June 19, 1928. 1,673,857

H. A. W. WOOD

METHOD OF CASTING PRINTING PLATES WITHOUT RISERS

Filed June 20, 1924 3 Sheets-Sheet 1

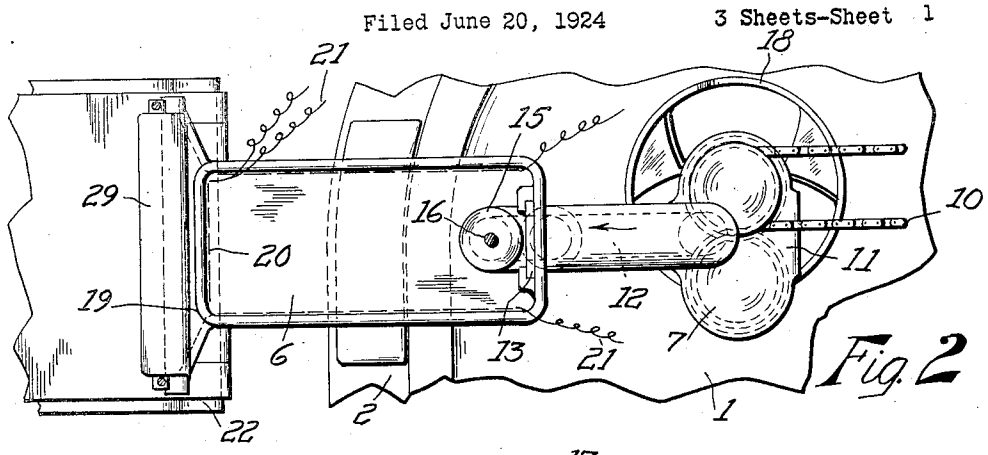


Fig. 2

