June 10, 1930. J. R. ROGERS 1,762,890

TYPOGRAPHICAL CASTING MACHINE

Filed Feb. 4, 1929 4 Sheets-Sheet 1

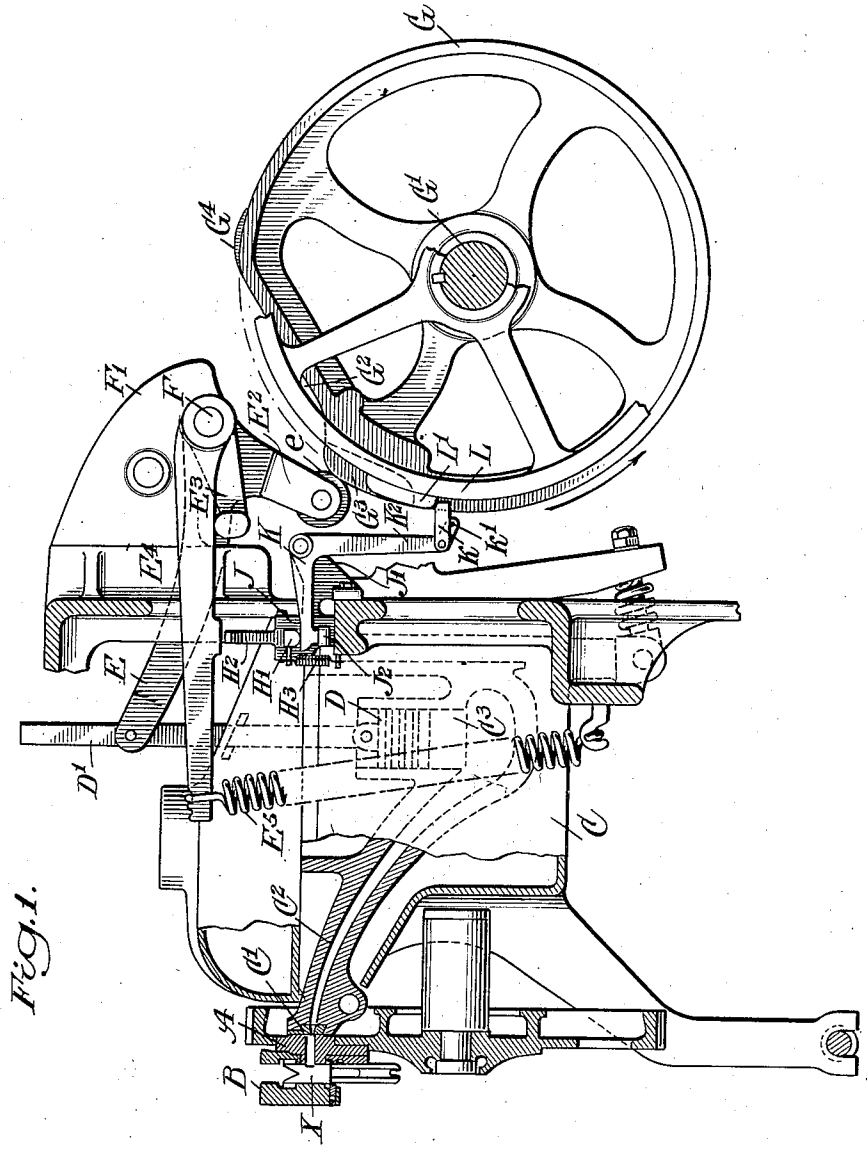


FIG. 1.

INVENTOR
John R. Rogers
BY
Morrison Kennedy & Campbell
ATTORNEYS

June 10, 1930. J. R. ROGERS 1,762,890

TYPOGRAPHICAL CASTING MACHINE

Filed Feb. 4, 1929 4 Sheets-Sheet 2

Fig. 2.

