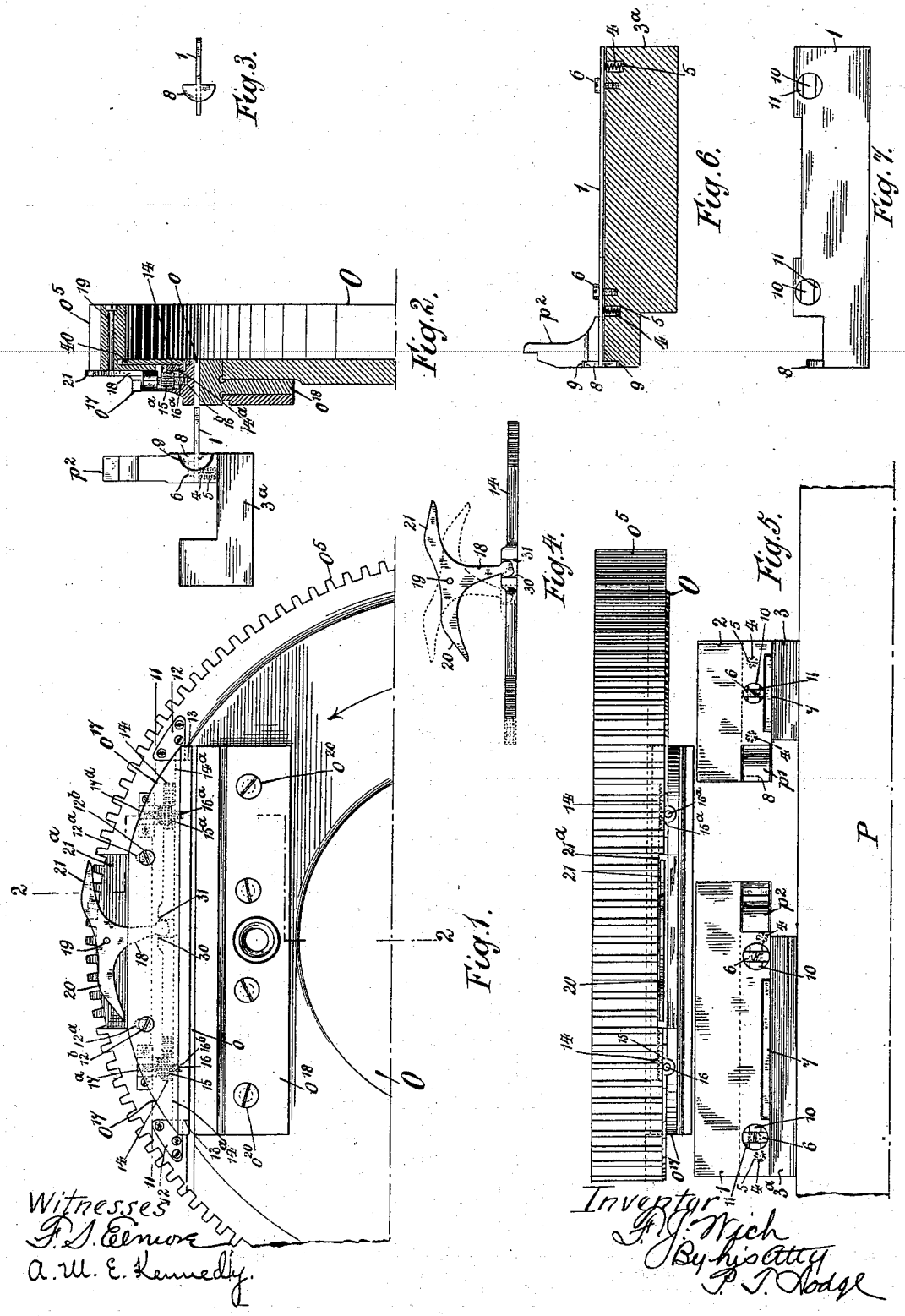
No. 648,449. Patented May 1, 1900.

