No. 625,972. Patented May 30, 1899.

E. GIROD.

LINOTYPE OR ANALOGOUS MACHINE.

(No Model.) (Application filed Dec. 31, 1897.)

3 Sheets—Sheet 1.

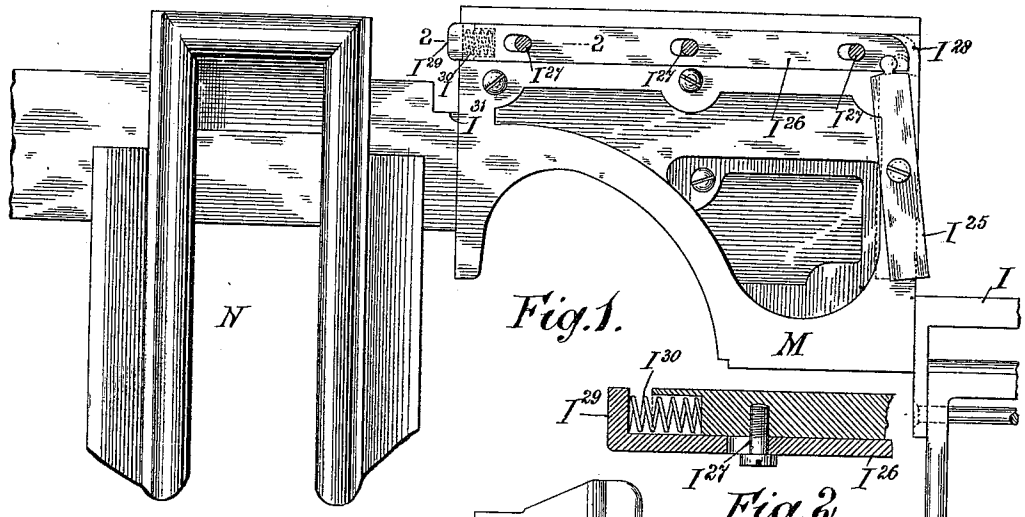

Fig. 1.

Fig. 2.

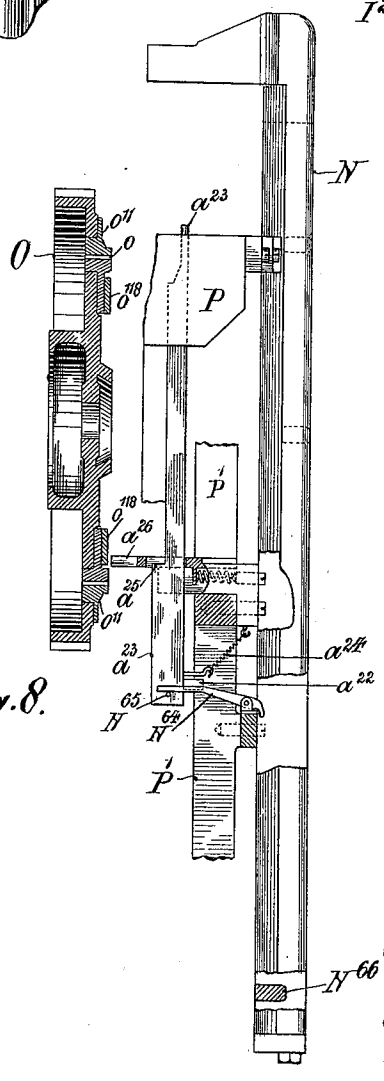

Fig. 8.

WITNESSES.
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LINOTYPE OR ANALOGOUS MACHINE.

(No Model.) (Application filed Dec. 31, 1897.)