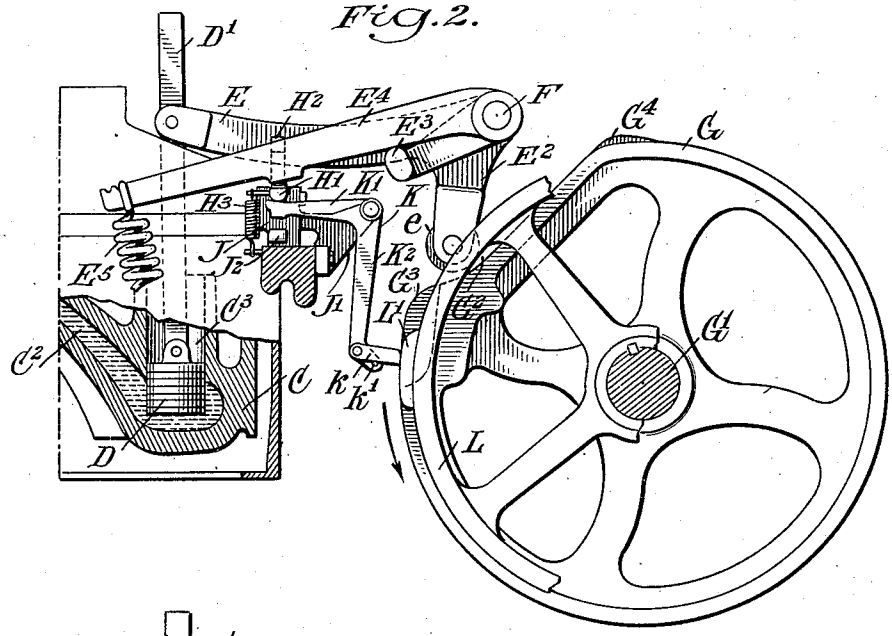
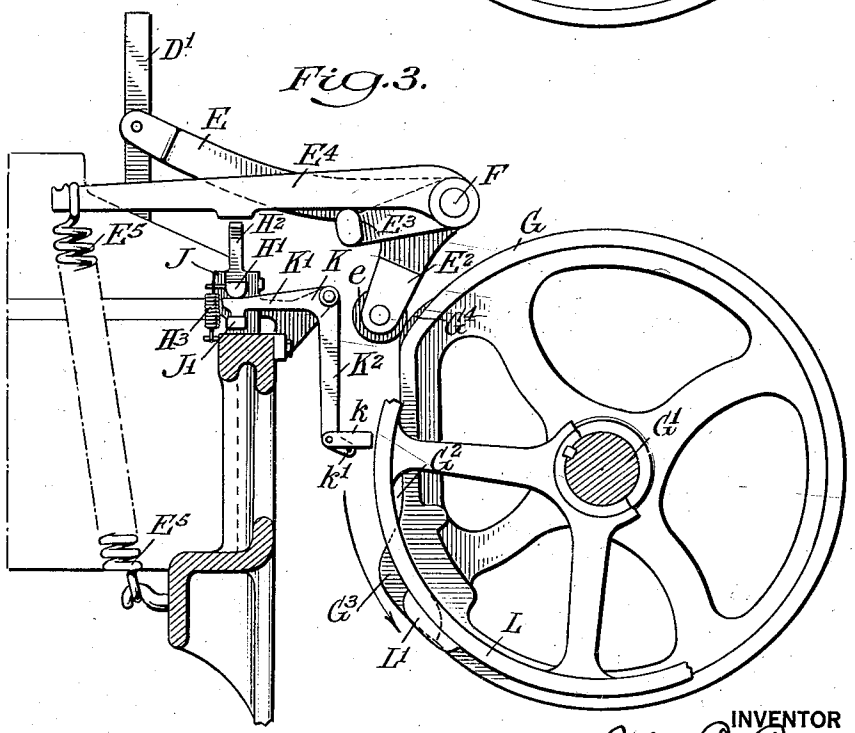


Fig. 3.



INVENTOR
John R. Rogers
BY
Morrison Kennedy & Campbell
ATTORNEYS

June 10, 1930. J. R. ROGERS 1,762,890

TYPOGRAPHICAL CASTING MACHINE

Filed Feb. 4, 1929 4 Sheets-Sheet 3

Fig. 4.

