# G. E. SMITH.

## Founder's Molding Machine.

No. 201,636. Patented March 26, 1878.

Fig 1.

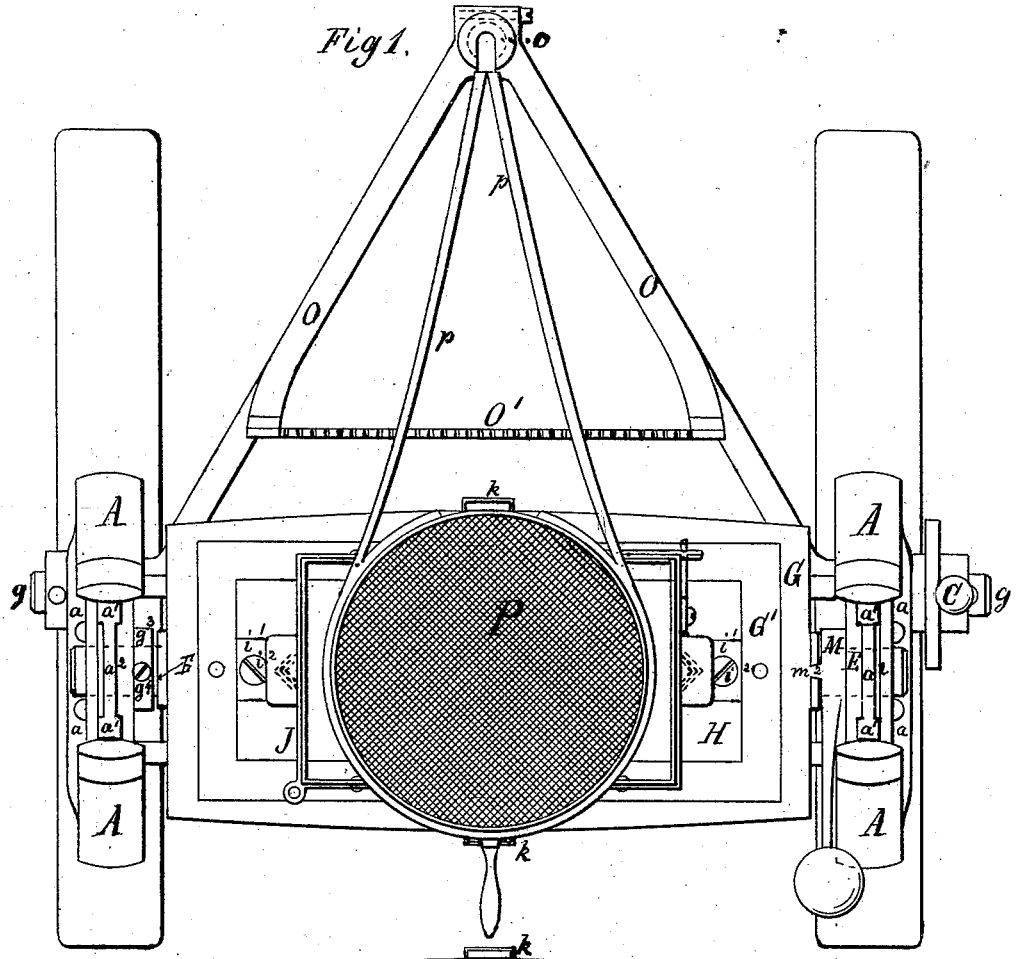



Fig 5.

