No. 889,231. PATENTED JUNE 2, 1908.

J. G. HOLBOURNS & H. A. LONGHURST.

LINOTYPE MACHINE.

APPLICATION FILED MAY 27, 1907.

5 SHEETS—SHEET 1.

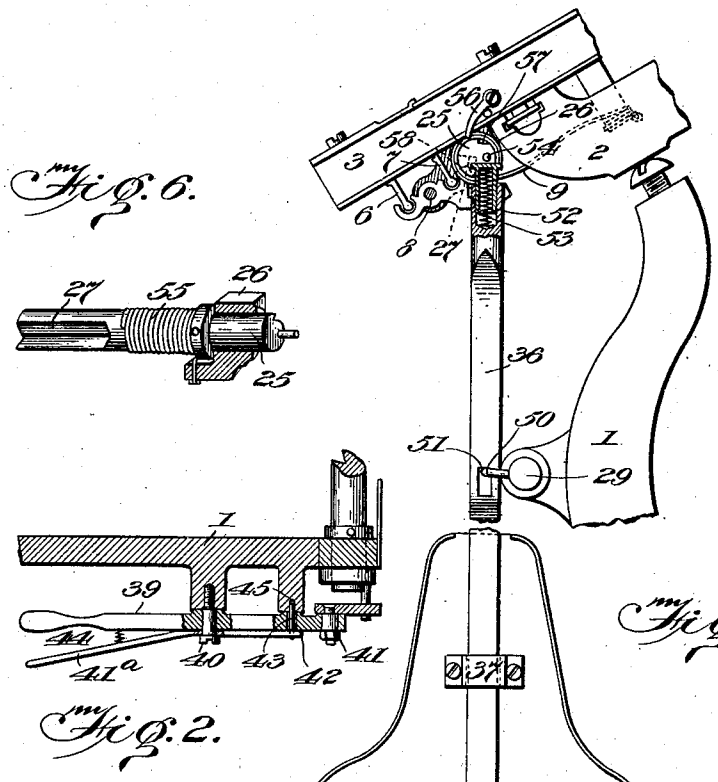
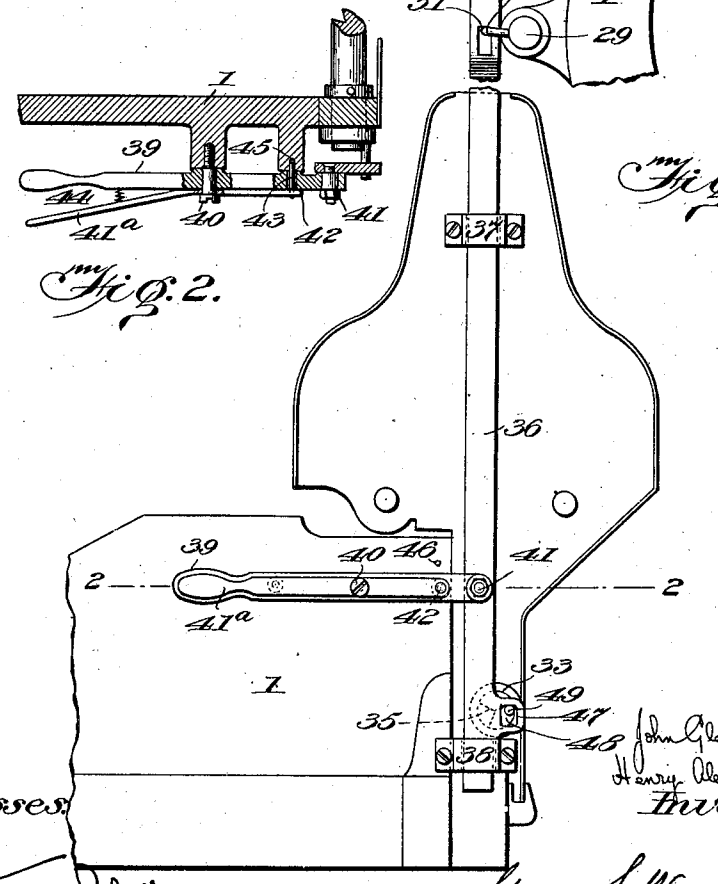


Fig. 6.

