No. 646,953. Patented Apr. 10, 1900.

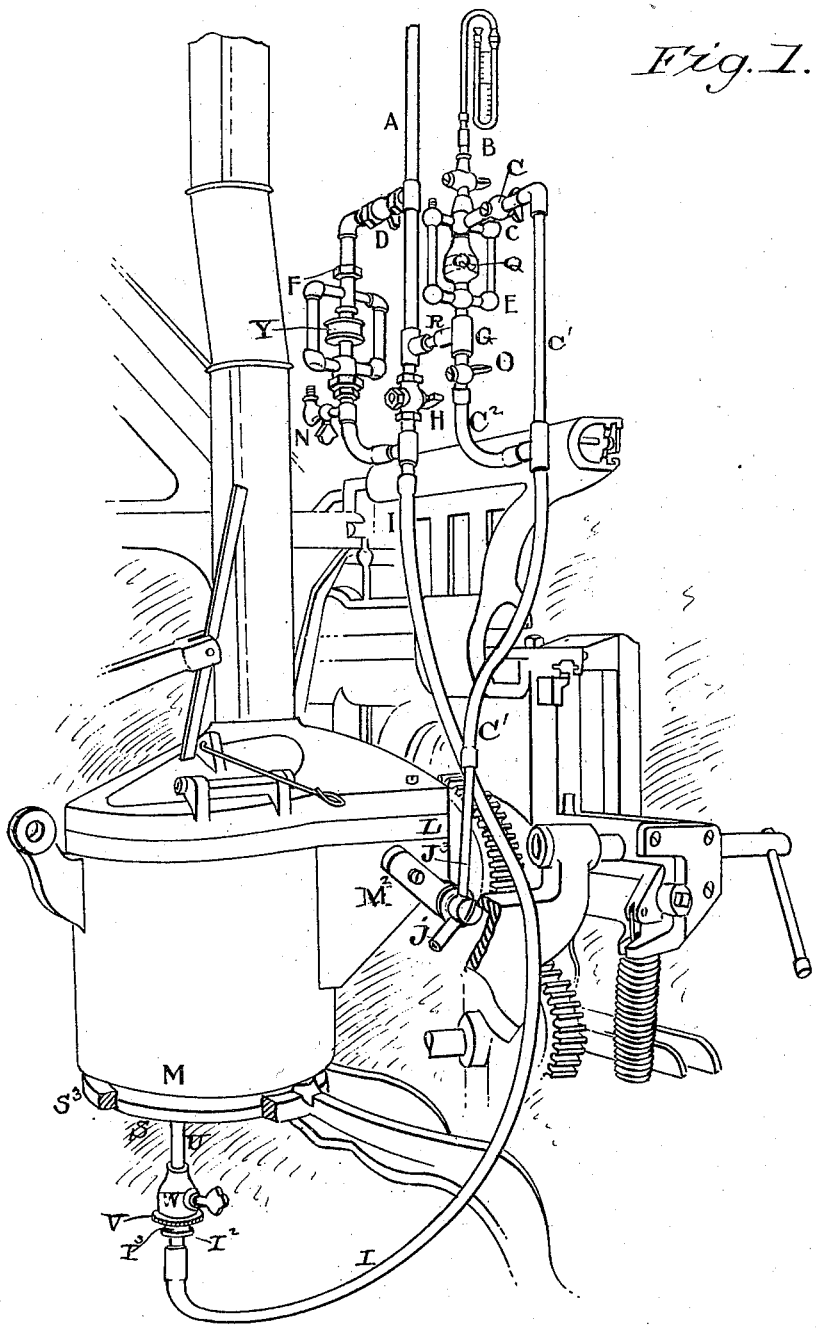
J. N. CHAMBERLAIN.

METAL HEATING APPARATUS FOR LINOTYPE MACHINES.