F. J. WICH.

ADJUSTABLE MOLD FOR LINOTYPE MACHINES.

(Application filed Sept. 9, 1899.)

(No Model.) 3 Sheets—Sheet 1.



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(No Model.) 3 Sheets—Sheet 2.

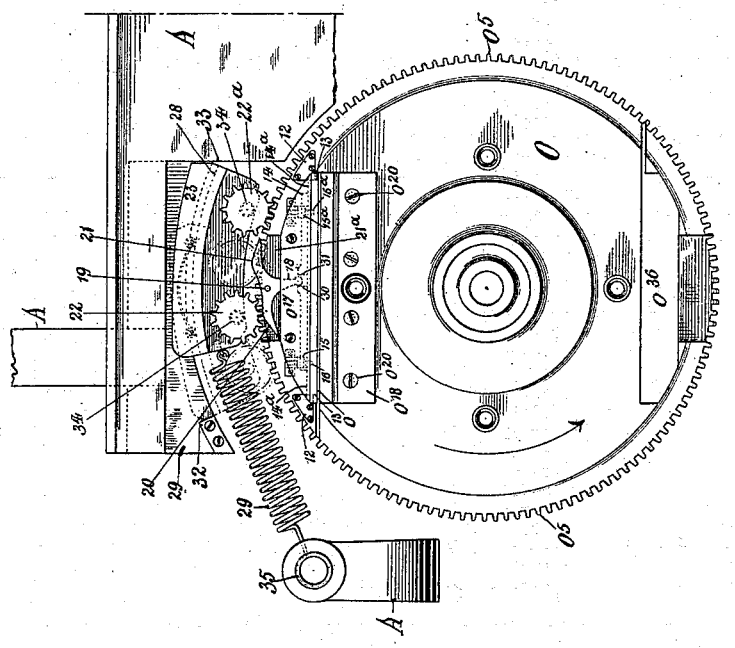

Fig. 9.

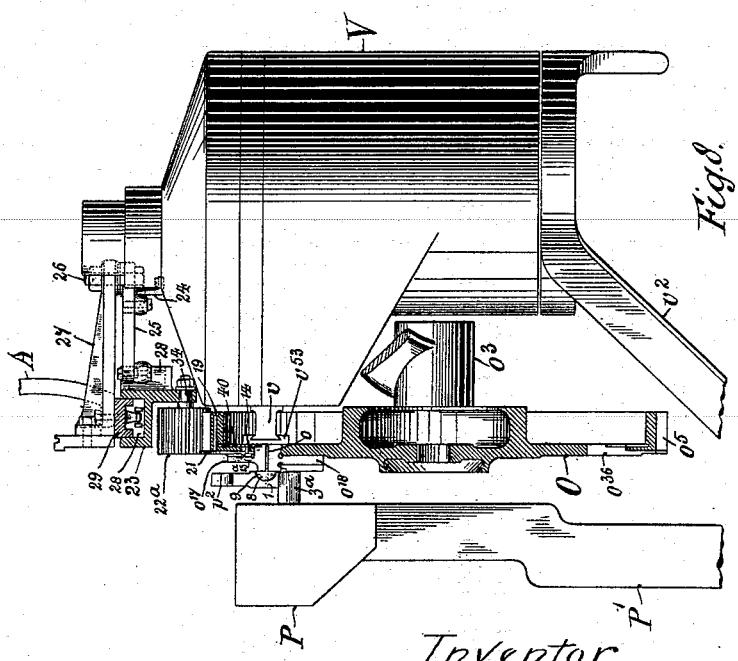

Fig. 8.

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(No Model.) 3 Sheets—Sheet 3.