Fig. 1.

Fig. 2.



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5 SHEETS—SHEET 2.

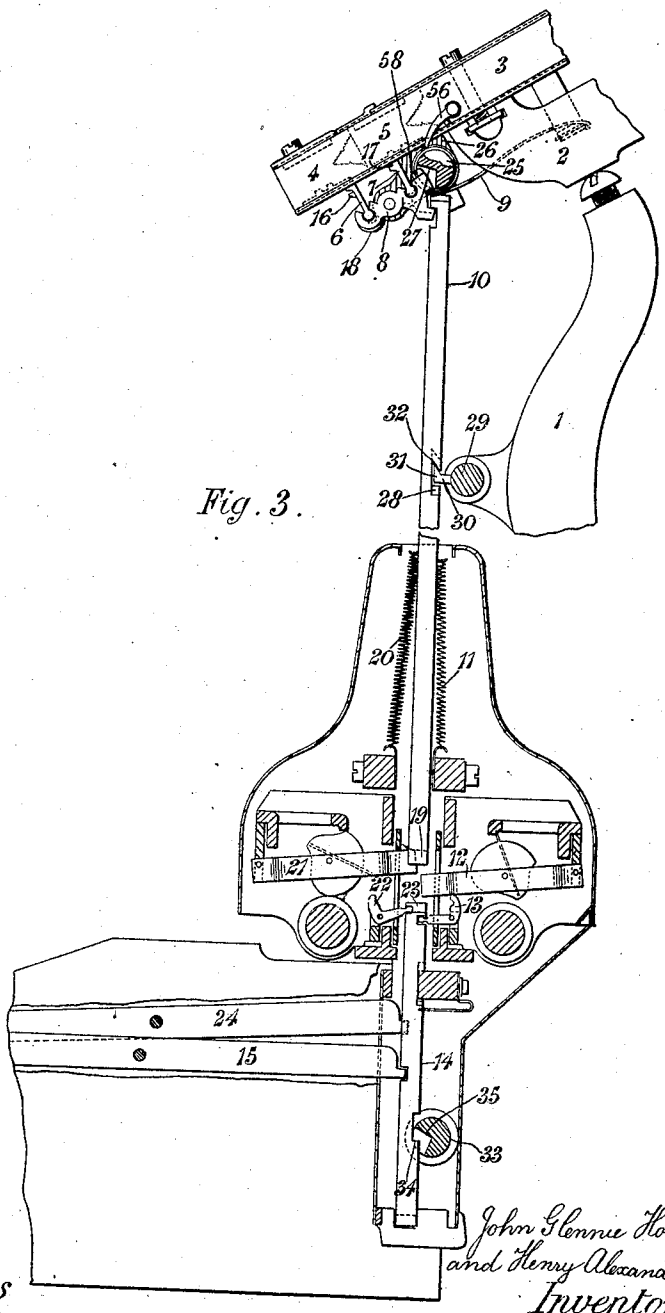

Fig. 3.

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5 SHEETS—SHEET 3.

