No. 623,075. Patented Apr. 11, 1899.

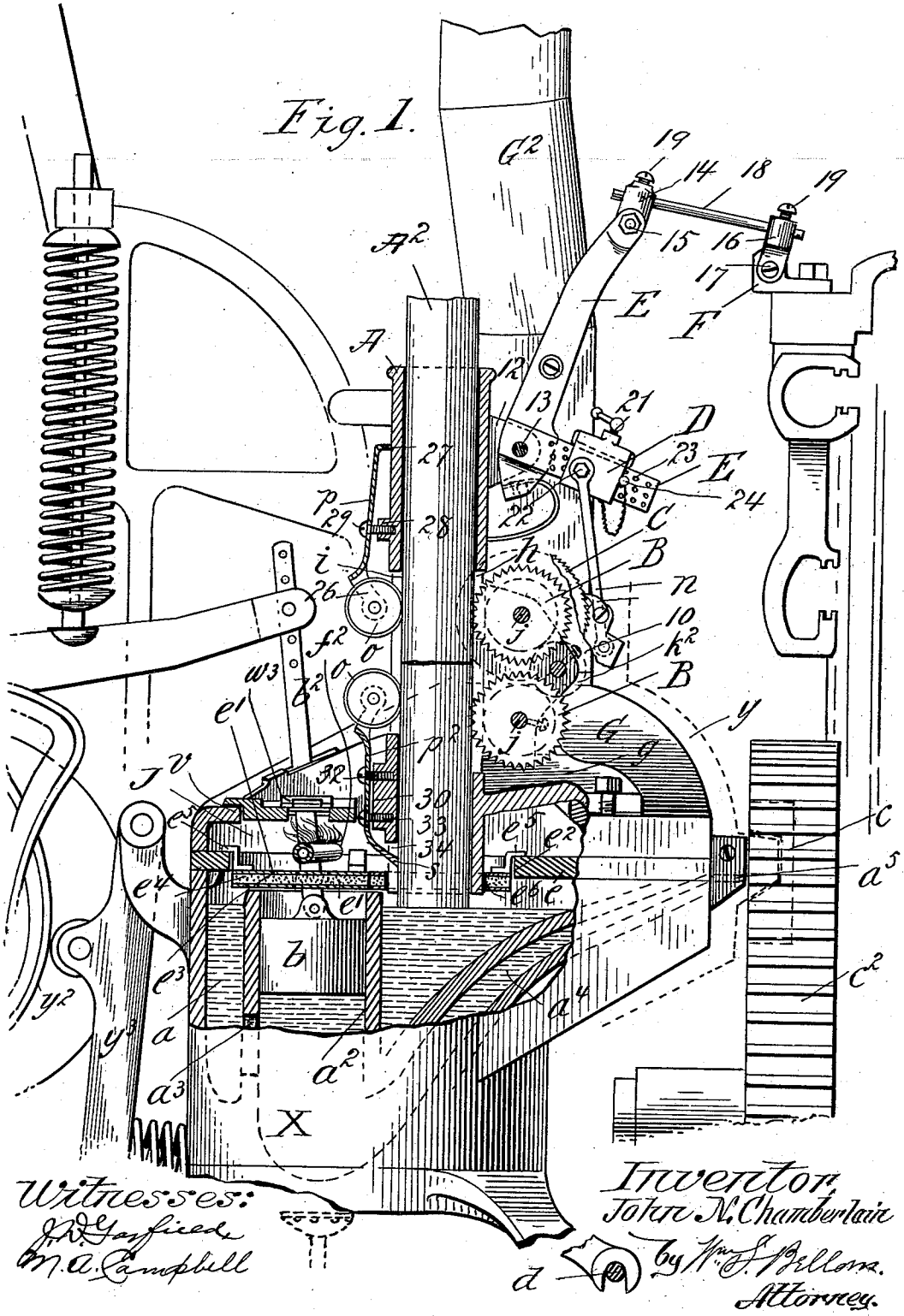
J. N. CHAMBERLAIN.

MECHANISM FOR FEEDING AND MELTING METAL.

(Application filed Mar. 31, 1898.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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No. 623,075. Patented Apr. 11, 1899.

