No. 838,741. PATENTED DEC. 18, 1906.

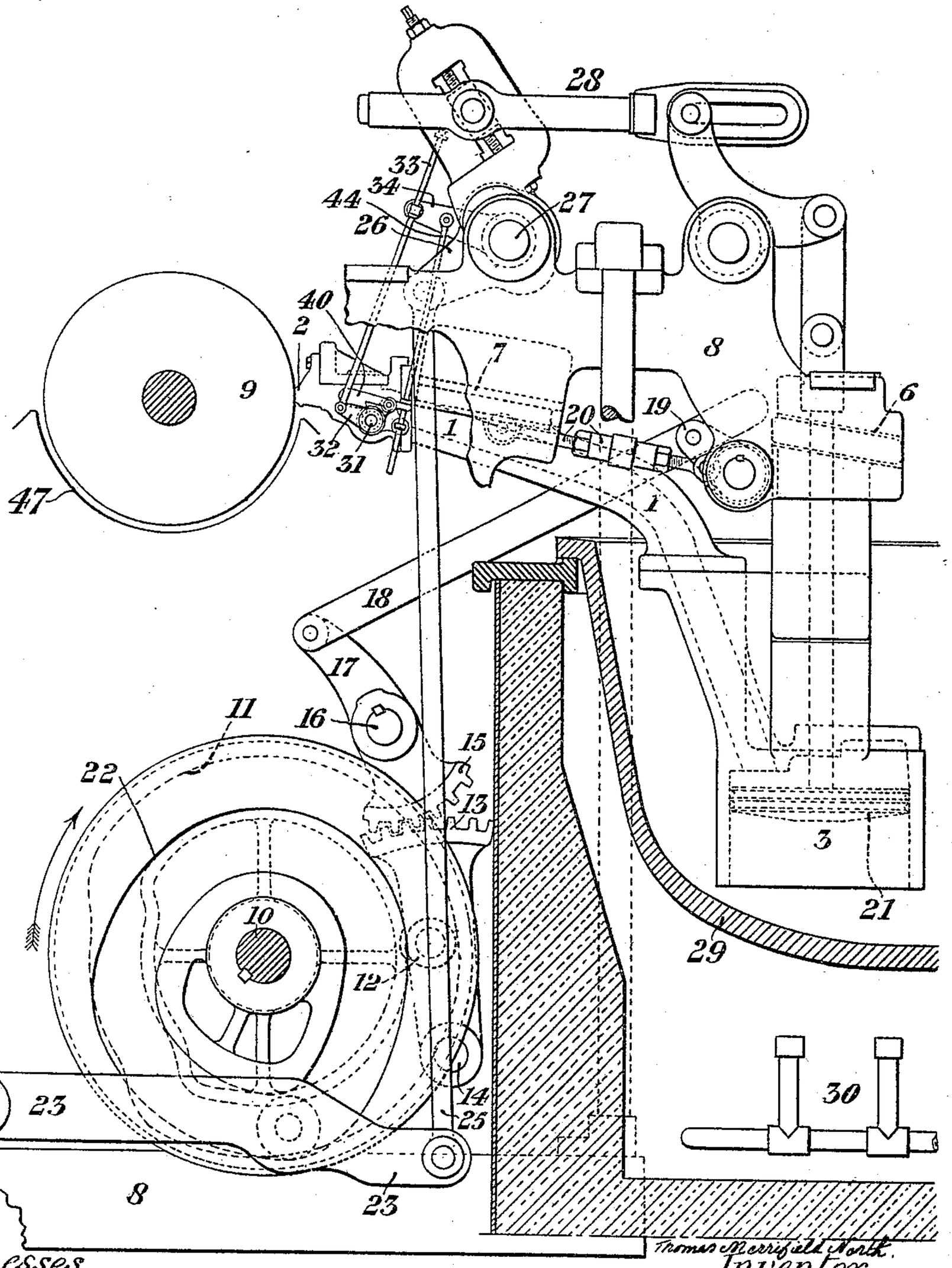
T. M. NORTH.

MEANS FOR CASTING STEREOTYPE PLATES.

APPLICATION FILED FEB. 20, 1905.