(Application filed Feb. 27, 1897.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

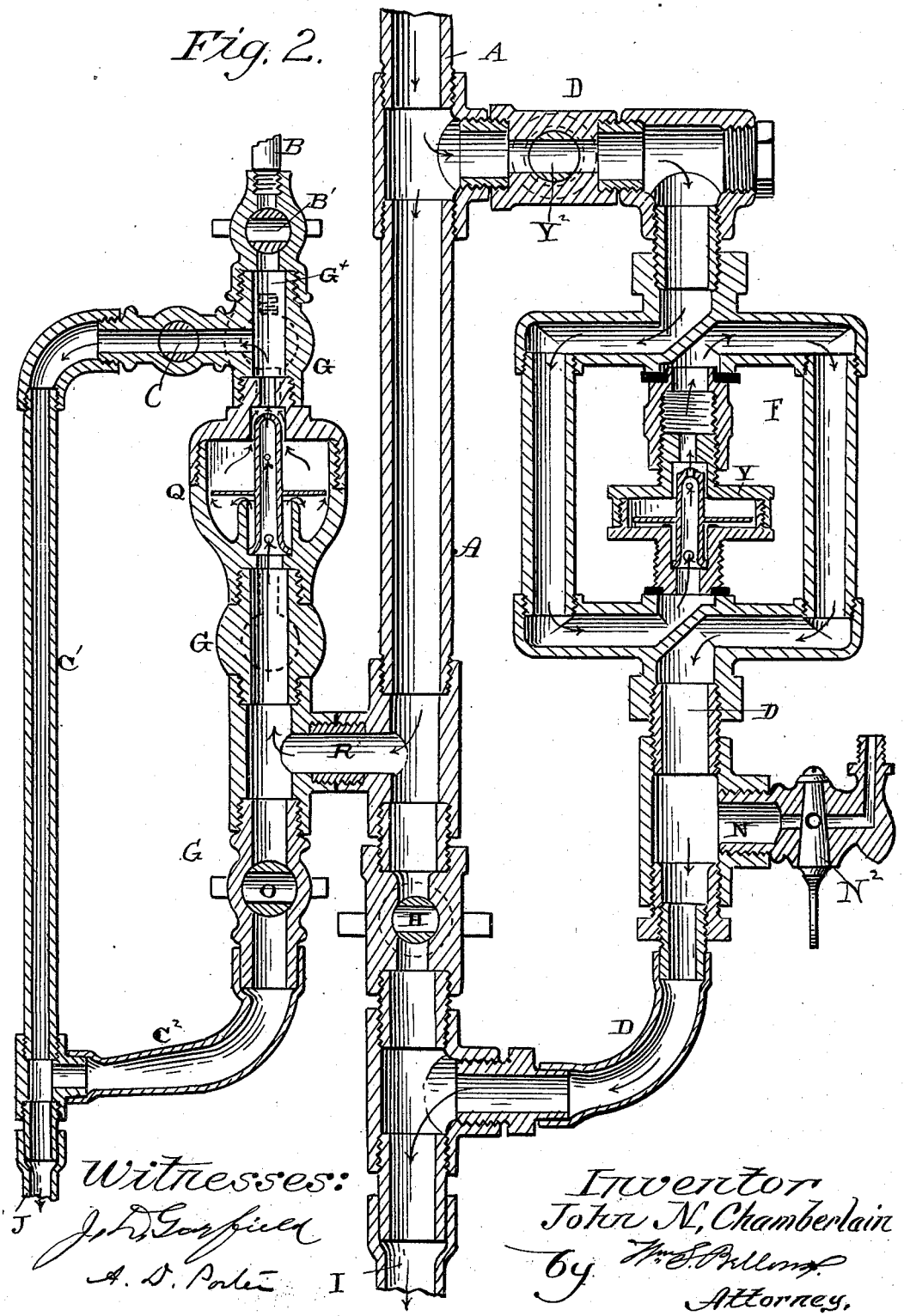

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Fig. 3.