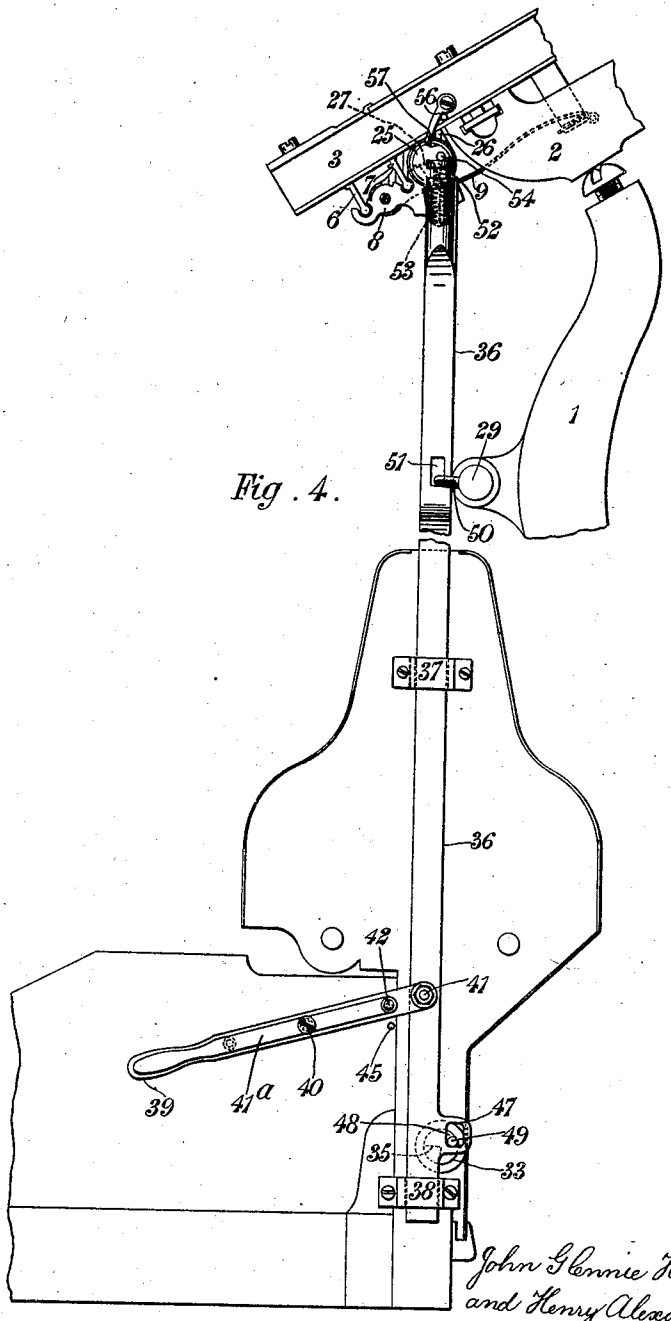

Fig. 4.

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5 SHEETS—SHEET 4.

