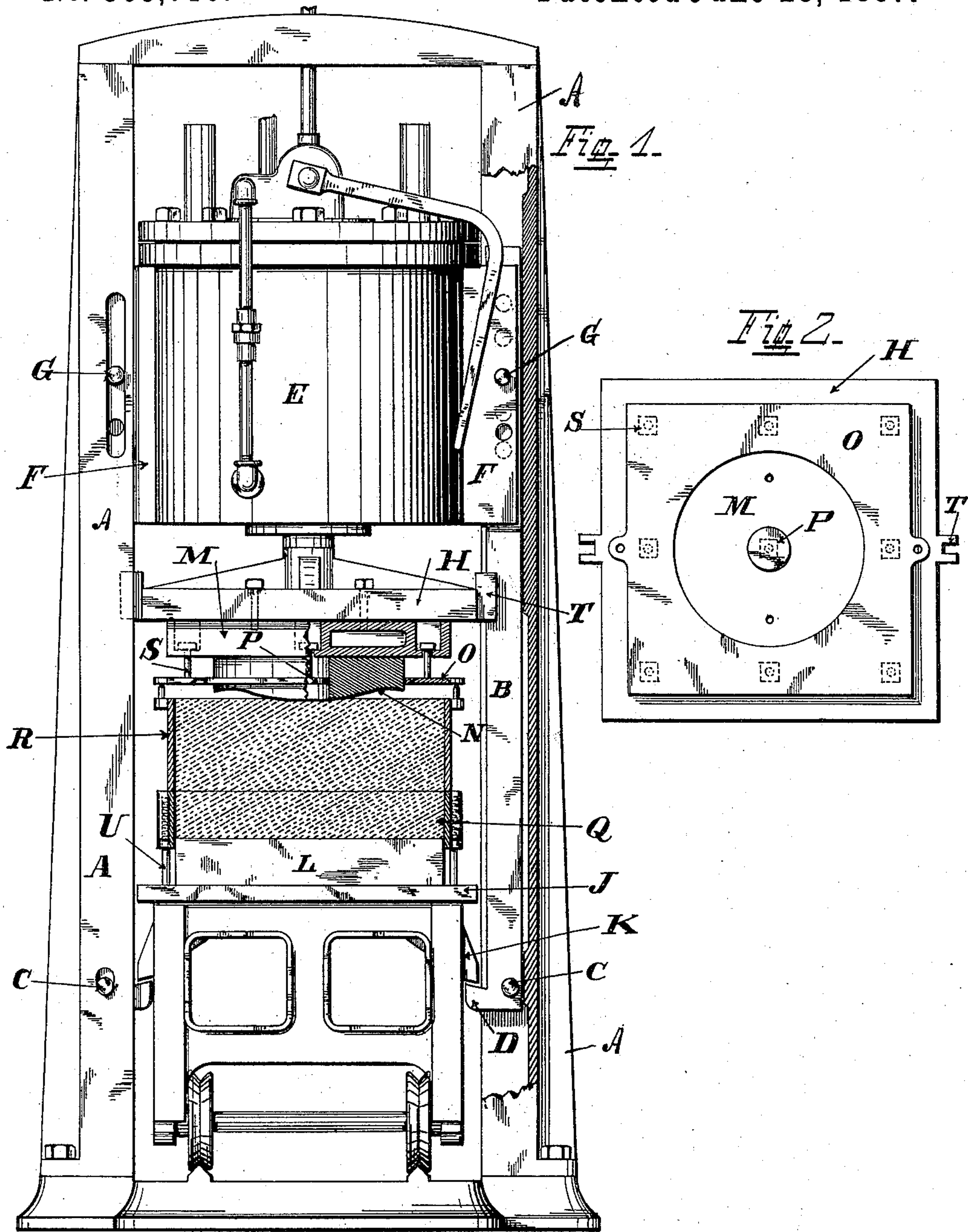


(No Model.)

H. TABOR.
METAL FOUNDING MACHINE.

No. 365,710.

Patented June 28, 1887.



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

METAL-FOUNDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,710, dated June 28, 1887.

Application filed December 21, 1886. Serial No. 222,157. (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.

This invention pertains to improvements in machinery employed by the metal-founder in making his molds, such machines being often spoken of as "molding-machines." My improved machine, like many of its class, operates by pressing the sand in a flask around and against the pattern. My present invention, however, embodies peculiarities of construction and mode of operation which will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a metal-foundry machine illustrating my improvement, a portion of one of the side columns, a portion of the pattern and pattern-block, a portion of the stripper-plate, and the flask, with its contained sand, being shown in vertical section; and Fig. 2, a view of the under surface of the press-head H, showing the stripper-plates attached thereto.

In the drawings, A indicates a pair of columns, these columns being secured at their bases to a sole-plate and serving as main-frame elements for the machine.