7 SHEETS—SHEET 1.

*Fig. 1.*




Witnesses

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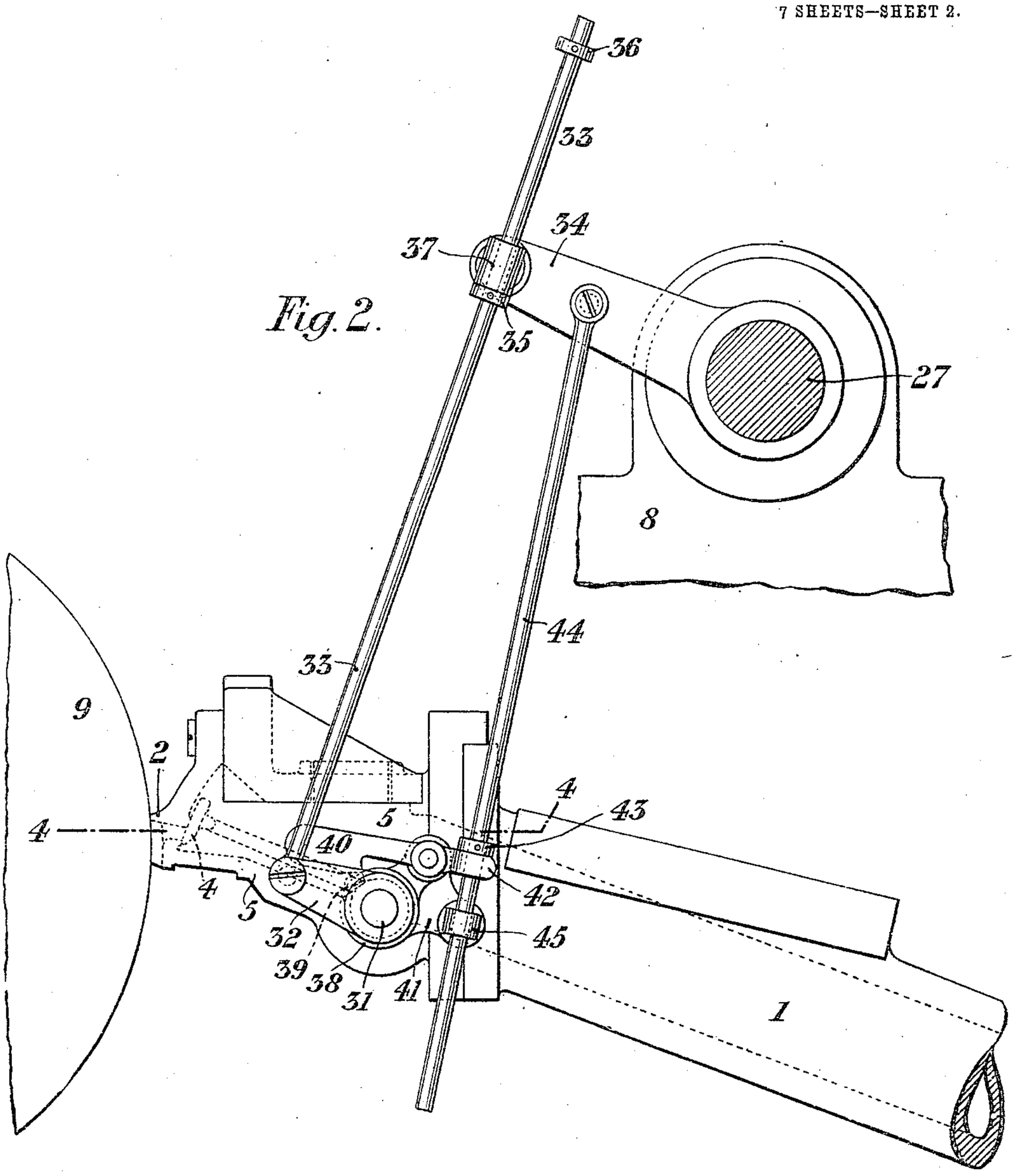
7 SHEETS—SHEET 2.

Fig. 2.

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7 SHEETS—SHEET 3.

