(No Model.)

H. TABOR.

SAND MOLDING MACHINE.

No. 365,711. Patented June 28, 1887.

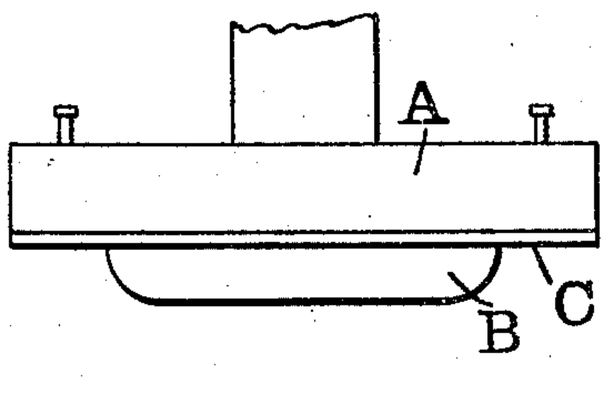

Fig. 1.

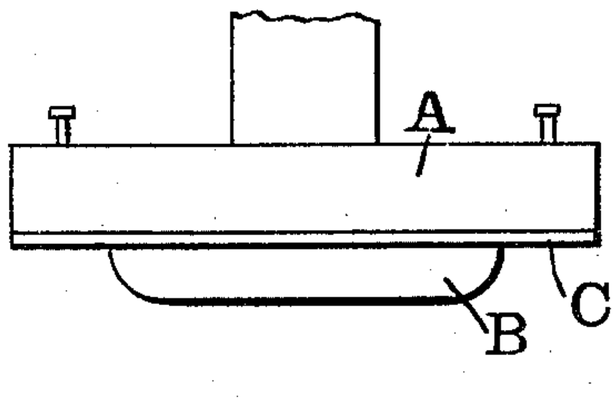

Fig. 2.

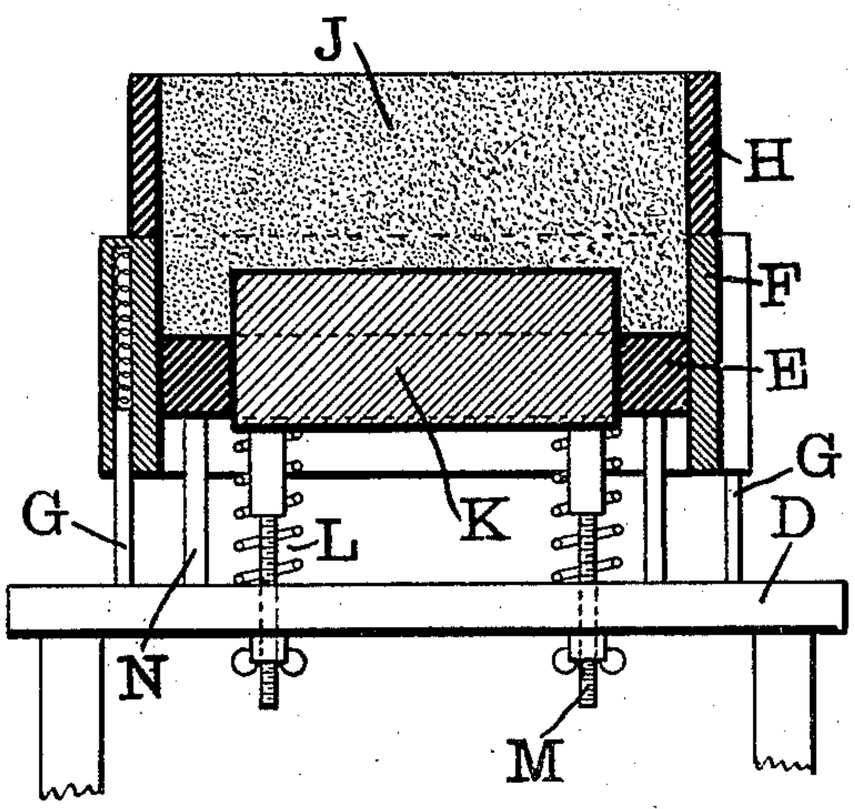

Fig. 1.