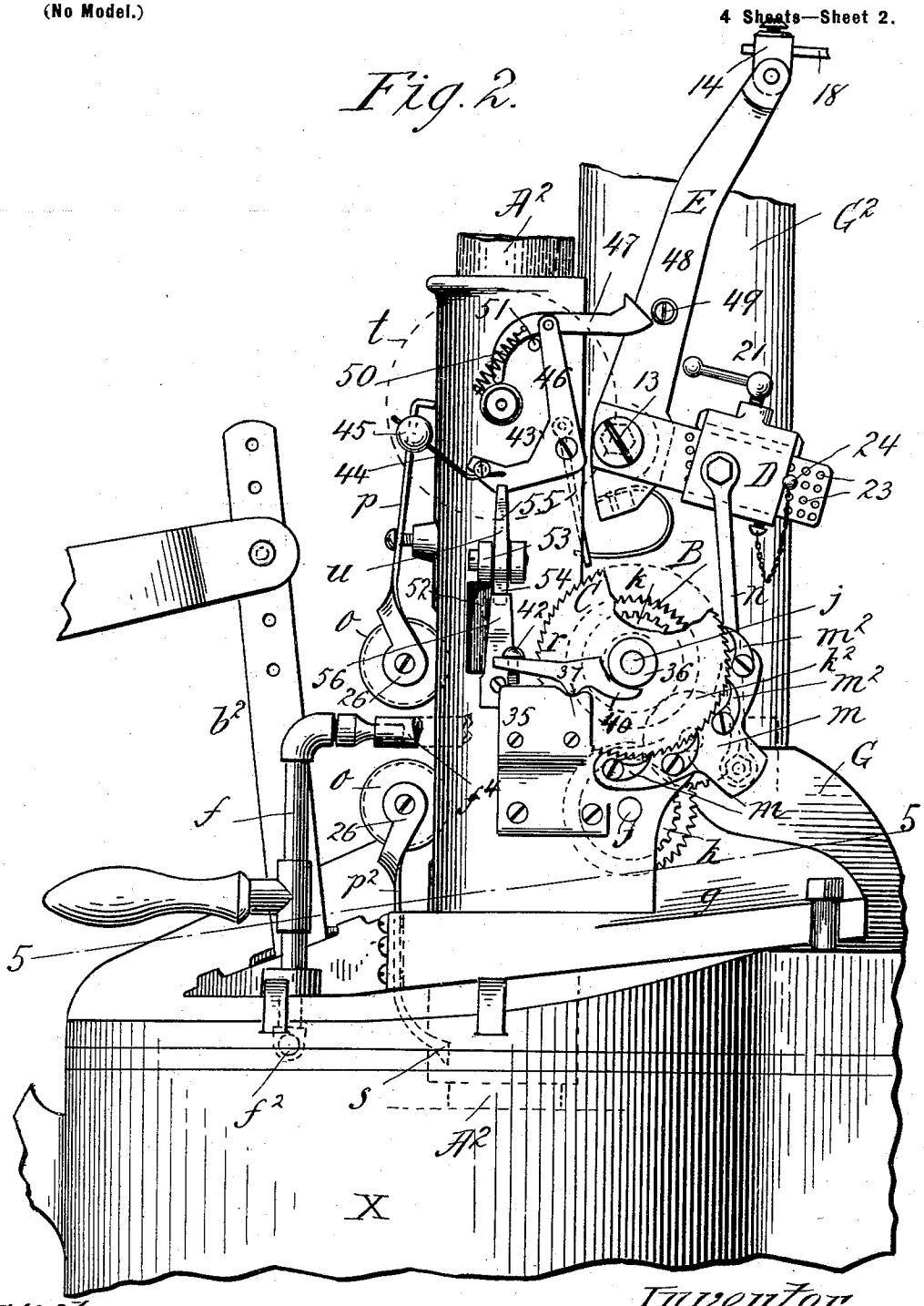
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MECHANISM FOR FEEDING AND MELTING METAL.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



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MECHANISM FOR FEEDING AND MELTING METAL.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

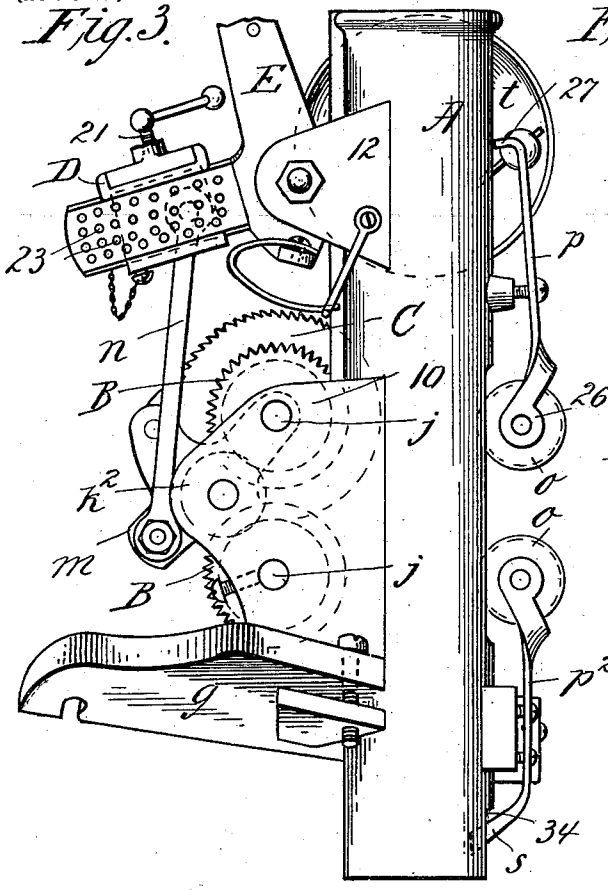


Fig. 4.

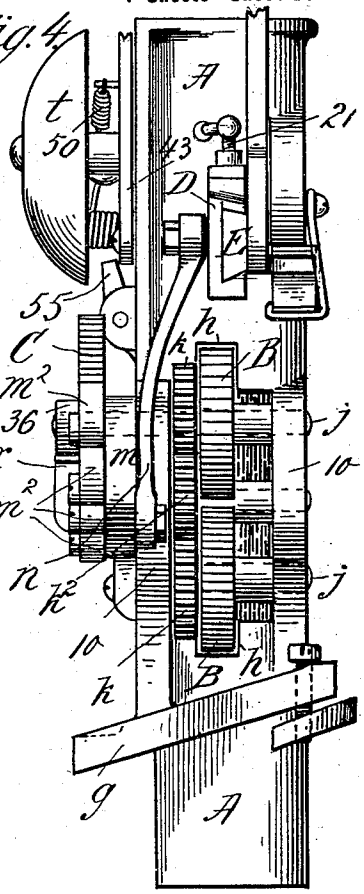
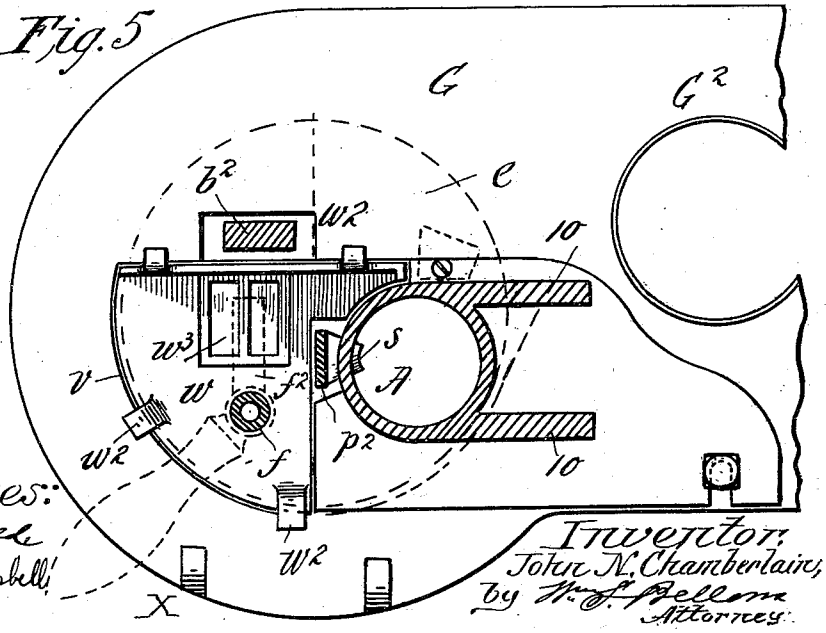