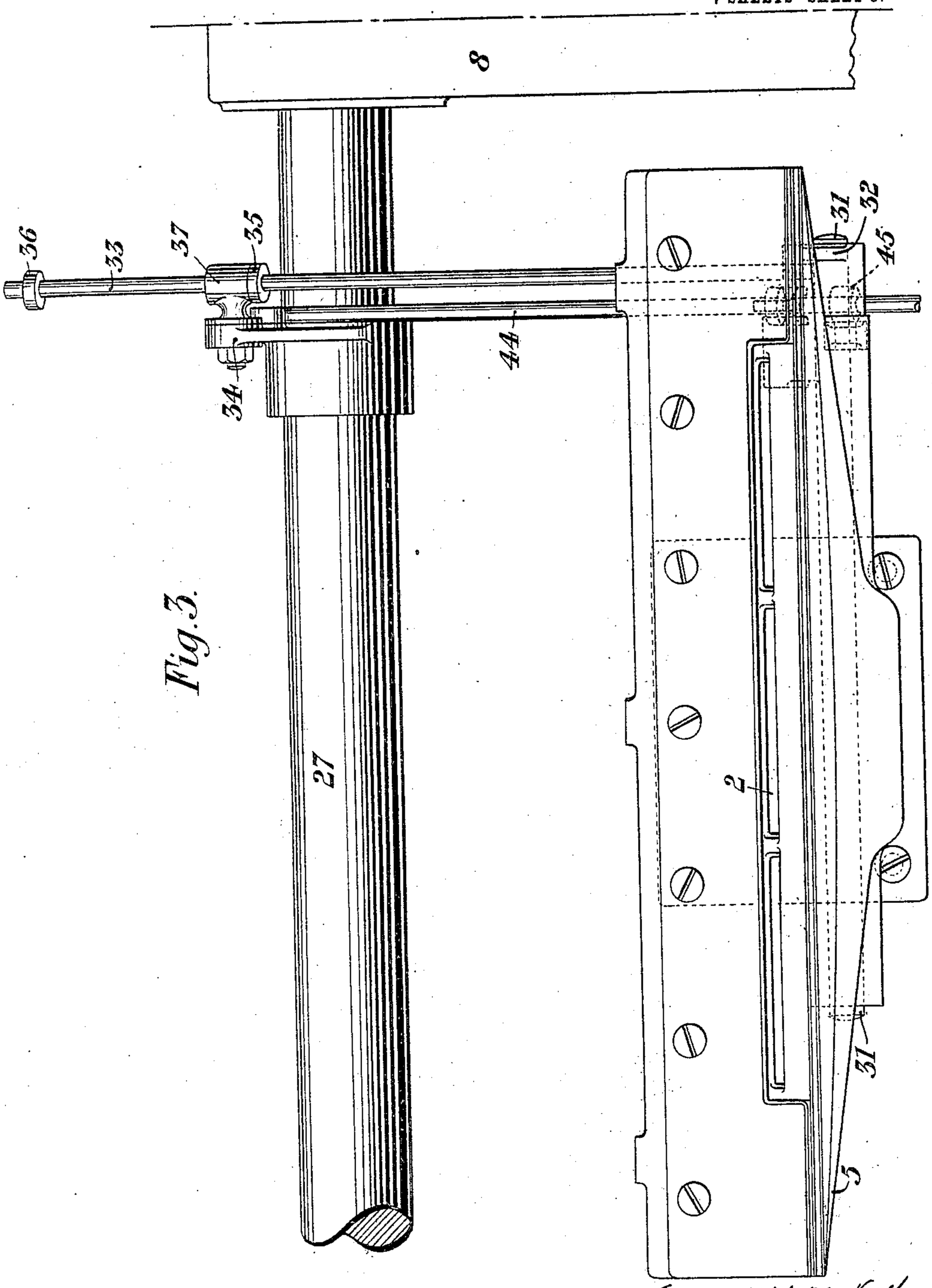


Fig. 3.

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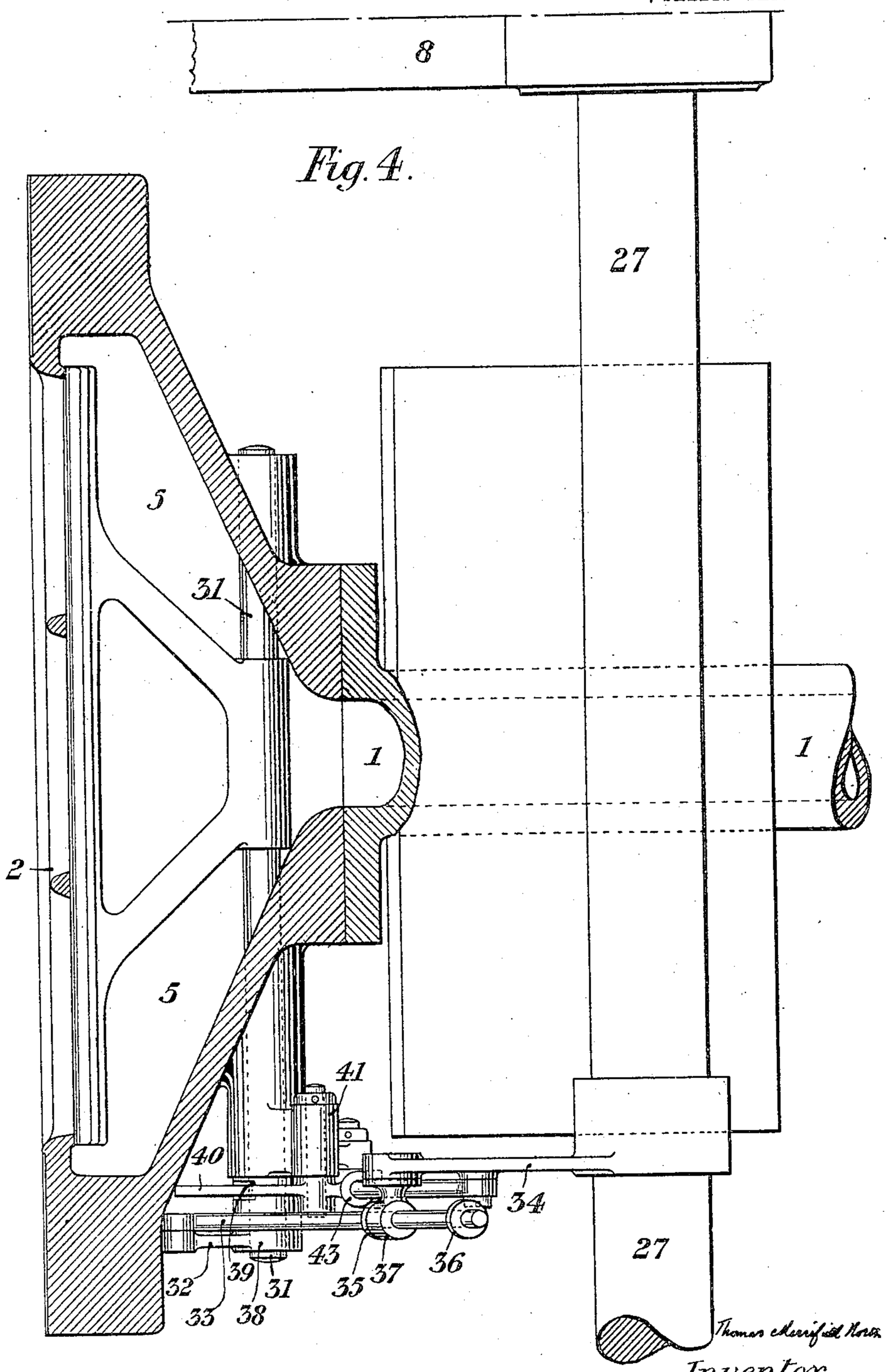
7 SHEETS—SHEET 4.

Fig. 4.

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7 SHEETS—SHEET 5.

