D. Bruce. Sheet 1. 2 Sheets

Type Casting Mach.

No. 3324 Patented Nov. 6. 1843.

Fig: 1.

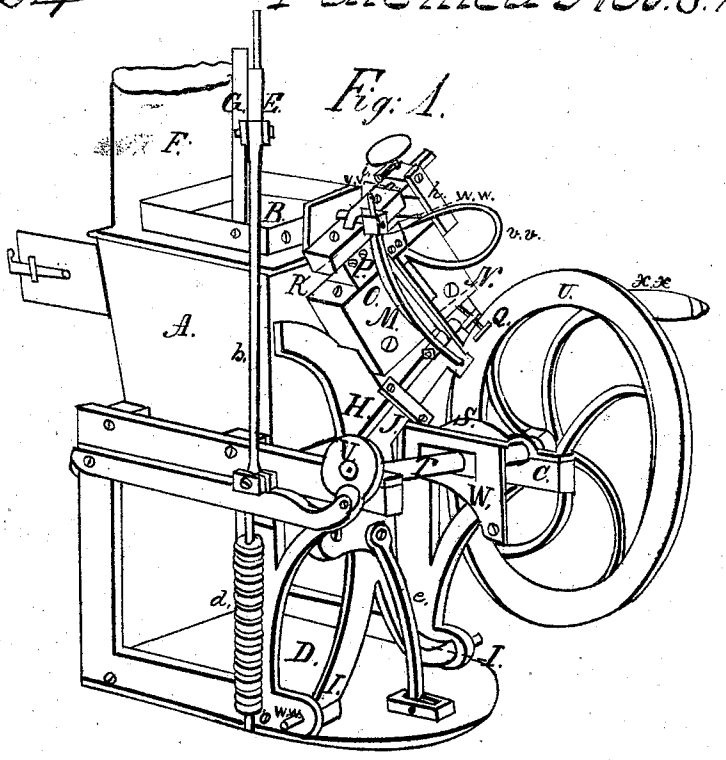
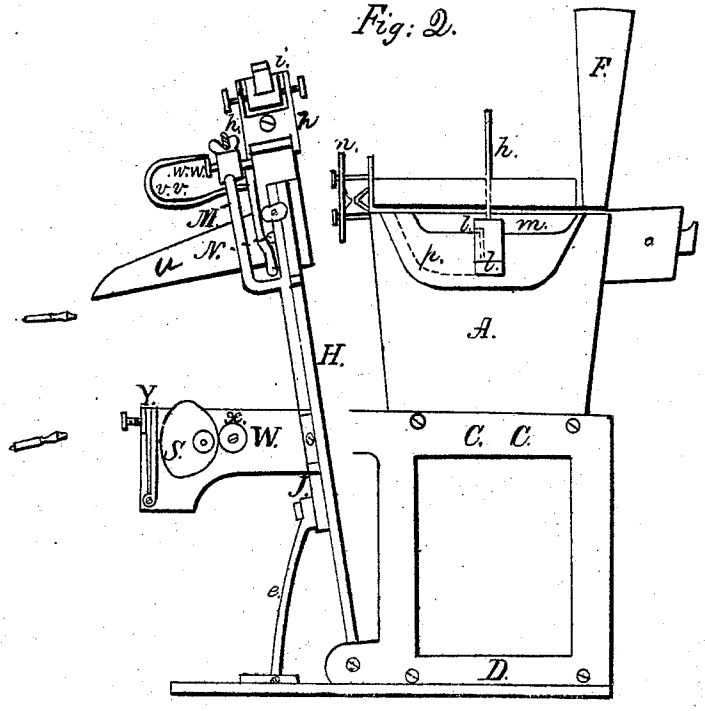


Fig: 2.



Sheet 2. 2 Sheets.

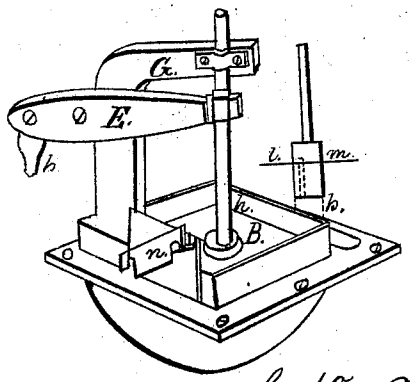
D. Bruce.