Fig. 5



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(No Model.) 4 Sheets—Sheet 4.

Fig. 6.

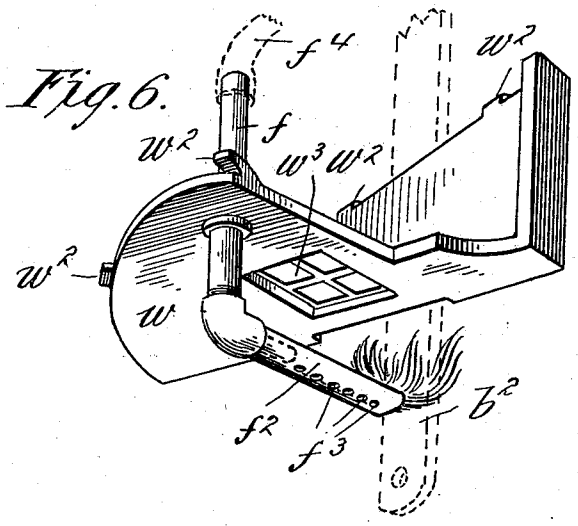


Fig. 7.

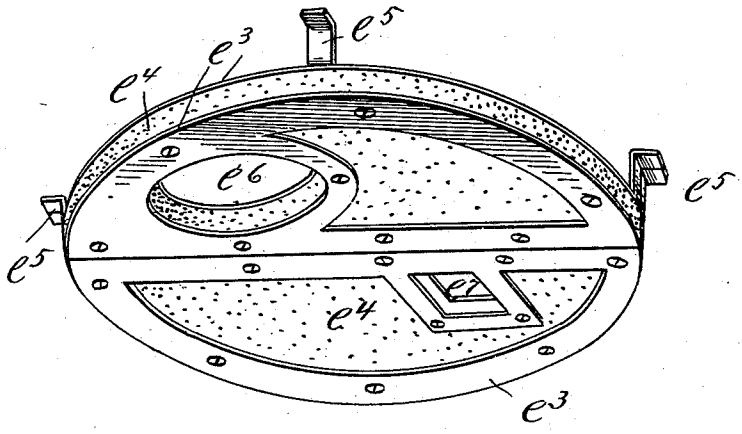
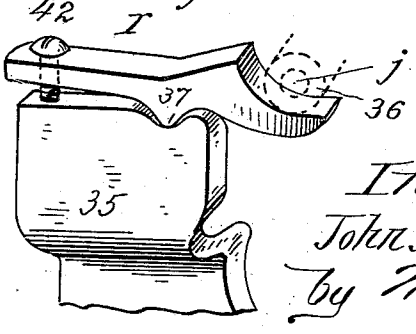


Fig. 8.



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UNITED STATES PATENT OFFICE.

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MECHANISM FOR FEEDING AND MELTING METAL.

SPECIFICATION forming part of Letters Patent No. 623,075, dated April 11, 1899.

Application filed March 31, 1898. Serial No. 676,017. (No model.)

To all whom it may concern:

Be it known that I, JOHN N. CHAMBERLAIN, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Mechanism and Apparatus for Feeding and Melting Metal, of which the following is a full, clear, and exact description.

This invention relates to mechanism for feeding metal to a melting-pot or to any melting apparatus therefor, being especially applicable for use in conjunction with a melting-pot for type-metal, from which pot the molten metal is discharged to be utilized in molding type or lines of type, or in conjunction with a melting-pot for metal for other purposes, one principal object of the invention being to provide a feeding device which has the capability of delivering the metal at an automatically-controlled rate, so that the metal to be melted shall be fed into the melting-pot substantially corresponding to the delivery.

An advantage aimed at and derived under the exercise of the present invention consists in the ability to maintain the melted metal at all times at a uniform heat and always in the same molten condition, whereby uniform results in the molded products are acquired, whereby deterioration and waste of the metal are avoided, and whereby the accumulations of dross are lessened. It is to be explained in this connection that where cold ingots of type or other metal to be melted are at irregular intervals introduced into the melting-pot it not only suddenly cools down the already-melted metal in the pot, but makes it almost impossible to maintain a uniformity in the condition of the metal to be delivered to make the castings.

Another object of the invention is to make provision against the admission of cold air to the top of the melting-pot and in such a way as not to interfere with the infeed of the metal or to be affected disadvantageously by the entrance-passage for the metal to be fed into the pot.

Another object of the invention is to provide, in combination with the feeding devices, means for preventing the tail-end portion of the bar or ingot being fed, after it has passed by the devices which actuated it, from falling into the pot.

Another object of the invention is to provide an automatic alarm, so that after a supplied bar or bars of the metal to be fed have been downwardly moved gradually to correspond to the metal delivery and it is required that a new bar or bars of metal be supplied in the feeder a warning will be given and this warning continued or repeated until the new metal is supplied, the presence of the newly-supplied metal placing the alarm mechanism in its non-sounding condition.