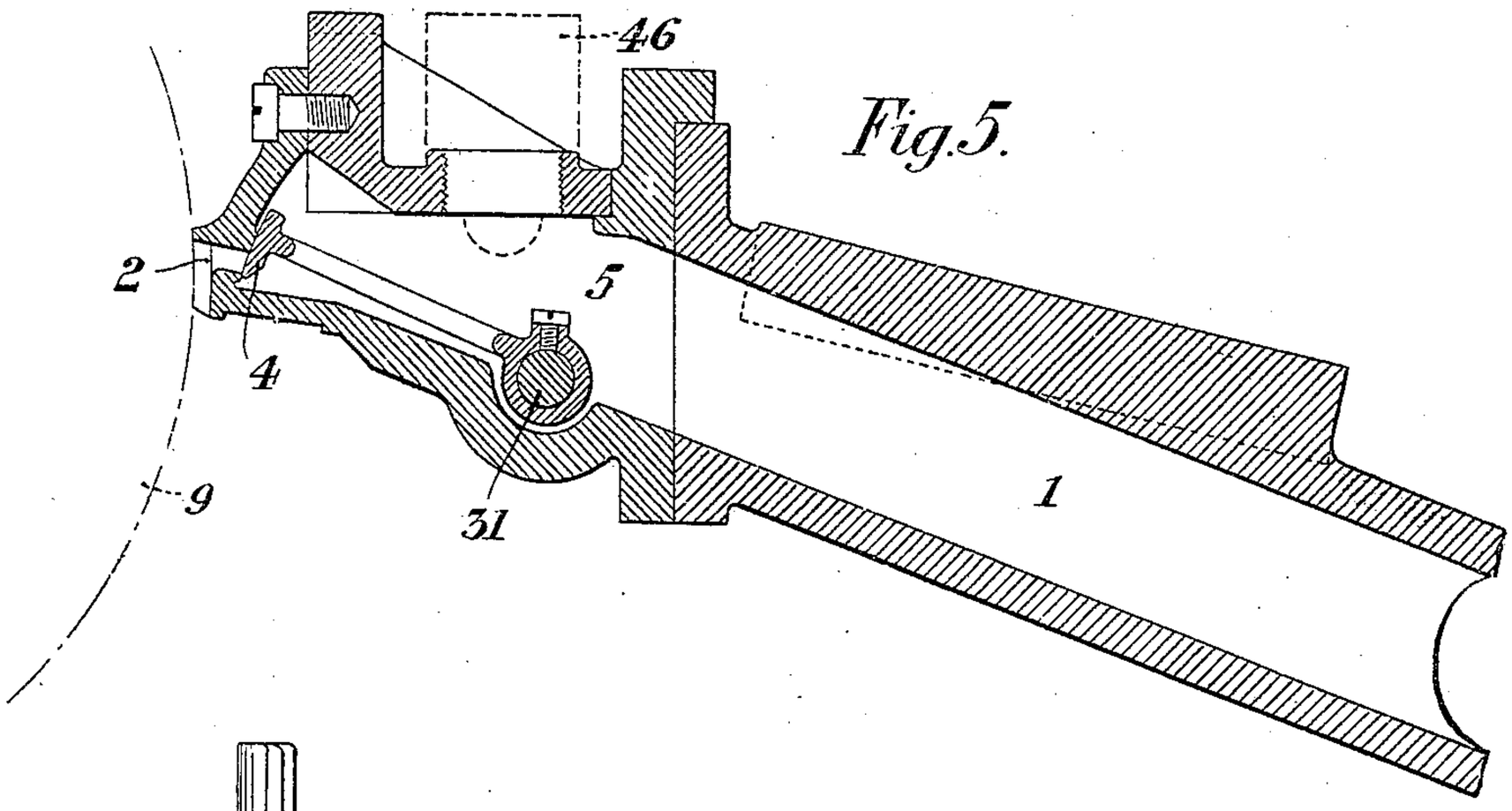


Fig. 5.

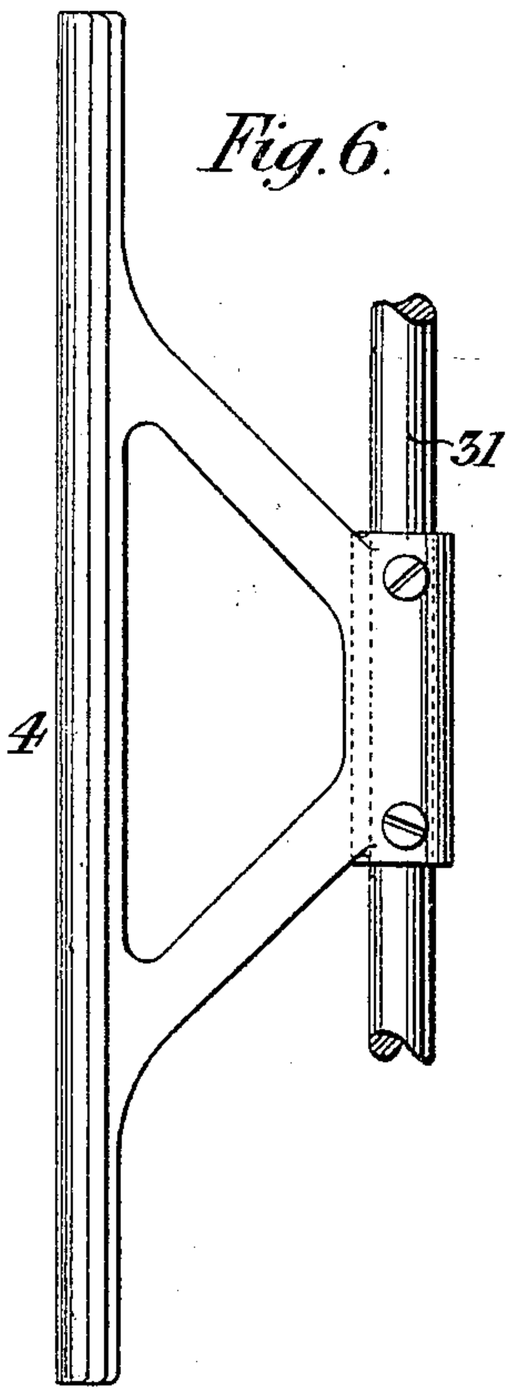


Fig. 6.