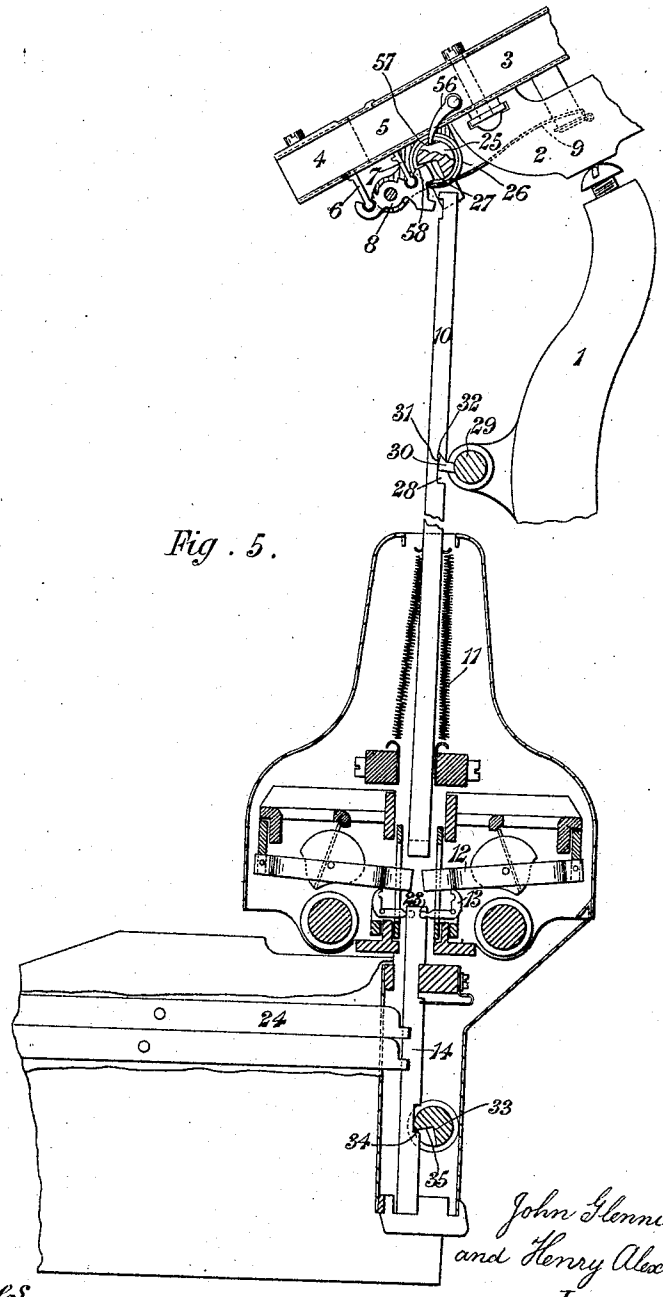

Fig. 5.

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5 SHEETS—SHEET 5.

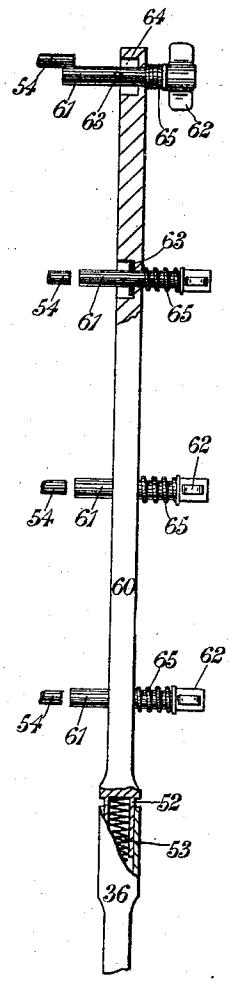

Fig. 7.

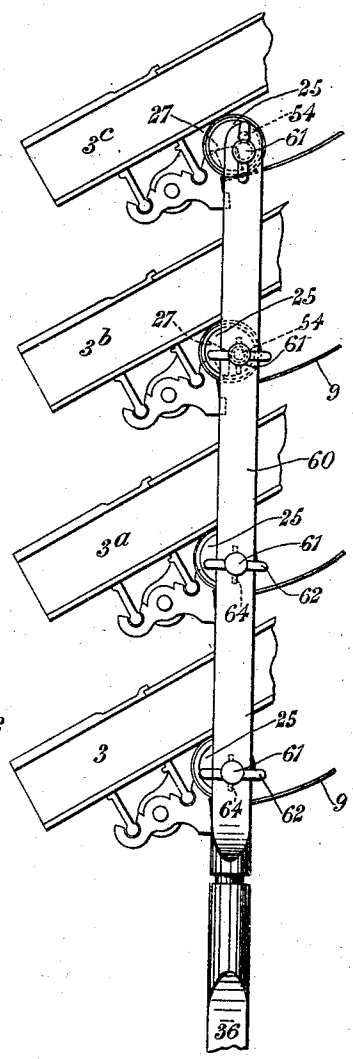

Fig. 8.

Witnesses
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UNITED STATES PATENT OFFICE.

JOHN GLENNIE HOLBOURNS AND HENRY ALEXANDER LONGHURST, OF LONDON, ENGLAND, ASSIGNORS TO LINOTYPE AND MACHINERY LIMITED, OF LONDON, ENGLAND, A COMPANY.

LINOTYPE-MACHINE.

No. 889,231. Specification of Letters Patent. Patented June 2, 1908.

Application filed May 27, 1907. Serial No. 375,952.

To all whom it may concern:

Be it known that we, JOHN GLENNIE HOLBOURNS and HENRY ALEXANDER LONGHURST, subjects of the King of the United Kingdom of Great Britain and Ireland, and residing at 188 Fleet street, in the city of London, England, have invented new and useful Improvements in Linotype-Machines, of which the following is a specification.

