(No Model.)

# S. J. ADAMS.

## SAND MOLDING APPARATUS.

No. 377,006. Patented Jan. 31, 1888.

Fig 1.



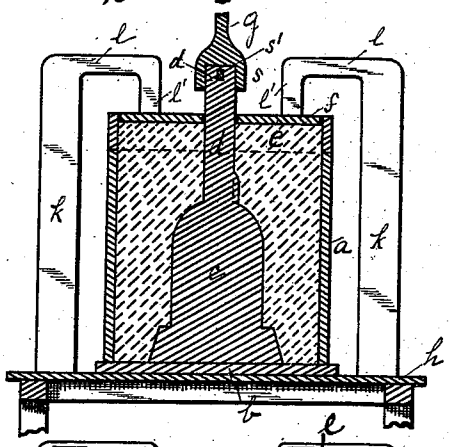


Fig 3.

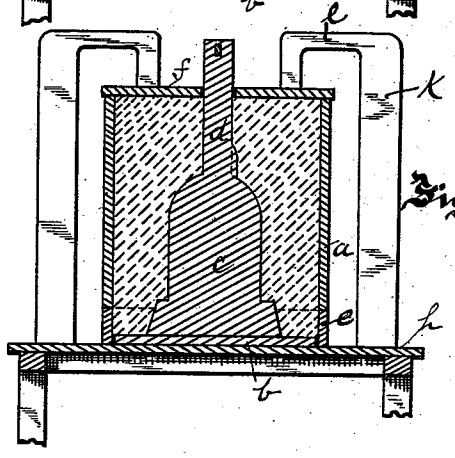


Fig 2.

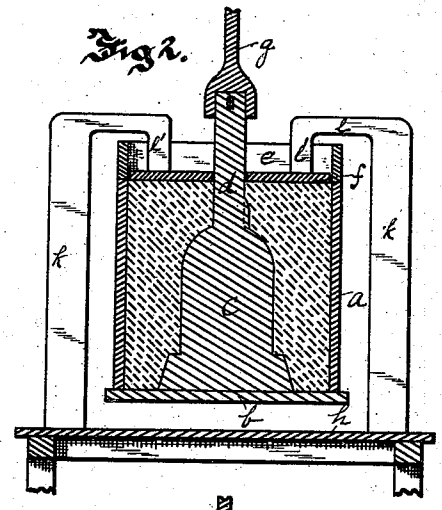


Fig 4.

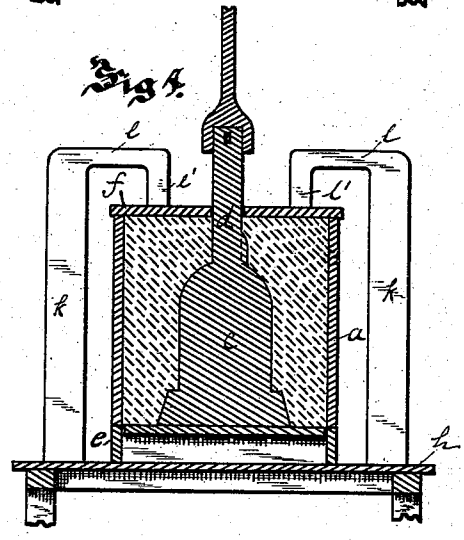


Fig 5.

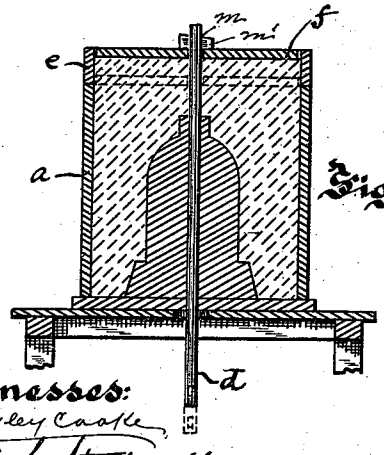
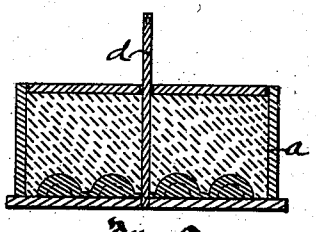


Fig 6.



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# UNITED STATES PATENT OFFICE.

S. JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

## SAND-MOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 377,006, dated January 31, 1888.

Application filed March 31, 1887. Serial No. 233,099. (No model.)

*To all whom it may concern:*

Be it known that I, S. JARVIS ADAMS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Sand-Molding Apparatus; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the manufacture of sand molds, its object being to provide a simple apparatus for the manufacture of these molds by what is termed "compression"—that is, by pressing the sand around the pattern, as contradistinguished from ramming or jarring the sand around the pattern in forming the mold.