Another object of the invention is to provide devices for the purposes hereinabove stated that shall be of practical construction and susceptible of convenient and easy use and all in a manner apparent to persons who may not be disposed or able to give great attention to the appliances.

The invention consists in the combination, with a melting-pot and a suitable tube or guide for the bar or ingot of metal to be fed into the melting-pot, of a feed roll or rolls for engaging the bar and causing it to be moved through the guide and means for imparting intermittently a rotational movement to said roll or rolls; and the invention furthermore consists in the combination, with such a device, of pressure-rolls to bear on the opposite side of the bar or ingot being fed and to press the latter firmly against the feed roll or rolls and prevent the same from being bound or obstructed in its passage through the guide therefor.

The invention furthermore consists in the combination, in a device of the character hereinbefore referred to, of a brake device operative to prevent undue rotational movements of the feed-rolls, whereby the weight of the type-metal, which is considerable, will not result in its falling downwardly into the melting-pot.

The invention furthermore consists in the combination, with the melting-pot and metal-feeding devices delivering thereinto, of an alarm device operative to be sounded on the omission or the absence of a given or sufficient quantity of metal to be fed within the feeding mechanism.

The invention furthermore consists in the

combination, with a melting-pot having a reciprocating piston or pumping device for effecting the discharge of the metal intermittently from the pot through the delivery-passage of the latter, of a burner arranged in proximity to the plunger or actuating rod of the piston, serving to keep molten any accumulations of metal which may come thereupon for the purpose of preventing such accumulations of metal from clogging in the apertures in the cover of the pot through which the plunger-rod has its reciprocatory movement.

The invention furthermore consists in the construction and combinations of parts, substantially as will hereinafter fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings.

In Figure 1 the melting-pot for metal is illustrated in sectional elevation, the same comprising certain features of improvement and having in conjunction therewith the feeding mechanism for uniformly delivering the metal into the pot, which latter mechanism constitutes the greater part of the novelty in the subject-matter illustrated. It is shown in this view that there is relatively a movement between the melting-pot and the feeding device which is supported thereby and a machine understood as comprising a mold or matrix to which the metal is delivered, which movement is taken advantage of for the purpose of actuating the feeding mechanism. Fig. 2 is purely an elevation of the upper part of the melting-pot and an elevation of the feeding mechanism supported by the pot as seen from the same side as that from which Fig. 1 is taken. Fig. 3 is a side elevation of the feed mechanism as seen from the opposite side from which Figs. 1 and 2 are taken. Fig. 4 is an edge view or elevation of the feeding mechanism as seen at right angles to the last-named views. Fig. 5 is a horizontal section and partial plan view of the feeder and melting-pot, the plane of section being indicated by the line 5 5, Fig. 2. Fig. 6 is a perspective view of an appliance which constitutes, in part, the cover or device for guarding the top of the pot against the entrance of cold air thereinto, having combined therewith the burner, which operates to prevent the accumulations of cooling metal on the pump-plunger. Fig. 7 is a perspective view of the sectional cover for the melting-pot. Fig. 8 is a perspective view more especially illustrative of the brake appliance which operates in conjunction with the feed-roll.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, X represents a melting-pot for metal to be used for any purpose—such, for instance, as in the molding of type or lines of type or in making projectiles or any other articles. The melting-pot is shown as having a main chamber a for containing the liquid therein in a molten state and having therewithin a secondary chamber a^2, of cylindrical form, having an opening a^3, whereby the liquid metal may pass from the main melting-chamber into the secondary chamber under the piston or plunger, which acts in the manner of a force-pump to expel the liquid from the secondary chamber through the discharge-spout or hollow neck a^4, the delivery-orifice being indicated at a^5 in Fig. 1, and it will be mentioned incidentally that metal delivered from the melting-pot through the spout by the forcing action of the plunger is commonly delivered into a mold or matrix, the location of which is indicated by the dotted line c in Fig. 1, which mold or matrix may be one of a series or a single one mounted upon a rotatable carrier c^2 therefor. The melting-pot is here shown as having a rocking support at d, and a rocking motion is imparted to the melting-pot, whereby it has a swinging or reciprocatory movement, for instance, within the limits between the full lines and the dotted lines y in Fig. 1, and this rocking reciprocatory movement may be imparted by a cam of slight or gradual grade (indicated at y^2) operating against the cam-roller or lever y^3, which is jointed to a lug or earpiece of the melting-pot. This mechanism in itself constitutes no part of the invention, although the invention is in part dependent for its operation on means whereby movement is derived by some part which is utilized for actuating the feeders to be hereinafter described with particularity.

The melting-pot is provided at its top with a partial cast-iron cover e—that is, one which overlies only a part of the area of the pot—constructed with a circular hole e^2 therein. This circular hole has provided therefor the two-part cover or lid e', which is made of layers or frames of sheet metal e^3, and a thicker interposed layer e^4 of asbestos.

The cover-sections or matching circular halves have the angular supporting-lugs e^5, whereby they are sustained from the margin of the top boundary or partial cover e of the melting-pot.

The mechanism shown is constructed for the feeding of round bars of the metal to be melted, this cross-sectional form having been found preferable, although the invention is not limited to a feeder having capacity for operating on bars or ingots of any particular shape. One of the cover-sections has, to one side of the secondary chamber in the melting-pot and thereabove, a circular hole e^6, down through which the fed metal may pass. The other cover-section has a hole the position of which is indicated at e^7, Fig. 5, through which the pump-plunger-actuating rod b^2 has its movement.