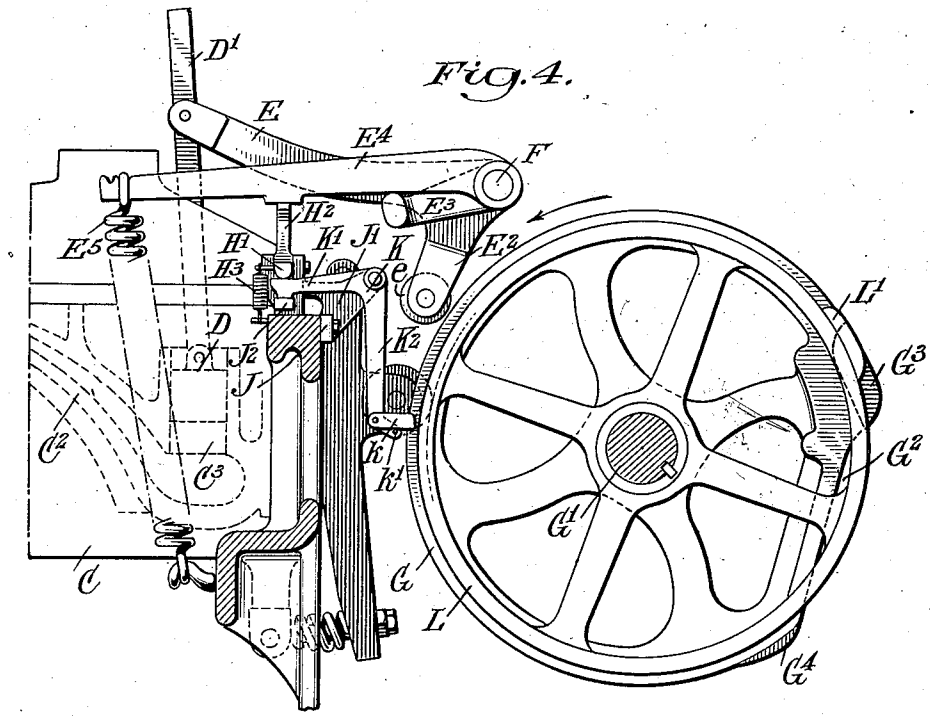
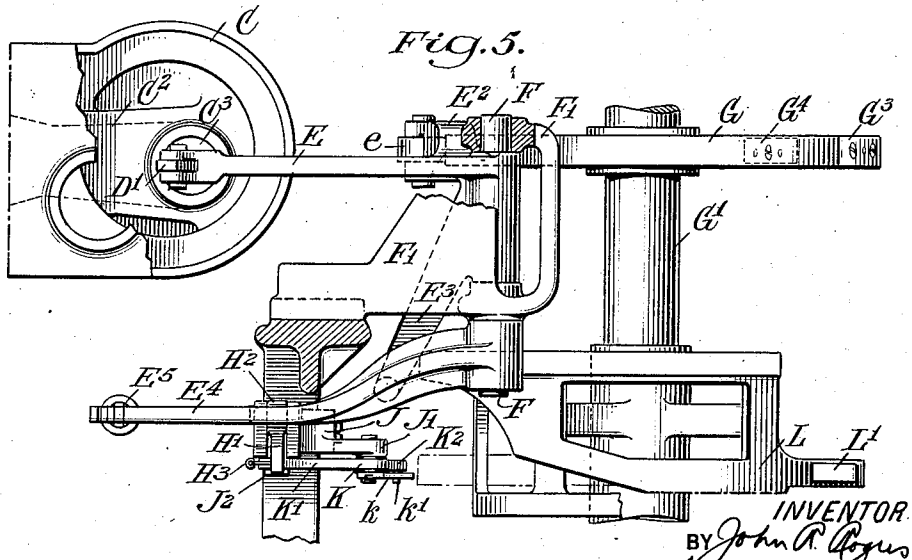


Fig. 5.