3 Sheets—Sheet 2.

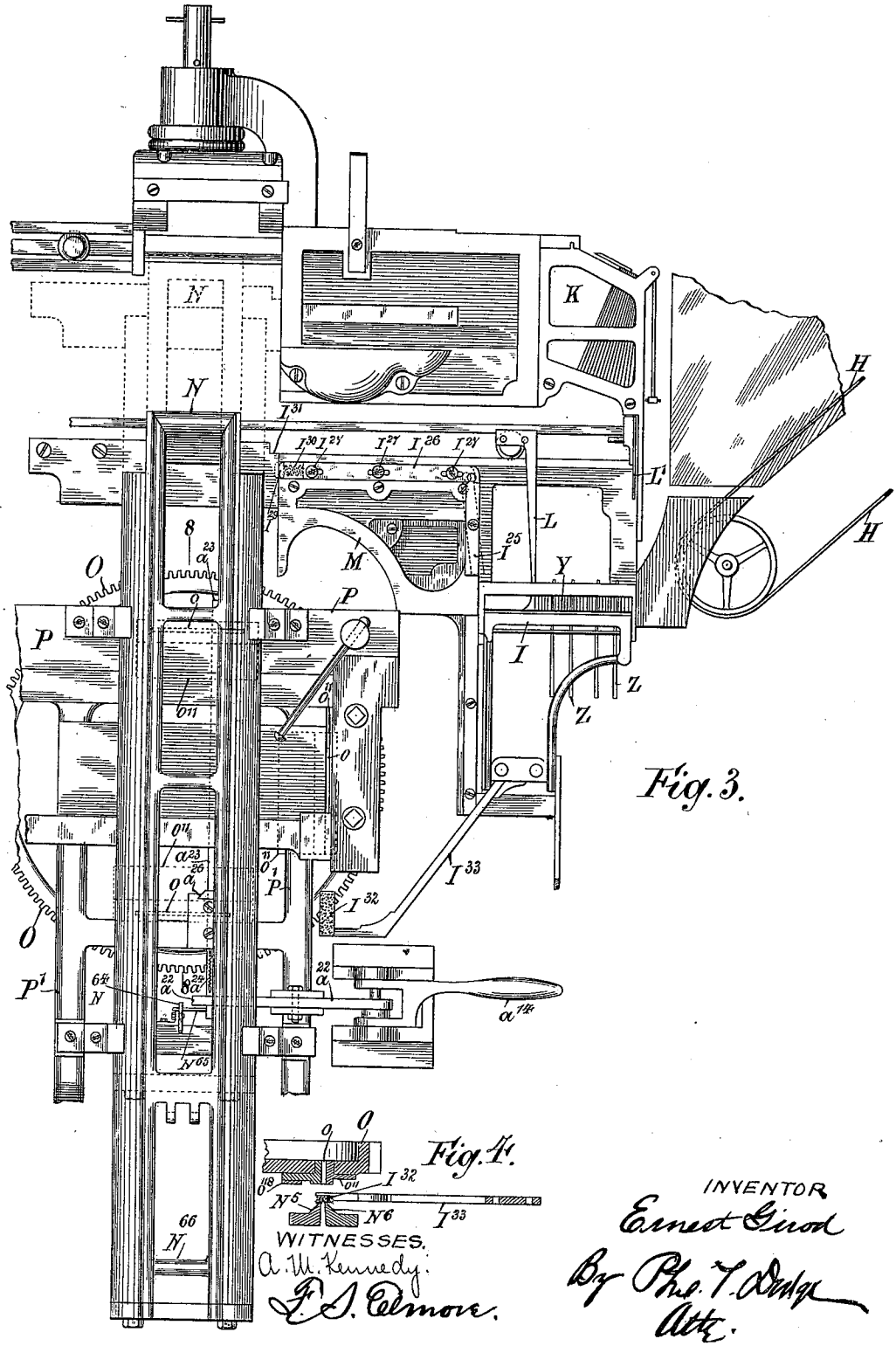

Fig. 3.

Fig. 4.

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LINOTYPE OR ANALOGOUS MACHINE.

(Application filed Dec. 31, 1897.)

(No Model.) 3 Sheets—Sheet 3.