The present invention relates to improvements in linotype machines, more especially in those of the well known Mergenthaler type described in the specification of Letters Patent No. 436532, dated September 16th 1890, and in which the matrix magazine or magazines are supported in an oblique position on the machine frame and from which it or they are individually removable for the purpose of substituting another magazine or magazines charged with a different font or fonts of matrices; each magazine having its own set of escapement levers and pawls; the connections between the said levers and the keyboard consisting of a set of vertical escapement rods coöperating with the respective escapement levers, and a set of key lever rods coöperating with the respective key levers on the one hand and the respective escapement rods on the other.

When it is desired to "change" a magazine, *i. e.* take it off the machine and substitute another one for it, the present construction of machines of the type above mentioned, makes it necessary:—(*a*). to lock the escapement levers and pawls to prevent any matrices dropping out of the magazine through its delivery mouth; (*b*). to disengage the escapement rods from the escapement levers; and (*c*). to lock the key levers. This means three distinct acts, all of which must be performed *seriatim* before the magazine is taken off the machine. After the substitute magazine has been mounted on the machine frame, the three acts just mentioned must be reversed also *seriatim*, making a total of six distinct acts.

The present invention provides simple and efficient means by which each set of three distinct acts can be effected simultaneously and exactly, the second set being effected by a mere reversal of the act which effected the first set.

Referring to the accompanying drawings which are to be taken as part of this specification and read therewith, Figure 1 is a side elevation from the right hand side of the machine, partly in section, showing the parts unlocked, *i. e.* in composing position: Fig. 2 a horizontal section on line 2—2 of Fig. 1: Fig. 3, a vertical section in a plane parallel with that of Fig. 1 and showing the parts in the same position as in that figure: Fig. 4, a side elevation from the right hand side of the machine, showing the parts locked by the present invention: Fig. 5, a vertical section in a plane parallel with that of Fig. 4 and showing the parts in the same position as in that figure: Fig. 6, a perspective view of the right hand end of the matrix-escapement locking-shaft, looking at it from the front: Fig. 7, a detail front elevation illustrating the application of the improved escapement-lever locking-mechanism to a multiple magazine machine; and Fig. 8, a detail elevation from the right hand side of the machine, corresponding therewith.

1, 1 are portions of the frame of the machine; 2, a portion of the frame that supports the magazines; 3, the front portion of a magazine; 4, 5, the two leading matrices in the right hand groove of the said magazine; 6, 7, the pawls of the escapement lever 8, it being that one of the set of escapement levers that controls the release of matrices from the said groove; 9, the spring that constantly urges the lever 8 to withdraw its pawl 6 from before the matrix 4; 10, the right hand one of the set of escapement rods; 11, its spring; 12 its cam lever; 13, its tumbler; 14, the right hand one of the set of key lever rods; 15, the respective key lever; 16, 17 the pawls of the escapement lever 18, it being that one of the set of escapement levers that controls the release of matrices from the groove next to the one above mentioned; 19, the respective escapement rod; 20, its spring; 21, its cam lever; 22, its tumbler; 23, the respective key lever rod and 24, the respective key lever. All the above parts are fully described in the specifications of Letters Patent 436532, September 16th 1890, and 531266, December 18th 1894.

The means provided by the present invention are as follows.

25 is a rock shaft, the function of which is to lock the escapement levers in the position that will prevent any matrices escaping through the delivery mouth of the magazine. It is, therefore, supported in suitable bearings 26 in a line parallel with the row of

escapement levers and adjacent thereto, and that side of it which is next to the said row, is adapted by being turned about its axis in one direction to bear down upon the row of levers so as to lock them against the action of their springs 9. This adaption may consist of a series of fingers projecting from the said face—one finger for each escapement lever—or a groove lengthwise of the said side and having a face 27 near enough to the row of levers to so engage them all when it is so turned. The shaft 25 is on the same side of the latter as are its row of escapements. The drawings show the shaft behind the said row, but it may be in front of them, although it is thought that the position in this respect shown, is the most convenient one, especially when the escapements have their front pawls withdrawn from the magazine by springs rocking their tails up.