INVENTOR

BY John R. Rogers

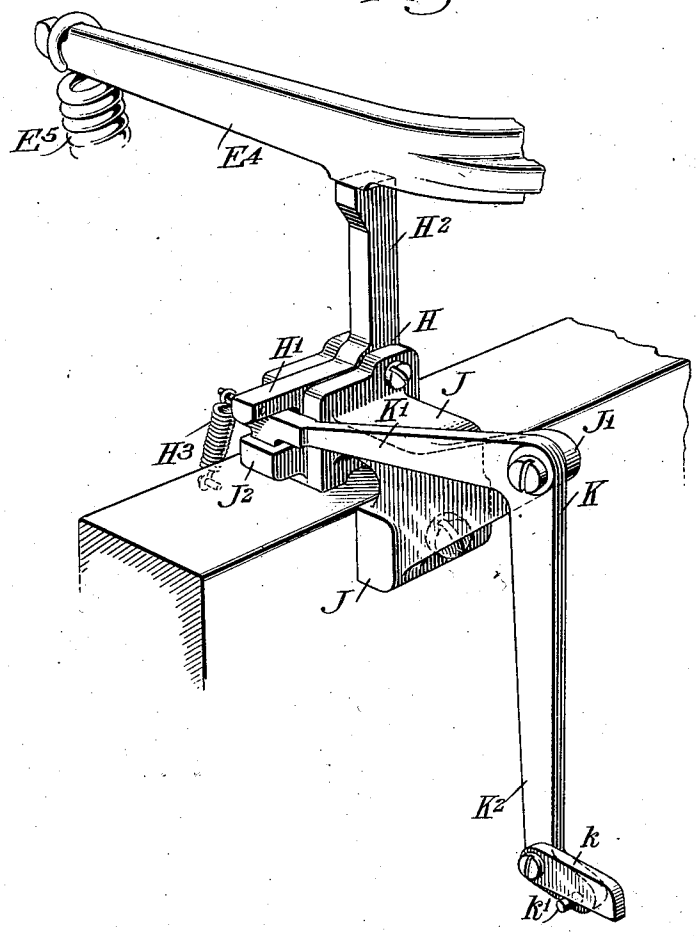
Morrison, Kennedy & Campbell ATTORNEYS

June 10, 1930. J. R. ROGERS 1,762,890

TYPOGRAPHICAL CASTING MACHINE

Filed Feb. 4, 1929 4 Sheets-Sheet 4

Fig. 6.



INVENTOR
John R. Rogers
BY
Morrison Kennedy & Campbell
ATTORNEYS

Patented June 10, 1930 1,762,890

UNITED STATES PATENT OFFICE

JOHN R. ROGERS, OF BROOKLYN, NEW YORK, ASSIGNOR TO MERGENTHALER LINOTYPE COMPANY, A CORPORATION OF NEW YORK

TYPOGRAPHICAL CASTING MACHINE

Application filed February 4, 1929. Serial No. 337,207.

This invention relates to typographical casting machines, such as linotype machines of the general organization represented in U. S. Letters Patent to O. Mergenthaler, No. 436,532, wherein a melting pot is arranged to deliver molten metal into a slotted mold and up against a composed line of matrices to produce a type bar or slug bearing on its edge type characters corresponding to the intaglio characters of the matrices. In these machines, the molten metal is introduced into the mold by means of a spring-actuated pump piston or plunger arranged within the pot and controlled in its action by a rotary cam, which makes one complete revolution for each cycle of operation of the machine. The cam is usually made of cast iron and is concentric thruout except at one point in its circumference, where it is formed with a recess or depression, which at the proper time permits the plunger to descend under the influence of its actuating spring to fill the mold with molten metal for the cast. Normally, however, the plunger is sustained by the cam in raised or inactive position against the tension of its actuating spring thru the medium of a so-called "pump lever," one arm of which is provided with an anti-friction roller bearing against the cam, and the other arm of which is connected directly to the plunger rod. As the parts are thus arranged, the roller is caused to ride idly upon the cam under the constant pressure of the pump actuating spring for approximately five-sixths of each cycle of operation of the machine (the inactive period of the plunger) and thereby subjects the cam to excessive wear. Thus, in linotype machines as ordinarily constructed, the axis of the anti-friction roller is seldom absolutely true or in parallelism with the cam shaft, and even though it should happen to be accurately positioned at the time of assemblying, normal shrinkage and expansion of the metal in the supporting bracket and adjacent parts, as well as the strains set up therein by the pump spring, frequently prevent the proper rolling contact between the roller and the cam. As a result, the outer edges of the cast iron cam chip and break off, the tracking surface of the cam often becomes deeply scored, and the operation is bumpy, noisy, and otherwise objectionable.