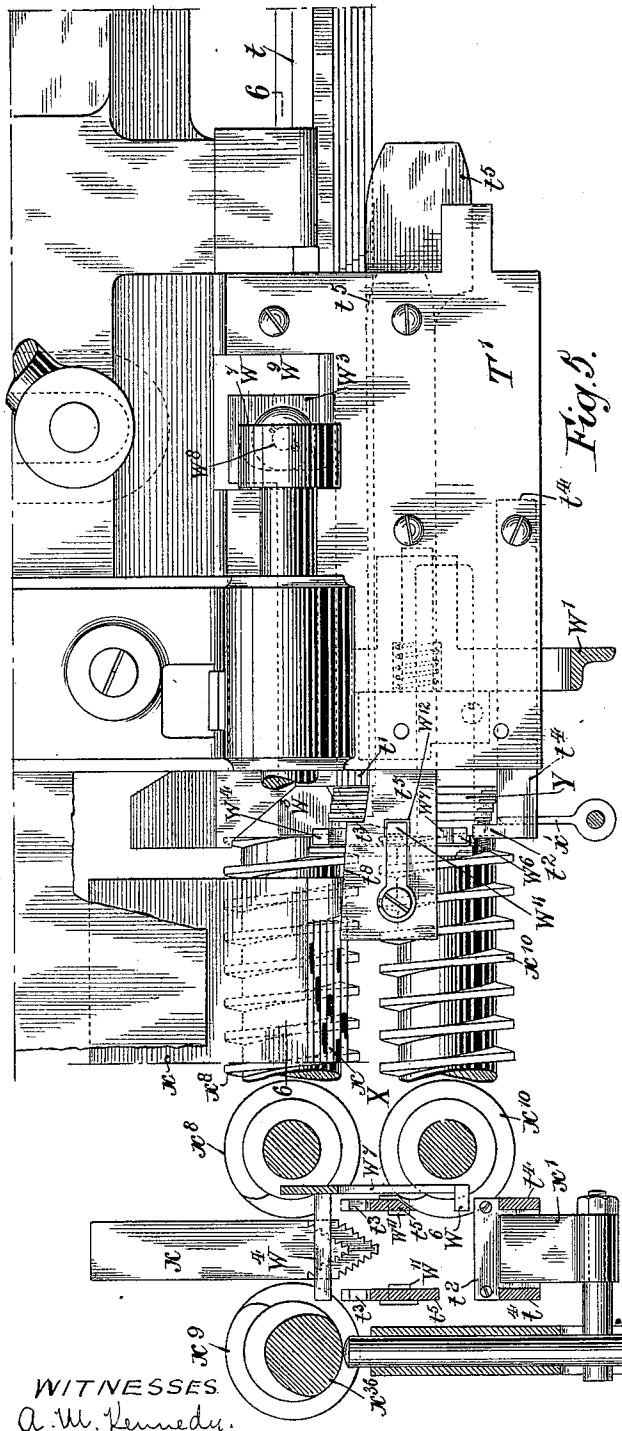

Fig. 9.

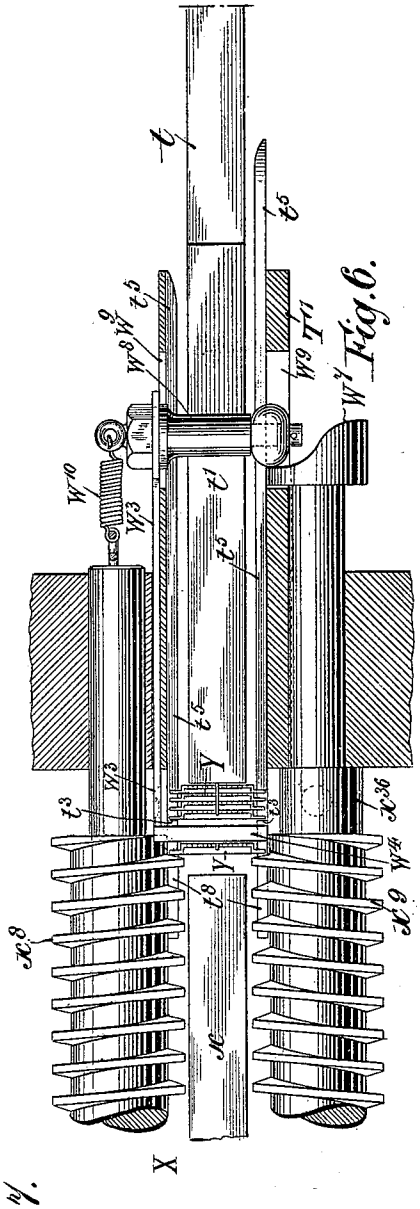

Fig. 11.

WITNESSES.
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Atty.

UNITED STATES PATENT OFFICE.

ERNEST GIROD, OF LONDON, ENGLAND, ASSIGNOR TO THE MERGENTHALER LINOTYPE COMPANY, OF NEW YORK, N. Y.