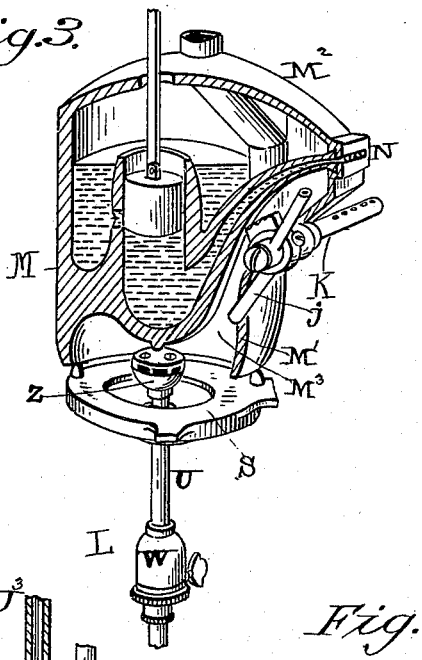


Fig. 4.

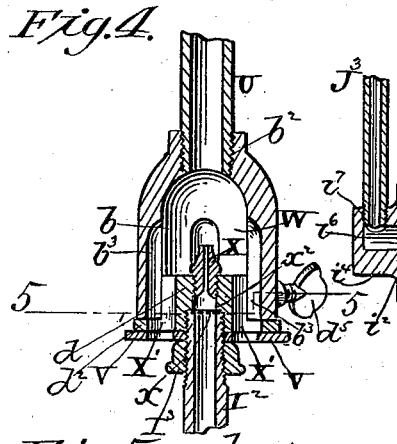


Fig. 7.

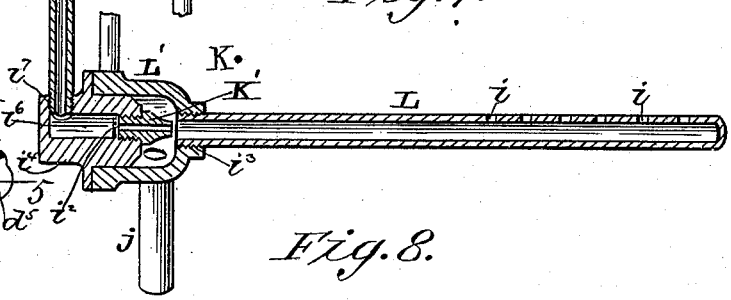


Fig. 8.

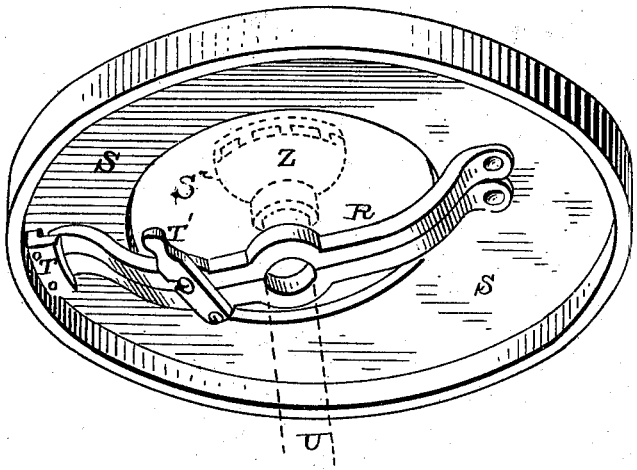


Fig. 5.

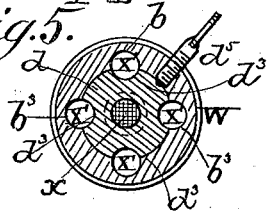
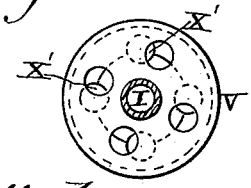


Fig. 6.



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UNITED STATES PATENT OFFICE.

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METAL-HEATING APPARATUS FOR LINOTYPE-MACHINES.

SPECIFICATION forming part of Letters Patent No. 646,953, dated April 10, 1900.