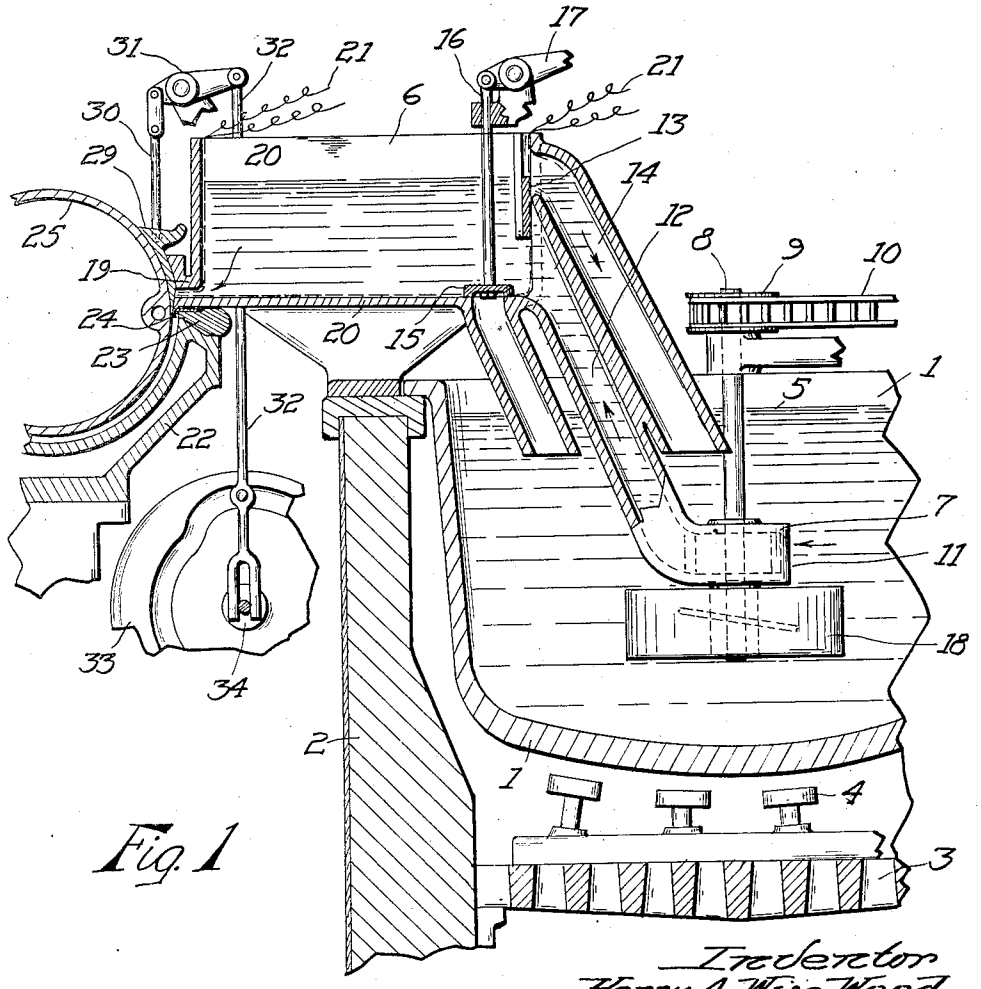


Fig. 1

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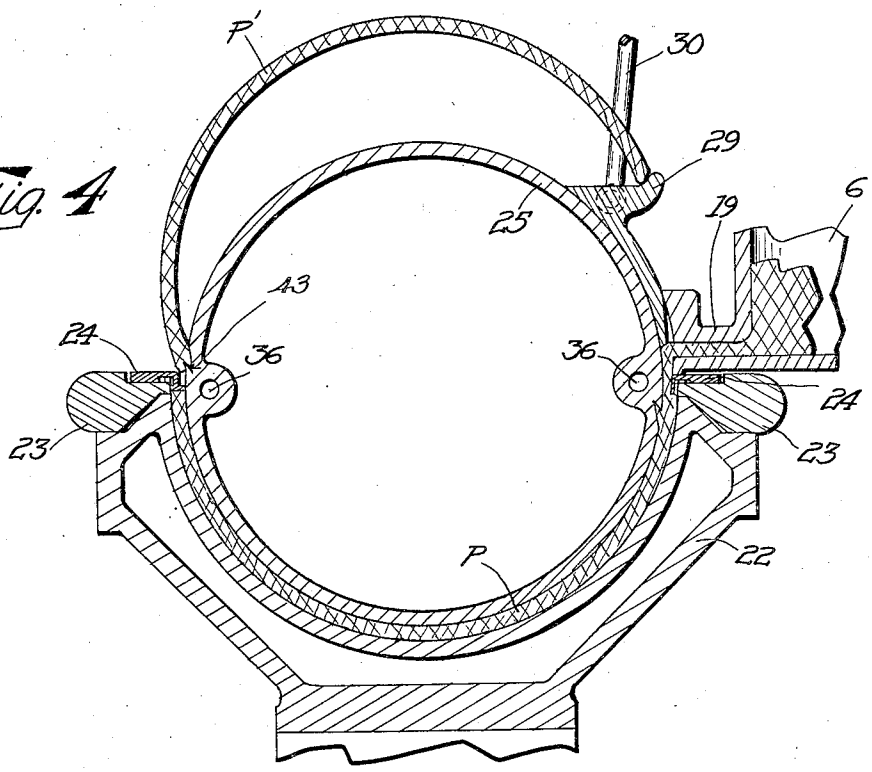
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Fig. 4