LINOTYPE OR ANALOGOUS MACHINE.

SPECIFICATION forming part of Letters Patent No. 625,972, dated May 30, 1899.

Application filed December 31, 1897. Serial No. 665,057. (No model.)

To all whom it may concern:

Be it known that I, ERNEST GIROD, a subject of the Queen of the United Kingdom of Great Britain and Ireland, residing at No. 36 Trent road, Brixton Hill, London, in the county of Surrey, England, have invented certain new and useful Improvements in and Connected with Linotype and Analogous Machines, (for which I have obtained a patent in Great Britain and Ireland, No. 9,569, dated April 14, 1897;) and I do hereby declare that the following is a full, clear, and exact description of the invention, reference being made to the accompanying drawings, which are to be taken as part of this specification and read therewith, and one which will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in and connected with linotype and analogous machines; and it consists in improvements which are applicable more particularly to the well-known Mergenthaler linotype-machine, that being the one for which they have been made. Further information thereon will be found in the specification of Letters Patent No. 436,532, dated September 16, 1890. It should be understood, however, that the said invention is not limited to linotype-machines operating on and with female matrices to be combined direct with a casting mechanism, but that it is equally applicable, other circumstances being convenient, to linotype-machines operating on and with male dies to be combined directly with a strip or sheet of stereotype matrix material, which they indent and which is then combined with the casting mechanism. For that reason and for the purpose of this specification the appellatives "matrix" and "matrices" are to be understood as including both the female matrices and the male dies above mentioned.

The accompanying figures are to be taken as part of this specification and read therewith.

In the drawings, Figure 1 is a detail front elevation illustrating the first part of the invention. Fig. 2 is a detail longitudinal section taken along the line 2 2 of Fig. 1; Fig. 3, a front elevation of a portion of a Mergenthaler linotype-machine and illustrates the first and second parts of the invention; Fig. 4, a detail longitudinal section relating to the second part; Fig. 5, a rear elevation of part of the distributer of the same machine; Fig. 6, a horizontal section taken along the line 6 6 of Fig. 5, and Fig. 7 a sectional end elevation. They jointly illustrate the third part of the invention. Fig. 8 is a transverse vertical section taken along the line 8 8 of Fig. 3 and illustrates the fourth part of the invention.

The first part of the invention relates to the so-called "assembling-block" I. It has received this name because it is in it that the matrices Y and space-bars Z are assembled one after the other in proper order by the process of composition. The matrices Y drop from a matrix-magazine (not included in the figures) onto an endless and rapidly-moving belt H, which shoots them down over a suitable guiding mechanism into the assembling-block I and between the front and rear parallel bars which constitute the top of it. The space-bars Z are dropped into the block at the respectively proper moments from a magazine K.

When a line has been assembled in the block I, the latter is raised vertically between suitable guides to the level of the shifter, which consists of a pair of vertical arms L L', capable of horizontal motion separately as well as conjointly. That organ thereupon seizes the said line and moves it away horizontally to the left through a slotted and fixed part of the machine-frame known as the "guide-block" M and delivers it into the head of the elevator or transporter N, commonly known in America as the "first" elevator, which head is made after the manner of the top of the assembling-block I to receive the said line. This transporter N has a vertically-reciprocating motion first down to the mold-wheel O, against which it holds the composed line while the linotype is being cast, and then up above its original level to coöperate with the transferring-arm of the distributer X (the position shown in dotted lines in Fig. 3) and back again to the level along which the "shifter" L L' works, (the position shown in full line in the same figure.)