Application filed February 27, 1897. Serial No. 625,383. (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 Metal-Heating Apparatus for Linotype-Machines, of which the following is a specification.

This invention for improvements in linotype-machines particularly appertains to the metal-heating appliances thereof.

The objects of the invention are to provide gas-burning appliances comprising a burner located under the type-metal-melting pot and another burner applied under, along, and parallel with the elongated metal-delivery mouth of the pot adjacent the place of molding the "slug" or line of type, and to provide, combined with the main gas-supply pipe, also gas-supplying conduits connecting both said burners with provision whereby the gas may flow, first, under its full pressure and for its maximum quantitative delivery to the pot-burner only, or, second, for such maximum quantitative delivery to both the pot and the neck burner, or, third, under maximum quantitative delivery to the pot-burner and simultaneously therewith with a restricted pressure and reduced delivery to the neck-burner, or, fourth, whereby from the normal supply-pipe gas-pressure the gas may be delivered for consumption at both the pot-burner and the said burner outside of, along, and adjacent the orifice of the neck-burner under the restricted pressure and in minimum quantity; and the results attained by the provisions mentioned are that in the use of the linotype-machine for a given period daily or periodically, as occasion demands, it becomes easy to bring the type-metal in the melting-pot most quickly to the proper molten condition, to then reduce the heat at the burner under the pot, whereby it is merely sufficient to maintain the same in the required molten condition, so that it will flow with sufficient freedom through the neck to the type-matrices, and to impart a burner-flame uniformly along the line of liquid-metal delivery, whereby the same may not harden as it is being introduced into the matrices at the point most distant from the body of molten metal in the pot to the ultimate end of producing solid "slugs" with clean sharp type-faces, obviating the liability of chopping or clogging by the metal, which might otherwise be in improper condition, to the further end of preventing the type-metal from becoming deteriorated and "burned out," as results from being unduly heated, and still further to the end of acquiring the improved manner of burner-heat maintenance at the expense of largely-reduced gas consumption.

In addition to attaining better slugs, to maintaining the metal in better condition, reducing waste of same by heat destruction, and to a material reduction in the gas consumption, a minor object of the invention is to devise improved special appliances, the operation of which will be easily understood by the linotype engineers, inuring to convenience and practicability of the results, as will be hereinafter rendered apparent.

The invention consists in the combinations and arrangements of parts and apparatuses and the constructions and combinations of parts, substantially as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, in which my invention is illustrated, Figure 1 is a perspective view showing a portion of a linotype-machine comprising and adjacent the melting-pot thereof and showing combined therewith the present improved appliances. Fig. 2 is a central vertical section showing the main gas-supply pipe and portions of the pipes which lead to the pot-burner and neck-burner, respectively, with intermediate appliances whereby the gas may pass in full volume directly to either or both of the said burners simultaneously or by detour courses and through gas-restricting regulators, whereby the gas from the main supply-pipe may be carried in lessened volume and with lessened rapidity to either the pot-burner or the neck-burner or in such manner simultaneously to both. Fig. 3 is a view showing in section and perspective the melting-pot and in perspective the pot and neck burners. Figs. 4, 5, and 6 represent in vertical section, in horizontal section, and in inverted plan view, respectively, the devices for the introduction of gas and air to the pot-burner. Fig. 7 is a central longitudinal sectional view of the tu-

bular horizontal pot-burner. Fig. 8 is a perspective view showing the under side of the perforated plate applied under the pot and through which the pot-burner protrudes.

In the drawings, M represents the usual melting-pot of the linotype-machine, having the neck M^2, provided with the horizontally-widened end N and having in a common horizontal line the series of small perforations constituting the metal-delivery orifice for the molten metal.

Z represents the pot-burner, having the location, as heretofore, for such burner under the center of the melting-pot, and K represents the neck-burner of elongated tubular form, its forward end being closed and having a series of upwardly-opening jets, its location being outside of the casing M', which incloses the pot, and parallel under and adjacent the orifice or series of perforations, which constitute the mouth of the pot-neck.