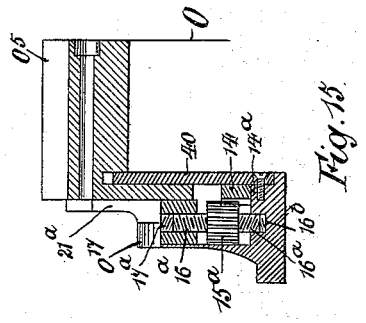

Fig. 15.

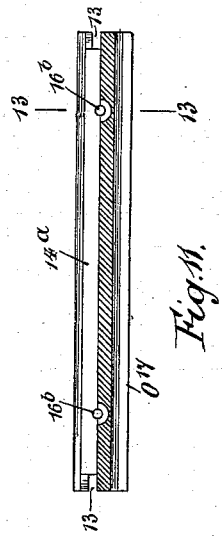

Fig. 11.

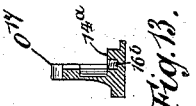

Fig. 13.

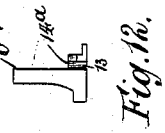

Fig. 12.

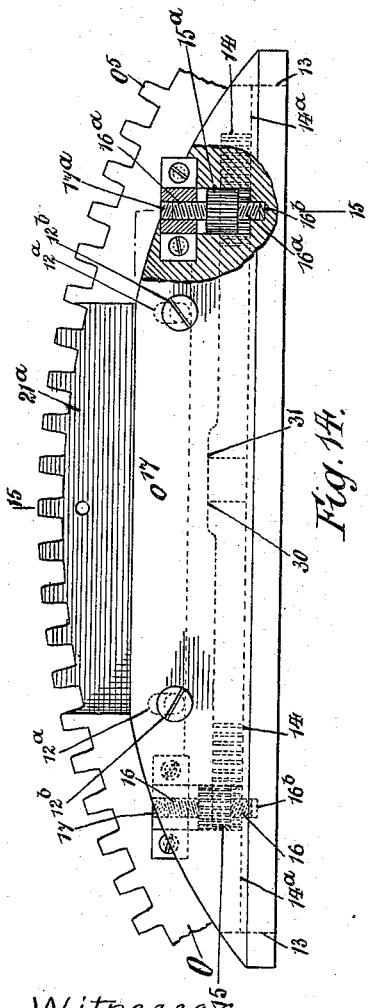

Fig. 14.

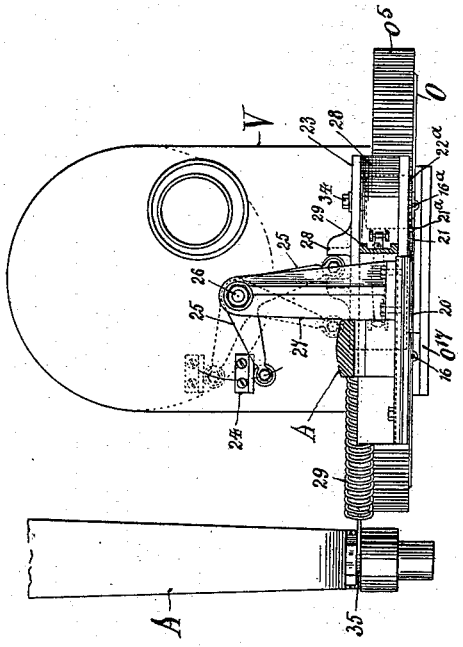

Fig. 10.

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UNITED STATES PATENT OFFICE.

FERDINAND JOHN WICH, OF BROADHEATH, ENGLAND, ASSIGNOR TO THE MERGENTHALER LINOTYPE COMPANY, OF NEW YORK, N. Y.

ADJUSTABLE MOLD FOR LINOTYPE-MACHINES.

SPECIFICATION forming part of Letters Patent No. 648,449, dated May 1, 1900.