The feeding mechanism comprises a more or less nearly vertical feed or guide tube A, preferably circular as to its internal passage, which is open from end to end, and this is exteriorly constructed with webs, flanges, lugs,

or earpieces, as will be hereinafter pointed out, for constituting supports for devices which contribute to constitute, in conjunction with the feed-tube, the feeding mechanism. The feed-tube A has at its lower part the horizontally and angularly extended base-lug *g*, whereby it is bolted or otherwise removably attached on the top of the melting-pot in a firm and rigid manner. The feed-tube has at its opposite sides, between its top and bottom, the vertical apertures *h* and *i*, and at either side of the margin of the aperture *h* the feeding-tube is integrally cast with the opposing earpieces 10 10, having formed therein the journal-supports for the two feed-rolls B B, which have serrated rims and peripherally enter within and through the aperture *h* in the one side of the feed-tube to have a feeding impingement against the portion of the bar or bars A^2 of the metal which is within the feed-tube adjacent the location of these feed-rolls. The said feed-rolls B B are fixed on their respective journal-shafts *j j*, on which shafts are provided spur-gears *k k*, with both of which mesh the intermediate spur-gear k^2, whereby when one of the feed-rolls is turned the other one must necessarily turn in the same direction. Upon the journal-shaft *j* of the upper feed-roll is a ratchet-wheel C, alongside of which is mounted for a rocking reciprocatory movement the pawl-carrying lever *m*, this lever supporting pivotally thereon one, or preferably, as shown, several pawls m^2, the arrangement of these pawls being such that their engaging points have different relative positions upon the teeth of the ratchet-wheel which they respectively engage, so that there will be practically no lost motion. This provision and arrangement of multiple pawls on a single carrier to operate in conjunction with a single ratchet-wheel is not a new device and is not herein claimed; but its employment is to be stated as a preferred one, as tending to mechanical perfection and the most satisfactory results.

Above the gear-united feed-wheels B B the feed-tube casting is provided with the earpiece 12, which forms a support for the adjustable actuator for the pawl-carrier, this device comprising the means whereby the amount of rotational movement of the feed-rolls, and the consequent extent of the feeding of the metal, may be much or little, as the purposes of the work in hand may demand, and this device, as shown, consists of the angular lever E, at its elbow pivotally mounted, as at 13, upon the said earpiece 12, its upwardly-extended arm being articulated to the part F, which is stationary in this case and mounted on the machine in conjunction with which the metal feeding, melting, and delivering mechanism is employed.

The particular purpose or character of this machine, which is no part of this invention, requires no special further mention herein.

The means by which the angular lever E is jointed to the fixture F, as shown, will be pointed out, as follows: The upper end of the lever has the extension-piece 14 secured thereto by the pivot or bolt 15. The fixture F has upwardly-extended above it the similarly-shaped extension-piece 16, this being pivotally mounted thereon, as indicated at 17. Both of these extension-pieces 14 and 16 are transversely perforated and receive through them the connecting-rod 18, which is held in confinement by the set-screws 19 19.

Of course it is manifest that any movement relatively between the melting-pot and the machine or fixture to which the lever E is articulated will cause a swinging reciprocatory movement to the said lever. This lever E has on its lower angular member the slide-block or clasp D, which may have a dovetail engagement with the arm on which it may be adjusted, a gib 20 being provided, against which the pressure of the confining or clamping device comprised in the screw 21 is received. The adjustable block D has by the rod *n* connection with the pawl-carrier.

It is possible to have the block D so placed on the lever-arm which supports it that the pivot 22, uniting the upper end of the rod *n* to said block, is coincident with the center of oscillation, which is the pivot 13 of the lever E, under which condition any reciprocatory movement of the angular lever will be without effect to operate the pawl-carrier; but of course, as the point of connection 22 is more or less distant from the center of oscillation of the lever E, correspondingly more or less will be the rotational movement on each of its impulses of the feed-wheels, resulting in a more or less extensive feeding movement bodily of the bar metal.

The side-block-supporting arm of the angular lever is provided with a series of sockets 23, each of which is at a different distance from the center of oscillation 13, and a stop-pin 24 is removably provided in one or another of these sockets, as desired, for the purpose of convenience in adjustment of the block D to insure any feed-throw of the ratchet-wheel. Manifestly, after loosening the clamp-screw 21 by placing the stop-pin 24 in the proper one of the sockets which is determinative of the required throw and moving the block D hard against said stop-pin and again confining the block, this operation is one of entire convenience and may be performed by any person having only moderate familiarity with machinery.

The bar metal is to be provided approximately, though slightly smaller than the passage through the feed-tube A^2, and a pair of pressure-rolls *o* are provided, spring-mounted at the opposite side of the feed-tube from the feed-rolls B B, these pressure-rolls bearing upon the bar metal and pressing it firmly against the toothed feed-rolls. The upper pressure-roll *o* is shown as pivoted between the opposite earpieces 26 of the flat spring *p*, which spring has its upper end inwardly

turned, as shown at 27, to rest against the outside of the feed-tube, and the feed-tube casting is provided at a point between the ends of the spring p with the boss 28, into which passes the shank of the screw 29, the head of the screw serving to place the spring under more or less stress, accordingly as the screw is turned in more or less, whereby the pressure-bearing of the roller upon the metal bar may be as required.

The lower pressure-roller is carried at the upper end of a similar spring p^2, which intermediately of its length overlies the boss 30 and has the pair of screws 32 33; but in respect of this lower roller-supporting spring its lower inwardly-turned extremity s, instead of having the resistant therefor constituted by the side of the tube, enters through an aperture 34 near the lower end of the tube and finds its resistant to be constituted by the bar metal being fed. Inasmuch as the lengths in which the bar metal is placed into the feed-tube for convenience are not very great, the said inturned end s insures that the fag ends of the metallic sections or bars of the metal after they have passed the nipping or feeding action of the feed-rollers B B will be restrained from falling into the melting-pot, but will only be introduced into the pot as the newly-supplied bar thereabove forces it down under the operation of the feed-rollers.