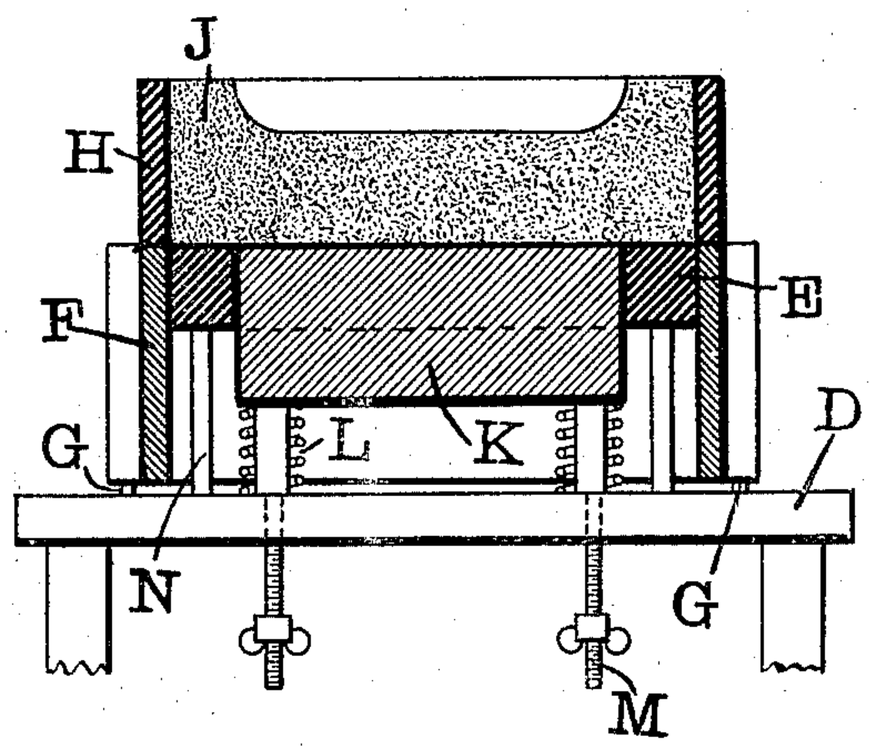

Fig. 2.

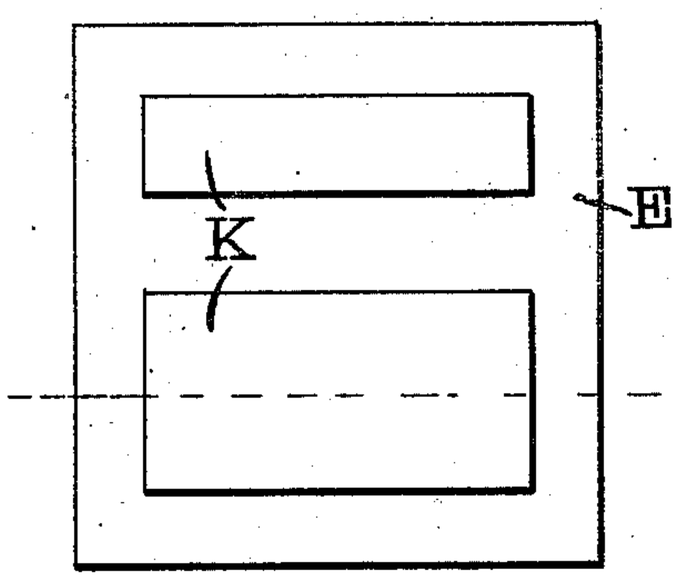

Fig. 3.

Witnesses:
W. A. Seward
C. C. Beal.

Harris Tabor
Inventor
by James N. See
Attorney

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HARRIS TABOR, OF NEW YORK, N. Y., ASSIGNOR TO THE TABOR MANUFACTURING COMPANY, OF SAME PLACE.