Application filed September 9, 1899. Serial No. 729,965. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND JOHN WICH, of Broadheath, in the county of Chester, England, have invented certain new and useful Improvements in and Connected with the Adjustable Molds of Linotype-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 the adjustable molds of linotype-machines, and which are specially applicable to the Mergenthaler linotype-machine described in the specification of Letters Patent No. 436,532, dated September 16, 1890. In that a composed line of matrices and space-bars is delivered into a vise, where it is firmly held in a horizontal position, with the casting-face of it vertical and in front of one side of a so-called "mold-wheel." The latter has a slot extending through it from one side to the other and being parallel with a diameter of it. This slot forms the mold for the body of the linotype, while the printing faces or characters on the edge of the said linotype are formed in the cavities in the above-mentioned casting-face of the matrices. A subsequent improvement has placed the slot in a mold-block detachable from the mold-wheel and consisting of a cap-plate and a bottom plate having two end liners between them, the four pieces being held together by a screw passed downward through each end of the cap-plate and the respective end liner into the bottom plate, as shown, for example, in United States Letters Patent No. 539,993, the mold-block itself being fixed to the front side of the mold-wheel in front of a wide slot therein provided to give the metal-pot access to the back of the mold-block. The mold-wheel stands in rear of the composed line of matrices and space-bars, with its front side parallel with the casting-face of the latter and normally at some little distance from it, the slot in the mold-block being then vertical and to the right of the said line. At the proper moment it is turned through a quarter of a circle, thereby bringing the slot into a horizontal position immediately in rear of the row of formative cavities above mentioned, and pushed up to the composed line till it makes metal-tight contact with the casting-face thereof and is held there. The metal-pot and its pump are next moved up from the rear till the mouth of the said pot makes metal-tight contact with the rear face of the mold-block, whereupon hot metal is injected into the linotype-mold. The metal-pot and pump are then moved to the rear, and the mold-wheel also, to clear the line of matrices, the linotype remaining in the slot. The wheel is next turned through three-quarters of a circle in the same direction as before, thereby presenting the slot in front of the ejector. It is next moved forward up to the knives for trimming both sides of the linotype, whereupon the ejector advances from the rear and pushes the linotype forward out of the slot between the knives and into a galley. The wheel is then moved back into its normal position.

Since the substitution of the above-described mold-block for the slot in the mold-wheel there have been devised several mold-blocks, some adjustable for length of slot and some adjustable for both length and depth of slot.

The present invention consists in improved means for adjusting the length and the depth of the slot, either or both, as may be required, which means are hereinafter specified in detail and claimed.

Referring to the accompanying drawings, which are to be taken as part of this specification and read therewith, Figure 1 is a front elevation of a portion of the mold-wheel, the mold-block, excepting the end liners, and some of the means for adjusting the position of the cap-plate; Fig. 2, a transverse section taken on the line 2 2 of Fig. 1 and including the left vise-jaw, jaw-block, and liner; Fig. 3, an end elevation of a liner detached from its jaw-block; Fig. 4, a front elevation of the rack to move the cap-plate and of its rocking lever; Fig. 5, a plan of the mold-wheel, mold-block, line-holding vise, and abutment; Fig. 6, a sectional rear elevation of the left-hand vise-jaw, liner, and jaw-block; Fig. 7, a plan of the liner illustrated in Fig. 6; Fig. 8, a side elevation from the right hand of the metal-

pot, the mold-wheel, vise, and abutment in the casting position; Fig. 9, a front elevation of the mold-wheel and reciprocating carriage for opening and closing the mold; Fig. 10, a plan corresponding with Fig. 9; Fig. 11, a sectional plan of the mold cap-plate taken on the line 11 11 of Fig. 1; Fig. 12, a side elevation from the right hand of the mold cap-plate; Fig. 13, a vertical section on the line 13 13 of Fig. 11; Fig. 14, a detail front elevation, on an enlarged scale, of the cap-plate and its rack-and-pinion gear; and Fig. 15, a section on the line 15 15 of Fig. 14.