The object of my invention is to provide apparatus for pressing these molds which is simple in construction and by which the ordinary complicated apparatus heretofore employed is done away with, the entire pressure for compacting the sand being obtained through the medium of a rod or bar extending within the flask, which rod or bar may be connected with any suitable mechanism for applying the pressure to the mold.

To this end my invention consists, generally, in the combination of a flask, a pattern or patterns and pattern-block, a packing-plate, a rod, or like device extending within the flask, and power-connections engaging said rod and adapted, through said rod, to impart the compressing force to the sand within the flask and compact it around the pattern.

It also consists in certain improvements in the construction of the apparatus for supporting the parts and arranging the flask and its connections for applying the compressing force to the sand contained therein.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal central section of one form of my improved apparatus, showing the invention where the flask, pattern, and pattern block or plates are moved, the packing-plate being held stationary. Fig. 2 is a view of the same apparatus, showing the position of the parts at the end of the movement of the apparatus in forming the mold. Fig. 3 is a view of my improved apparatus where the flask and packing-plate remain stationary the pattern and pattern-plate are moved to and compact the sand within the flask. Fig. 4 is a like view showing the position of the parts when the mold is formed. Fig. 5 is a like view of the apparatus where the flask, the pattern, and its plate are held stationary and the packing-plate is moved to compress the sand within the flask; and Fig. 6 shows my invention applied to another form of mold.

Like letters of reference indicate like parts in each of the figures.

The most approved form of my invention is illustrated in Figs. 1 and 2, the flask *a* resting upon the pattern plate or block *b*, to which the pattern *c* is secured, while the rod or bar *d*, by means of which the compressing force is applied, extends up through the pattern and above the flask. Resting upon the upper end of the flask *a* is the reservoir *e*, to provide a sufficient amount of sand to press into the flask proper in forming the mold, and fitting within the upper part of this reservoir is the packing-plate *f*, this packing-plate having a central opening through which the power-rod *d* extends. This rod *d* has a suitable connecting device, by means of which it is secured to the rod *g*, which may be drawn up by any suitable power mechanism, that illustrated in the drawings being a cylinder, *g'*, and the rod *g* forming the piston-rod thereof, though any suitable means for drawing up the rod *g* may be employed. The form of connection between the rod *d* and the rod *g* shown consists of a sleeve, *s*, fitting over the end of the rod *d* and having a wedge-key, *s'*, passing through the same, this key being adapted to pass through a suitable seat, *d'*, in the upper end of the rod *d*.

In order to hold the packing-plate *f* stationary during the compressing operation, I provide on the operating-table *h* the standards *k*, having arms *l*, provided with lugs *l'* on the under surface thereof, these arms *l* extending out in such position that when the flask is placed under the power-rod *g* the lugs *l'* on the arms *l* will engage the plate *f* and prevent its rising.

In this construction of apparatus the operation is as follows: The flask *a* is placed upon the pattern-plate *b*, the rod *d* extending up through the flask. The reservoir *e* is then placed on the upper end of the flask, and the flask and reservoir filled with sand. The

packing-plate *f* is then placed over the rod *d*, its edges fitting into the reservoir *e*, and the filled flask is then slipped under the power-rod *g* in such position that the lugs *l'* of the arms *l* extend down and bear upon or fit closely to the packing-plate *f*. The rod *d* is then connected to the power-rod *g*, and this rod *g* is drawn up, the rod at the same time lifting the flask, the reservoir, the pattern-plate, and the pattern, while the packing-plate *f* is held from rising by the arms *l*, the sand within the flask being thus compressed and caused to pack closely and evenly around the pattern, and the packing-plate being forced down until its lower edge is about even with the lower edge of the reservoir *e*. When this compressing operation is finished, the flask is lowered down onto the operating-table *h* and the rod *d* disconnected from the rod *g*. The reservoir and the packing-plate are then removed, and the pattern, with its rod *d*, withdrawn from the mold, and the mold is finished ready to receive its core or cores, according to the shape of the articles to be cast.

In Fig. 3 is shown the operation of the apparatus where the flask, reservoir, and packing-plate are held stationary, and in this case the reservoir *e* is placed upon the operating-table, the pattern-plate *b* carrying the pattern *c*, and the rod *d* resting also on the table, and the pattern-plate fitting within the reservoir. The flask *a* is then placed upon the reservoir and the packing-plate *f* placed upon the flask and around the rod *d*, the packing-plate in this case extending over the flask instead of fitting within it, as shown in Fig. 1. Before placing the packing-plate upon the flask, the flask and reservoir are filled with sand, and the apparatus is then placed under the power-rod *g*, the arms *l* on the standards *k* extending over the packing-plate *g*, though in this case the lugs *l'* on the said arms are not required. The rod *d* is then connected to the bar *g*, and the bar *g* drawn up, as above described, and the pattern and its pattern-plate are drawn up with the bar, the pattern-plate sliding within the reservoir *e* and forcing the sand up into the flask proper, so causing it to be uniformly compacted around the pattern. The apparatus is then disconnected from the bar *g*, the pattern lowered, the reservoir removed, and the flask lifted off the pattern, thus forming the mold ready to receive the core.