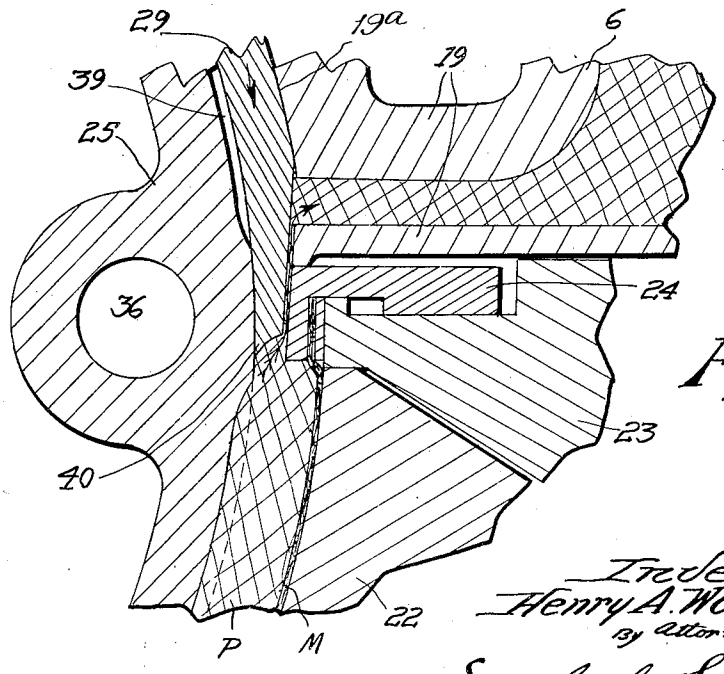


Fig. 3

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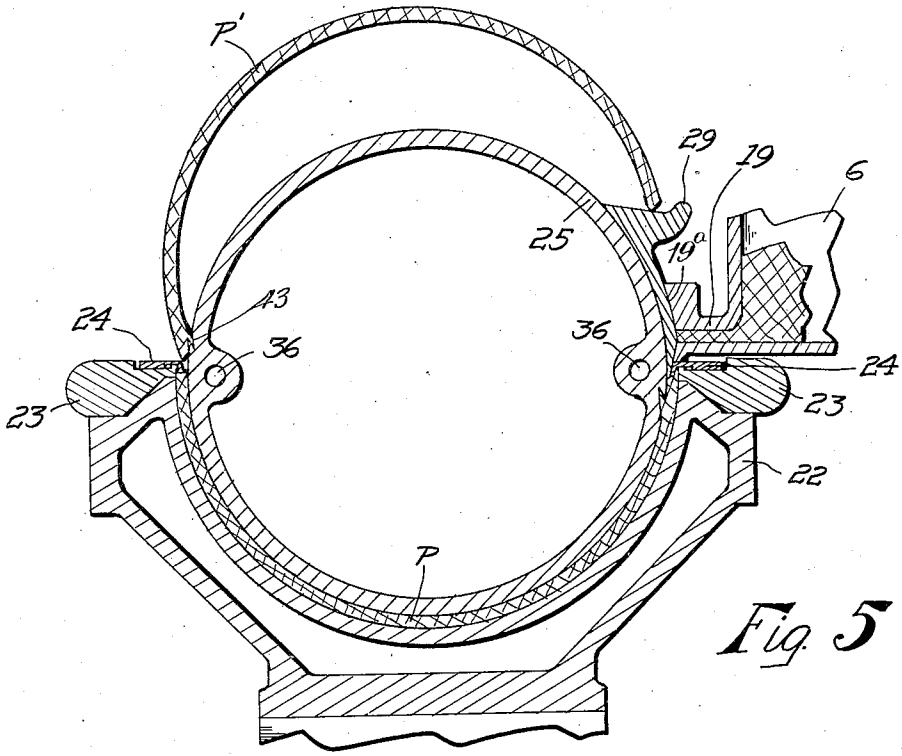


Fig. 5

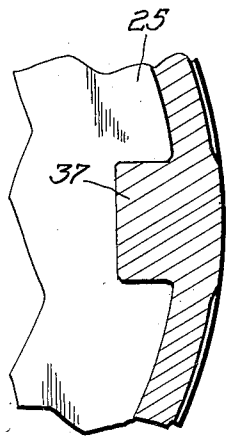


Fig. 6

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UNITED STATES PATENT OFFICE.

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METHOD OF CASTING PRINTING PLATES WITHOUT RISERS.

Application filed June 20, 1924. Serial No. 721,272.