Each escapement rod has a notch 28 in its rear edge, all the notches being of the same size, shape, and position, so that when all the rods are out of action, the notches form a slot. Immediately behind and parallel with the row of escapement rods, there is a second rock shaft 29 mounted to turn in the frame 1. The function of this rock shaft 29 is to disengage all the escapement rods simultaneously from the tails of the escapement levers and to assist in engaging them with the tails of the escapement levers of the substituted magazine. The front face of it, therefore, carries a bar 30 projecting from it towards the front and standing in all the notches 28. The top of this bar has a ridge 31 on it and the tops of the said notches are undercut as shown at 32 to receive the said ridge so that when the shaft 29 is turned from the escapement rods, the ridge 31 disengages the top ends of the escapement rods from the tails of the escapement levers and holds them disengaged therefrom as shown in Fig. 5. The bar 30 and ridge 31 may be replaced by a series of fingers of equivalent shape—one finger for each escapement rod.

Immediately behind and parallel with the row of key lever rods 14, there is a third rock shaft 33 mounted to turn in the machine frame. Its function is to lock the key board (which it does by locking the said rods 14 against being raised so that the key levers cannot then be depressed) and to unlock it again after the substituted magazine is in working position on the machines. To enable it to do this, each rod 14 has a face 34 in or on its rear edge, and down upon which, a face 35 in or on the shaft 33 can be brought when the latter is turned in the right direction, thereby locking the keyboard. The reversal of the shaft 33 rocks the face 35 out of the upward path of the faces 34, thereby unlocking the keyboard. All the faces 34 are necessarily in the same horizontal plane, in order that a turn of the shaft 33 through a given arc may affect them all equally. They may be either the bottom side of notches as shown, or projections from the rods 14. The face 35 may be replaced by a series of fingers occupying the same radial position on the shaft 33—one finger for each rod 14.

The three rock shafts 25, 29 and 33 are actuated simultaneously in each direction by a single bar 36 which can be reciprocated vertically in suitable guides 37, 38, fixed on the side of the machine. This reciprocation is effected by a lever 39 presenting its grip within easy reach of the operator, fulcrumed at 40 on the side of the machine frame, and having its rear end connected with the bar 36 by a pivot 41. The arcual motion of this pivot 41 may be compensated for by the guides 37, 38, being wide enough to allow the bar 36 to rock laterally therein. The lever 39 is fitted with a releasable automatic lock to lock it to the machine frame 1 when it is not required for use, such lock consisting of a locking bolt 42 fast to a lever 41^a which is also fulcrumed on 40, the bolt 42 working through a hole 43 in the lever 39 and made, by a spring 44 which is resilient between the levers 39 and 41^a, to enter a socket 45 in the machine frame 1 when the lever 39 is in the composing position, and a second socket 46 when it is in the locked position.

The shaft 33 is connected to the bar 36 in such a way that the rise of the latter shall make the former bring its face 35 down upon the faces 34, and the reversal of it make the said shaft 33 take the said face 35 out of the upward path of the faces 34. Any suitable connection may be employed for the purpose. We propose the one illustrated. It consists of a lug 47 projecting from the bar 36 and having a horizontal slot 48 in it, which slot engages with a stud 49 projecting into it from the shaft 33, the stud being fast to the said shaft and sufficiently eccentric to the axis thereof, for the elevation of the lever 39 to bring the face 35 down upon the faces 34 & for the depression of it to turn the face 35 out of the upward path of the faces 34.

The shaft 29 is connected to the bar 36 in such a way that the rise of the latter shall make the former raise all the escapement rods and move them all to the rear; and the reversal of it, make the said shaft move the said rods to the front again and drop them again, it being clearly understood that the raising and moving of the escapement rods does not begin until after the escapement levers shall have been locked. Any suitable connection may be employed for the purpose. We propose the one illustrated. It consists of a cranked pin 50 fast to the end of the shaft 29, projecting to the front, and laterally into a slot 51 in the bar 36. This slot 51 is so positioned, proportioned, and shaped, that when the lever 39 is in the composing position, the top of the said slot is down upon

the pin 50, that the bottom of the said slot comes up to the said pin at the moment, or at any rate, not before, the bar 36 overtakes the push piece 52 described further on, and that it shall allow of the arcual element in the motion of the said bar.