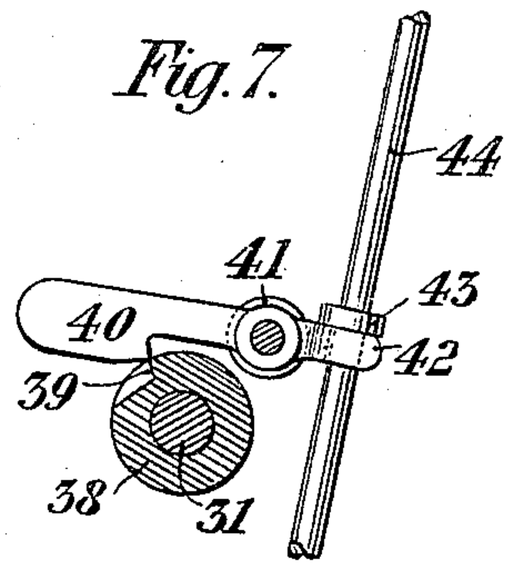


Fig. 7.

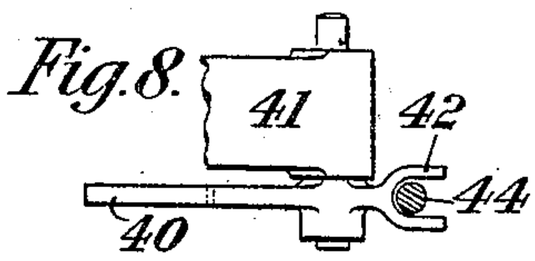


Fig. 8.

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No. 838,741. PATENTED DEC. 18, 1906.

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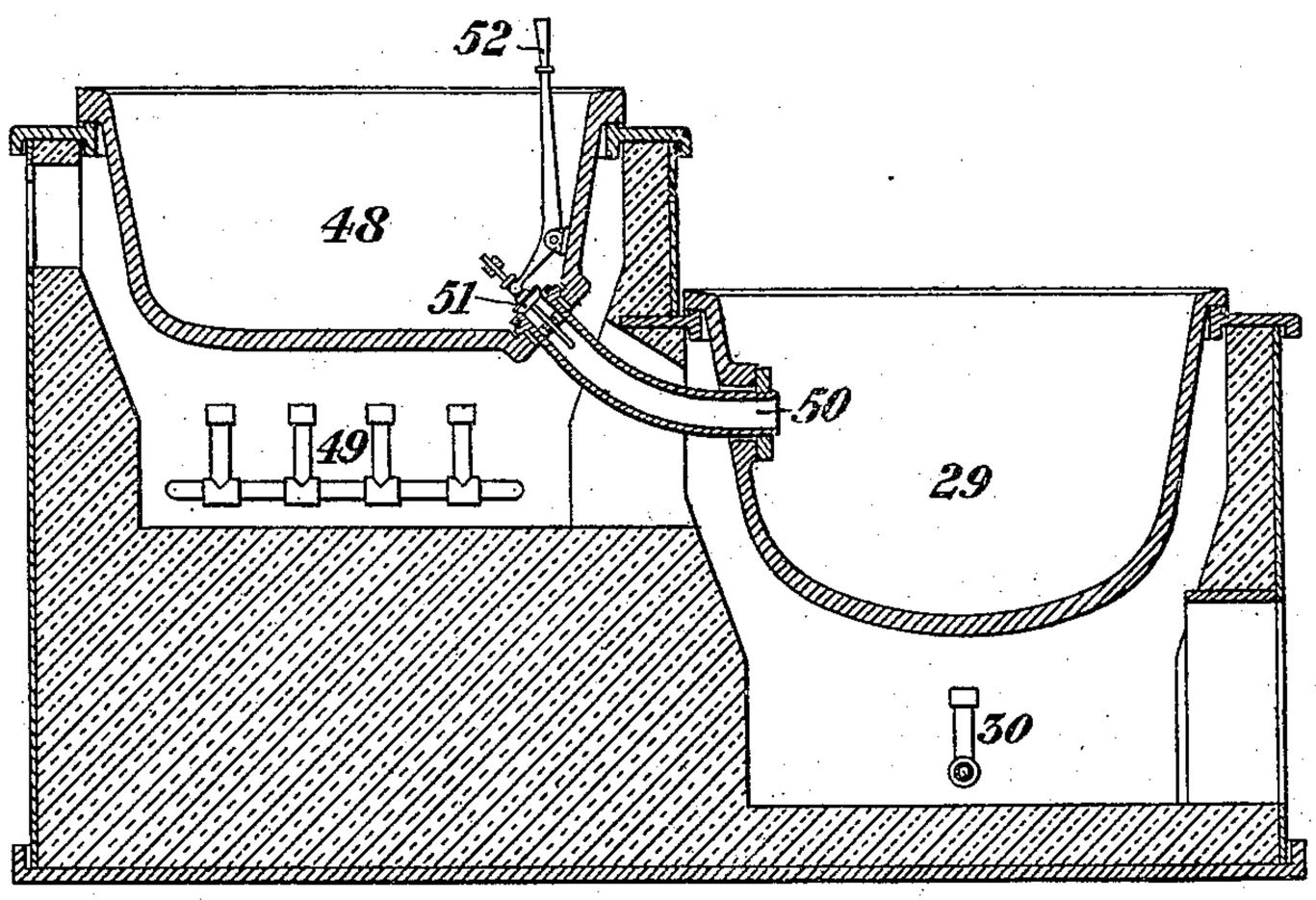
# MEANS FOR CASTING STEREOTYPE PLATES.

APPLICATION FILED FEB. 20, 1905.