A represents the gas-pipe, through which the supply of gas for both burners passes and which is provided near its lower end with the by-pass cock H, which is closed when but a lessened amount of gas is to be fed to the pot-burner Z under the melting-pot M, while the linotype-machine is not in operation or after the metal has been fully and completely heated, but which is open when the burner is in full operation, while the metal in the pot is being heated preparatory to starting and using the linotype-machine. Connected to this pipe A at any suitable point is a detour-passage D, to which is connected the yoke F, and in this yoke or connected thereto is the governor or gas-restricting device Y, which can be regulated so as to allow any desired amount of gas to pass through it. This restricting device is set so that just enough gas passes through to keep the metal in the pot M in a liquid condition without any waste of gas and without any watchful care on the part of the operator.

In passage D, between its junction with supply-pipe A and the regulator Y, is a cock Y^2. The moment the cock H is closed (cock Y^2 being opened) the gas is forced to pass through the restricting device Y, and this being regulated the blaze at the burner Z is instantly reduced to the much-lessened though adequate degree.

Below the yoke F is an outlet-pipe N, provided with a stop-cock N^2, and upon the outer end of this pipe the pressure-gage or gas-meter B (shown in Fig. 1) can be preferably temporarily applied for the purpose of investigating the regulator and ascertaining the amount of gas that is supplied through the regulator to the burner. This regulator above described is fully shown and described in my Patent of November 5, 1889, No. 414,493, and hence no further description is here deemed necessary.

To the lower end of the pipe A is attached a flexible pipe or connection I, through which the gas passes to the pot-burner Z. This burner Z is secured to the upper end of the pipe U, to the lower end of which is attached the commingling-chamber W, inside of which is placed the removable nipple X and through the bottom of which are formed a number of openings X' for the admission of air, and which openings are controlled by the rotating valve or register V, which is provided with a corresponding number of openings, as shown in Fig. 6. By turning this valve the openings are fully opened or opened at any desired extent or closed. The air passing through these openings mingles with the gas before it is fed to the burner.

Between the nipple X and the end of the pipe I is placed a circular wire gage x, which prevents the nipple from becoming clogged by any impurities in the gas.

In detail the gas and air commingling chamber and air-regulating devices therefor are constructed thus: The chamber-casing W is constructed in the form of a metallic shell, having cylindrical lower portion and dome-shaped centrally-drilled and screw-tapped top portion, the shell having the smooth circular opening b therein, of which the aforementioned screw-tapped hole b^3 is a continuation through to the upper end. Within the inner side walls of the chamber-casing are the semicircular longitudinally-extending niches b^3, four in number being shown. Into the lower end opening in said chamber-casing is inserted, with a close sliding fit, a comparatively-short cylindrical plug d, provided with the outwardly-extending base-flange d^2 to set against the lower end of chamber-casing and preventing said cylindrical plug from being entered too far within the chamber. Four semicircular niches d^3 are longitudinally formed the full length of the sides of plug d, they extending through the flanged lower end portion of the plug, becoming fully circular thereat. The said cylindrical plug is set so that its niches d^3 match those b^3 of the casing, whereby they together make separated cylindrical passages leading into the chamber, and the plug d is detachably held by the set-screw d^5, screwing through the casing-wall against said plug, so that at pleasure the plug may be removed. The said cylindrical plug d is axially drilled and tapped from the bottom part way through on the larger diameter and the rest of the way through the upper end on the smaller diameter, whereby the seat x^2, against which the gage sets, is produced. The nipple X screws into the upper tapped opening through the plug d and has its upper orifice comparatively considerably below the top of the chamber. The pipe-section I^2, externally screw-threaded, screws into the lower tapped opening in the plug d, and the apertured disk constituting the register-valve rotates on this pipe-section and is held up to its place by the annular nut I^3. Should the gage become clogged with a gummy refuse from the gas, deposited thereon, the device W d may be detached by unscrewing from the pipe-section I^2, the gage may be removed and

cleaned and easily replaced, and the parts reassembled. Should the nipple become stopped up, it may be readily taken out from plug *d* after the latter has been removed from the chamber-casing.