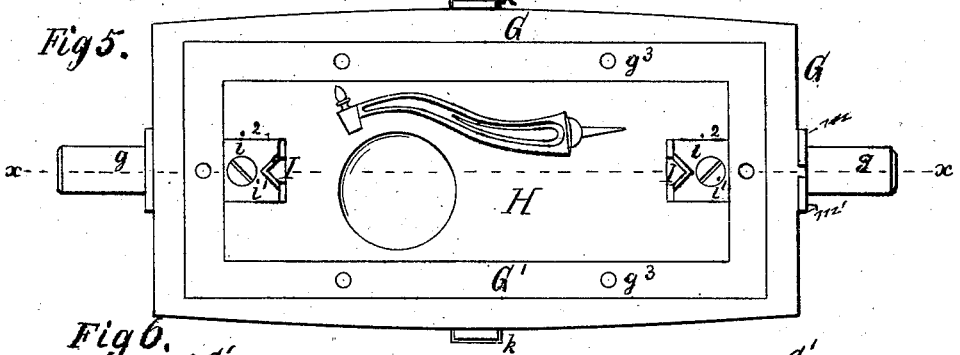
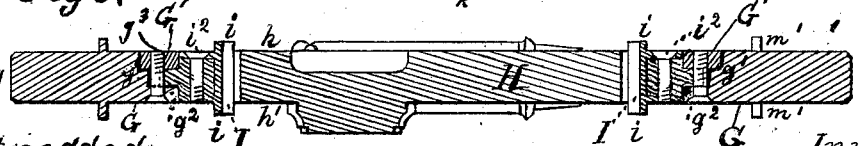



Fig 6.




Witnesses:

J. F. Theodore Lang

J. Russell Bart

Inventor:

George E. Smith

by

Mason, Fenwick & Lawrence

# G. E. SMITH.

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Fig 2.

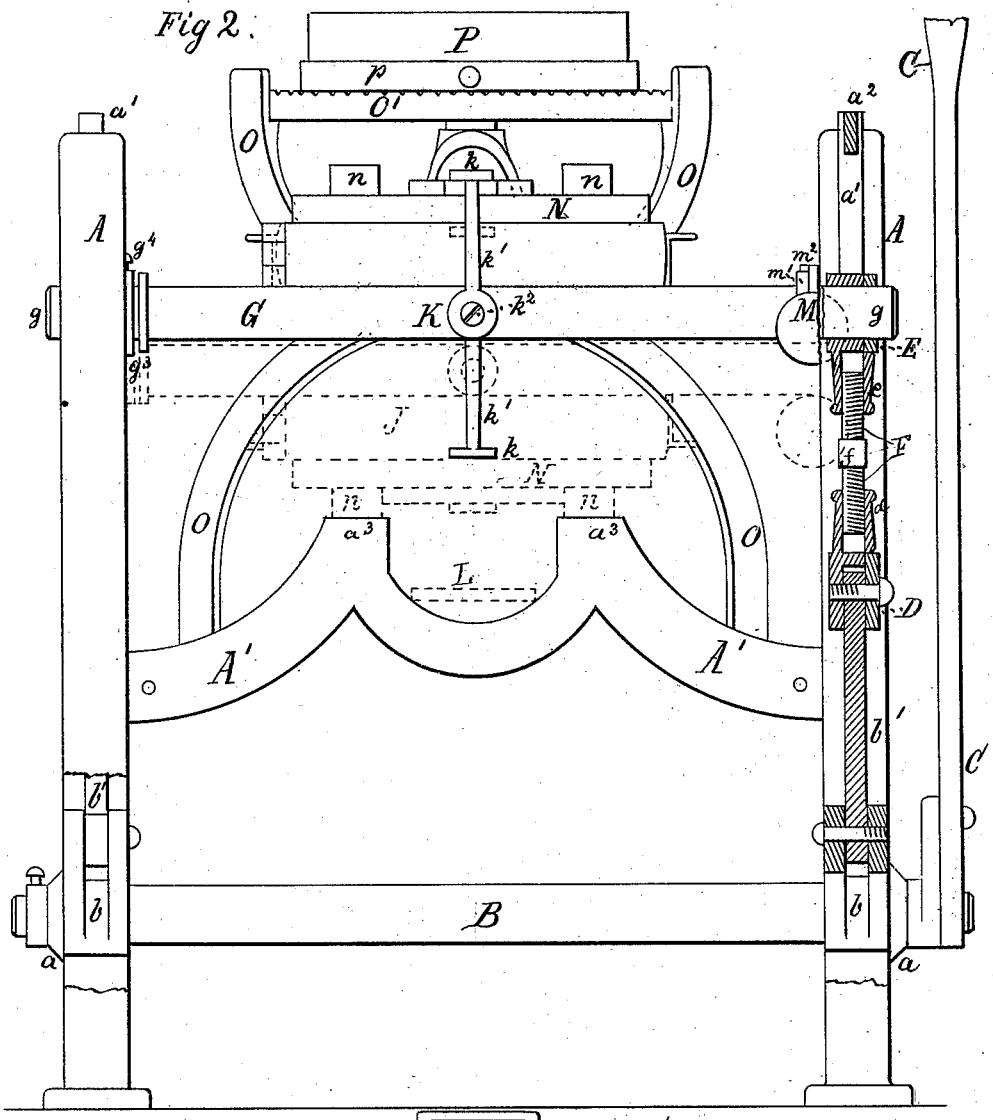
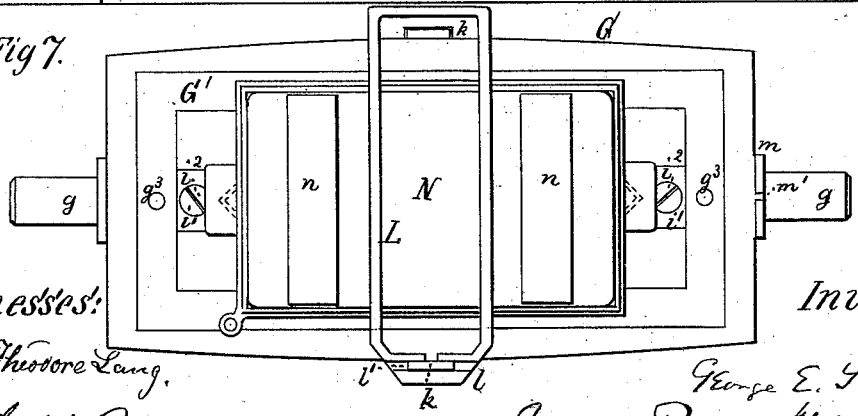