7 SHEETS—SHEET 6.

*Fig. 9.*




Witnesses
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# MEANS FOR CASTING STEREOTYPE PLATES.

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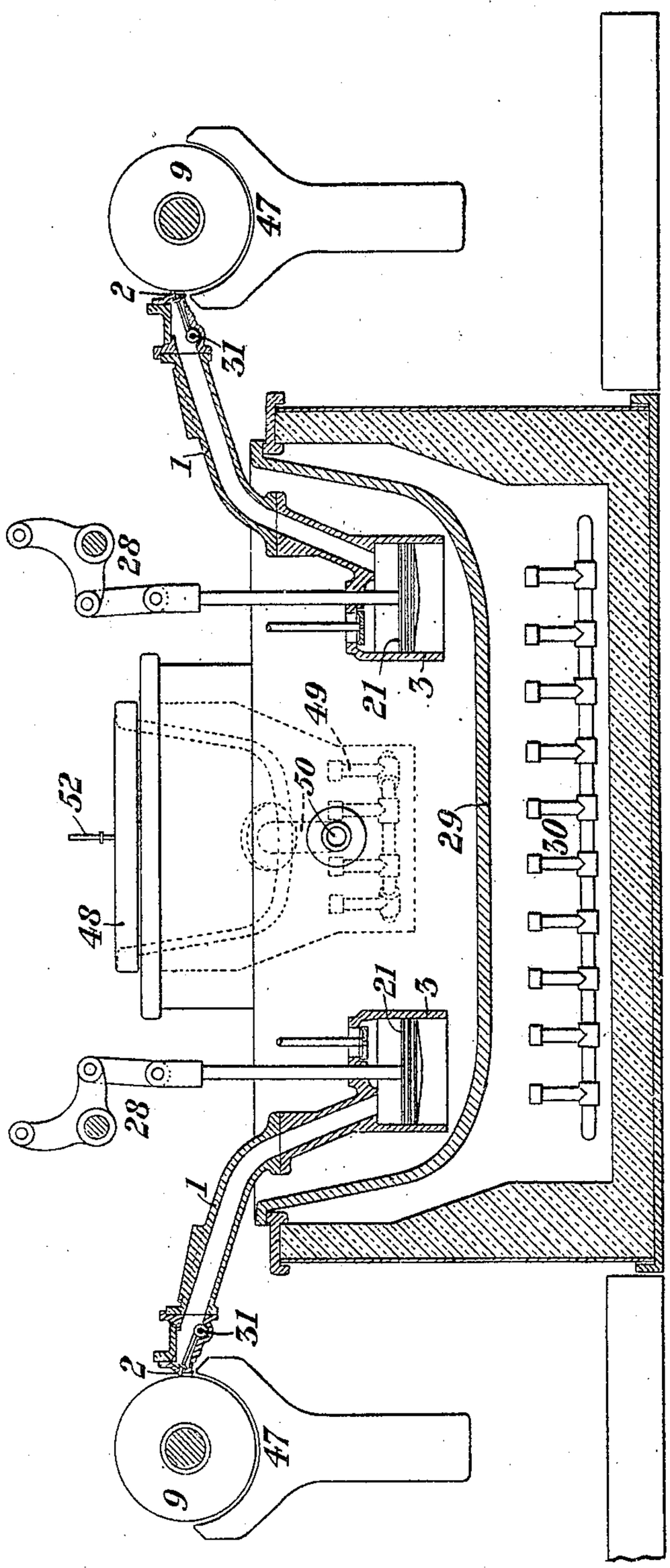
7 SHEETS—SHEET 7.

Fig. 10.




Witnesses
Wm Sutherland Robinson.
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# UNITED STATES PATENT OFFICE.

THOMAS M. NORTH, OF LONDON, ENGLAND, ASSIGNOR TO LINOTYPE AND MACHINERY LIMITED, OF LONDON, ENGLAND.

## MEANS FOR CASTING STEREOTYPE-PLATES.

No. 838,741. Specification of Letters Patent. Patented Dec. 18, 1906.

Application filed February 20, 1905. Serial No. 246,606.

*To all whom it may concern:*

Be it known that I, THOMAS MERRIFIELD NORTH, of 188 and 189 Fleet street, in the city of London, England, have invented new and useful Improvements in Means for Casting Stereotype Printing-Plates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in means for casting stereotype printing-plates, and is more particularly applicable to the machine and plates described in the specifications of Letters Patent Nos. 721,117 and 782,299.

The object of the invention is to increase the output of the machine as compared with the output of similar machines as hitherto constructed, and this is attained by increasing to the extent of doubling the cross-section of the throat and delivery-mouth of the metal-pump and the rate at which the casting mechanism works and combining an improved cut-off valve with the mouthpiece of the said throat. It is this increased rate that makes the cut-off valve necessary, because it exposes the matrix to greater danger than ever of being injured by splashes of hot metal or of being torn by the sprue. The splashes would occur as the mouth of the throat was being moved smartly—almost jerked—away from the mold, such jerking sufficing to jerk a splash of metal out of the throat into the mold, where it would fall upon the matrix. The mischief that this splashing is capable of doing is explained in the specification of the above-named Patent No. 782,299. The radial length of the sprue will vary according to circumstances, because it is not under control, and whenever it happens to be longer than the clear way that the retreat of the concave segments (with the matrix on them) from the cast plate leaves between the latter and the matrix the matrix will be torn by the sprue.

To provide against the constantly-recurring cooling of the metal in the melting-pot which would result from the increased demand thereon due to the increased rate of working of the casting apparatus and the consequent increase in the quantity of cold metal supplied to the said pot, there are provided one or more preliminary pots in which ingots are melted to the required degree of fluidity preparatory to the molten metal being delivered into the usual melting-pot.