B represents strong tension-bars, of wrought-iron or steel, disposed within the columns, the columns being hollow and open upon their inner faces.

C is a horizontal pin in the lower end of each of these tension-bars, the pin projecting from the bar outwardly through short vertical slots in the sides of the columns, whereby the bar is supported when its pin rests upon the bottom of its slot, and whereby the bars are rendered capable of a limited vertical motion.

D represents inwardly-projecting hooks upon the lower ends of the tension-bars.

E is a cylinder provided with a piston, piston-rod, and valve, and arranged for operation in a manner similar to the cylinder of a steam-engine, except that the valve is to be operated by hand when the piston is to be reciprocated.

F represents wings at the sides of the cyl-

inder, these wings engaging the upper ends of the tension-bars within the columns, whereby the cylinder is susceptible of vertical movement within the main frame of the machine.

G represents pins engaging the wings of the cylinder and chosen ones of a series of holes in the upper ends of the tension-bars, whereby the cylinder is secured in adjustable position of height upon the tension-bars, slots in the faces of the columns permitting the manipulation of the pins when the position of the cylinder upon the tension-bars is to be altered, and also permitting the vertical movement of the pins as the tension-bars and cylinder rise and fall.

H is a flat press-head secured to the lower end of the piston-rod of the cylinder and adapted to serve as the top-pressing element of the machine.

J is a flask-receiving table (shown as being in the form of a wheeled car) adapted to be moved upon a track between the frame-columns of the machine, so as to be conveniently run in and out under the press-head.

K represent lugs projecting from the sides of the table, these lugs being at such height from the base of the machine as to freely pass over the hooks D when the tension-bars are as far down as the engagement of the pins C in their slots will permit, and to be engaged by these hooks as the tension-bars rise.

L is a plunger projecting from the upper surface of the table, and of a size and form corresponding, substantially, with the interior of the flask to be molded, this plunger forming the bottom-pressing element of the machine.

M is a pattern-block secured removably to the under surface of the press-head, this block being merely a thick plate to which the pattern may be attached, and of a size corresponding, substantially, with the size of the flask to be molded.

N is the pattern, secured to the lower surface of the pattern-block, the pattern in the illustration being shown as a thick ring with an irregular lower surface.

O is a stripper-plate encircling and neatly fitting the exterior of the pattern, and adapted for vertical movement thereon.

P is a stripper-plate fitting the interior of the ring-like pattern.

Q is a sand-box, forming virtually a lower extension of the flask, such sand-box being adapted to slide over the plunger L, and having a depth at least equal to the distance through which the mass of sand being operated upon will be compressed.

R is a flask, or half-flask, rather, in which the molding is to be done, the flask being set directly over the sand-box.

S represents headed studs uniting the stripper-plates to the pattern-block, the studs engaging the pattern-block loosely and in such manner (clearly shown) that the stripper-plates may fall away from the pattern block a limited distance, and at the same time be capable of moving closely up against the pattern-block.

T represents guide-lugs upon the press-head, engaging the tension-bars or frame-columns, or both, and serving to steady and guide the press-head as it moves; and U are legs reaching from the sand-box to the table, these legs consisting of pins working upward against springs within sockets upon the sand-box, whereby the sand-box will be supported above the table.

In operating the machine the table is rolled out from between the frame-columns, the sand-box and half-flask set thereon in the position shown in the drawings, and sand placed in the flask and sand-box until they are full. The sand is simply shoveled in loosely, and the top may be leveled off with a strike, if desired. The valve of the cylinder is now to be moved so as to admit steam, compressed air, water, or such other pressure medium as may be used beneath the piston, whereby the press-head H becomes moved to its highest upward position. The pattern-block and pattern rise with the press-head, and the stripper-plates drop as far as their studs will permit. The table, with its loosely-filled flask, is now run into position accurately below the press-head, and the valve of the cylinder is operated so as to exhaust the pressure medium from below the piston and admit it above the piston, thereby causing the press-head to be forced downward. As the press-head moves downward the pattern comes in contact with the loose sand in the flask and it readily embeds itself more or less therein. As the descent of the press-head and pattern continue, the stripper-plates come in contact with the top of the flask and the top of the sand therein, whereupon the downward motion of the stripper-plates with reference to the flask becomes arrested. The pattern continues to descend into the soft and yielding sand until it has impressed its full depth therein, in case the pattern is a shallow one, and consequently the pattern-block will be pressed firmly down upon the top of the stripper-plates, and through them exert its pressure upon the top of the flask and upon the top of the sand therein. The downward motion of the press-head continuing, the flask and sand-box are pushed downward farther toward the table, the plunger L pressing the