A A are portions of the machine-frame; O, the mold-wheel; o^3, its hub or bush; o^5, the gearing by which it is driven; o^{17}, the cap-plate, and o^{18}, the bottom plate of the mold-block; o, the adjustable slot between them; o^{20}, the screws by which the bottom plate is fixed to the mold-wheel; o^{36}, the wide slots in the mold-wheel to receive as many mold-blocks; P, the abutment or vise-head standing in front of the composed line of matrices and space-bars to support them against the forward pressure of the mold-wheel; P′, the vise-frame that carries the abutment P, the right and left hand vise-jaws p' p^2, and their blocks 3 3^a; V, the metal-pot; v, its throat; v^{53}, its mouthpiece fast on the end of the said throat, and v^2 the frame that carries the said pot V. All the parts just enumerated are as heretofore, excepting the cap-plate o^{17} in respect of its connection to the mold-wheel O.

1 is the left, and 2 the right, hand liner to fit between the cap-plate o^{17} and bottom plate o^{18} at the respective ends thereof. The construction of one is represented best in Figs. 2, 3, 5, 6, and 7. Each one is supported just above the top face of the respective jaw-block 3 3^a between springs 4 4, standing in seatings 5 5 in the said blocks, and the heads 6 of screws screwed down into the latter. These screws are not screwed as far as they will go down into the respective block 3 or 3^a, and the springs 5 stand up for a short distance above it, so that each liner has a little play between the screw-heads 6 above it and the jaw-block under it for a reason which will appear later on.

7 is a ridge upon each jaw-block to serve as an abutment to support the respective liner against the forward push of the mold-wheel O.

8 is a plate fast on that end of each liner which contacts with the composed line of matrices and space-bars to fit over the respective end of the row of formative cavities in the matrices, so as to prevent type-metal squirting there during the act of casting. Each plate 8 is semicircular in side elevation and stands within a recess 9 in the respective vise-jaw, with its vertical edge flush with the rear face of that jaw, as shown in Figs. 2 and 3. A liner projects rearward beyond the respective jaw-block for a distance equal to the width of the slot o from front to rear, as shown clearly in Fig. 2. The jaw-block 3^a of the left-hand vise-jaw p^2 is capable of being moved to or away from its fellow jaw p' by the means described in the specification of British Letters Patent No. 8,228 of 1898. As the left-hand liner 1 is carried by the said jaw-block, it is evident that the longitudinal movement of the jaw serves to adjust the position of the liner 1 in the slot o with reference to its distance from the liner 2 to adjust the length of the said slot for the desired length of linotype. The depth of the slot o—that is, the distance between the cap-plate o^{17} and the bottom plate o^{18}—is adjusted to vary the thickness of linotype by substituting another pair of liners 1 2, thicker or thinner, as the change may require, for the pair in the jaw-blocks 3 3^a. To facilitate such change, the above-mentioned screw-heads 6 are T-shaped, 10 10 being slots in the liner to clear them, and 11 11 being sinks over which the T-heads 6 stand to hold the liner loosely to the jaw-block. The cap-plate o^{17} is movable up to and away from the bottom plate o^{18} on suitable guides for the purpose of opening and closing the mold—that is to say, changing the vertical width of its mold-slot. These guides are shown as plates 12 12, fixed to the front face of the mold-wheel O. Vertical slots 12^a, with headed screws 12^b passed through them from the front into the stationary plate 40, described farther on, may also be used as guides. Their operative edges are vertical to correspond with the direction in which the cap o^{17} is required to move and each one engages in a slot 13 in the respective end of the cap-plate o^{17}, as illustrated in Figs. 1, 9, and 11.