The shaft 25 is connected to the bar 36 through the top of the latter, but in such a way that the rise of this bar 36 shall lock all the escapement levers before the escapement rods shall have been disengaged from the escapement levers, for if such locking did not precede the disengagement, the springs 9 would withdraw all the front pawls 6 from before all the leading matrices 4, and the latter would drop out of the magazine. It has already been explained how the disengagement just referred to is delayed. Any suitable device for enabling the rise of the bar 36 to so lock the said levers may be employed for the purpose. We propose the one illustrated. It consists of a push piece 52 sliding lengthwise within the bar 36, a spring 53 resilient between the bar 36 and the said push piece, and a crank pin 54 projecting from the end of the shaft 25 behind the axis of the latter, the crank pin 54 and push piece 52 being kept in touch with each other by the spring 53 and the one 55 described further on. This spring 53 is strong enough to make the rise of the push piece 52 (and therefore the turn of the shaft 25) begin with the depression of the lever 39. The face 27 on the shaft 25 must be down on the escapement lever shoulders 58 before the bottom of the slot 51 comes up to the cranked pin 50. The spring 53 is, further, weak enough to allow of the continued rise of the bar 36, now necessary to turn the shaft 29 backwards.

55 is a helical spring on the shaft 25 always tending to turn it backwards and capable of doing so when the push piece 52 is not opposing it.

56 is a detent on the magazine 3, adapted to drop behind a shoulder 57 on the shaft 25 as soon as the face 27 is down upon the escapement lever shoulders 58, thereby coöperating with the spring 55 to lock the shaft 25.

The invention acts as follows. All the matrices having been distributed into the magazine, the operator disengages the locking bolt 42 from the socket 45, depresses the lever 39 and allows the spring 44 to reëngage the bolt 42 in the socket 46. The consequent rise of the bar 36, first locks the escapement levers, secondly disengages the escapement rods from the said levers and holds them so disengaged, and thirdly, locks the key levers, the locking of the key levers being effected simultaneously, or practically so, with the disengagement of the escapement rods, and both after the locking of the escapement levers. The operator then engages the detent 56 with the shaft 25. The magazine is now ready for being taken off the machine. As soon as the substitute magazine is on the machine, the crank pin 54 on its shaft 25 then resting on the push piece 52, the operator disengages the locking bolt 42 from the socket 46 and, raising the lever 39, allows the spring 44 to engage the bolt 42 in the socket 45 again. He also disengages the detent 56 from the shaft 25. The consequent drop of the bar 36, first, unlocks the key-levers; secondly, reëngages the escapement rods with the escapement levers, both unlocking and reëngaging taking place simultaneously, or practically so, and thirdly, allows the spring 55 to unlock the escapement levers, thereby completing the change.