Fig 7.




Witnesses:

J. P. Theodore Lang.

J. Russell Bard

Inventor.

George E. Smith

by Munn, Dennick & Lawrence

# G. E. SMITH.

## Founder's Molding Machine.

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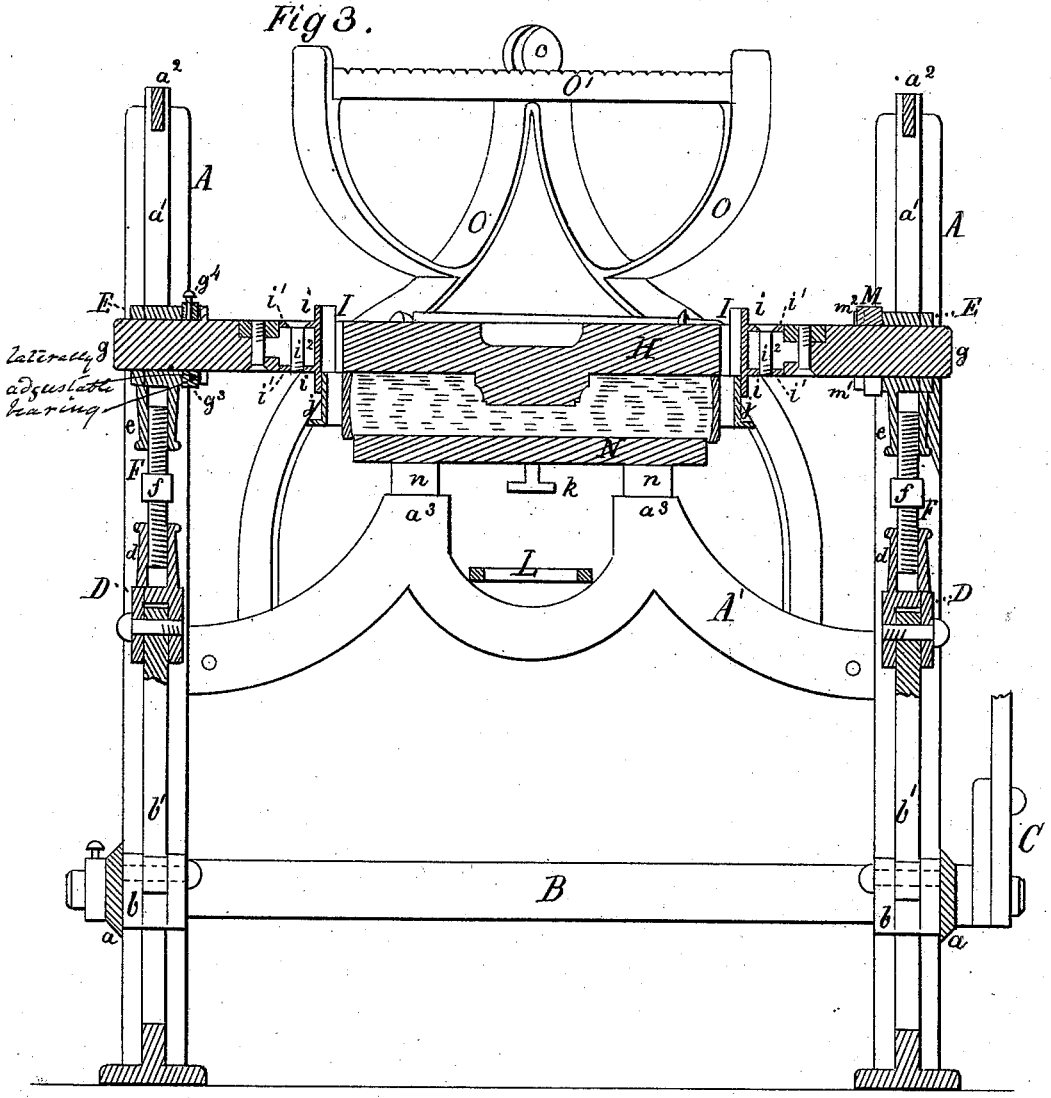
*Fig 3.*