Type Casting Mach.

No. 3324 Patented Nov. 6. 1843.

Fig: 3.

Sec. 1.



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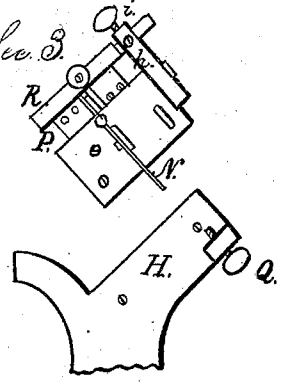

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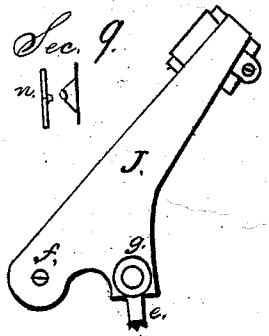

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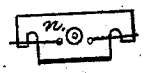

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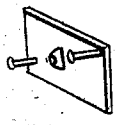
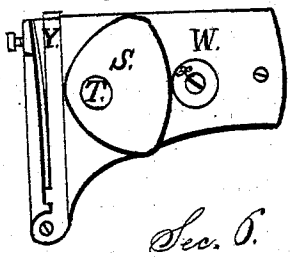


Sec. 9.

Sec. 4.



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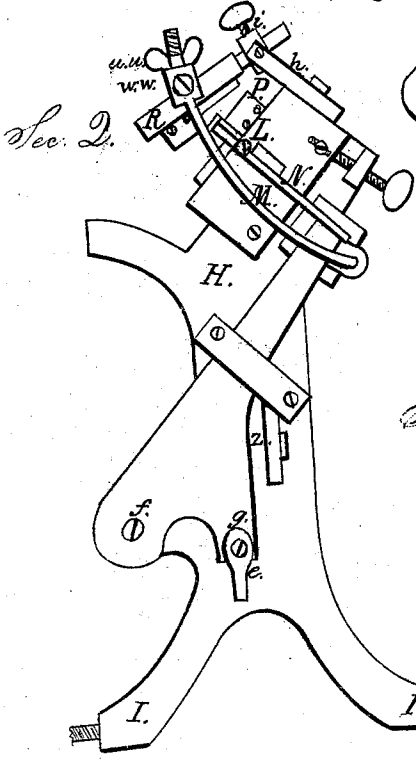

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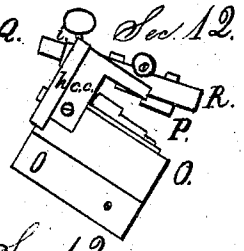

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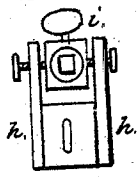

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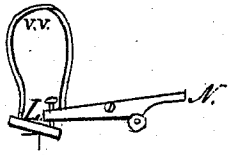

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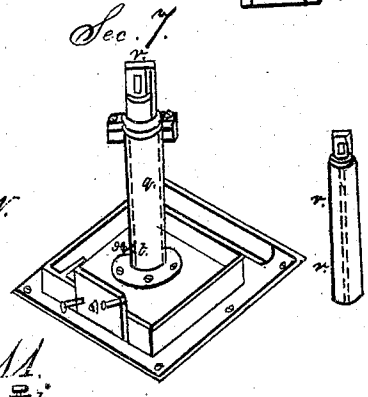

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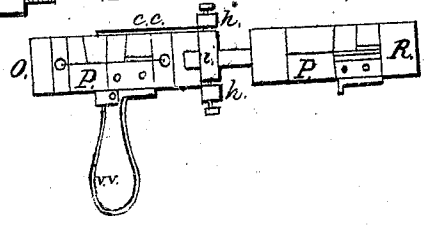

UNITED STATES PATENT OFFICE.

DAVID BRUCE, JR., OF WILLIAMSBURG, NEW YORK.

IMPROVEMENT IN TYPE-CASTING MACHINES.