Now, seeing that the elevation of the assembling-block I is under the control of the operator, without reference to the travel of the transporter N above mentioned, it occasionally happens that he sends that block upward toward the shifter L L′ soon enough for the latter to seize the composed line in question and move it through the guide-block M before the transporter N has been returned low enough to receive it. The consequence is that that line, instead of being delivered by the shifter into the head of the transporter or first elevator N, is thrown out and pied. The object of this first part of the invention is to prevent an accident of the kind just mentioned. This object is effected by a stop adapted to lock the assembling-block I down in its lowest or composing position and to be moved out of its path only by the descent of the vertically-reciprocating transporter N—that is, when it is on its way to aline itself with the shifter L L′. Thus the assembling-block I is kept down in its lowest or composposing position all the time that the head of the transporter N is above or below the level of the slot in the guide-block M. The combination which I prefer to use (see Figs. 1 and 2) consists of a detent I^{25}, pivoted on the face of the guide-block M, and a slide I^{26}, adapted to work on suitable guides I^{27} in a horizontal slot I^{28} in the said guide-block by having one end pivotally connected with the adjacent end of the detent I^{25} and the other, I^{29}, protruded by a spring I^{30} into the path of the transporter N. When a certain and properly-placed lateral projection I^{31} on the transporter N engages the spring-protruded nose I^{29} of the slide I^{26}, it pushes the latter in against its spring I^{30}, thereby rocking the operative nose of the detent I^{25} out of the upward path of the assembling-block I and freeing the latter, as indicated by the full lines in Fig. 3. The corners of the nose I^{29} are rounded or tapered off to provide for its giving way before the projection I^{31}. The contact of that projection with the nose I^{29} during the upward motion of the transporter N rocks the detent I^{25} it is true, but the consequent motion is only an idle one.

The second part of the invention relates to the cleaning of the cutting edges of the trimming-knives N^5 N^6. (See Figs. 3 and 4.) These knives stand in a vertical position parallel with each other and edge on to the rear not far from and parallel with the path of the assembling-block I. The cleaning above mentioned is done by a wiper I^{32}. In all machines heretofore used in America this wiper has been attached to a vertically-guided rod operated intermittingly. In practice it is found that under certain conditions, particularly when linotypes with overhanging two-line letters are produced, there is a liability of the ejector to advance before the wiper is removed from its path, the result being the stoppage of the machine, the destruction of the wiper, and occasionally other injury to the machine. To overcome these difficulties, I now attach the wiper I^{32} to the curved arm I^{33}, projecting downward and outward to the left from the assembling-elevator I, the rising of which sets various parts of the machine in motion, as usual. The arm and wiper stand normally below and entirely clear of the knives and other parts, as shown in Fig. 3. When the assembling-elevator is lifted with the composed line preparatory to the transfer of the line and the starting of the machine, it carries the arm I^{33} with it, thereby causing the wiper to pass upward between the knives and the mold and to immediately return to its original position as the assembling-elevator descends. The movement of the elevator occurs at such time in relation to the movement of the other parts of the machine that it is impossible for the wiper to stand in the path of the outgoing slug, the ejector, or other parts of the machine, so that collision between them cannot occur. The arrangement shown is exceedingly simple and cheap and has also the additional advantage of giving to the wiper a long movement, so that it is adapted to coöperate with the longest knives required in practice.

The third part of the invention (see Figs. 5, 6, and 7) relates to improvements in the distributer. An improved form of the more important organs of the latter is illustrated in detail in the specification of Letters Patent of Great Britain No. 26,648 of 1896. These organs are (*a*) the transferring or vertically-swinging lifting-arm, commonly known as the "second" elevator, and a pusher by which the matrices are moved from the transferring-arm onto the introductory supporting-rails of the distributer, up to a stop thereon, and (*b*) an automatic lifter by which the leading matrix is lifted above the stop and preparatory to their engagement by the threads of (*c*) the usual horizontal traversing-screws of the distributer, which carry the matrix along until it is dropped into its own proper groove in the magazine.

t is the free and operative end of the transferring-arm or second elevator. It is a short length of rail of the same cross-section as the V-shaped notches in the tops of the matrices Y, so that when the line of matrices is carried endwise the matrix-teeth will engage the teeth of the bar or rail *t*, so that the matrices will be suspended therefrom, as in the ordinary Mergenthaler machine. The transferring-arm is a lever having its fulcrum in the rear of the machine, upon which it has an intermittent reciprocating motion in the vertical plane under the control of a suitable cam, the construction and mode of action being essentially the same as that of the arm marked T in United States Letters Patent No. 436,532, to O. Mergenthaler, dated September 16, 1890. When a composed line of matrices is ready to be transferred to the distributer, it finds itself in the head of the transporter or first elevator N, the latter then standing in its high-

est position. (Illustrated by the dotted lines in Fig. 3.) At this time the matrix-line is supported opposite the end of the rail t of the lifter, so that the line may be pushed endwise to the right out of the transporter N and into engagement with the lifter-rail t.