Witnesses:
J. P. Theodore Lang.
J. Rupell Barry

Inventor:
George E. Smith
by Munn, Pennick & Lawrence

4 Sheets—Sheet 4.

# G. E. SMITH.

## Founder's Molding Machine.

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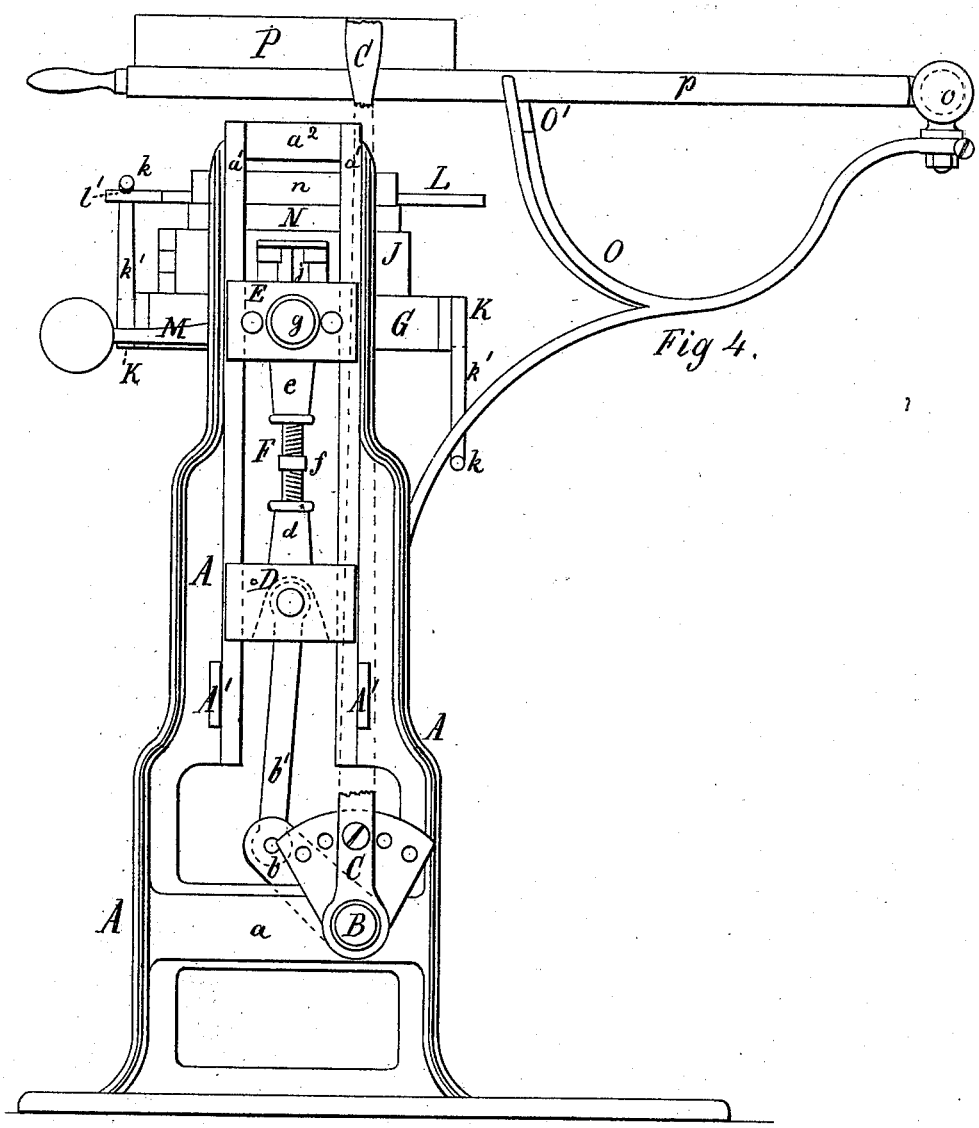