It will be apparent that if the mold cavity or matrix up to which the delivery-orifice of the melting-pot is brought at the delivery period and from which it recedes is comparatively small, so that a slight quantity of molten metal is injected thereinto. It is required that the adjustable block D be considerably inwardly adjusted toward the center of oscillation 13, while in cases where the mold-cavity is much larger the block D requires to be correspondingly further outwardly adjusted, and by numbering the sockets 23 or having it determined the extent of variation in feed which an adjustment between one and another will insure, it becomes easy to nicely govern and regulate the feed of the metal into the pot to accord with the delivery of the metal therefrom.

Adjacent the journal-supports for the arbor or journal-shaft on which are fixed both the ratchet-wheel and one of the feed-wheels B, formed on or secured to the tube-casting, is the bracket or lug 35, on which is mounted a brake device r, which coacts with the said arbor j of the ratchet-wheel and feed-wheel, or, what amounts to the same thing, the brake coacts with a hub 36, extended from the face of the ratchet-wheel, which is fixed as one to the arbor. As shown, this brake is constructed in the form of a bar 37, having at its lower side a V-shaped projection 38, by which it has a fulcrum-support in a depression 39 therefor in the upper edge of the bracket-lug 35. One extremity 40 of the bar is curved to bear peripherally against the hub 36 of the ratchet-wheel, while through the other extremity of this brake-bar passes the screw 42, which enters into the bracket and serves, by being screwed down more or less, to regulate the braking-pressure on the feed-wheels, so that they are only capable of movement as they are positively actuated by the mechanism described against the braking-contact applied. Such braking-contact is sufficient to prevent the weight of the bar metal rotating the feed-wheels at the intervals between the feeding impulses, whereby it might be precipitated into the pot.

The alarm device, which is constructed and arranged so as to be sounded at each feeding operation of the mechanism in the absence of properly-supplied quantity of the bar metal to be fed in the guide-tube and to be restrained from being sounded while the bar metal in sufficient quantity is within the feeder, will be now described.

A gong-bell t is mounted on a boss therefor on the side of the tube-casting which is at right angles to the side at which the feed-rolls are located. Pivotally mounted on the same side of the casting, adjacent the bell, is an angular lever 43, having the spring extension-arm 44, provided with the striker or hammer 45. The other arm 46 of the hammer-lever is provided with the intermediately-pivoted lever or dog 47, having the hook 48 at its extremity suitably adjacent the plane of traverse of the upper arm of the operating-lever E, said lever having the stud 49 to engage the dog in each of its reciprocations and to cause it, as it draws the latter forward, to swing the hammer-lever 43 in a direction to cause the hammer to recede from the inner surface of the gong against which it is adapted to strike.

As the parts are viewed in Fig. 2, when the engaging stud after engaging the dog is moved partially to its limit at the right, the dog in necessarily swinging in a downward forward course becomes disengaged from the stud by the cam action of the fixed stud s' against the curved arm of the dog, and the hammer-lever rebounds toward the bell under the reaction of the spring 50, which is applied to the left-hand member of the dog, and which spring serves the double purpose of returning the hammer-lever and also of causing the dog to assume the position with its hook end uppermost to be again engaged by the said stud 49 the next time the upper arm of the lever E is moved toward the feed-tube.

Now in so far as the alarm mechanism described to the extent as above is concerned the bell would be sounded at each reciprocation of the lever E; but there is provided in conjunction with the mechanism as above pointed out a device which is operative to prevent the striker contacting against the gong to sound it or to permit the striker to contact, according as to whether this device is controlled by the presence or non-presence at some given point in the tube of a portion of the bar metal. There is therefore pro-

vided through the feed-tube casting the aperture 52, above which are the earpieces 53, in which is intermediately pivoted the lever *u*, one member or finger 54 of which is adapted to enter a suitable distance through said aperture 52 within the feed-tube passage, while the other member 55 is adapted to have a position either across the plane of movement of the hammer-lever to obstruct it from having its full throw or outwardly removed from such plane, whereby the hammer-lever may have its full throw and sound the gong, and of course it is apparent that so long as there is an absence of the bar metal sufficient to fill the feed-tube at least up to the position of the finger or lever member 54, which enters the tube-aperture, the gong will be repeatedly sounded at every actuation of the feeder mechanism, and the attendant will be thereby notified to insert one or more new bars or sections A^2 of the metal into the tube, the action of which is to force the lower lever member 54 outwardly against the force of the spring 56, applied thereagainst with an inward pressure, and correspondingly place the upper lever member 55 in the hammer-obstructing position.

Referring to Fig. 1 of the drawings, it will be perceived that the melting-pot above its sectional top $e\ e^2\ e^3$ is surmounted by a casing or hood G, more or less of a dome shape, having the stock or pipe G^2, the interior of the pot communicating with the hooded chamber through a suitable opening, and this inclosed upper chamber receives the fumes from the molten metal.

The hood G of the melting-pot directly supports the feeder mechanism, which is bolted thereto, and it has at one side a semicircular opening *v* in its top like a trap-door, which is in part overlaid by the base-flange *g* of the feeder-body, while the remaining quadrantal portion of this opening is overlaid by the correspondingly-shaped cover *w*, of brass or other suitable metal or material, supported by the lugs w^2 upon and within the margin of the opening. The vertical member of the burner-tube *f* is supported by this cover *w*, it passing through a perforation therein and has the angularly-bent burner member f^2, with the perforations f^3 for the entrance of air thereinto to commingle with the gas passing through the burner-tube and issuing for combustion at the forward open end thereof to impinge against the pump-rod b^2 at the part thereof which is within the chamber J, constituted between the hood-top and the cover-sections aforementioned, somewhat below. A flexible or other gas-conduit f^4 leads to connection with the burner-tube *f* for supplying a very small, yet sufficient, quantity of gas to the burner for combustion with chamber J. The reciprocating pump plunger-rod b^2, receiving thereon more or less molten metal from the secondary chamber in the pot, which metal may force its way upwardly around and past the plunger, is by the burner f^2 so heated as to be prevented from cooling and clogging in the passages through which the plunger-rod plays with a close fit. The isinglass-covered aperture w^3 permits to be seen if the burner f^2 is burning and whether more or less.