SAND-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,711, dated June 28, 1887.

Application filed February 21, 1887. Serial No. 228,324. (No model.)

To all whom it may concern:

Be it known that I, HARRIS TABOR, of New York, New York county, New York, have invented certain new and useful Improvements in Metal-Founding Machines, of which the following is a specification.

My invention relates to improvements in machines to be employed by the metal-founder in producing sand molds, and the improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of portions of an ordinary molding-press fitted with my improvements, the half-flask, sand-box, bed-platen, and displacement-blocks appearing in vertical section, this view showing the flask as filled with sand and before being subjected to compression; Fig. 2, a similar view of similar parts after the sand has been subjected to compression and the pattern impressed into the sand, and Fig. 3 a plan of the bed-platen and displacement-blocks.

Molding-presses involve two pressing elements arranged for movement relatively to and from each other. I herein refer to the top pressing element as the "press-head," and to the lower pressing element as the "table." The pressing may be effected by forcibly moving the press-head toward a fixed table, or the press-head may be the fixed element of the press, and the pressing may be effected by moving the table upward. My improvements are applicable to molding-presses of either kind—that is, presses in which the table is fixed and the press-head movable or the press-head fixed and the table movable—and also to presses in which both the press-head and table are movable to and from each other.

In the drawings, A indicates the press-head or top pressing element of any ordinary molding-press.

B is the pattern or half-pattern, rigidly secured to the under side of the press-head, and adapted to be pressed into the sand in the flask as the press-head and flask are forced together.

C is a stripper-plate lying against the under surface of the press-head and surrounding the pattern, and capable of a limited motion to and from the press-head, the intention being that after the pattern has been properly impressed into the sand the press-head and pattern will rise from the sand, the stripper-plate remaining for an interval upon the top of the sand, so as to prevent improper lifting of sand edges as the pattern rises.

D is the table or base of the molding-press, forming the resisting-surface of the press opposed to the press-head.

E is the bed-platen, consisting of a horizontal flat surface standing above the table D, and having a mortise or mortises with contours corresponding substantially to the outline of the pattern or patterns B.

F is the sand-box, the same surrounding and fitting the edges of the bed-platen, and capable of vertical movement with reference thereto, the bed-platen thus forming, substantially, a fixed piston for the sand-box.

G are leg-studs resting upon the table and supporting the sand-box, these studs entering sockets in the sand-box and bearing against springs therein, so that the sand-box may be pressed downward toward the table, in the manner and for the purpose not new, so far as the present specification is concerned.

H is the half-flask of the ordinary kind, the same resting upon the top of the sand-box, with whose inner dimensions it substantially corresponds, the sand-box forming, practically, a downward continuation of the half-flask.

J is molding-sand, which has been shoveled or otherwise placed in the flask and sand-box, the top of the sand being leveled as by the usual process of striking, this sand appearing in Fig. 1 as filling the half-flask and that portion of the sand-box projecting above the bed-platen, the sand being in a loose uncompacted condition, resulting from its being merely placed in the flask and sand-box, while in Fig. 2 this same sand appears as very much lessened in depth by reason of having been subjected to compression, which has caused all of the sand to become located entirely in the half-flask, the print of the pattern also appearing in the top of the sand.

K represents displacement-blocks, fitting the mortises in the bed-platen, and arranged to slide freely vertically therein and normally project above the upper surface thereof.

L are springs disposed below the displacement-blocks and serving to support the same in their upward position against the mere weight of the sand which lies above them.

M are studs attached to the displacement-blocks and projecting therefrom downwardly through the table, these studs being provided with nuts at their lower end to serve in adjusting and limiting the upward movement of the displacement-blocks, and with shoulders above the table to serve in limiting the descent of the displacement-blocks, and N are legs supporting the bed-platen in a fixed position relative to the table.

