(No Model.)

M. R. MOORE.

SAND MOLDING MACHINE.

No. 346,380. Patented July 27, 1886.

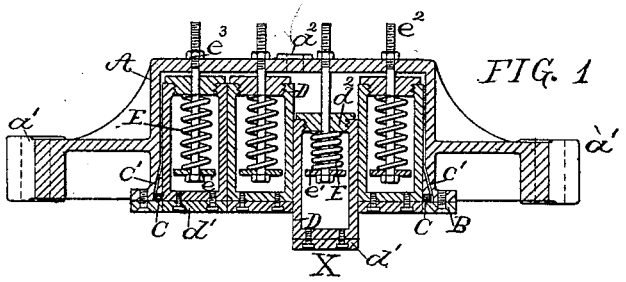

FIG. 1

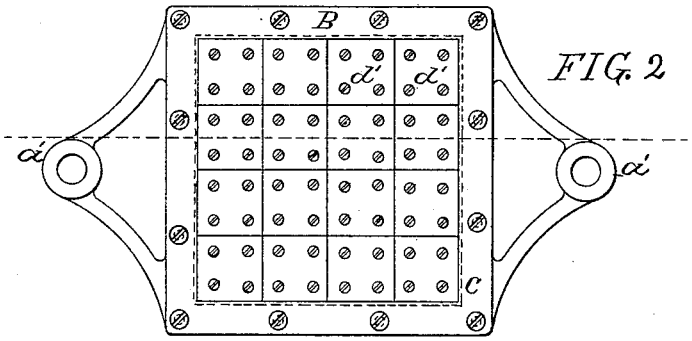

FIG. 2

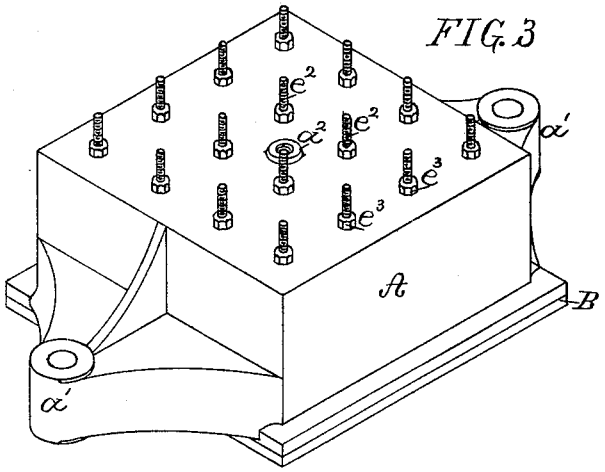

FIG. 3

Witnesses
Rollin Defrees.
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UNITED STATES PATENT OFFICE.

MATTHEW ROBERT MOORE, OF INDIANAPOLIS, INDIANA.

SAND-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No 346,380, dated July 27, 1886.

Application filed March 18, 1886. Serial No. 195,697. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW ROBERT MOORE, of the city of Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Improvement in Machines for Making Sand Molds for Castings; and I do hereby declare that the following specification is such a full, clear, and exact description of my invention as would enable any person skilled in the art to which it pertains to understand, construct, and operate the same, reference being had to the drawings hereto attached and forming part of this specification, and to the letters of reference marked thereon.

My invention relates particularly to that part of the process of making sand molds known as "ramming" or "tamping," and is an improvement in the construction of the device, appliance, or part of a sand-molding machine whereby that operation is performed.

Letters Patent were granted me dated July 22, 1884, and numbered 302,349, wherein is described a process of ramming or compacting the sand by means of fluid-pressure, the device or appliance whereby this operation was accomplished being a series of parallel rods or rammers, which were forced endwise against the sand by the expansion of a flexible diaphragm or bag, behind or within which was admitted fluid under pressure. The mode of bringing back the rammers to their original position after completing a mold and relieving them from pressure by forcing the "cover" or containing-frame against a flat surface was also described. I have discovered, however, that the use of the diaphragm or bag is not necessary. The fluid-pressure can as well be applied to the rammers directly, without the intervention of any retaining device, provided only that they be made of suitable material and fit each other sufficiently close, and that the cover or carrying-frame be adapted to hold fluid, and the joint between the edges of its opening and the common surface of the sides of the assemblage of rammers be provided with suitable packing to prevent the escape of fluid and keep the rammers in mutual contact. It is also much better to secure, by the use of spiral springs, the automatic return of the rammers to their position after pressing a mold and release of pressure. These modifications obviate some defects found to exist in the former arrangement, and by their adoption the operation of the device is greatly improved.

The improvements are clearly shown in the accompanying drawings, wherein Figure 1 represents a sectional view of the improved cover containing the rammers and springs. Fig. 2 shows the faces of the cover and rammers, with a dotted line indicating the plane whereon the sectional view is taken; and Fig. 3 is an isometrical projection of the cover, showing its external form and the arrangement of the rods and nuts whereby the rammers are held in place.

Like parts in the several views are designated by the same letters of reference.