In the accompanying drawings, which are to be taken as part of this specification and read therewith, and in which like reference-numerals indicate like parts throughout the several figures, Figure 1 is a sectional elevation of as much of a stereotype-plate-casting machine as is necessary to illustrate the present invention. Fig. 2 is an enlarged view of a portion of Fig. 1. Fig. 3 is an elevation as seen from the left-hand side of Fig. 2, with the core shown in the latter figure omitted. Fig. 4 is a view showing the throat, mouthpiece, and cut-off valve mechanism, partly in plan and partly in section on the line 4 4 of Fig. 2. Fig. 5 is a central vertical section of a part of the throat, mouthpiece, and cut-off valve. Fig. 6 is a plan of the cut-off valve and a portion of its operating pivot or spindle. Figs. 7 and 8 are respectively a sectional side elevation and a sectional plan of a part of the valve-controlling devices, and Figs. 9 and 10 are central vertical sections taken at right angles to each other of the improved apparatus for melting the metal.

As before explained, the object of the present invention is to increase the output of the machine, and this is attained by increasing the cross-section of the throat 1 and delivery-mouth 2 of the metal-pump 3 and the rate at which the casting mechanism works and combining a cut-off valve 4 with the mouthpiece 5 of the said throat.

As shown best in Fig. 1, the pump 3 is supported and adapted to slide obliquely in guides 6 7, formed in a fixed part of the machine-frame 8, and of which guides the former is situated in or traverses the vertical plane containing the axis of the pump-cylinder, and the other is situated nearer to the core 9 and adapted to support the pump through the throat 1. The pump 3 and throat 1 are as one piece moved in the guides 6 7 by the following mechanism:

On the cam-shaft 10 is secured a grooved face-cam 11, (shown in dotted lines in Fig. 1,) engaging with a roller 12 on a toothed seg-

ment 13, pivoted at 14 to a fixed part of the machine-frame 8. The toothed segment 13 meshes with another toothed segment 15, fast to a shaft 16, suitably journaled in the machine-frame 8, said shaft having also secured to it a lever-arm 17, pivotally connected to one end of a link 18, whose opposite end is similarly connected to a rocking arm 19, suitably connected by an adjustable link 20 to a part of the throat 1 adjacent to the before-mentioned guides 7. It will be obvious that as the cam 11 rotates (the direction of rotation is indicated by the arrow in Fig. 1) the mouth 2 will be successively moved up to the core 9, held there during the casting operation, and withdrawn from the core and retained in its retracted position until it is next projected forward to deliver the molten metal for making the next cast.

The pump-plunger 21 derives its vertical reciprocating motion from a grooved face-cam 22, fast on the cam-shaft 10, this cam actuating a lever 23, turning on a fixed fulcrum 24 and pivotally connected to the lower end of a link 25, whose upper end through a lever-arm 26 imparts oscillating motion to a rocking shaft 27. This rocking shaft 27 transmits motion to the pump-plunger 21 by the lever-and-link mechanism, which as a whole is marked 28 and which constituting no part of the present invention is not herein specifically described. The pump 3 is submerged in the molten metal contained in the melting-pot 29, which is heated by a suitable gas-furnace 30.

The cross-section of the throat 1 is, as before explained, double that of the throats hitherto employed in the same class of machines, and correspondingly the area of the aperture of the mouth 2 is also double that of the mouth-apertures provided in existing machines. The before-mentioned valve 4 is of a length sufficient to close the aperture 2 throughout its entire length, which length corresponds with the length of the plate, and it is secured to a shaft 31, suitably journaled in the sides of the mouthpiece 5. On one end of this shaft, situated at the outside of the mouthpiece 5, is secured a lever-arm 32, to which is pivoted the lower end of a link or rod 33 in sliding connection with a lever-arm 34, fast on the before-described rocking shaft 27. The said sliding connection is provided by the link or rod 33 being fitted with two collars 35 36 and being capable of sliding to the extent determined by the positions of these collars on the said rod through a sleeve 37, swiveled to the lever-arm 34. The boss 38 of the lever-arm 32 is provided with a projection or tooth 39, (shown best in Fig. 7,) with which is adapted to engage a detent 40, pivoted to a bracket 41, fast to or cast in one piece with the mouthpiece 5, as shown best in Fig. 4. The detent 40 is provided with a yoke or fork 42, the two arms of which are acted upon by a collar 43, fast upon a rod 44, which at its upper end is pivoted to the lever-arm 34 and at or near its lower end slides in a guide 45, swiveled to the above-named bracket 41. At its upper part the mouthpiece 5 has fitted to it a valve 46, (shown in dotted lines only in Fig. 5,) like the valve described in the before-mentioned specification of Patent No. 782,299 and for a similar purpose. 47 is a segmental back, (shown diagrammatically in Fig. 1,) within which the matrix is fitted in the ordinary manner.