This invention relates to the casting of printing plates without a riser in a solid state attached to the plate when cast.

The principal objects of the invention are to eliminate entirely the presence of the riser on the plate when cast without sacrificing any of the advantages which an ordinary riser provides; to do away with the use of the mechanism ordinarily employed for sawing off a solid riser and yet leave the edge of the plate in a smooth condition and of the desired contour; to avoid the loss of time and the slowing down in the production of plates necessitated by the sawing off of the riser, and also to avoid the necessity of waiting until the plate is chilled before the riser cutting operation can be started, and at the same time to produce a plate of less length than the matrix in which it is cast, and of no greater length than a similar plate from which the riser has been severed while cold; to provide for quick and automatic separation of the plate from the core; to produce the plates ready to go on the press at a rapid rate; to strip the plate from the core by the co-operation of the means for eliminating the riser; and to provide for completing the plates without producing chips or sawdust which sometimes cause trouble in the mechanism.

Additional objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which:

Fig. 1 is a cross section of one form of casting mold and metal pump and pot with a preferred embodiment of this invention applied thereto;

Fig. 2 is a plan of the same;

Fig. 3 is a sectional view on enlarged scale of the portion of the mold at which the metal enters, showing an intermediate step of the operation of separating the still molten riser from the plate;

Fig. 4 is a sectional view of the mold and plate showing one plate ejected from the mold and ready to be removed and another plate just starting to be cast, the parts of the riser separating means being in a different position from those shown in Figs. 1 and 3;

Fig. 5 is a similar view showing the position of the parts when the whole operation is completed and the second plate is fully cast and its riser entirely separated; and Fig. 6 is an enlarged sectional view similar to Fig. 3 showing a modification.

The conventional method of casting plates for rotary printing presses is to pour molten metal into a mold, in which a matrix has been placed. This mold is generally closed on all sides and edges except the edge through which the metal is poured. On this edge a "riser" is formed, which serves the purpose of a feeder, from which the shrinkage within the plate during the cooling process is supplied. This riser is generally so proportioned that it remains in a molten state while the plate is solidifying, so that a reservoir of molten metal is being maintained during that process.

From this it will be seen that it eventually becomes necessary to rid the cast plate of this riser, so that the plate may be produced with a straight finished edge instead of the irregularly shaped mass formed thereon by the riser. This makes it necessary to provide a device for severing the riser from the plate proper, usually in the shape of a cutting mechanism of one form or another, according to the idea of the designer and the demands of the machine. The process of cutting off the riser after it has solidified produces a quantity of chips or sawdust which are apt to clog the working parts of the machine and interfere with its operation. It also serves to slow down the production of plates, since a certain number of seconds is required for the act of cutting off the riser.

It has been suggested that the riser while it still is in the molten state, can be cut off by means of a rotating valve or the like. This method has proved defective, however, because among other objections, no way has been found of cutting off the molten riser of a printing plate close enough to the edge of the type matter to avoid reducing the number of lines.

This has been because the valve devices proposed have never been able to sever the molten riser at a point nearer to the type than the edge of the matrix, which is used to secure the matrix in the mold. Thus, a blank space has had to be left on the plate edge equal in width to the clamping edge of the matrix which shortens the type surface of the plate by as many lines of type at least as the clamping edge of the matrix is wide.

As the shortening of the printing surface of a newspaper plate, in the direction of its curvature, reduces the number of type lines the page may carry, and as advertising is sold by the line, it has been necessary to bring the type area of a page to the uttermost edge of the printing plate. It is this limitation that has largely made impracticable the otherwise desirable method of cutting off the riser while in its molten state.

The invention is capable of use with an ordinary melting pot 1 located in a furnace casing 2 provided with a grate 3 or gas burners 4 under the pot as may be desired. The molten metal, as is well understood, is maintained at a level indicated by 5 in the melting pot. In this case it is pumped into a hopper 6 from which it is delivered into the mold. For the purpose of raising the metal from the pot 1 into the hopper 6 I have shown a pump 7 of the gear type driven by a shaft 8 from a sprocket 9 and chain 10 connected with a motor not shown. Of course any type of pump may be employed as that is not a feature of this invention.