The burner-supporting upright pipe-section U has by its lower end a screw connection in the tapped opening in the upper end of the chamber-casing. The pipe U, extending from the top of the air-chamber W, passes through the clamp R, which is secured to the under side of the perforated plate S, which is placed under the pot M. The clamp consists of two pivoted curved or bent rods, which catch the pipe U and support and steady it in position. These two rods have their ends to catch, when closed, around the pipe, under the L-shaped support secured to the under side of the plate S, and the two rods are secured in position by means of the pivoted catch T'. An opening S^2 is made centrally through the plate S at the base of the burner Z, the same being of larger diameter than the portion of the burner or the burner-pipe which it surrounds, and through this opening air is fed to the burner in a sufficient quantity to perfect the combustion, thus effecting a great saving in gas.

The top plate of the burner Z is secured to the cup or bottom portion by means of screws, which pass down through the two parts, and through the flange formed around the outer edge of the top plate are suitable openings, through which the gas burns. No novelty is claimed in the form of this burner-head Z.

The plate S rests upon the horizontal ring-frame, which is provided as a part of this machine-frame therefor, as shown at S^3 in Fig. 1. The object of this plate is to prevent the cold air from striking the bottom of the pot while it is being heated and yet allow sufficient air to pass through the central perforation therein to the burner to insure perfect combustion.

The partially-surrounding downwardly-opening hood or casing M' around the under portion of the pot produces a heating-chamber M^3 therewithin and has air entered therewithin through the opening S^2 in the plate S to aid combustion at the burner Z and to supply heated air and induce its circulation into and through the neck-burner, as hereinafter pointed out. Also extending from the pipe A, just above the cock H, is a short lateral pipe or conduit R, and to this pipe or conduit R the vertical pipe G is intermediately thereof connected, which is provided with a gas-restricting device or regulator Q above the connection R and with a by-pass cock O below said pipe connection.

The detour-pipe C' connects with the pipe G above the restricting device Q, and this said detour-passage is in part constituted by the pipe-section C^2, which leads from pipe or conduit G below cock O to pipe C' at its lower end, where C' and C^2 have in common connection with the pipe J, which leads to the neck-burner. In the upper end of this pipe G, which constitutes an outlet extension G^4, is placed a cock B', which when open permits the flow of the gas to the gage B, which may be temporarily applied at this point for the purpose of determining the pressure of the flow of gas through device Q, which can be regulated to any desired degree, and then the gas is made to pass through the opened cock C and the detour-pipe C', through the pipe J, to the neck-burner K.

The regulator above described is substantially shown and described in my patent of October 15, 1878, No. 209,021, and in which no novelty is here claimed.

As stated above, the gage B can be applied to either one of the cock-provided outlet-passages leading from connection with the gas-restricting devices and used to test or ascertain the flow of gas therethrough. When the cock O is open and the one C is closed, the gas flows freely and directly to the neck-burner K, and a large flame is produced for the purpose of quickly bringing the neck N to a heated condition just before it is desired to put the machine in operation to such an extent that the metal being forced by the pump in the melting-pot will not become chilled in passing through the neck at the start off and impede the feed of the metal and the operation of the linotype-machine as a whole. This neck-burner consists of a tube L, having its forward end closed, provided with a suitable number of upwardly-opening perforations *i i*, said tube extending from the air-commingling chamber L', in which is placed a removable nipple K', that is also protected from the impurities in the gas by a wire-gauze i^2, which is placed on the pipe for this purpose. The commingling-chamber L' is comprised in a chamber-casing of much the same form as the chamber-casing W for the pot-burner, it having the connection of the screw-threaded burner-pipe L therewith at its forward screw-tapped opening i^3, and in its rearwardly-opening cylindrical chambered portion is placed with a close sliding fit the cylindrical plug i^4, having the shoulder-flange i^5 and provided therein with the forwardly-opening chamber or passage i^6 with the sidewise opening i^7, with which connects the tubular stem J^2, which receives the connection therewith of the rubber gas-pipe J, which connects with the lower end of the aforesaid gas-conveying pipe C'. The aforesaid nipple K' is supported in the forward end of the said hollow plug i^4.