In the operation of the before-described apparatus the throat 1 is caused to approach and recede from the core 9 in the usual manner, and when the mouth 2 is in contact with the said core, in which position it is represented in Figs. 1, 2, and 3, the pump-plunger 21 is raised to discharge molten metal through the mouth 2 and into the mold constituted by the core 9 and the matrix supported on the segmental back 47. Assuming that all the parts are in the relative positions in which they are represented in Fig. 1 and the shaft 10 is rotating in the direction indicated by the arrow in that figure, the sequence of the various motions will be as follows: During the first seventy degrees of rotation of the said shaft 10 the pump 3 and throat 1 will remain stationary and the plunger 21 will be moved from its highest to its lowest position, and toward the end of this section of the operation the sleeve 37 will engage the collar 36, and thereby effect the opening of the valve 4, the detent 40 falling into engagement with the tooth 39 when the valve is fully open. During the next or second seventy degrees of rotation neither the throat 1, pump 3, nor plunger 21 will have any motion imparted thereto; but concurrently with the termination of this portion of the rotation the retraction of the mouth 2 from the core 9 will commence, and during the next ensuing ninety degrees of rotation the said mouth will be successively retracted, maintained stationary in its retracted position, and then again moved into close operative contact with the core 9, the pump-plunger 21 during this period receiving no motion relatively to the pump 3. During the next ten degrees of rotation no motion will be imparted to any of the parts concerned in this series of operations; but concurrently with the termination of the said ten degrees of rotation the plunger will commence its ascent, this ascent continuing during the next hundred and twenty degrees of rotation of the shaft 10, but being rapid for the first sixty degrees of such rotation, so as to quickly inject the molten metal into the mold, and slow for the remaining sixty degrees of such rota-

tion, so as to apply pressure to such molten metal, and thereby cause it to more surely enter all the interstices of the mold, the throat 1 and pump 3 of course remaining stationary in their forward position throughout the ascent of the plunger 21. Near the end of this section of the operation the collar 43 contacts with the forked tail 42 of the detent 40, and thereby raises the said detent out of engagement with the tooth 39, and immediately thereafter the sleeve 37 contacts with the collar 35 and closes the valve, if it is not already closed by falling by its own gravity, this closure taking place simultaneously with the attainment by the plunger 21 of its highest position or slightly after that juncture. This completes the cycle of operations of the casting mechanism, each rotation of the shaft 10 being productive of a similar cycle. The before-specified different degrees of rotation are those which are considered to give the most satisfactory results; but they may be varied, if desired. The plunger is operated through the usual spring-buffers, which absorb the power exercised by the cam 22 when the pressure within the mold-chamber is at its maximum, thereby enabling the said plunger to remain stationary and inoperative for the remaining part of the same rotation of the cam. The last-named buffers are similar to those employed for the same purpose on existing machines of the class to which the present invention applies, and as they therefore form no part of the said invention they are not shown in the drawings.

In existing stereotype-plate-casting machines of the class to which this invention applies the restricted area of the mouth 2 has sometimes been causative of defective castings, because it was rarely possible to supply the molten metal to one side of the mold sufficiently quickly to enable it to flow to the opposite side of such mold without being appreciably cooled, and, moreover, this restriction was also causative of an unnecessary prolongation of the time appropriated to the casting operation, and therefore to that extent curtailed the output of the machine. By the present invention this restriction is entirely removed, the molten metal being delivered through the mouth 2 at practically the same rate as that at which it can pass from one side to the other of the mold. The time occupied in the actual casting operation is the principal factor in determining the speed of working of the other parts of the apparatus and the limit of the output of such apparatus. Consequently the acceleration in the rate of casting as provided for by the present invention enables the apparatus to be operated at a higher rate of speed, and therefore the output will be proportionately increased.

The before-mentioned increased rate of working of the casting apparatus necessarily increases the draft upon the supply of molten metal, and consequently increases the rate at which the cold metal must be supplied to the melting-pot for reduction to the fluid condition. Were this cold metal supplied directly into the single melting-pot which has hitherto only been provided, the metal therein would be subjected to chilling influences following each other in close succession, and consequently the molten metal would be seldom in the condition necessary for producing satisfactory castings. To overcome this difficulty, the apparatus, as shown in Figs. 9 and 10, is provided with one or more melting-pots 48 (only one is shown in the drawings) in addition to the ordinary melting-pot 29, each of such additional melting-pots 48 being heated by a suitable gas or other furnace 49. This melting-pot 48 is situated, preferably, at a higher level than the ordinary melting-pot 29, so that the molten metal may descend into the latter by gravity, for which purpose the said ordinary and additional pots are connected by a pipe 50, controlled by a suitable valve 51, which may be opened and closed by means of a hand-lever 52. The present pot 29 still has a furnace 30 to maintain the molten metal therein at the proper temperature.

By constructing the last-described melting plant of suitable size or capacity it may advantageously be arranged to supply several casting-machines or several machines with multiple casting devices. As an example of one such application Fig. 10 represents more or less diagrammatically an arrangement wherein two casting devices are supplied with molten metal from one and the same melting plant.

I claim—

1. In apparatus for delivering molten metal to the mold of a stereotype-casting machine, the combination with the mouthpiece adapted to deliver molten metal into the mold, of a pivoted valve within said mouthpiece, the pivot extending to the outside of the mouthpiece, a lever-arm on this pivot exterior of the mouthpiece, a detent adapted to operatively engage the said lever-arm to prevent the closing of the valve, means operatively connected with the lever-arm adapted to open and close the valve at the required times, and means operatively connected with the detent adapted to disengage it from the lever-arm when the valve is required to close.

2. In apparatus for delivering molten metal to the mold of a stereotype-casting machine, the combination with the mouthpiece adapted to deliver molten metal into the mold, of a pivoted valve within said

mouthpiece, the pivot extending to the outside of the mouthpiece, a lever-arm on this pivot exterior of the mouthpiece, a detent adapted to operatively engage the said lever-arm, a rocking shaft, a lever-arm on this rocking shaft, a rod pivoted to one lever-arm and in sliding connection with the other, and a rod in operative connection with the lever-arm on the rocking shaft and detent, placing them in sliding connection with each other.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

THOMAS M. NORTH.

Witnesses:

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WARWICK HY WILLIAMS.