Fig 4.

Fig 8.

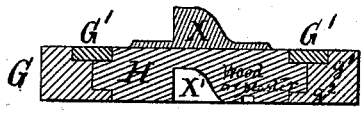
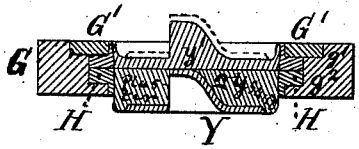



Fig 9.




Witnesses:
J. S. Theodore Lang
J. Russell Carr

Inventor:
George E. Smith
by Munn, Pennie & Lawrence

# UNITED STATES PATENT OFFICE.

GEORGE E. SMITH, OF RACINE, WISCONSIN, ASSIGNOR TO WILLIAM AIKIN AND WM. WHYTE DRUMMOND, OF LOUISVILLE, KENTUCKY.

## IMPROVEMENT IN FOUNDERS' MOLDING-MACHINES.

Specification forming part of Letters Patent No. **201,636**, dated March 26, 1878; application filed June 27, 1877.

*To all whom it may concern:*

Be it known that I, GEORGE E. SMITH, of Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Founders' Molding-Machines, which improvements are fully set forth in the following specification and accompanying drawings, in which latter—

Figure 1 is a top view of my improved molding-machine. Fig. 2 is a front view and partial section of the same, showing one of the adjustable bearings in section. Fig. 3 is a vertical central longitudinal section of the machine. Fig. 4 is a side view of the same. Fig. 5 is a plan view of the match-plate fastened in the pivoted reversing frame. Fig. 6 is a vertical longitudinal central section of the same in the line *x x* of Fig. 5. Fig. 7 is a plan view of the reversing frame with match-plate, having the drag of a flask attached to it ready for reversing. Fig. 8 is a transverse section of the reversing frame and match-plate with a pattern attached. Fig. 9 is a transverse section of the reversing frame, showing the same pattern as in Fig. 8 attached thereto by means of plaster matches, as hereinafter explained.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts, as hereinafter fully described and specifically claimed, whereby a pattern is rapidly rammed or packed in the sand, and from which the pattern is accurately drawn without numerous manipulations of the molder.

In the drawings, A represents one side of the frame of the machine, with a cross-bar, *a*, and two vertical guides, $a^1$, connected by a cross-bar, $a^2$. The cross-bar *a* contains one of the bearings of a shaft, B, which shaft is similarly supported, near its other end, by a cross-bar, *a*, and bearing of another similar side frame, A, with guides $a^1$.

The shaft B is operated by means of a radially-adjustable hand-lever, C, and is provided below each pair of guides $a^1$ with a crank, *b*, and a pitman, *b'*. The pitman *b'* connects the said crank with a vertically-sliding block, D, and an adjustable bearing, E, which are suitably fitted to and between the guides $a^1$, so as to slide up and down upon them.