The present invention is intended to obviate these and other difficulties by relieving the cam of the pressure of the pump actuating spring while the plunger is inactive. To this end, it is proposed to lock said spring normally out of action and to release it momentarily, so that it may function as heretofore, at the time of casting. In the preferred embodiment illustrated, the means employed consists of a trip device arranged directly beneath the pump spring lever and controlled automatically from the main drive shaft of the machine. The exact construction and arrangement of the parts will be best understood from the detailed description to follow.

In the accompanying drawings, the invention has been shown merely in preferred form and by way of example, but obviously many changes and variations may be made therein and in its mode of application, which will still be comprised within its spirit. It should therefore be understood that the invention is not limited to any specific form or embodiment, except in so far as such limitations are specified in the claims.

Referring to the drawings:

Fig. 1 is a vertical section taken thru the casting mechanism of a linotype machine equipped with the present improvements;

Figs. 2, 3 and 4 are similar views, showing the parts in different relative positions;

Fig. 5 is a top plan view of Fig. 4; and

Fig. 6 is a detail perspective view, showing the improved trip device on an enlarged scale.

In Fig. 1, the parts are shown in the relative position they occupy after a composed line of matrices X has been justified and just prior to the commencement of the casting operation, the slotted mold A being closed at the front by the matrix line, which is presented momentarily thereto by a so-called "first elevator" B, and closed at the rear by the mouth-piece C^1 of a melting pot C. The pot C is formed with a throat or passage C^2 thru which molten metal is forced upwardly from the pot well C^3 by a reciprocating plunger D into the mold during the casting

operation. The plunger D is connected by means of a rod or link D^1 to the front or free end of a fore-and-aft rocking lever E, which latter is formed at its opposite end with an elongated bearing sleeve E^1 loosely mounted on a transverse rock shaft F. This shaft F is journaled in a fixed supporting bracket F^1 and is provided with two arms E^2, E^3, the former carrying an anti-friction steel roller *e* arranged to track upon the periphery of a rotary cam G fast to the main shaft G^1, and the latter being extended laterally beneath another fore-and-aft lever E^4 keyed or otherwise secured to the rock shaft F. At the front, the lever E^4 is connected to a long pull spring E^5, which is powerful enough to depress the plunger D and force a charge of metal under high pressure into the mold. With this known arrangement, the cam G, being formed with the usual recess G^2 in its periphery, and by reason of its engagement with the roller *e*, is capable of controlling the operation of the plunger thru the lever E; and the spring E^5 thru the engagement of the lever E^4 with the arm E^3 is capable of depressing the plunger to carry out the slug-casting operation, the latter operation being permitted when the recess G^2 is brought opposite the roller *e*. It will now be seen that, except at the moment of casting, the cam G sustains the pump plunger thruout each machine cycle of operation in its raised or inactive position against the tension of the spring E^5, and since the recess G^2 takes up but a comparatively short section of the cam track, the major portion thereof is constantly subjected to the wear and grind of the pump lever roller *e* under the heavy pressure of the pump spring.

In order to remedy this condition and overcome the difficulties arising therefrom, the present invention provides automatic means for relieving the pump lever of the tension of its actuating spring until just prior to the casting period, so as thus to remove the pressure of the pump lever roller upon the cam G during the time the pump plunger is inactive. Such means (as best shown in Fig. 6) comprises an angular trip dog H, which in the present instance is arranged beneath and in operative relation to the spring-actuated lever E^4. The dog H is centrally pivoted in a fixed supporting bracket J and presents a horizontal member H^1 and an upright member H^2, the latter in the normal position of the dog being adapted to sustain the lever E^4 against the tension of the spring E^5 and when the dog is rocked about its pivotal axis to move out of the path of said lever to permit its operation. The rocking of the trip dog H is effected thru its horizontal member H^1 by means of a bell crank lever K pivotally connected to a rearwardly projecting portion J^1 of the bracket J and arranged to operate in a plane disposed at right angles to the trip dog.