It is to be remarked that the metal in the pot, heated to a molten state by a burner located below the pot, is kept at a more uniform heat and consistency by not only preventing cold air from reaching it from above, but providing the heating-chamber above the pot, through which the lower end of the feed-tube A passes, the heat is utilized to heat the lower end of the metal passing into the pot, also to extend more or less to heat the top of the metal, so that less gas is required at the lower burner. Without this provision while the metal in the bottom of the pot would be sufficiently heated the metal in the top would harden or freeze under many circumstances. The introduction of cold metal, even when fed gradually into the pot, causes a variation in the condition of the metal from which the castings are to be made which it is desirable to overcome.

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

1. The combination with a melting-pot for metal, of a mechanism for feeding a bar of stock metal into the pot, means for discharging the metal from the pot into the mold, and adjustable means for varying the infeed of the metal to correspond to the discharge.

2. The combination with a melting-pot and a guideway for bars or ingots of metal to be melted, of a feed roll or rolls for engaging the bar metal and causing it to be moved through the guide, and means for imparting intermittently a rotational movement to said roll or rolls, substantially as described.

3. The combination with a melting-pot and a feed-tube or metal-guide, of one or more feed-rolls to impinge against the metal passing within the guide, and means for imparting rotational movement to the feed-rolls, and one or more pressure-rolls at the opposite side of the guide from the feed-rolls, substantially as and for the purposes set forth.

4. The combination with a melting-pot and a feed tube or guide for the bars or ingots of metal, of feed-rolls adapted to engage the bar metal, and a restraining device at a point in advance of the feed-rolls for preventing that portion of the bar metal which has passed the feed-rolls from falling into the pot.

5. The combination with a melting-pot of a feed-tube thereabove having an aperture through its side, of one or more rollers having serrated edges entering through the aperture in the feed-tube to impinge against the bar metal therein, a ratchet-wheel connected with one of said serrated wheels, a pawl engaging the ratchet-wheel, and means for imparting a ratchet-driving movement to said pawl, substantially as described.

6. The combination with a melting-pot of a

feed-tube having an aperture through its side and a feed-wheel mounted on the side of the tube and having its edge entered through said aperture, a ratchet-wheel united to said feed-wheel, a pawl-carrier mounted for reciprocatory movement adjacent the ratchet-wheel, means for imparting a reciprocatory movement to said pawl-carrier, and means for regulating the extent of movement which the pawl-carrier shall have, substantially as and for the purposes set forth.

7. In a mechanism for feeding metal into a melting-pot, the combination with a metal guide or tube through which the bar metal is to be fed, having an aperture through its side, a feed-wheel mounted on the side of the tube and having its edge entered through said aperture and having a ratchet-wheel, of a pawl-carrier and pawl mounted for a back-and-forth movement to coact with the ratchet-wheel, a lever and means for imparting a swinging movement thereto, and a connection between said lever and the pawl-carrier and means whereby said connection has its engagement with the lever at different points distant from its center of swinging movement, for the purpose set forth.

8. The combination with a feed-tube having a feed-wheel mounted on the side thereof and entering the interior of the tube provided with a ratchet-wheel, of a pawl-carrier and pawl, the lever E, and means for imparting thereto a reciprocatory movement, a slide-block and means for adjustably confining it on said lever, and a connecting-rod uniting said block to the pawl-carrier, substantially as and for the purposes set forth.

9. The combination with a feed-tube having a feed-wheel mounted on the side thereof and entering the interior of the tube provided with a ratchet-wheel, of a pawl-carrier and pawl, the lever E having a series of sockets and a limiting-stop to be placed in any one of the said sockets, means for imparting to said lever E its reciprocatory movement, a slide-block and means for adjustably confining it on said lever, and a connecting-rod uniting said block to the pawl-carrier, substantially as and for the purposes set forth.

10. In a metal-feeding mechanism, the combination with a feed-tube having an aperture through its side, of one or more feed-rolls adapted to engage and propel the metal through said aperture, and means for imparting rotational movement thereto, of a spring projecting to bear against the metal being fed at a point in advance of the feed-wheels for restraining the latter end portion of the metal from falling from the feeder after it has passed beyond the action of the feed-wheels.

11. The combination with a melting-pot of a metal-feeding mechanism comprising a feed guide or tube, means for propelling the bar metal through said guide or tube, and an alarm device adapted to be non-audible during the presence of the bar metal within any given portion of the feeder, but adapted to be sounded in the absence of metal in such given portion of the feeder, for the purpose set forth.

12. In a metal-feeding mechanism of the character substantially as described, the combination with a feed-tube having an aperture in the side thereof and a pivotally-mounted device on the tube adjacent said aperture and having one member adapted to be entered therethrough and to have its position affected by the presence or non-presence in the tube of the bar metal, of a gong, a striker therefor, means for periodically swinging the striker, the arrangement of the striker on said pivoted device being such that the striker is obstructed from having its full extent of movement while said device *u* is in its position insured by the presence of metal within the feeder, substantially as described.

13. The combination with a feed-tube having the aperture 52, the lever device *u* intermediately pivoted and having one member thereof adapted to protrude through said aperture, of a gong, a hammer-lever pivotally mounted and having a member thereof movable in a plane which may be intersected by an arm of the lever device *u*, and means for imparting a periodical reciprocatory movement to the hammer-lever, substantially as and for the purposes set forth.

14. The combination with the feed-tube having the aperture 52 of the lever device *u*, a feed-wheel, and a lever for actuating said feed-wheel, a hammer-lever and gong, a two-armed pawl or dog pivoted on the hammer-lever, a stud on the said feed-wheel-operating lever adapted to engage said dog, and a fixed projection against which a portion of said dog may contact and by which be disengaged from said stud, and a spring for causing the rebound of said hammer-lever, all substantially as and for the purposes set forth.