In the apparatus shown in Fig. 5 the packing-plate and the rod *d* only are movable, the rod *d* sliding through the pattern or its plate, which rests upon the table *h*, and an opening being formed in the table *h* to permit the passage of this rod. The flask *a* is placed upon the pattern-plate and the reservoir upon the upper end of the flask, and the sand is filled within the flask and reservoir. The packing-plate *f* is then placed in position over the rod *d*, which has a suitable keyway, *m*, above the plate, through which a key, *m'*, may be driven, so securing the packing-plate to the rod, and the bar *g*, which, with its power apparatus, is located under the table, is then connected to the rod *d*, and this rod, with the packing-plate *f*, drawn downwardly, so as to force the sand into the flask and pack it around the pattern. As soon as the packing-plate has been drawn down the required distance and the sand properly compacted around the pattern, as is shown in dotted lines, the rod *d* is disconnected from the bar *g*, the key *m'* driven out, the packing-plate and reservoir lifted off, and the flask lifted off the pattern, or the pattern out of the flask, as may be desired, leaving the finished mold ready to receive the core.

In Fig. 6 my invention is illustrated in connection with apparatus for forming a nest of molds within the single flask, and in this case the invention is illustrated where the apparatus is employed in the same manner as that shown in Fig. 1, differing only in that the rod *g*, from which the power for compacting the mold is obtained, instead of passing up through one of the patterns, as in the other figures shown, leads directly up from the pattern-plate, (this being desirable where a nest of molds is formed,) and that the rod *d* may be disconnected from the pattern-plate and withdrawn by the power apparatus, the parts operating in the same manner as that described in Fig. 1, and in forming molds in two-part flasks the apparatus may be operated in this manner, forming a half-mold in one flask and another half-mold in another flask, and the two be placed together, as is well known in the art. The reservoir *e* may in some cases be dispensed with, though it is generally considered desirable to employ it, as it holds a body of sand proper to compress the sand without forming a depression in the flask. This depression is not, however, objectionable in all cases, because the depression may either be filled with a drag in certain classes of work or with a suitable bottom board; or where separate cope-prints are formed for each mold a seat is thus provided for the core, and in such cases it is only requisite that the flask be made slightly longer in order to hold a sufficient body of sand for compacting.

In forming molds by my improved apparatus the power is applied to compact the sand through the medium of a rod passing through the flask and connected either to the pattern or to its pattern block or plate, and all that is necessary is to have some means for drawing this rod in such manner as to compact the sand within the flask and around the pattern, this power being applied to the flask in any of the ways described, and acting in either case to form a perfect mold, and one which can be made by those who are unskilled in the formation of molds, while at the same time the complicated machinery heretofore considered necessary in forming molds by pressing apparatus is entirely done away with.

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

1. In apparatus for forming sand molds by compression, the combination of the flask, a pattern-plate closing one end of said flask and

carrying a pattern therein, a packing-plate inclosing the other end, a rod or like device extending within the flask and attached to one of said plates, and power-connections engaging said rod to compress the sand within the flask, substantially as and for the purpose set forth.

2. In apparatus for forming sand molds by compression, the combination of a flask, a pattern and its pattern-block, a packing-plate, a rod or like device extending within the flask and attached to said pattern or pattern-block, and power-connections engaging said rod and adapted through said rod to impart the compressing force to the sand within the flask, substantially as and for the purpose set forth.

3. In apparatus for forming sand molds by compression, the combination of a flask, the pattern and its pattern-block, a reservoir, a packing-plate, a rod or like device extending within the flask and attached to said pattern or pattern-block, and power-connections engaging said rod and adapted through said rod to impart the compressing force to the sand within the flask, substantially as and for the purpose set forth.

4. In apparatus for forming sand molds by compression, the combination of the pattern plate or block carrying the pattern and having the rod or like device extending through the opposite end of the flask and secured to said pattern and pattern-block, the flask resting on the pattern-plate and the packing-plate fitting within the flask or its reservoir, standards engaging with the packing-plate, and power-connections engaging with the rod where it extends beyond the flask, substantially as and for the purpose set forth.

In testimony whereof I, the said S. JARVIS ADAMS, have hereunto set my hand.

S. JARVIS ADAMS.

Witnesses:
JAMES I. KAY,
J. NEGLEY COOKE.