed by an adjustable slide mounted on a movable bar, a rotatable annulus on said bar provided with stop-pins of different lengths adapted to engage a stop on the bar and prevent backward movement of said slide during the casting of a type, and means for shifting said annulus at the proper times, for the purpose and substantially as described.

31. In a type-casting machine, a mold having an adjustable side carried by a reciprocating bar, a stop-pin on said bar, a rotatable annulus surrounding said bar and provided with a series of pins of different lengths adapted to engage the stop on the bar and prevent movement of the slide during the casting operation, and means for automatically operating said bar and said annulus prior to the casting of the type, and for returning them to normal position after the casting of the type.

32. In a type-casting machine, the combination of a matrix-holder, a mold having an adjustable side carried by a reciprocating bar, a stop-pin on said bar, a rotatable annulus surrounding said bar and provided with a series of pins of different lengths adapted to engage the stop on the bar and prevent movement of the slide during the casting operation, with a matrix adapted to stop the end of the mold and limit the inward move-

ment of the bar, and means for automatically operating said annulus so as to lock the slide prior to the casting of the type, and for returning said matrix, annulus and bar to normal position after the casting of the type.

33. In a type-casting machine, the combination of the mold, having one side formed by a slide, an adjustable bar carrying the slide, a stop on said bar, a rotatable annulus provided with a series of stop-pins adapted to engage the stop on the bar, a pivoted segment X*h* for oscillating said annulus, rod X*j* for operating said segment, and the spring X*k* and cam X*m* and rod *n* for operating said rod.

34. The combination of the mold having a movable side, and means for reciprocating said side, and a pin attached thereto; with the matrix-holder, and a matrix-ring adapted to be presented by the holder to the mold, said matrix-ring having a plurality of matrices for different characters, and a lateral recess beside each matrix adapted to be entered by said pin and thereby regulate the size of the mold, substantially as and for the purpose described.

35. The combination of the mold having a movable side a movable bar carrying said side, means for reciprocating said bar, and a pin attached to said rod; a matrix-holder, and a matrix adapted to be presented by the holder to the mold, said matrix having a lateral recess adapted to be entered by said pin and thereby regulate the size of the mold; with a rotatable annulus provided with a series of stop-pins adapted to engage a stop-pin on the bar and prevent backward movement of the slide during the casting of a type, and means for operating said annulus, substantially as described.

36. The combination of the mold having a movable side X*a* connected to a sliding bar X, a pin X*d* attached to said bar, and means for reciprocating the bar, a matrix-holder and a series of detachable matrices adapted to be successively presented by the holder to the mold, each matrix having a lateral recess adapted to be entered by said pin to limit the inward movement of the slide and thus regulate the size of the mold; and means for conducting a matrix to and removing it from the holder, with the rotatable annulus on said bar provided with a series of stop-pins adapted to engage a stop-pin on the bar and prevent backward movement of the slide X*a* during the casting of a type, and means for operating said annulus, for the purpose and substantially as described.

37. The combination in a type-casting machine, of a mold and matrix-holder adapted to receive a matrix and present it to the mold; and a pair of adjustable stops, with means for projecting either one of said stops into the path of said holder, whereby it may be rocked as it is moved toward the mold.

38. The combination in a type-casting machine, of a mold and a rocking matrix-holder C*b* adapted to receive a matrix and present the same to the mold, said holder having a segment C*l* on one end; with a pair of movable stop-rods C*m* and C*n*, means for moving the holder to and from the mold, and means for projecting either one of said rods into the path of said segment, whereby the holder may be rocked as it is moved toward the mold.

39. The combination in a type-casting machine, of a mold, a matrix-holder adapted to receive a matrix and present the same to the mold, a pair of movable stops, and means for projecting either one of said stops into the path of said holder, whereby it may be rocked as it is moved toward the mold; with the fixed stop whereby the holder is rocked to normal position when moved back from the mold, substantially as and for the purpose described.

40. The combination in a type-casting machine, of a mold, a matrix-holder adapted to receive a matrix and present the same to the mold, said holder having a segment on one end, a pair of movable stop-rods, and means for projecting either one of said rods into the path of said segment, whereby the holder may be rocked as it is moved toward the mold; with a means for moving the holder to and from the mold and the electromechanical devices whereby the stop-rods may be operated, substantially as and for the purpose described.

41. In a type-casting machine, the combination of a mold, one side of which is formed by the periphery of a rotatable disk, and means for oscillating said disk after each casting of a type.

42. In a type-casting machine, the combination of a mold, one side of which is formed by a reciprocating slide, and the other by the periphery of a rotatable disk, with means for rotating said disk, and reciprocating said slide, substantially as and for the purpose described.

43. In a type-casting machine, the combination of an oscillating disk adapted to close one side of the mold during the casting operation and having a peripheral slot adapted to receive the cast type and convey the same away from the mold, with means for moving said disk so as to present the slot to the mold at the proper time, substantially as described.

44. In a type-casting machine, the combination of an oscillating disk having a plate at one side adapted to close the side of the mold during the casting operation and a peripheral slot opposite the plate adapted to receive the cast type and convey the same away from the mold, and means for moving said disk so as to present the plate and the slot alternately to the mold at the proper times, substantially as described.

45. In a type-casting machine, the combination of a disk adapted to form one side of the mold, and provided with a peripheral slot adapted to receive the finished type, and having a scraper adapted to trim one side of the type as the disk is rotated, substantially as and for the purpose described.

46. In a type-casting machine, the combination of the disk having a plate forming one side of the mold, a peripheral slot opposite said plate adapted to receive the finished type, and a scraper intermediate the slot-plate and adapted to trim one side of the type as the disk is rotated, with a fixed scraper adapted to trim the other side of the type when the same is being moved by the slot from the mold.

47. In an electromechanical selecting device, the combination of a rotary cylinder, a series of contacts thereunder supported on spring-arms and a perforated strip adapted to be moved between the cylinder and said contacts, with means for moving said cylinder intermittently, and an eccentric for automatically moving said spring-arms and contacts away from the cylinder when it is moved, substantially as described.

48. In a type-casting machine, the combination of a mold having an adjustable side; with a matrix-ring having a plurality of matrices and a recess beside each matrix and mechanism whereby said recesses control the size of the mold for the type cast from the relative matrix.

49. In a type-casting machine, the combination of a series of reciprocating carriers, a relatively stationary matrix-holder, molding mechanism beside the holder and matrix-rings removably mounted on the carriers and adapted to be caught separately by the holder and presented to the mold, each matrix-ring having a plurality of matrices for different characters, and a recess beside each matrix substantially as described, with mechanism adapted to engage a recess of each matrix-ring adapted to control the adjustment of the mold, so that each type character will have a body of the proper size, and mechanism whereby after the casting operation, the matrix-ring is returned to its own carrier and the cast type automatically removed from the mold, for the purpose and substantially as described.

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

CHARLES MÉRAY-HORVÁTH.

Witnesses:
JOSEF WM. RONANN,
WILHELM PATAKY.