15. In a mechanism for feeding bar metal the combination with a metal-guide having one or more feed-rolls, and means for imparting rotational movement thereto, of a brake device applied to prevent a rotational movement of the rolls except as positively imparted thereto by its operating mechanism, substantially as described.

16. In a mechanism for feeding bars of metal the combination with a feed-tube having an aperture through its side of a feed-roll journaled on the side of the feed-tube and extending through said aperture, a ratchet-wheel secured to said feed-roll, a pawl-carrier and a pawl to engage the ratchet-wheel, means for reciprocating the pawl-carrier, a second feed-wheel also journaled to project through said aperture, and gear-wheels connecting both feed-wheels whereby they both move in unison in the same direction.

17. In a mechanism for feeding bar metal, the combination with the feed-tube leaving apertures through its sides, of the feed-rolls

B B connected to be moved in unison and having means for imparting their rotational movements thereto, the pressure-rolls *o o* spring-supported and protruding through the aperture in the tube therefor, the brake device applied to retard the rotation of one of the feed-wheels, and the bar-metal-restraining finger *s*.

18. In a mechanism for feeding bar metal, the combination with the feed-tube having the apertures through its sides of the feed-wheels and means for imparting a rotational movement thereto, the brake device operating relative to said feed-wheels, the pressure-rolls, the restraining-fingers *s*, the gong, a striking mechanism therefor operated by the feed-wheel-rotating mechanism, and a device controlled by the presence or non-presence of bar metal in the feed-tube for preventing or permitting the gong-striker to contact with the gong, substantially as and for the purposes set forth.

19. The combination with a machine comprising a mold, of a melting-pot having relatively to the mold an approaching and retreating movement, metal-discharging mechanism for supplying metal periodically from the pot into the mold, a feeder for bar metal, provided for the pot and means actuated by the movement of the pot relatively to the mold for introducing into the pot a quantity of metal substantially the same as that discharged at each metal-delivering operation, substantially as and for the purposes set forth.

20. The combination with a metal-melting pot provided with means for discharging the molten metal therefrom, having a heater therefor, at its under side, and having a closed chamber at its top, a burner in said inclosed chamber, and a feeder for introducing metal into the pot quantitatively corresponding to the metal discharge, substantially as described.

21. The combination with a metal-melting pot having a heater at its bottom, provided with a pump for the expulsion of the molten metal from the pot, and having a closed chamber at its top above the metal therein, of a pump-operating rod passing through an opening which is provided therefor in the walls of said closed chamber, and a burner located in said chamber and adapted to present its burner-flame against the pump-operating rod, substantially as described.

22. The combination with a metal-melting pot having a heater at its bottom, provided with a pump for the expulsion of the molten metal from the pot and having a closed chamber at its top above the metal therein, of a feeder mechanism for introducing metal into the top of the pot through said closed chamber, in a quantitatively-determined manner, and a burner located within and for heating the inclosed chamber, subject to the heat of which the metal introduced into the top of the pot passes, substantially as and for the purposes set forth.

23. The combination with the melting-pot having the discharging-passage a^4 and a discharging-pump, and having a cover *e* below its top provided with an opening, and a sectional apertured cover supported from the margin of the opening in said cover *e*, of the hood G covering the top of the pot leaving a chamber J between its upper walls and the cover-walls therebelow, and having an opening *v*, a removable cover or door for said opening supporting a burner, a depending member of which, when the door is in place, has its position in the inclosed chamber adjacent the pump-operating rod which passes through the upper and lower walls of said chamber J, substantially as and for the purposes set forth.

24. The combination with the melting-pot having the partial cover *e* with the opening e^2 below its top, and the cover-sections e^3, e^4 composed of layers of sheet metal and asbestos, provided with the supporting-lugs e^5 e^5, of the chamber-inclosing wall thereabove having an opening, the pump-plunger and its operating-rod passing through openings therefor in the upper and lower chamber-inclosing walls, a removable door for the said opening in the chamber-inclosing top wall, which supports the burner-tube *f* having the angularly-turned end for directing its burner-flame against the pump plunger-rod, and a feeding mechanism operative to introduce bar metal through said inclosed chamber, into the pot at a controlled rate, whereby the entering metal becomes partially heated before reaching the molten metal in the pot, substantially as described.

25. The combination with the melting-pot, and a molding apparatus, and means for imparting a movement of the pot relative to the molding apparatus, of a feed-tube having feed-wheels, and a ratchet and pawl and pawl-carrier, an angular lever E having on an arm the adjustable block D, and a rod connecting said block with the pawl-carrier and having a pivoted extension-piece 14 on its other arm, a similar extension-piece 16, pivotally mounted on a stationary support, both said pieces 14, 16, having perforations, the rod 18, and the set-screws 19, 19, substantially as and for the purposes set forth.

26. The combination with the melting-pot and the feed-tube having apertures through its walls, of the feed-wheels B B, geared together and one thereof having a ratchet-wheel united thereto, the pawl-carrier and pawls, the pressure-rolls *o o* entering the feed-tube passage opposite the feed-rolls, the reciprocatory angular lever E, having the stud 49 and the adjustable block D, the rod *n* connecting said block and the pawl-carrier, the gong and its striker-lever 43 having the pivotally-mounted dog 47, the stationary pro-

jection 51, the spring 50, and a device controlled by the presence or non-presence of metal in the feed-tube for preventing or permitting the strikers contacting on the gong, substantially as described and for the purposes set forth.

27. The combination with a type-form-casting machine, of automatic mechanism for supplying the melting-pot of the machine with metal to replace the molten metal delivered therefrom; and means for regulating such feeding mechanism so as to vary the rate of delivery of the metal therefrom.

Signed by me, at Springfield, Massachusetts, this 14th day of March, 1898.

JOHN N. CHAMBERLAIN.

Witnesses:
WM. S. BELLOWS,
M. A. CAMPBELL.