Specification forming part of Letters Patent No. **3,324**, dated November 6, 1843.

To all whom it may concern:

Be it known that I, DAVID BRUCE, Jr., of Williamsburg, Kings county, Long Island, and State of New York, have invented a new and Improved Machine for the Casting of Printing-Types; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view, and Figs. 2 and 3 sectional parts of the same.

In Fig. 1, letter A represents the furnace, to which is secured the melting-pot B, containing the type-metal. The furnace is secured to and resting upon the cast-iron frame C C, which frame is secured to the bed-plate D. The furnace-door is represented as thrown open. F is the commencement of the smoke-pipe. The pump-frame G, with the tilt or working beam E thereto attached, ranging edgewise, will be better understood by referring to Fig. 3, section 1.

In Fig. 1, H is the vibrating arm, whose lower extremities, I I, are its axis, working on points passing through the cast-iron frame C C. This vibrating arm will be better seen in Fig. 3, section 2. In this view the arm H will be seen attached to the oblique lever J, whose office is to open and close the mold P and tilt the matrix L through the agency of the bent bar M and the lever N. In Fig. 1 on the arm H will be seen attached the mold-block O, secured to whose upper oblique surface may be seen the mold P, held between the upper mold-block, R, by the bar M, before mentioned in section 2. This bar M extends from an eye in the lower edge of the upper end of the oblique lever J, into which it turns at a right angle with its own length, as seen in section 2. This bar, whose office is to open and close the mold, as before stated, is adjusted to the requiste tightness to the mold by a thumb-nut, *u u*, operating upon an eye, through which its upper end passes. This eye is secured in its place by another screw, as shown in section 2, W W.

In section 3 may be seen the mold-block O, with the mold P and upper mold-block, R, detached from the arm H, shown immediately below it. This mold-block O is attached to arm H by two screws. The lower one serves as an axis, and the upper one (its shank-hole being slotted or elongated) admits of the block being depressed or elevated by the thumb-screw shown in section 2.

Returning to Fig. 1, the mold and other attachments may be seen pressed up toward the kettle by the cam S, revolving with and upon the shaft T. This shaft, to which is attached the balance-wheel U and another cam, V, (whose office is to work the pump-gearing,) revolves in boxes upon and near the termination of the cast-iron frame C C. To one end of the shaft T may be seen the pump-cam V, upon whose edge is seen a roller connected with the lever *a*, from which extends upward the rod uniting with the beam E, as shown in section 1. Beneath lever *a* and extending downward is seen the spiral spring *d*. The foot of the rod on which this spring is placed passes through an eye affixed to the frame C C, and the upper end of the rod falls into a shallow socket in the under side of the lever *a*. The office of this spring is to depress the pump through the arrangements connected with the lever, as before described.

The rod *e*, Fig. 1, is seen connected with the oblique lever J and the bed-plate D. It will be seen that the lower part of the rod *e* is not in a line with the axis of the arm H, but about three inches in advance of it. The effect thereby obtained is that while a forward and retrograde movement is given to the arm H, a corresponding vertical motion is given to the lever J, whose office is, as before mentioned, to open the mold and tilt the matrix through the agency of bar M and the lever N. (See section 13.) Section 5 shows the oblique lever J. The screw-head *f* is its center of motion on the arm H, and the screw-head *g* shows the upper end of the rod *e*, as before described. On the upper end and edge is seen an elongated roller. This roller passes under the matrix-lever N. On the other edge may be seen the eye for the bar M.

In Fig. 1, attached to the upper end of the lower mold-block, may be seen the hinge-frame, as also shown in section 6. This frame is fitted with proper exactness to slide upon the end of the mold-block by two rabbets running along its edges *h h*, and is secured to the mold-block by a screw, as shown in section 3. The slotted or elongated screw-hole indicates that the in-

tention of this is to allow of adjustment to various sizes of molds to be attached to the mold-block.