The opposing sides of the block D and bearing E are provided with tubular projections *d* and *e*, respectively, into which the ends of a screw, F, are fitted, the one end having a left and the other a right thread, so that by turning the middle head *f* of said screw F either to the right or to the left the block D and bearing E are either moved toward or from each other, and thus the stroke of the lever is lengthened or shortened, according to the height of the flask.

The bearings E support the trunnions *g* of the reversing frame G, which is generally of oblong shape, and has two inner reductions or steps, $g^1$ $g^2$. The smaller or lower step, $g^2$, serves as the rigid support of the match-plate H. The larger or upper step, $g^1$, serves as the support of a removable clamp, G', which is fastened upon the said step $g^1$ by means of screws $g^3$ or otherwise, and overlaps the same all around to the same extent as the step $g^2$.

The match-plate H is made of the thickness of the frame G; but its edge is so trimmed as to fit the space between the overlapping part of the clamp G' and the step $g^2$. By this construction the match-plate is very firmly secured in the frame without liability of being mashed by undue pressure of the follower.

The steps $g^1$ $g^2$ are made perfectly horizontal, so that the match-plate, under all circumstances, even when warped, presents two parlalel and horizontal surfaces, *h h'*, in the frame G. One of the trunnions, *g*, is provided with a movable shoulder, $g^3$, made adjustable by means of a set-screw, $g^4$, so that by bearing against the side of the bearing E it prevents lateral lost motion of the frame G. The patterns are halved or otherwise divided for convenient molding, and the matching parts are fastened upon the surfaces *h h'* vertically opposite each other. Patterns which are not divided are successively placed in similar positions as those divided by burying the corresponding half of it successively in plaster or sand match, which is secured in the frame G.

The described well-known methods of molding are all applicable to my improved machine, as will be hereinafter sufficiently explained.

The match-plate H is provided, near its ends, with vertical guides I, by preference of triangular shape, which are arranged in the center line of the match-plate, and the projecting parts *i* receive similar projections on the sides of the flasks J, in line with the usual V-shaped eyes and pins of the "cope" or "drag." This construction secures a very accurate position of the flask on the match-plate, and when the flasks are matched the molds of the patterns are so very near perfect as to leave no trace of the dividing-line upon the castings.

The guides I are provided with parallel plates $i^1$, which are fitted flush on the match-plate, and secured thereto by means of screws $i^2$, and slide to or from the flask, and hence adapt the same plate to different-sized flasks.

The frame G is provided, about the middle of each side, with one retaining hook or head, *k*, on a vertical arm, $k^1$, which arm has a boss, K, through which a screw, $k^2$, is passed, so as to hold it in an upright position. One of these hooks is always above the surface of the match-plate and in front of it, where the said head *k* serves to clamp the end *l* of a yoke L, which is laid across the bottom board N of the flask when provided with sand, previous to its being reversed, while the other end of the said yoke is pressed upon the said bottom board by the operator's hand.

The flattened end *l* of the yoke L is provided with a depression, *l'*, into which the head *k* fits, and thus is prevented from slipping.

To hold the frame G steadily in its two practical horizontal positions, one of the trunnions, *g*, is provided with a swell or rim, *m*, which has two corresponding notches, $m^1$, and a pawl, M, with a lateral tooth, $m^2$, which fits the said notches $m^1$ when allowed to bear down upon the trunnion, and which is lifted or swung out of the said notches when the frame G is to be turned or reversed.

By means of two cross-bars, A', which connect the two side frames A, I support the flask when reversed. I have shown the most simple and proper manner of furnishing such support by providing the cross-bars A' with projections $a^3$, upon which the cleats *n* of the bottom board N rest, leaving sufficient room between them to disconnect the yoke from the head *k* before the sand is pressed.

To the rear of the frame A a frame, O, is attached, which, at its rear extremity, is provided with a universal joint, *o*, to which the rear end of a swinging riddle-frame, *p*, is secured. Near the frame G the frame O is provided with a serrated bar, O', upon which the riddle frame *p* is moved forward and backward. The frame *p* encircles the riddle P, and holds it suspended above the frame G. In moving the riddle over the bar O' its serrations cause the riddle to be shaken vertically, thus increasing its effectiveness.