The cap-plate o^{17} is moved from the bottom plate o^{18} and back again toward it once during each revolution of the mold-wheel O, such motion of the cap being effected automatically by the machine. The mechanism for so moving it consists of a rack 14, a pair of pinions 15 15^a, a pair of screws 16 16^a, and means for actuating the said rack. The latter is capable of a reciprocating motion in the direction of its length on a shelf 14^a on the cap-plate o^{17}, as indicated in Fig. 2, and gears with the two pinions 15 15^a. Each of these is fast upon one of the right and left handed screws 16 16^a between its threads, as shown best in Fig. 14. The four screw-threads are preferably double pitched. Their function is to move the cap-plate o^{17} to or from the bottom plate o^{18}, and for that reason their bottom ends engage in correspondingly-screw-threaded sockets 16^b 16^b in the cap-plate o^{17}, while their top ends engage in correspondingly-screw-threaded sockets 17 17^a, fast on the mold-wheel O. The threads of the screws 16 16^a are so arranged with reference to the sockets 17 17^a and cap-plate o^{17} that the mold shall be closed when the rack 14 is at the right-hand end of its motion and open when the said rack is at the left-hand end of its motion. The rack 14 is actuated by the following means:

18 20 21 are the three arms of a T-shaped lever having its fulcrum upon a stud 19, fast

in and projecting from the front face of the mold-wheel O above the rack 14.

21^a is a recess in the front face of the wheel O for it to work in.

The arm 18 is a depending one, and its end engages between two projections 30 31 on the rack, as shown in Fig. 4. The arms 20 and 21 are preferably hog-backed, and the respective proportions of the said lever are such that when the arm 18 is over to either hand the arm on the opposite side of the fulcrum 19 projects its convexity beyond the periphery of the wheel O.

22 22^a are a pair of rollers pivoted upon horizontal axes 34, projecting to the front from a carriage 23, one on each side of the fulcrum 19. Both rollers are always in touch with the periphery of the mold-wheel O to effect the depression of the projected arm 20 or 21, as the case may be, and the projection of the then depressed one. Pinions are preferred to rollers, because they engage with the wheel O. Both are wide enough to keep engaged with it. Whether they are pinions or rollers either terminal position of the rack 14 holds one or the other of the arms 20 21 projected beyond the wheel O and standing in their path.

The carriage 23 has a reciprocating motion concentric with the rotary motion of the mold-wheel upon the frame A between two stops 32 33. The top of the carriage is a trough-shaped rail 28 and embraces an inverted-trough-shaped rail 29 on the machine-frame A, as shown in Figs. 8 and 9. The engagement of the sides of the two troughs with each other keeps the motion of the carriage 23 in the proper plane, while the constant engagement of the pinions 22 22^a with the wheel O keeps it up to the machine-frame A.

The carriage 23 is moved from the stop 32 to the stop 33 by the forward motion of the metal-pot V, as follows:

24 is a projection fast on the top of the metal-pot V.

25 is a bell-crank lever fulcrumed at 26 on a bracket 27, projecting to the rear from the main frame A, as shown in Figs. 8 and 10. Each end of the lever 25 carries an antifriction-roller, one end standing in the forward path of the projection 24 and the other engaging in a fork 28 on the back of the carriage 23. The latter is moved from the stop 33 to the stop 32 by a spiral spring 29, pulling on it from a fixed point 35 on the machine-frame A.

It is obvious that the mold must be closed in time for the casting of the linotype in the slot *o* and kept closed until after the linotype is ready to be ejected. According to the present invention the mold is automatically closed by bringing the cap-plate o^{17} down upon both liners 1 and 2 until they are pinched metal-tight between it and the bottom plate o^{18} and automatically opened afterward by moving the cap-plate o^{17} away from the said bottom plate. One cast is effected during one cycle of the linotype-machine, and during that time the following motions are gone through:

First. Starting from the normal position already described, the projection 24 being then in touch with the bell-crank lever 25, as shown by the dotted lines in Fig. 10, the carriage 23 consequently held up to the stop 32 by the spring 29, as shown by the dotted lines in Fig. 9, and the arm 21 projecting beyond the periphery of the mold-wheel O, the latter makes a quarter-turn in the direction of the arrows in Figs. 1 and 9, carrying the arm 21 under the pinion 22^a to open the mold by moving the cap-plate o^{17} away from the bottom plate o^{18} and projecting the arm 20. It then moves to the front till the front faces of the cap and bottom plates o^{17} o^{18} bear against the composed line of matrices and space-bars, then between the vise-jaws p^2 p', and immediately in front of the abutment P, thereby putting the said plates, respectively, above and below the liners 1 2. (See Fig. 8.) This putting of the said plates o^{17} o^{18} in the position described is facilitated by the degree of play enjoyed by the liners 1 2, because if either plate—say the bottom one o^{18}—catches against the rear edge of a liner the latter will slip up out of the way of the said plate.