The metal enters the pump 7 at a point 11 from the interior of the pot 1. It is forced up through a pipe 12 into the hopper 6 in which a level is maintained by an adjustable gate 13 past which any overflow may return to the pot 1 through an overflow tube 14 extending below the level 5. I have also shown a means for emptying the hopper comprising a valve 15, rod 16 and lever 17 for opening a port below and allowing the metal to flow back into the pot preferably under the level 5. An ordinary mixer 18 on the shaft 8 is indicated for the usual purpose.

The hopper 6 is provided with a spout 19 through which the metal is allowed to flow directly into the mold. The inside of the hopper 6 and the spout 19 are shown as provided with electrical heating elements 20 so that the temperature of the metal within may be maintained at any desired degree. Feeding wires 21 are shown for conducting a current to them, but if desired any other means may be employed. This constitutes the metal delivering means.

The mold comprises a casting box 22 which in this case is shown as forming the concave wall for receiving the matrix M and intended to be lowered to open the mold. This box is shown as having a horizontal axis and as provided with matrix bars 23 and clips 24 on its two upper edges. These hold the clamping edges of the matrix M and are arranged to strip the matrix from the cast plate when the casting box is lowered from the pouring position in the usual manner.

I have shown a core or cylinder 25 arranged to rotate about its own axis, and the axis of the casting box when in casting position, and forming the other side of the mold. I have not shown any specific means for rotating this core or for raising or lowering the box 22 as any means well known in this art can be employed.

The mold is so located with respect to the end of the spout 19, which is provided with a cylindrical end surface 19^a concentric with the curvature of the mold, that the metal will be delivered from the hopper 6 through this spout by gravity directly into the mold cavity between the core 25 and box 22 at one edge and preferably all along that edge. The matrix is clamped at each straight edge as shown in Fig. 3 between the edge of the bar 23 and clip 24 which covers the upper and inner edge of the matrix. Above it is the spout 19 which registers with it.

The mold is provided with an oscillating shutter or valve 29 adapted to swing on the surface of the core 25 about the center of that core. It extends throughout the length of the spout or nozzle 19. This shutter is operated by a link 30, lever 31, link 32 and cam 33 from the driving shaft 34 on which the cam is mounted. The latter link is shown as having a roll co-operating with the cam for that purpose. The cam 33 is shaped and timed to move the shutter 29 in a manner which will be pointed out later.

I find it advisable to prevent the chilling effect of the usual cooling water within the cylinder 25 from reaching that portion of the metal contained within the channel between the plate P and the interior of the nozzle 19. One means for accomplishing this is the provision of the cylinder or core 25 with an insulating area in the form of a cored hole 36, which when filled with air will not conduct the heat as rapidly as would a solid wall. Another way to do it it shown in Fig. 6, in which a much thicker solid wall is employed so that it will take longer for the heat to be dispersed through it. At any rate some means is employed for insulating this part of the mold from the cooling devices which I have not illustrated herein, but which are ordinarily employed in this kind of mold.

Of course the printing plate P is provided on its inner face with finishing strips p which are cast in suitable grooves 39 in the core for that purpose. On account of the proximity of the adjacent group of grooves around the cylinder I find it advisable to provide a lip 40 at the lower edge of the shutter 29 projecting downwardly to prevent metal from running upwardly into the grooves of the upper half of the cylinder.

Fig. 4 shows the position of the parts when the metal is being poured. It will be seen that the metal is free to flow into the

mold cavity from the hopper and entirely fill it. At this time the shutter 29 is in its uppermost position so that the channel into the mold is unobstructed. Now when it is desired to sever the connection between the partly cooled metal within the mold and the molten metal within the passage of the spout 19 the shutter 29 is brought downward by the action of the cam 33, timed as stated to perform this operation at the exact instant indicated by the existing conditions. The shutter 29 swings down around the axis of the core from the position shown in Fig. 4 to that shown in Fig 3, thus partly closing the channel for the passage of metal between the mold and spout. The plate P is nearly solidified by this time, which action may be hastened by the usual cooling methods. The shutter starts to move before the solidifying action is entirely completed.