Connected with the commingling-chamber L' is the downwardly-inclined air-conductor pipe *j*, which, as shown in Fig. 3, has its open end extended to within the chamber M^3 within the hood or casing surrounding the pot in which the air by the pot-burner is heated to a comparatively-high degree, so that the already-hot air supplied in conjunction with the gas for combustion along under the delivery-neck of the melting-pot aids materially in perfecting the combustion with a corresponding economy of gas.

The burner-tube L projects along under the neck N, outside of the pot-casing M^2 and adjacent and parallel with the line of the orifice N, and while the machine is in use and well under way and the gas is being made to pass through the restricting device Q heats the neck at the place of delivery of the metal into the mold and matrix just sufficiently to prevent the metal from becoming cold.

By means of the apparatus as here shown and described a saving of metal is effected, as it enables the metal to be kept at a much cooler temperature than in melting-pots as ordinarily heated, thus preventing the tin and antimony, which are the most expensive components of the metal, from being converted into dross, deteriorating the type-metal. The type-metal is, nevertheless, easily kept up to the sufficiently high and even temperature to assure the liquid condition of the metal for efficient results in linotype-casting.

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

1. In a linotype-machine, the combination with the melting-pot thereof having a delivery-neck, the burner beneath the pot, and a burner adjacent the delivery-neck of the pot, of a main gas-supplying pipe A, having in continuation thereof the pipe extension I leading to connection with the pot-burner, a pipe or conduit D branching from and returning to connection with said main supply-pipe A having therein the cock Y^2 and in advance of said cock, a gas-restricting regulator Y, a cock H in the main pipe A between the outleading and returning branching connections therewith of the said pipe D, a pipe or conduit G, and passage T connecting an intermediate portion thereof with said main supply-pipe A at a point to the rear of said cock H, the pipe J having a connection with the neck-burner, with which the forward part of said pipe G connects and a cock O in the passage G between the passage R and pipe J, a conduit C′ connecting the more distant portion of the said pipe G with the pipe J, having a cock C therein, and a gas-restricting regulator Q between said passage R and cock C, all whereby under various manipulations of said cocks H, Y^2, C and O, there may be given first the maximum gas-delivery to pot-burner only; secondly, maximum delivery to both pot and neck burners; thirdly, maximum delivery to one, regulated and minimum delivery to other of the burners; or fourthly, regulated minimum gas-delivery to both pot and neck burners, for the purposes explained.

2. In a linotype-machine, the combination with the melting-pot thereof having a delivery-neck, the burner beneath the pot, and a burner adjacent the delivery-neck of the pot, of a main gas-supplying pipe A, having in continuation thereof the pipe extension I leading to connection with the pot-burner, a pipe or conduit D branching from and returning to connection with said main supply-pipe A having therein the cock Y^2 and in advance of said cock, a gas-restricting regulator Y, the outlet branch N leading from the branch D between the regulator and the return connection of said pipe with pipe A, a cock H in the main pipe A between the outleading and returning branching connections therewith of the said pipe D, a pipe or conduit G, and passage R connecting an intermediate portion thereof with said main supply-pipe A at a point to the rear of said cock H, the pipe J having a connection with the neck-burner, with which the forward part of said pipe G connects and a cock O in the passage G between the passage R and pipe J, a conduit C′ connecting the more distant portion of the said pipe G with the pipe J, having a cock O therein, a gas-restricting regulator Q between said passage R and cock C, and a cock-provided outlet-passage G^4 for the connection therewith of a gas-gage, branching from the conduit G between the regulator Q and the cock C, all substantially as and for the purposes set forth.