One arm K^1 of the lever K extends forwardly and terminates directly beneath the free end of the horizontal member H^1 of the dog H, where it is confined and restrained against vertical displacement by a lug J^2 formed on the bracket J. This lug is in no way essential to the operation of the device, but it insures a predetermined position of the lever K, which is important for reasons about to appear. The other arm K^2 of said lever extends downwardly and carries a finger *k* pivoted thereto near its lower end and resting normally upon a stud k^1 projecting transversely from the arm K^2. As shown in Fig. 1, the finger *k* is arranged so as to occupy a normal position immediately adjacent the peripheral face of a cam L, which is also mounted on the main shaft G^1 and provided with a shoe L^1, the latter being adapted during the normal operation of the machine to engage the finger and thereby actuate the lever K at the proper time. When the lever K is thus actuated, its forwardly projecting arm K^1 is forced upwardly and rocks the trip dog H so as to locate the upright member H^2 clear of the spring lever E^4, the return movement of the dog as well as that of the lever K being effected, after the shoe L^1 passes the finger *k*, by a light pull spring H^3 anchored to the frame work and connected to the free end of the horizontal member H^1.

To facilitate the rocking movements of the trip dog H, the spring-actuated lever E^4 is raised at the time out of contact with the upright member H^2, this being accomplished by making the customary anti-wear shoe G^3 (employed to form and define the leading end of the recess G^2) slightly higher than heretofore and by adding at the following end of said recess a second anti-wear shoe G^4 of corresponding height. Accordingly, immediately before and after the descent of the plunger D (shown respectively in Figs. 1 and 3), the roller *e* will be in contact with first one and then the other of these shoes and, thru the pump lever arm E^3, will support the lever E^4 momentarily clear of the dog H, thus permitting the latter to be rocked out of the path of the lever E^4 while the roller is in contact with the first shoe G^3, and later returned to its original position beneath said lever when the roller is engaged by the second shoe G^4.

It is frequently necessary in practice to "back up" the machine, that is, to turn the cam shaft G^1 by hand in the reverse direction to that in which it normally rotates, and if on such occasions the finger *k* should be engaged by the cam shoe L^1, it would merely be raised about its pivotal axis without disturbing the bell crank lever K. The parts are in this way insured against possible breakage which might otherwise occur while the

spring-actuated lever E^4 is supported by the trip dog H.

The operation of the parts is as follows; In Fig. 4, the machine is shown at rest with the lever E^4 supported against the tension of the spring E^5 by the trip dog H and the pump lever roller *e* sustained clear of the cam G by the buoyancy of the molten metal in the pot thru the pump lever E and the intervening connections. This relation of the parts remains unchanged until the shoe G^3, by rotation of the cam shaft G^1, is brought into contact with the roller *e* (see Fig. 1). By such contact, the rock shaft F is turned a few degrees in a clockwise direction and raises the lever E^4 out of contact with the trip dog H. At or about this time, the shoe L^1 on the cam L engages the finger *k* on the depending arm K^2 of the bell crank lever K and, as the cam shaft continues to rotate, pushes the arm K^2 forwardly. The other arm K^1 of the lever K is thus swung upwardly against the tension of the spring H^3 and rocks the upright member of the trip dog out of the path of the lever E^4 (Fig. 2). The latter is now free, and immediately the recess G^2 is brought opposite the roller *e*, the spring E^5 acts thru said lever to depress the pump plunger D in the manner before described. As the cycle of operation progresses, the pump lever E, as well as the spring-actuated lever E^4 are rocked upwardly by the cam track of the recess G^2 and the roller *e* is then engaged by the shoe G^4 (see Fig. 3), whereupon the lever E^4, thru the lateral arm E^3 of the lever E, is again lifted slightly further to clear the trip dog H and allow the spring H^3 to return the dog to its original active or locking position beneath the lever E^4. When the shoe G^4 passes beyond the roller *e*, the lever E^4 will come to rest upon the upright member H^2 of the dog H and thereby relieve the pump lever E, and hence the cam G, of the pressure from the spring E^5.