Under the old conditions the metal in the riser was kept in a molten condition on account of the greater cross sectional area of the riser so that the shrinkage of the metal in the mold was compensated for by the necessary descent of the metal into the mold from the riser. In the present case, however, this shrinkage is compensated for by the descent of the shutter 29 into the mold and the forcing of the metal ahead of it inwardly toward the center of the mold cavity if the shrinkage is such as to permit it to do so. If not, the shutter continues to advance until the surplus metal is forced out along the side of it as indicated by the curved arrow in Fig. 3 when such metal goes back into the hopper. The operation of the shutter, of course, is so timed as to synchronize with the rate of cooling of the metal being used at that time. It does not shut the mold passage instantaneously, but there is some dwell so that the surplus metal can be forced out. The timing is such that when the plate P becomes completely solidified and there is no further need of supplying it with molten metal for the purpose of replenishing the shrinkage incident to cooling, the shutter at that instant comes to its final position shown in Figs. 1 and 5. At that time it shuts off all communication between the mold and hopper 6 and the molten metal supply between the mold and the interior of the spout is forced out of the way by the advancing inclined edge of the shutter from the position shown in Fig. 3 to that shown in Fig. 5. In this way the supply of metal is entirely separated from the plate without the production of any riser at all, although all the advantages of a riser have been maintained through the various states of the cooling and solidifying action. Because of the construction shown there is no limitation placed upon the point to which the shutter 29 may descend. All metal but that actually used in the formation of the printing plate is displaced and eliminated from the plate. The metal in the spout 19 is maintained in a molten state whenever that is necessary by the heating elements 20. The riser edge of the plate is cast against the surface of the parts 24 and 29 which are finished to the proper shape to form the desired shape of this edge to permit it to be clamped properly on the cylinder of the press.

Fig. 1 shows the mold closed, the shutter 29 closing all communication between the hopper 6 and the mold cavity and ready to rise by the action of the cam 33. When the shutter rises to the position shown in Fig. 4 the metal will flow in as indicated in that figure. Now as the plate cools and the cam 33 rotates the latter will act to move the shutter 29 down from the position shown in Fig. 4 to that shown in Figs. 1, 3, and 5 just as the metal reaches the proper stage for that action as described above. When the shutter rises again the casting box 22 drops away from the cylinder and the matrix is stripped by the parts 23 and 24. Now the cylinder or core 25 turns through a half revolution in the usual way so that the newly cast plate is delivered on its upper half. When this occurs the preceding plate P' meets a projection on the shutter 29 and is thereby lifted during its turning action away from the surface of the core 25. The plate is turned positively with the core and kept against its surface throughout its turning action up to this point by a notch 43 in the core which of course is filled by a projection on the plate. By the time the parts get to this position the shutter 29 has opened as shown in Fig. 4 so that a new plate P may be cast while the preceding plate P' is being removed from the machine by hand or otherwise. When the plate is delivered it may or may not be shaved along its inner ribs before being clamped down on the cylinder of the press. As there is no riser and that edge of the plate is cast true against the surfaces of the parts 29 and 24 the entire finishing operation may in some instances be dispensed with.

In this way it will be seen that the riser sawing mechanism can be entirely eliminated and even the shaving means in some cases; that although the riser is not present and does not have to be manipulated, sawed off or delivered, yet none of the advantages of the riser are lost. Furthermore, notwithstanding that the metal supply is separated from the cast plate while the former is in a fluid condition the plate is of no greater length than a similar plate from which the riser has been sawed while cold. Neither is any blank space necessary on the edge of the plate conforming to the width of the clamping edge of the matrix and thus the type surface of the plate does not have to be

shortened. Furthermore the connection of the plate with the metal supply or riser is done away with without producing chips or sawdust which might clog the working parts of the machine and interfere with its operation. This invention is also carried out with a corresponding increase in rate of production.