W′ is the pusher for effecting the transfer of the matrix-line to the rail t. It is fast to the end of a slide which has a reciprocating horizontal motion in a suitable guide. Neither of the latter are included in the figures. The motion of the pusher W′ is from the position illustrated in Fig. 5 to outside the rail t.

t' is a second but stationary short length of rail, being held fast to the lift-box T′, through which the matrices are pushed by the pusher W′ along introductory supporting-rails t^4 t^5. Each rail has a shoulder t^2 or t^3, the four shoulders standing in the same vertical plane and together constituting the stop above mentioned to limit the advance of the line toward the distributer-rail.

x' is the automatic matrix-lifter to lift the foremost matrix of the line clear of the stop-shoulders, so that it may be carried forward horizontally to the distributer-rail and screws.

x is the distributer-rail, of the same cross-section as the rails t t', and onto it each matrix is delivered to be traversed therealong by the three screws x^8 x^9 x^{10}.

The lifter x' is a vertical dog receiving a reciprocating vertical motion from a spring x^{33} and a cam projection x^{36}. It and the stop are so proportioned and positioned, respectively, that when the former is at the bottom of its stroke it stands under the leading matrix, then held in contact with the stop by the pusher W′.

The top introductory supporting-rails t^5 are continued from the stop for a short distance between the traversing-screws, their edges being inclined upward, as shown at t^8 in Fig. 5.

The mechanism just described with reference to this third part of the present invention are as heretofore, their action being, in brief, to lift the matrices one at a time between the successive threads of the screws, so that the latter may carry them to the right along the distributer-bar. They are introduced into this specification only to show the coöperation of the devices forming the third part of my invention. The object of this latter is to insure the engagement of the leading matrix by the threads of the distributer-screws, and that object is attained by the following means: the two top distributer-screws x^8 x^9, used to overhang the leading matrix Y. When they did, that matrix was lifted up within their zone, but sometimes not high enough to clear the bottom shoulders t^2. A matrix in that predicament would most likely be bent and stop the distributer, thereby necessitating the personal attention of the operator to clear the latter. The threads of the two screws above mentioned now stop at the right of (looking at them from the front of the machine) the vertical path of the said matrix, as clearly shown in Figs. 5 and 6. According to the present invention the lifter x' does not place the matrix within the zones of the distributer-screws. It lifts it high enough to stand opposite to them, and then a supplementary pusher pushes it horizontally up to the threads of the said screws. This supplementary pusher consists of a horizontal reciprocating bar W³, having a transverse piece W⁴, adapted to act behind—that is to say, on the left of—the top of the lifted matrix and to be returned to its first position, so that it may act in turn on the succeeding matrices, which are lifted one after another before it.

The supplementary pusher may be and advantageously is provided with a transverse lug W⁶, carried by a leg W⁷, which is fast to and depends from the said pusher, the said lug being held in a proper position for engaging the matrix near its foot at the same time that the transverse piece W⁴ engages the top of it. The function of this lug W⁶ is to prevent the matrix from swinging out of the perpendicular during the time that the supplementary pusher is dealing with it.

It is obvious from the foregoing what must be the extent and time of the two motions of the supplementary pusher. Those motions may be imparted to it by any suitable and convenient mechanism. The one illustrated is as suitable and convenient as any. It consists of a special cam-face W⁷ on the cam which carries the cam projection x^{36}, already mentioned, a transverse rod W⁸, adapted to slide in horizontal slots W⁹ W⁹ in the cheeks of the lift-box and which has the bar W³ fast to it, and a tension-spring W¹⁰. This spring pulls from a fixed point upon one end of the rod W⁸ and keeps the opposite end in touch with the cam-surface W⁷, the tension of the spring W¹⁰ putting the supplementary pusher through its operative stroke, and the projection of the cam-surface W⁷ returning it to its first position for the rise of the next matrix.

To further safeguard the proper motion of the leading matrix up the inclines t^8, above mentioned, there is combined with each introductory rail a spring-detent W¹¹, which yields before the advancing matrix and locks behind it, thereby obviating any tendency to slip back. This detent is shown in Fig. 5 as being a horizontal one fixed to the outer face of the rear side of the lift-box T′, its nose reaching the respective matrix through a hole W¹² in the said side. The rise of the cam-surface W⁷ is such that the pusher-plate is retracted to the right of the rising matrix and then permitted to move to the left sufficiently to carry the thickest matrix within the grasp of the detent W¹¹ and into position to be engaged by the threads of the screws. The motion of the screw x^9 will cause the rise of the cam W⁷ to bear against the rod W⁸ and so start it on its return motion out of the way of the screw-threads and of the next matrix to be lifted.