If a deep body of sand and a shallow body of sand be subjected to compression through equal vertical distances, it is obvious that the shallow body of sand will become much more compacted than the deep body. In ordinary hand-molding the workman places his pattern and flask upon a flat follow-board and fills the flask with sand. By proper manipulation of his rammer he compacts all the sand to equal density. There is not so much sand directly over the pattern as there is directly over the naked parts of the follow-board, and consequently the ramming referred to will result in the top of the sand being pressed down the farthest over the naked portions of the follow-board. The molder then shovels more sand into this low space and rams this in place, and when he is done the top of the sand is level and even with the top of the flask; but much more sand has been put into those portions of the mold not directly above the pattern.

If, instead of the hand-rammer, the sand be pressed upon by a flat platen, it is evident that the low column of sand directly over the pattern will be much more compact than the higher column not over the pattern. Hence flat-platen molding-machines have not been adapted for work in which the patterns have much projection. In modern molding-machines recourse has been had to various forms of yielding platens which would accommodate themselves to the projection of the pattern and result in pressing the sand farther down where the sand was deep than where the sand was shallow. Such machines left the top of the sand irregular or with the surface corresponding to the irregularities of the yielding pressing-surfaces. Machines of the character just referred to—that is, with a yielding pressing-surface—sometimes press upward upon the sand, the pattern being embedded in the top of the sand, the broad principle being, however, precisely the same in both cases—that is, the pressing-surface opposing the pattern left the sand with irregular surfaces corresponding to the different degrees of compression required. The yielding pressing-surface may briefly be defined as a surface which regulates the compression of the sand with reference to the depth of sand to be compressed.

Now, in my present invention I proceed upon a principle and mode of operation radically different from that inherent in machines with yielding pressing-surfaces and radically different, so far as I know, from anything heretofore done. I regulate the depth of sand to the amount of compression required to produce the proper density.

Referring again to Fig. 1 of the drawings, and assuming that the press-head is the movable and the table the fixed element of the press, and that the sand J has been loosely placed in the flask and sand-box, the operation of the press is to bring the press-head A with the pattern down onto the top of the sand and impress the pattern in the loose sand, the sand becoming very little compacted by this preliminary operation. The press-head or the stripper-plate, in case a stripper-plate is used, comes against the top edge of the flask, and as the descent of the press-head continues the flask and sand-box are pressed downward. The bed-platen E, forming the floor on which the sand rests, is stationary, and as the flask and sand-box move downward the bed-platen obviously causes the sand to be very forcibly moved out of the sand-box and into the flask, thus producing the desired degree of general compactness of sand, the pressing motion being stopped, preferably, when the upper surface of the bed-platen coincides with the lower edge of the flask. Now, leaving out of consideration the displacement-blocks K, and assuming the bed-platen to form a simple level floor for the sand, it will be apparent that the sand just below the pattern will have been much more compacted than the sand just within the walls of the flask. This will leave the sand too hard directly under the pattern. Machines with yielding pressing-surfaces would seek to obviate this defect by pressing farther upward upon the sand just within the walls of the flask than upon that directly upon the pattern, the word "upward" assuming, of course, that the pattern is on the press-head or top pressing element of the press; but in my present invention I cause the displacement-blocks K to occupy spaces upon the bed-platen, but directly under the pattern, and, consequently, when the loose sand is thrown into the flask and sand-box there will be less depth of sand directly below the pattern than at the walls of the flask.

The displacement-blocks are held up by the springs L with sufficient force to insure that the blocks will not descend by the simple weight of the sand above them. During the pressing operation before referred to the springs yield and the blocks descend until their upper surfaces are even with the upper surface of the bed-platen, and when the pressing is completed the sand will present a smooth level surface even with the lower edge of the flask, and a proper compression will have taken place at all parts in this surface. This will be understood by inspecting Fig. 2. If I wish to decrease the solidity of the sand below the pattern I lower the nuts upon the studs M, thus permitting the displacement-blocks to

project farther from the bed-platen and thus lessen the initial depth of sand below the pattern. If I wish to increase the solidity of the sand under the pattern, I reverse the operation and increase the initial depth of the sand under the pattern. It is to be understood, of course, that this adjustment is effected before the loose sand is thrown in.