I do not claim herein the machine disclosed herein or the product as the former is claimed in my divisional application, Serial No. 105,819, filed April 30, 1926, and the latter in Serial No. 146,274, filed November 4, 1926.

Although I have illustrated and described only a single form of the invention and shown it as applied to a well known type of casting box and melting pot I am aware of the fact that modifications can be made in the invention itself and that it can be used with other types of casting boxes and melting pots without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited in these respects, but what I do claim is:—

1. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and, before it has completely solidified, forcing a solid object toward the mold cavity near the point of introduction of the metal to supply any voids left by shrinkage and forcing the solid object to a position in which the surplus metal will be forced out of the mold and disconnected from the cast plate.

2. The method of making a stereotype printing plate which consists in filling the mold with molten metal and entering an object near the point of introduction of the metal in a gradual manner in a direction to tend to compress the metal in the mold, supply any voids left by shrinkage, and gradually force the surplus metal out of the mold.

3. The method of making a stereotype printing plate which consists in connecting a mold therefor with a source of molten metal, allowing the metal to run into the mold until it fills it, then cooling the plate until it partly solidifies and cutting off the source of metal from the plate by forcing an element adapted to fill the passage conducting the metal toward the cooling plate to supply extra metal to the plate necessitated by its shrinkage, and forcing the surplus metal out of the mold and at the same time disconnecting it from the source of supply.

4. The method of making a printing plate without a riser which consists in providing a passage in which molten metal can run into the mold, retarding the chilling of the metal in the mold at a point adjacent to the point at which the metal enters, forcing a shutter having a cross section to fill said passage in line with the width of the mold to gradually cut off the passage as the metal solidifies and force the surplus metal out past it and finally cut it off from the cast plate and form a finished edge at that point.

5. The method of filling a stereotype plate mold and finishing the edge of the plate at which the metal is introduced which consists in elevating the metal above the mold, raising a shutter located at the end of the mold passage to form a communicating space between the mold and the supply of metal thus permitting the metal to flow by gravity into the mold and fill it, cooling the metal in the mold down to a semi-solid condition, and then forcing said shutter backwardly in a gradual manner to close said passage, to expel surplus metal, cut the metal off from the mold, and leave the edge of the cast plate in the form of the advance edge of the shutter whereby it will be left in the desired shape on that edge.

6. The method of making a printing plate without a riser which consists in providing a passage in which molten metal can run into the mold, retarding the chilling of the metal in the mold at a point adjacent to the point at which the metal enters, forcing a shutter in to cut off the passage as the metal solidifies and force the surplus metal out past it and finally cut it off from the cast plate.

7. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and entering an object into the mold cavity near the point of introduction of the metal to eject the molten metal lying between the plate proper and the source of supply.

8. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and introducing an object into the mold to a position between a matrix holding device and the opposite side of the cavity so that a plate shall be cast without a blank end corresponding substantially to the face of the said matrix holding device.

9. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and introducing an object into the mold between a matrix holding device and the face of the mold opposite it for separating the plate from its riser.

10. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and closing the mold between the plate and the source of its metal supply, at a point between the matrix holding device and the side of the mold opposite it, in order to separate the plate from its riser.

11. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and

separating the plate from its riser by moving an object into a position directly adjacent to the printing surface of the plate, and thus severing the plate from its riser close to its printing surface.

12. The method of making a stereotype printing plate without a riser which consists in filling the mold with molten metal and separating the plate from its riser by moving an object toward the plate in freeing it from its riser.

13. The method of casting a printing plate without a riser which consists in moving an object into the mold past the sprue space in a direction in line with one dimension of the cast plate to cut off the sprue space from the mold and form the edge of the plate with a surface defined by said object.

In testimony whereof I have hereunto affixed my signature.

HENRY A. WISE WOOD.