Second. The metal-pot V moves forward until its mouthpiece v^{53} is pressed metal-tight against the back of the mold-block, as shown in Fig. 8. During that movement the projection 24 (see Fig. 10) rocks the lever 25 on its pivot 26, thereby moving the carriage 23 from the stop 32 to the stop 33 against the pull of the spring 29, the pinion 22 over the then projecting arm 20 so rocking the T-lever on its fulcrum 19 and moving the rack 14 to the right, thereby making it close the mold by shutting the cap-plate o^{17} down upon the liners 1 2 and pinching them between the bottom plate o^{18} and itself. The depression of the arm 20 leaves the arm 21 projected.

Third. The pot V and wheel O are moved back a little while the composed line is being justified in the usual way, so carrying the projection 24 away backward from the lever 25, whereupon the spring 29 pulls the carriage 23 up to the stop 32, thereby moving the pinion 22^a over the arm 21 and opening the mold a little and leaving the arm 20 projected.

Fourth. The pot V and wheel O move to the front, the carriage 23 to the stop 33, and the pinion 22 over the arm 20, so closing the mold for casting, as shown in Fig. 8, and projecting the arm 21.

Fifth. After the linotype has been cast the pot V moves back, the carriage 23 up to the stop 32, the pinion 22^a over the arm 21, and the mold is opened by the movement of the cap-plate o^{17} upward away from the bottom plate o^{18}, the arm 20 being left projecting.

Sixth. The wheel O moves back for the plates o^{17} o^{18} to clear the liners 1 2 and then makes its three-quarters' turn, followed by

a movement to the front into the ejecting position, carrying the arm 20 under the pinion 22 to close the mold and projecting the arm 21.

40 is a plate made fast to the back face of the cap-plate to cover up the cavity in it in which the rack 14 and the pinions 15 15ª work, so as to prevent dirt or splashes of hot metal getting in.

The wheel O is driven by a pinion. (Not included in the figures.) There is a groove in its periphery to provide for the arm 21, and it clearing each other as the said arm is carried past it.

The mechanisms for moving the wheel O and the pot V are not included in the figures, because they do not form any part of the present invention.

The substitution of a thicker or thinner pair of liners for the pair on the jaw-blocks 3 3ª necessitates a compensating device adapted to provide for a longer or shorter motion of either the rack 14 or a longer or shorter throw of the lever that actuates the rack. Such a device may consist advantageously of a spring between each side of the lever-arm 18 and the rack 14, or the fulcrum 19 may be adjustable radially to the axis of the wheel O, the springs in any case giving way as soon as proper closure of the mold has been effected. A suitable device for the purpose is illustrated in Figs. 8 and 9, where 35 is a hog-backed spring, its middle bearing against the top rail 29 and its ends made fast to the carriage-rail 28.

The invention is not limited to the illustrated combination of T-lever and rack. In that respect the invention consists in the combination, with the movable rack 14, of two levers pivoted upon the mold-wheel O and so connected with the said rack 14 that they shall stand projected beyond the periphery of the wheel O alternately, according to the position of the rack at one or the other end of its motion, and be depressed alternately by contact with one of the pinions 22 22ª to move the rack from one of its terminal positions into the other.