Operation: The match-plate, which has the requisite patterns attached thereto, is fastened in the manner described within the frame G. The drag is placed upon the match-plate so that its projections *j* enter the guides *i* of the match-plate. The first sand is now sifted through the riddle upon the patterns and "tucked" by hand; then the drag is filled with sand, and the sand struck off and covered with the bottom board. The yoke L is then attached to head *k*, and the free end of it held down upon the bottom board. The pawl M is now lifted until the tooth $m^2$ has left the notch $m^1$ $m^1$, whereupon the frame G is turned over and the pawl M falls into an opposite notch, $m^1$ $m^1$, and locks the frame in a horizontal position. Now the operator moves the hand-lever C down, thereby lowering the frame G and the drag, and when the cleats *n* settle upon the projections $a^3$ of the bars A' the yoke L is relieved from the head *k* and allowed to drop down upon the bars A'. The lever C is moved down far enough to insure the necessary packing of the sand in the drag, and then this lever is moved up again, whereby the frame G is also moved up, and the pattern drawn vertically from the sand. The upper side of the match-board is now ready for the cope, the filling and packing of which is done precisely in the same manner as that of the drag.

When the drag or cope are joined the impressions of the patterns are so perfect that their joints are not perceptible upon the casting, and the casting is also free from imperfections which are usual in "hand drawing." The sponging of the molded sand for preserving the consistency is here unnecessary, and consequently there are no chilled, cracked, or blistered places on the surface of such casting, all of which is due to the steady withdrawal of the patterns from the sand in a vertical direction.

In order to explain the operation of molding with patterns secured with plaster matches or sand matches, I have shown in Fig. 8 a transverse of a match-board, H, with a pattern, X X', secured in position, and in Fig. 9 a similar section of a match-board, H, with plaster matches *y y'* and a pattern, Y, the latter of which is inserted into the lower plaster match *y*, ready for molding, and the dotted outlines above the upper plaster match *y'* indicate its position when the other side is ready for molding. The match-board H in Fig. 9 is represented in two halves, which is, however, not always necessary, and works the same as one solid match-board.

Aside from the greater accuracy of performance of my improved molding-machine, there are not less than thirty-seven distinct hand-movements saved, which must necessarily be performed in operating with other molding-machines with which I am acquainted.

What I claim as new, and desire to secure by Letters Patent, is—

1. A reversible and vertically-movable match and pressure plate, applied and oper-

ating substantially as described, whereby the sand is packed around the patterns by downward pressure while supported below, as set forth.

2. A reversible and vertically-movable match and pressure plate, applied and operating substantially as described, whereby the patterns affixed to it are withdrawn upwardly from the molds and the molds are supported below during such withdrawal, as set forth.

3. A revolving or reversible and vertically-sliding and pressure pattern, in combination with a stationary follow board or platform, whereby the said pattern is molded in sand by downward pressure and the mold supported below, substantially as set forth.

4. The frame G, clamp G′, and match-plate H, combined, whereby the match-plate is kept rigidly in form and position, substantially as set forth.

5. A revolving vertically-sliding frame, in which patterns are supported by either match-plates, plaster or sand matches, in combination with a platform, substantially as described.

6. The combination of the match-plate H, having triangular or V-shaped and horizontally adjusted outer guides *i*, and cope and drag J, having inner guides *j* to fit the said outer guides, substantially as and for the purpose set forth.

7. The riddle P, applied to the molding-machine, and held loosely in connection therewith by a joint, as at *o*, whereby it is movable laterally, or up and down, or is invertible, substantially as and for the purpose described.

8. The combination, with the frame G, of the pitmen *b′*, the bearings E, sliding blocks D, and the screws F, having each a right screw-thread on one end and a left screw-thread on the other end, whereby the stroke of the lever is regulated, or the altitude of the frame G adjusted with respect to the different heights of the flasks or copes and drags thereof, substantially as described.

9. The frame G, having a rim, *m*, and notches $m^1$, in combination with the pawl M, having a lateral tooth, $m^2$, whereby the said frame is permitted to be reversed, and is kept in horizontal position, substantially as described.

Witness my hand in the matter of my application for a patent on a machine for founders' molding this 27th day of June, A. D. 1877.

GEORGE E. SMITH.

Witnesses:
J. P. THEODORE LANG,
JOHN T. ARMS.