The fourth part of the invention is illustrated in Figs. 3 and 8. It relates to mechanism for preventing the injection of molten metal into the mold in the event of the transporter N, above mentioned, failing to present the composed line to the mold properly. Hitherto the forward motion of the mold-wheel O has been relied on to throw the casting mechanism out of gear whenever the transporter has so failed. The details of the mechanism by which it accomplished this are reproduced here from the specification of Letters Patent No. 436,532, dated September 16, 1890.

a^{23} is a vertical bar suspended by a spring a^{24} from the vise-frame P′, and so long as it is in its normal position it projects its head a^{23} above the abutment P in the downward path of the head of the transporter N on its way to the casting position.

a^{25} is a dog on the rear edge of the bar a^{23}, and a^{26} is a plate adapted to slide horizontally to and from the front of the machine. That plate is pushed to the rear by a spring pushing on an extension of it, as illustrated in Fig. 8, and to the front by a forward motion of the mold-wheel O. The bar a^{23} stands within a slot in the plate a^{26} long enough to permit of the latter's motions. The normal position of the bar a^{23}—the one due to the pull of the spring a^{24}—keeps the plate a^{26} opposite the dog a^{25}. The transporter-head fails to present the composed line properly if it does not come down upon the abutment P. If it does not come down so far as that, the front face of the mold-wheel O, coming up to the plate a^{26}, pushes it against the dog a^{25} and so swings the bottom end of the bar a^{23} to the front far enough to make it turn the lever a^{22} on its fulcrum. The motion of this lever is adapted to throw the casting mechanism out of gear. It can be put into gear again by the hand-lever a^{14}. If, on the other hand, the transporter-head does come down upon the abutment P, it depresses the bar a^{23} low enough for the plate a^{26} to miss the dog a^{25} when the mold-wheel O pushes that plate to the front, so that the slide of the said plate to the front leaves the bar a^{23} alone. In either case the spring of the plate a^{26} returns it to its normal position. One of the forward motions (the one occurring in advance of the ejection of the linotype) of the mold-wheel O takes place when the mold o^{11} in use is on the right hand of the axis of the wheel O, (see the right-hand dotted lines in Fig. 3;) but as it is now a very general practice to fit a wheel O with as many as four molds o^{11}, separated from each other by a quarter of a circle, and as the wheel O makes two motions about its axis—one of ninety degrees and one of two hundred and seventy degrees—there is one mold at the bottom, as shown in the figures, when the above-mentioned mold in work is in the right-hand position above mentioned. The presence at that moment of the one at the top may be ignored. It is inoperative as far as the present invention is concerned. Each mold, with its matrix-alining plate o^{118}, projects from the front face of the mold-wheel O for an appreciable distance, (see Fig. 8,) so that when that wheel comes forward into position for the newly-cast linotype to be ejected from the mold the bottom mold swings the bar a^{23} forward against the lever a^{22} and puts not only the casting, but also the ejecting and other mechanisms, out of gear, they all being driven from the same first-motion shaft. It should be borne in mind that when the bottom mold swings the bar a^{23} the transporter-head is away above the abutment P′.

As the above-described mischievous action of the bottom mold was caused by the rising of its projection from the mold-wheel face, the combination, with the said wheel, of studs capable of an adjustable amount of projection has been tried; but the necessarily-frequent readjustment of them was found to be a nuisance. Hence it became necessary to devise some mechanism by which the mold-wheel, with a mold-block at the bottom, whenever it comes forward to the ejecting position should be prevented from pushing the bar a^{23} forward.