I make the cover or containing-frame A a casting of box-like shape, provided with suitable lugs or projections, *a' a'*, whereby by means of bolts or distance-pieces it may be secured to a bottom board, whereon the flask (not shown) is to rest. The periphery of the opening of the box is made smooth by planing, and is provided with a recess, *c c*, adapted to contain a suitable packing ring or strip, which is held in place by the frame B, which is fastened to A by means of flush-headed bolts or screws. Small holes *c' c'* admit fluid from the interior of the box to the outside of the recess, behind the packing, which, when the pressure is applied, forces the packing inward against the surface of the sides of the rammers, holding them in contact with each other, and making a fluid-tight joint between them and the cover or frame.

D D are the rammers, which must be of such size, shape, and number as will enable them collectively to fill and loosely fit the opening of A. Their sides must be true and smooth, so that they may fit each other with such accuracy as to form a fluid-tight joint with and be capable of moving freely and easily upon each other when in contact. They are of metal or other suitable material, and are made hollow to provide a place for the returning-springs. I prefer to face them with rubber or other soft and elastic material, as shown at *d' d'*, which, by spreading laterally under pressure, serves to prevent the intrusion of sand

into the joints between the rammers, and also prevents injury to patterns should the rammers come in contact with them in the operation of molding.

The springs E E are contained in the cavities of the hollow rammers, and are confined by means of screw-plugs d^2 d^2, which close the openings of the rammers. Each spring rests upon a washer, e' e', through which passes a bolt or rod, e^2 e^2, which passes likewise through holes drilled through the plug or top of the rammer and through the top of the box-frame A, where it is threaded and provided with a nut, e^3 e^3. By means of these nuts the rods are drawn up and the springs made to bear against the tops of the rammers, and the rammers thus held in against the top of the box-frame. Sufficient tension is given the springs by screwing up the nuts to cause the rammers to spring back into position when forced out, as shown at X. A gasket (not shown) placed under each nut will prevent leakage around the rods through the holes in the frame through which they pass. A threaded orifice, a^2, in the top of A is made to receive a pipe or hose for supplying fluid under pressure and for allowing the same to escape, the inflow and outlet being controlled by means of a suitable cock or valve. (Not shown.)

If, now, the apparatus described be fastened by means of bolts or rods passing through the lugs a' a' at a suitable distance above the surface of a molding-bench, table, bottom board, or pattern-carrier of a molding-machine, and a flask full of sand be placed between the bottoms of the rammers and the top of the bench or table, fluid under pressure may be admitted through a^2, which, pressing on the tops of the rammers and overcoming the tension of the springs, will force the rammers down against the sand, compressing and packing it about any pattern which may be contained in the flask. Each rammer will continue to descend until the increasing density of the sand offers a resistance equal to the pressure impelling the rammer, when further compression will cease. Since the amount of pressure measures the degree of compression, and the several rammers are capable of independent motion, it will readily be seen that the result will be the compacting of the sand to a uniform density, regardless of variations in its depth or in the thickness of the pattern. This result may, however, be modified, if desired, by giving some of the springs greater tension than others. Upon releasing the fluid the springs withdraw the rammers, and the flask may be removed.

In another application, Serial No. 190,992, filed February 8, 1886, I illustrate but do not claim a series of reciprocating rammers, means for admitting fluid to project them in one direction, and springs for retracting them.

Having thus described my improvement, what I claim as new is—

1. In machines for making molds, a group of independently-movable rammers, as D, adjacent rammers being in contact with each other, arranged within a casing, in combination with means for admitting a fluid behind the rammers to force them outward, as herein specified.

2. In machines for making molds, a group of reciprocating rammers, a casing inclosing them, and means for admitting fluid under pressure to force them in one direction, in combination with each other, and with springs arranged in relation to the rammers to return them to a normal position after the pressure has been removed, as set forth.

3. The springs E E, combined with the rammers D D, in contact with each other, frame A, and means, as e^2 e^3, for adjusting said springs, arranged to return the rammers after they have been forced out by fluid-pressure in the operation of making sand molds for castings, substantially as set forth.

4. The box-like frame A, having means, as a' a', for attaching it to a molding-bench or equivalent part of a sand-molding machine, and having also means, as a^2, for admitting and discharging fluid, and a packing, as described, to retain the fluid under pressure, in combination with the set of rammers D D, in contact with each other, adapted to be used in connection with patterns, flasks, and sand, for molding sand molds for castings, as set forth.

5. The combination, with the frames A and B, packed as shown, of the rammers D, in contact with each other, springs E, and adjusting means, as e^2 e^3, the rammers being arranged to be operated by fluid-pressure, and the whole adapted for joint operation in making sand molds for castings, as herein specified.

In testimony whereof I have hereunto set my hand at Indianapolis, Indiana, this 16th day of March, 1886, in the presence of two subscribing witnesses.

MATTHEW ROBERT MOORE.

Witnesses:
ROLLIN DEFREES,
H. H. HANNA.