It is to be noted that leading features of novelty herein are the mold, arranged to be opened and closed automatically in connection with the liners arranged to be automatically projected into and withdrawn from the mold; the use of liners detachably connected to the matrix-clamping jaws, so that liners of different thicknesses may be substituted one for another; the employment of liners attached by flexible or yielding connections to the matrix-clamping jaws in order that the liners may adjust themselves to the mold independently of the jaws, and the combination of the opening and closing mold with means by which the mold is momentarily opened to release the liners and permit the movement of one jaw as an incident of the action of the justifying devices, and it will be evident that these features and others described herein may be modified in form and arrangement without departing from the substance of the invention.

I claim—

1. In a linotype-machine, the combination of a mold cap-plate, a mold bottom plate, mechanism automatically operating to approximate and separate said parts, liners having supports independent of the cap and bottom plates, and mechanism automatically operating to effect the seating of the liners between the cap and bottom plates and their separation therefrom.

2. The combination of bottom plate; cap-plate; matrix-clamping jaws; detachable liners carried thereby; means for holding them in position and means for moving the cap-plate away from or up to the liners.

3. In a linotype-machine, the combination of mold-liners fixed against fore and aft motion, a mold comprising top and bottom plates and movable forward and backward in relation to the liners, that they may embrace the latter, and means for automatically opening and closing the mold, substantially as described.

4. In a linotype-machine, the combination of matrix-clamping jaws, one movable endwise in relation to the other, mold-liners attached to said jaws, a mold comprising top and bottom plates, and movable forward and backward, and automatically-acting means for closing the mold when in operative relation to the liners and again opening it preparatory to its withdrawal from the liners.

5. The combination of jaw-blocks; liners carried thereby; means for allowing them a little play; and cap and bottom plates adapted to be moved up and put, the one above and the other below, the said liners.

6. In a linotype-machine, the combination of the mold-liners, the cap-plate and bottom plate of the mold, connected by guides and mounted to move forward and backward in relation to the liners, and mechanism substantially as described for automatically opening and closing the mold, whereby it is caused to close upon the liners preparatory to the casting action, and thereafter caused to release the liners that it may recede therefrom.

7. The combination of liners; cap-plate and bottom plate; guides for the cap-plate to move in up to or away from the liners; rack, screws and pinions for so moving it; and mechanism for reciprocating the rack.

8. The hereinbefore-described combination of liners; cap-plate and bottom plate; guides for the motion of the cap-plate up to or away from the liners; rack, screws and pinions for so moving it; levers connected with the said rack and means for actuating the levers alternately.

9. The hereinbefore-described combination in a linotype-machine, of liners; cap-plate and bottom plate; guides for the motion of the cap-plate up to or away from the liners; rack, screws and pinions for so moving it; levers

connected to the said rack; carriage-rails for it to move on; pinions on the carriage to engage the projected lever; projection and lever to move the carriage in one direction; and spring to move it in the other.

10. The hereinbefore-described combination of cap-plate; liners and bottom plate; rack, pinions and screws within the cap-plate; and back plate to cover the cavity in the said plate in which the said rack, pinions, and screws, work.

11. In a linotype-machine and in combination with a matrix-clamping jaw, a mold-liner connected thereto and provided with an enlarged head, 8.

12. In a linotype-machine, the combination of a slotted opening and closing mold, end liners arranged to be withdrawn from the mold after each casting action, and mold opening and closing mechanism, including a yielding member, whereby the mold is closed with a spring-pressure upon the liners.

13. In a linotype-machine, the combination of an opening and closing mold, a rotary carrier-wheel therefor, positively-acting mechanism carried therewith for opening and closing the mold, and devices external to the wheel to coöperate with the opening and closing devices as they are carried past the same by the rotation of the wheel.

14. In a linotype-machine, the combination of a mold adapted to open and close transversely of the slot, a melting-pot, and intermediate connections operated by the pot and serving to effect the opening and closing of the mold.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FERDINAND JOHN WICH.

Witnesses:
J. TAYLOR,
ARCHIE LOWE.