The axis-piece *i*, through which the square shaft of the upper mold-block passes, may be seen in section 6. This axis-piece is fitted with a circular collar, through which a square mortise is made and through which the square end or shaft of the upper mold-block, R, passes, and is held in its place by a thumb-screw passing through the collar and pressing upon the shaft. This collar has a slight circular movement, when required, within the axis piece, the object of which is to enable the upper mold-block to favor any slight inaccuracy there may be in the thickness of the mold when held between the upper and lower blocks. The mold P does not differ in any manner from the common hand-mold, excepting the jets are somewhat shorter and that it needs no leveling apparatus or wood or brass mouth-pieces.

The handle X X, for giving the machine motion, will be seen attached to the balance-wheel U, Fig. 1.

Section 1 shows the pot detached from the top of the furnace A. Here will be seen the piston and piston-rod. The upper end plays through the end of the frame G. The end of the beam E passes through a square mortise in the piston-rod.

k represents the pump-piston and part of its rod. This pump-piston is made to fit the pump-chamber with requisite exactness. About midway its length, Fig. 3, section 1, a small hole is drilled in toward its center. To meet this hole, another is drilled from the bottom, as shown by the dotted lines *l l*, thus forming a communication with the chamber of the pump through the piston. *m* represents the upper edge of the pump-chamber and inner surface of the bottom of the pot. (See Fig. 1.) It will be seen that the piston will not exert its full influence in forcing the metal downward until the hole in its side has descended past the edge of the pump-chamber. Neither can the chamber of the pump be replenished with metal until the piston has returned again, so as to raise the horizontal hole above the edge of the pump-chamber. The pump-chamber is bored out of the solid bottom of the pot, section 1, Figs. 2 and 3.

Section 1: *n* represents the outer surface of the plate which forms a communication with the mold P and the spout leading from the pump-chambers. Section 8 shows the inner surface of the plate *n*. Section 9 shows an edge view of the plate with its protruding conical nipple facing the spout, into whose mouth or orifice it is intended to fit. Section 10 shows a part of the pot through which the spout protrudes, and also the two studs on which this plate hangs, as shown in Fig. 2 and again in section 1. In section 8 will be seen two light springs extending from the nipple outward to he end of the plate. The intention of these springs is to produce a sufficient pressure upon the two studs on which the plate hangs to keep it in its place when drawn out upon them. (See section 1.) This plate, to designate it from any other heretofore used, I call the "male plate," as its conical nipple, which protrudes beyond its inner surface about the tenth of an inch, enters into the mouth of the spout, as shown in section 9 and again in Fig. 2. Through this conical nipple there is a suitable sized hole drilled, which is afterward reamed tapering from the outer side of the plate. The intention of this plate, as before stated, is to form a communication between the mold P and the spout when the mold is pressed up against it, as seen in Fig. 1. Fig. 2 shows the mold withdrawn from the spout, and the plate also drawn up to the heads of the studs, in which position it remains until the mold again presses it forward to the spout, from whence it always readily separates, as a portion of congealed metal in its conical aperture inclines it naturally to adhere to the cast in the mold until it is drawn against the heads of the studs, which then frees the plate from the cast. Thus it will be seen it is alternately pressed against the spout during the action of casting and withdrawn from the spout by the withdrawing of the mold.

Fig. 2 exhibits the position the mold-arm H and cam S would be in when the whole is withdrawn from the spout of the pot. In this view may be seen the position the pot would have upon the top of the furnace A; also the position of the pump and piston; and the dotted line *p* shows the course of the metal from the bottom of the pump-chamber to the termination at the spout.

Section 12 shows a mouth view of the mold secured to the upper and lower mold-blocks, O and R; also the discharger *c c* screwed to the lower mold-block and lying close to the mouth of the mold. The office of this discharger is to loosen the cast from the mold. The cast being made to adhere to the upper half of the jet or sprue formed by the plate *n* is drawn against it by the opening of the mold, which it consequently disengages, and the cast drops away from the mold.

Section 11 exhibits the mold P thrown open and attached to the surfaces of the upper and lower mold-blocks.

Having described the various sectional parts, I will now give a description of the general operation of the machine.