The pump cam G, as herein shown, is substantially the same in form as the one now used in the standard linotype machines, but with the present improvements, it will be obvious that it could be made in the form of a segment or segmental section having only sufficient area to embody the recess G^2 and might therefore be cast integral with one or the other of the cams immediately adjacent. In such case, however, the pump lever E and the spring lever E^4 should preferably be connected in a positive manner so that the former will be supported by the latter in their raised or inactive positions.

Having thus described my invention, what I claim is:

1. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring or equivalent means for actuating the plunger, and automatic means for locking the spring normally out of action and for releasing it momentarily during each rotation of the cam, for the purpose described.

2. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring or equivalent means for actuating the plunger, a cam shaft, a rotatable cam mounted thereon for controlling the operation of the plunger, and means controlled from said shaft for locking the spring normally out of action and for releasing it momentarily during each rotation of the cam.

3. In a typographical casting machine, the combination of a metal pot, a pump plunger therein, an operating lever therefor, a spring or equivalent means connected to the lever for actuating the plunger, a rotatable cam for controlling the operation of said lever, and automatic means for locking the spring normally out of action and for releasing it momentarily during each rotation of the cam.

4. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring or equivalent means for actuating the plunger, a cam for controlling the operation of the plunger, a trip dog movable into and out of operative position for locking the spring normally out of action, and automatic means for operating the trip dog to release the spring momentarily during each rotation of the cam.

5. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring-controlled lever for actuating the plunger, a cam for controlling the operation of the plunger thru said lever, a trip dog movable into and out of operative position for locking said lever normally out of action, automatic means for operating the trip dog, and means cooperating therewith for providing clearance between the lever and the trip dog to facilitate operation of the latter.

6. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring or equivalent means for actuating the plunger, a rotatable cam for controlling the operation of the plunger, a trip dog movable into and out of operative position for locking the spring normally out of action, a lever for operating the trip dog, and a rotatable cam mounted adjacent the plunger control cam for actuating said lever.

7. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring-controlled lever for actuating the plunger, a rotatable cam for controlling the operation of the plunger thru said lever, a trip dog movable into and out of operative position for locking said lever normally out of action, and automatic means for operating the trip dog, said plunger control cam being provided

with a pair of shoes or lugs arranged to co-operate with said means and adapted during each rotation of the cam to raise the plunger actuating lever clear of the trip dog to facilitate its operation.

8. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring-actuated and cam-controlled lever for operating the plunger, and automatic means serving normally to relieve the cam of spring pressure but operative at each cycle of operation of the machine to release the spring for the casting operation.

9. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring or equivalent means for actuating the plunger to effect casting, an automatic trip device adapted normally to lock the spring out of action, and means actuated at each cycle of the operation of the machine for releasing the spring for the casting operation.

10. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring for actuating the plunger, a rotary cam to control the operation of the plunger against the tension of its actuating spring, a trip dog for locking the spring normally out of action, a lever for operating the trip dog, a rotary cam for actuating said lever, and intermediate means whereby the latter cam is allowed to actuate said lever only while turning in one direction.

11. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring for actuating the plunger, a rotary cam to control the operation of the plunger against the tension of its actuating spring, a trip dog for locking the spring normally out of action, a lever for operating the trip dog, a rotary cam for actuating said lever, and a pivoted finger carried by the lever and arranged to engage the second cam whereby the latter is allowed to actuate the lever only while turning in one direction.

12. In a typographical casting machine, the combination of a metal pot, a plunger arranged to reciprocate therein, a spring for actuating the plunger, a rotary cam to control the operation of the plunger against the tension of its actuating spring, a trip dog for locking the spring normally out of action, and means actuated at each cycle of operation of the machine for operating the trip dog to release the spring for the casting operation.

In testimony whereof, this specification has been duly signed by:

JOHN R. ROGERS.