loose sand upward. As the sand-box and flask descend the legs U retreat upwardly within their sockets, thus causing no obstruction of the downward movement of the sand-box. The more the plunger L compresses the sand the greater becomes the resistance offered by the sand, and when the total resistance offered by the sand to the downward movement of the press-head exceeds the weight of the cylinder and tension-bars the downward motion of the press-head will cease and the cylinder and tension-bars will rise until their hooks at the lower ends of the tension-bars engage the lugs upon the table, at which time the upward motion of the cylinder and tension-bars will cease and the downward motion of the press-head and the parts urged by it will continue, thus causing the plunger to compact the sand upwardly as far as the pressing power permits, at which time the sand should be sufficiently compacted within the flask to form a perfect mold. It is highly desirable that the depth of the sand-box above the surface of the plunger should be such that when the proper compression has taken place the top of the plunger will have reached the top of the sand-box, thus forcing all of the sand into the flask. When the mold has been thus formed, the valve is reversed, so that the pressure medium will pull the press-head upward. The first effect of the relief of pressure is that the cylinder and tension-rods will descend as far as permitted by the pins C, after which the pattern becomes withdrawn from its embedment in the sand, the stripper-plates retaining their position upon the top of the sand until the pattern has been fairly withdrawn from the sand, after which time the stripper-plates accompany the pattern in its upward movement. The pattern now being up and free from the flask, and the hooks of the tension-bars being down and free from the lugs, the table, with the molded flask, may be moved outward and the flask removed and a new one proceeded with, or facing may be dusted upon the mold and the table may be run into the machine again and the mold subjected to a second pressing operation, thus returning the pattern and giving a face-finish under pressure. In case the machine is thus used for giving return-pressure great care must be taken to see that the flask is brought into perfect register with the pattern. Accuracy of register may be secured by providing the outer stripper-plate with holes to be engaged by the usual dowel-pin of the flask or with pins to engage the dowel-holes of the flask, as the case may be. By lifting the pattern sufficiently the facing may of course be dusted on without withdrawing the mold from the machine.

This mode of operation is particularly adapted to stove-molding, in which the patterns have little projection and great draft.

It is to be understood, of course, that if the pattern being operated with has not one flat

side it is to be divided, as is common in ordinary molding, the pattern-block M in my machine corresponding substantially in its relation to the pattern with the follow-board usually employed by molders.

It is also to be understood that the pattern and stripper-plates may be attached directly to the press-head. I, however, much prefer to employ the pattern-block. By employing a pattern-block for each pattern I am enabled to fasten the pattern-block and stripper-plates permanently to it, so that the parts, whether in use or in storage, are always properly associated.

The pattern-blocks may be attached to the press-head by bolts or other means which will permit a ready and convenient change of patterns.

It will be observed that as the pattern withdraws from the sand the stripper-plates retain their position on the sand for a reasonable length of time by gravity and prevent the loosening of the sand.

The legs U of the sand-box are not at all essential, as the friction of the sand-box upon the plunger will in many cases prevent its improper descent while sand is being thrown into the flask. The sand within the flask and sand-box does not tend to press the sand-box downward, but, on the contrary, provides the sand-box with additional support against descent, by reason of the friction of the sand against its inner walls. The sand-box itself is not essential, as the flask may engage the plunger directly, in which case the completion of the compacting process will leave a vacancy in the bottom of the flask—a matter not seriously objectionable in very deep flasks—and in a great many cases such objections as might exist can be removed by filling this vacancy by a later step.

In case patterns to be molded have comparatively flat surfaces, the plunger L may do its work well if its surface is flat; but in case of great irregularity in the pattern-surface it is highly desirable that the surface of this plunger be so arranged as to produce a substantially uniform compression of the sand. There are

several devices known to the art which may be applied to this plunger-surface, among which I will mention a rigid irregular plunger-surface conforming in contour to the surface of the pattern; again, an elastic plunger-surface formed by a yielding diaphragm backed up by air or other fluid under compression; again, subdividing the surface of the plunger into numerous small plungers connected together by articulate levers, so as to be capable of independently yielding, as set out in a patent lately granted to me; or small plungers may be backed up by pistons pressed upon by steam or other pressure medium, as set out in a patent application which I now have pending.

I do not confine myself to a molding-press in which the pressing force produces motion downward from above, as it is obvious that the press head H might remain stationary and the plunger be pressed upward from below; nor do I confine myself to a cylinder-and-piston pressing arrangement, as any well-known pressing means may be employed for forcibly moving my press-head and plunger toward each other.

I claim as my invention—

1. In a metal-founding apparatus, the combination, substantially as set forth, with a plunger arranged to press upward upon sand in a flask and a press head arranged to press downward upon the flask, of a pattern secured to such press-head, and a gravitating stripper-plate surrounding the pattern and connected with said press-head, as by studs S, in such manner as to permit a limited downward motion of the stripper-plate with reference to the press-head and pattern.

2. In a metal-founding apparatus, the combination, substantially as set forth, of a pattern-block fitted for attachment to the press-head of a molding-press, a pattern secured to said pattern-block, and a gravitating stripper-plate attached to said pattern-block.

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