The displacement block or blocks are to correspond in contour, substantially, with the pattern. No special accuracy need be observed in the matter, and the upper surface of the block or blocks may be leveled regardless of details of projection of the pattern, the object of the blocks being merely to occupy space and exclude sand while the sand is being thrown in. The bed-platen has its mortises to fairly fit the displacement-blocks, and thus forms virtually a silhouette follow-board, which has an uneven upper surface while the sand is being thrown in, but which has an even upper surface when under ramming-pressure.

In the drawings I show the displacement-block as of simple rectangular form corresponding to patterns of substantially similar contour, and in Fig. 3 I show two displacement-blocks of different sizes corresponding to substantially similarly-shaped patterns upon the press-head.

I show the bed-platen E as comparatively thin and supported on legs N, standing upon the table of the press. These legs are a mere expedient for supporting the bed-platen, which might, in the absence of the legs, be of sufficient thickness to rest directly upon the table of the press. It has been already stated, and it should be distinctly understood, that the springs L are merely for the purpose of supporting the displacement-blocks while the sand is being thrown in, the springs yielding immediately when the sand is subjected to pressure. The springs merely thus counterbalance the downward tendency of the displacement-blocks with their load of loose sand above them, and the displacement-blocks may be counterbalanced by weighted levers in lieu of springs.

Where it is desired that the sand shall be pressed until its main lower surface is even with the lower edge of the flask, the initial depth of the sand-box must be regulated accordingly, as the pressing operation virtually moves the sand out of the sand-box into the flask. In other words, the working depth of the sand-box must be so adjusted as to contain that body of sand which, when all thus virtually moved into the flask, will produce a proper compacting of all of the sand.

I have discovered in practice that the downward travel of the displacement-blocks is not governed by the downward travel of the sand-box. In some cases I have adjusted the displacement-blocks so as to project above the top of the sand-box and into the flask, and have caused the compression to result in the upper surface of the bed-platen being even with the lower edge of the flask. In such case the displacement-blocks move down to their proper pressing position even with the bed-platen. Molding-sand seems to follow closely the law of hydrostatics and in this manner I readily account for the movement of the displacement-block through a greater distance than that virtually moved through by the bed-platen.

I claim as my invention—

1. In metal-founding apparatus, the combination, with a sand-receptacle adapted to receive loose sand in which a pattern is to be impressed, and which is to be compacted by pressing, of a bed-platen or floor to such receptacle, and provided with a mortise or mortises corresponding in contour substantially with the pattern, and a displacement block or blocks fitting said mortises and projecting above said bed-platen or floor and counterbalanced, as by springs, so as to maintain said position of projection while said receptacle is full of uncompressed sand and yield to suppress such projection as the sand is compressed, the receptacle and bed-platen being fitted for movement relative to each other, substantially as and for the purpose set forth.

2. In a metal-founding apparatus, a sand-receptacle, a bed-platen forming a floor thereto and provided with mortises, the receptacle and bed-platen being fitted for motion relative to each other, and counterbalanced displacement-blocks fitted for movement in said mortises and normally projecting beyond the plane of the bed-platen and into the sand-receptacle, combined substantially as and for the purpose set forth.

3. In metal-founding apparatus, the combination, with a flask-supporting table, a press-head fitted for forcible movement to and from the table, a pattern secured to the press-head, a vertically-yielding sand-box supported by said table, a flask supported by said sand-box, and a bed-platen fitted for vertical movement within said sand-box, of a counterbalanced displacement block or blocks supported by said table and projecting through said bed-platen, substantially as and for the purpose set forth.

HARRIS TABOR.

Witnesses:
WILLIAM W. WOOD.
S. D. WADHAMS.