3. In a linotype-machine, the combination with a melting-pot, having a neck with delivery-orifices in a horizontally-extending line, a burner under the pot, and an elongated burner extending under and parallel with the neck, of a main gas-supply pipe A having connected therewith, the detour-pipe D leading from and returning to the said pipe A and having therein a gas-restricting regulator, and a cock Y^2 in said detour-pipe D to the rear of the restricting device, a cock H in said supply-pipe to the rear of the return connection of the detour-pipe with said supply-pipe, a lateral branch pipe R extending from the supply-pipe to the rear of the cock H supporting a pipe G at an intermediate part thereof having a gas-restricting regulator Q at its one part and a cock O in its other, a detour-pipe C′ leading from pipe G above the restricting device and having a pipe connection with the pipe G below its cock O, the pipe I connecting supply-pipe below its cock H with the pot-burner, and the pipe J connecting, in common, both pipes C′ C^2 with the pot-burner, substantially as and for the purposes set forth.

4. In a linotype-machine, the combination with the melting-pot M thereof having the burner Z therebelow, and constructed with the widened delivery-neck, and the hood or depending casing-wall M′ having the downwardly-opening space M^3, the centrally-perforated plate S through the central opening in which the pot-burner protrudes, the neck-burner comprising the burner-pipe arranged adjacent the neck outside of the said casing M′ and having the series of gas-delivery jets *i*, the pipe C′ connecting with said neck-burner pipe, and an air-conducting branch of said burner-pipe, the entrance end of which is located within the chamber-inclosed space

between the melting-pot and the said depending wall M', substantially as described and for the purpose set forth.

5. In a linotype-machine, the combination with the melting-pot thereof, of a burner adjacent the pot, a casing having a rearwardly-open chamber, a flanged plug fitted in the rearward part of said chamber and having a passage therethrough, rearwardly with which is connected a gas-supplying pipe, and having forwardly therein a nipple with a contracted opening, and a tubular connection leading forwardly from the chamber in said casing to the burner proper, substantially as described.

6. In a linotype-machine, the combination with the melting-pot thereof, of a burner adjacent the pot, a casing having a rearwardly-open chamber, an externally-flanged plug fitted in the rearward part of said chamber and having a passage therethrough constructed with the annular shoulder or seat x^2, and having forwardly therein a nipple with a contracted opening, a tubular connection leading forwardly from said chamber-casing to the burner proper, a gauze disk x seated on said annular shoulder back of the nipple, and a gas-supplying pipe screwing into the rearward end portion of the said plug with its end in confining contact against the said gauze disk.

7. In a linotype-machine, the combination with the melting-pot thereof, of a burner Z, the pipe-section U, the casing W having the rearwardly-opening chamber therein, and with the forward end of which said pipe-section U connects, said casing being constructed internally with the semicircular niches b^3, the plug d of cylindrical form fitted in and extended part way forward in the chamber of said casing, and provided with the external flange d^2 and having the recesses which match with the aforesaid niches and also extend through said flanged end of the plug, the supply-pipe section I^2 screwing into the rear end of the plug, the nipple with the contracted passage screwed into the forward end of the plug, the apertured plate V applied below and against the lower flanged end of the plug and rotating about the pipe-section I^2, and the nut I^3, and the set-screw d^5, all substantially as described.

8. In a linotype-machine, the combination with the melting-pot having the neck with a horizontally-widened delivery-mouth, of a burner consisting of a pipe arranged under outside of and along said mouth, provided with a series of upwardly-opening gas-jet holes, and means for supplying gas and air into said burner-pipe, substantially as described.

9. A melting-pot, a perforated plate applied to its bottom and a gas-burner which extends up through the plate, combined with a clamping device composed of two rods, pivoted at one end to the plate, and a catch for securing the rods together, substantially as shown.

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

J. N. CHAMBERLAIN.

Witnesses:
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M. A. CAMPBELL.