Taking hold of the handle X X and giving the balance-wheel half a revolution presses the arm H, through the agency of the cam S, up to the spout, carrying with it the plate *n*, as seen in Fig. 2. In the passage of the mold up to the spout the oblique lever J is drawn down by the rod *e*. The lever J draws down with it the mold-bar M, which draws closely together the mold. In passing down into this position the roller at its upper end rolls from under the matrix-lever N, which allows the spring *v v* to press down the matrix into its proper position upon the mold. The mold is now supposed to be ready to receive the metal.

By continuing the motion of the wheel the roller at the end of the lever *a* is pressed, by the influence of the spiral spring *d*, into the gape or notch cut in the circumference of the cam V, which, through its connection with the pump before stated, forces the pump downward and drives the fluid metal into the mold through the spout and plate. Continuing the motion of the wheel, the cam V forces the roller out of the notch into which it had been pressed, which raises the pump up to its proper elevation. While the pump is rising, the cam S is beginning to bring back the mold and arm H, the plate *n* is drawn from the spout against the heads of the studs, the matrix is tilted by the lever N, and the mold next opens by the mold-bar M, these two last movements being produced by the oblique lever J being raised by the rod *e*. The mold being opened, the cast is dislodged from it by the sprue or jet being drawn against the discharger *c c* at the mouth, and the shank of the letter being in like manner drawn against the stool of the mold, as in the ordinary way of casting type by the hand process. The type, being dislodged from the mold, falls upon a small sheet-iron shelf, *u*, attached to the arm H, Fig. 2, from whence it slides into a box or other receptacle for the purpose. Thus it will be seen that a continuous rotary motion given to the balance-wheel U by the handle X X produces all the motions before described, and by which mechanical arrangement type can be cast of a good quality and with little labor. The furnace, which has an ordinary grate at the bottom, is calculated for anthracite or bituminous coal, although small-sized anthracite is preferred.

The following dimensions of some of the principal parts of the machine will serve to govern the builders in its construction: height from bed-plate to the upper edge of the pot, fifteen inches; width of the bed-plate, eight inches; length of bed-plate, twelve inches; length of cast-iron frame where it supports the shaft, twelve inches; length of the vertical arm H, thirteen inches; length of oblique lever J, eight inches and a half; upper dimensions of furnace, seven inches by six and a half; depth of furnace, six and a half inches; depth of metal-pot outside, four inches and a half.

What I claim as my invention, and which I desire to secure by Letters Patent, is—

1. The male plate *n*, constructed with a nipple protruding beyond its back surface, and springs attached to the plate, arranged and operating in the manner and for the purpose set forth.

2. The method of opening and closing the mold and tilting the matrix by the combination and arrangement of the compound vibrating arm H and lever J, arms M and N, and spring *v*, said lever J having a simultaneous vibrating movement on an axis on the vibrating arm H, in the manner and for the purpose set forth, and this combination and arrangement I claim whether effected precisely in the manner here set forth or in any other manner substantially the same by which analogous results are produced.

3. The adjustable mold-block O, combined with the vibrating arm H, for the purpose herein set forth.

4. The combination of the adjustable frame *h* with the lower adjustable mold-block, O, in the manner and for the purpose set forth.

5. The combination of the circular collar perforated with a rectangular opening in the center to admit the rectangular shaft or stem of the upper mold-block with the hinge-piece *i* and adjustable frame *h*, in the manner and for the purpose set forth.

6. The manner of supplying the melted metal to the mold by a horizontally and vertically perforated piston placed below the level of the bottom of the metal-pot, arranged and operated in the manner set forth, by which the metal is forced into the mold at a lower temperature than heretofore effected, and the metal remaining in the mouth of the female plate (after the type has been cast) is drawn back into the seat or chamber of the piston as the piston rises, by which the mouth of the female plate is prevented from being stopped or choked by congealed metal.

7. The combined arrangement of these several parts—namely, the lever *a*, cam V, spring *d*, rod *b*, and vibrating beam E—by which the piston is operated, as possessing advantages above set forth.

8. Placing the vibrating mold-arm H between the furnace and the propelling or cam shaft, as described.

DAVID BRUCE, JR.

Witnesses:
MICHAEL DALTON,
W. G. STEARNS.