According to the present invention the bar a^{23} and the parts connected with it are not interfered with, but advantage is taken of the upward motion of the transporter N, that being the motion which immediately precedes the above-described downward one upon the abutment P, to pull the bar a^{23} down, so as to keep the dog a^{25} below the plate a^{26} during the above-mentioned forward motion of the mold-wheel O. Accordingly there is provided a connection between the transporter or first elevator N and the bar a^{23}. It consists of a trip-lever N^{64}, having its fulcrum upon the vise-frame P′—a stationary part of the machine. The rear end of the said trip-lever engages with the foot of the bar a^{23} through a stud N^{65}, projecting laterally therefrom, while the front end of it stands in the upward path of a suitably-positioned portion N^{66} of the transporter N. Although the bottom mold-block o^{11} comes nearly up to the plate a^{26}, the portion N^{66} engages the lever N^{64} and pulls the bar a^{23} down, keeping the dog a^{25} below the plate a^{26} until the bottom mold-block o^{11} has been moved back again. Either the stud N^{65} or the lever N^{64} must obviously be provided with an automatic releasing device to allow of the transporter N passing the trip-lever N^{64} on its downward travel again. The connection illustrated indicates that the front end of that lever will yield before the portion N^{66} and that it will be returned to its normal position ready for work by the greater weight of the rear arm of it.

I claim—

1. In a linotype-machine, the combination of a movable assembler-block in which the matrix-lines are assembled or composed, a first elevator or transporter to receive the composed lines, intermediate means for trans-

ferring the lines from the assembler to the transporter, and a locking device for the assembler, controlled in its action by the transporter, whereby the assembler is prevented from delivering the composed line until the transporter is in position to receive it.

2. In a linotype-machine, the combination with the transporter and the assembling-block; of a pivoted detent normally locking the said block in its lowest or composing position; a nose operatively connected with the said detent, automatically protruded into the path of the said transporter and adapted to be moved out of it and to move the said detent out of the path of the assembling-block, by the motion of the said transporter; as and for the purpose set forth.

3. In a linotype-machine, the combination with the transporter and the assembling-block, of a pivoted detent acting to hold the assembling-block; a horizontal slide; and a spring-protruded nose in position to be acted upon by the transporter; as and for the purpose set forth.

4. In a linotype-machine the combination of the vertically-movable assembler, the slug-trimming knives and an arm attached to the assembler and carrying a knife-wiper, substantially as described.

5. In a Mergenthaler linotype-machine of the class herein shown, the combination of the stationary slug-trimming knives N^5 and N^6, the vertically-movable assembler I, the knife-wiper I^{32} and the carrying-arm for said wiper, connected to the assembler and extended downward and laterally below the knives, substantially as described and shown.

6. In a linotype-machine, the combination of a distributer-bar, carrying-screws for the matrices, a matrix-lifter beyond the end of the screws, and a pusher acting to carry the lifted matrices successively into engagement with the screws.

7. In a linotype-machine, the combination with the distributer and matrix-lifter, of a supplementary pusher and a spring-detent; as and for the purposes set forth.

8. In a linotype-machine, the combination of shortened distributer-screws standing with their ends clear of the upward path of the leading matrix; a lifter; and a supplementary pusher; as and for the purpose set forth.

9. In a linotype-machine, the combination of shortened distributer-screws standing with their ends clear of the upward path of the leading matrix; a lifter; a supplementary pusher; and a spring-detent; as and for the purpose set forth.

10. In a linotype-machine, the combination with the mold-wheel having a mold projecting from the bottom portion of its face at the time the mold in work is coming up to the ejecting position, and the mechanism for preventing injection of molten metal into the mold in the event of the transporter failing to present the composed line to the mold properly; of a trip-lever adapted to be actuated by the transporter so as to prevent the unnecessary actuation of the above-mentioned mechanism by the said bottom mold, as set forth.

11. In a linotype-machine the combination with the mold-wheel having a mold projecting from the bottom portion of its face at the time the mold in work is coming up to the ejecting position, and the mechanism for preventing injection of molten metal into the mold in the event of the transporter failing to present the composed line to the mold properly; of a trip-lever having a fixed fulcrum, one of its arms engaging the suspended bar of the above-mentioned mechanism, and the other standing in the path of a certain part of the said transporter, so as to prevent the unnecessary actuation of the said mechanism by the bottom mold and allowing of the return motion of the said certain part past it, as set forth.

In witness whereof I have hereunto affixed my signature, in presence of two witnesses, this 18th day of November, 1897.

ERNEST GIROD.

Witnesses:
CHAS. S. WOODROFFE,
WINIFRED DAWES.