Figs. 7 and 8 illustrate the application of the present invention to a multiple magazine machine having any convenient number of magazines 3, 3^a, 3^b, 3^c, etc., superposed one above the other, and escapement rods extending from the key lever rods only as far as the escapement levers of the bottom magazine 3. The connections between the escapement rods below, and the escapement levers of each of the magazines 3^a, 3^b, 3^c, etc. above, the bottom magazine 3, may be of any convenient kind, such *e. g.*, as that described in the specification of Letters Patent 787817, April 18th 1905, or in that of 848771, April 2nd, 1907. In any case, each of the magazines above the bottom one 3, is fitted with a rocking shaft 25 having a face 27, a crank pin 54, a spring 55, a detent 56 and a notch 57, which parts, together with the respective escapement levers and their springs, may be attached to either the upper or the under side of the respective magazine. The means for disengaging the escapement rods from and reëngaging them with, the escapement levers, as well as the means for locking the key lever rods, are the same as described with reference to Figs 1 to 6. The push piece 52 is replaced by a vertical bar 60 adapted to be, operatively, a continuation of the bar 36, by being connected to the latter in the same way as in the push piece 52. The bar 60 is continued as far as the top magazine. It is provided with a series of transverse crank-pin turners 61, one for each magazine including the bottom one 3. These turners 61 are so positioned in the bar 60 that when the latter is in its lower position and the shafts 25 turned to the rear by their spring 55, the top of each turner 61 shall be on a level with the under side of the respective crank pin 54 in order that when one of the turners 61 is pushed through the bar 60 towards the said crank pin, it shall stand under and in touch with the latter, in the same way as the push piece 52 stands under and in touch with its crank pin. Each turner 61 can be engaged with, or disengaged from, the respective crank pin 54 at the will of the operator, and independently of all the

other turners. The figures show the bars 36 and 60 and all the turners 61 raised; and the escapement levers of the top magazine locked, because the respective turner 61 had been pushed in under the respective crank pin 54 before the bars 36 and 60 were raised. To allow of the engagement and disengagement of a turner 61 with its crank pin 54, a turner slides in a suitable guide in the bar 60; has a head 62 on its outer end suitably shaped for the operator to take hold of, pull it out, and turn it; and a transverse pin 63 fast to it, working in a slot 64 in the bar 60 and so positioned in the turner 61 that pushing the latter into engagement with the respective crank pin 54, pushes the pin 63 out of the slot 64, when a turn of the turner 61 will lock it in engagement with its crank pin 54 by making the pin 63 engage with the inner and unslotted face of the bar 60. 65 is a spring resilient between the bar 60 and a head 62 to disengage a turner from its crank pin 54 as soon as the former has been turned far enough to make the pin 63 register with the slot 64.

We claim:—

1. The combination in a linotype machine, of means for locking the escapement levers; means for disengaging the escapement rods from the escapement levers and holding them disengaged; means for locking the key board; and means common to the said three means, for actuating them by a single movement in one direction and for reversing them by a reversal of the said movement.

2. The combination with the matrix magazine of a linotype machine capable of being detached from and replaced upon the same and having a series of escapement levers, of a rock shaft parallel therewith and adapted by having a coöperating face, to lock the said levers when it is turned in one direction and to unlock them when it is turned in the opposite direction; a spring turning the shaft to unlock them; and a detent to hold the shaft in the locking position against the influence of the spring.

3. The combination in a linotype machine, of reciprocating key lever rods having faces; a rock shaft having a face coöperating with the said faces to either lock or unlock the said rods according to the direction in which it is turned; escapement rods; escapement levers actuated by the said rods and from which levers the said rods are detachable; a rockshaft; connections between the latter and the escapement rods, adapted to disengage the said rods from the said levers and to reëngage them, according to the direction in which the said rod is turned; a matrix magazine; a rock shaft having a face coöperating with the said levers to lock or to unlock them according to the direction in which it is turned; a spring tending to turn the said shaft to unlock the said levers; a reciprocating bar to actuate the said rock shafts; connections between them and the said bar; and means for actuating it.

4. The combination in a linotype machine, of means for disengaging the escapement rods from the escapement levers and holding them disengaged; means for locking the keyboard; and means common to both the said means, for actuating them both by a single movement in one direction, for holding the escapement rods disengaged and the keyboard locked, and for reversing both the said means by a reversal of the said movement.

5. The combination in a linotype machine having more than one magazine and escapement levers carried by each magazine; of means carried by each magazine for locking the escapement levers; means for disengaging the escapement rods from the escapement levers and holding them disengaged; means for locking the keyboard; means common to the said three means for actuating them all by a movement in one direction and for reversing them by a reversal of the said movement; and means for connecting the said actuating means to the escapement lever locking mechanism of any one of the magazines.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

JOHN GLENNIE HOLBOURNS.
HENRY ALEXANDER LONGHURST.

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