2 Sheets—Sheet 1.

W. AIKIN & W. W. DRUMMOND.

SAND-MOLDING MACHINES FOR METAL CASTINGS.

No. 195,070. Patented Sept. 11, 1877.

Fig. 1.

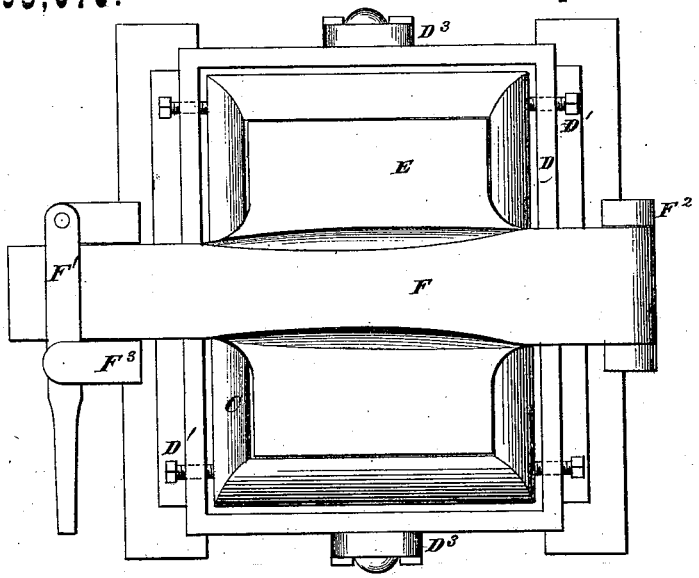
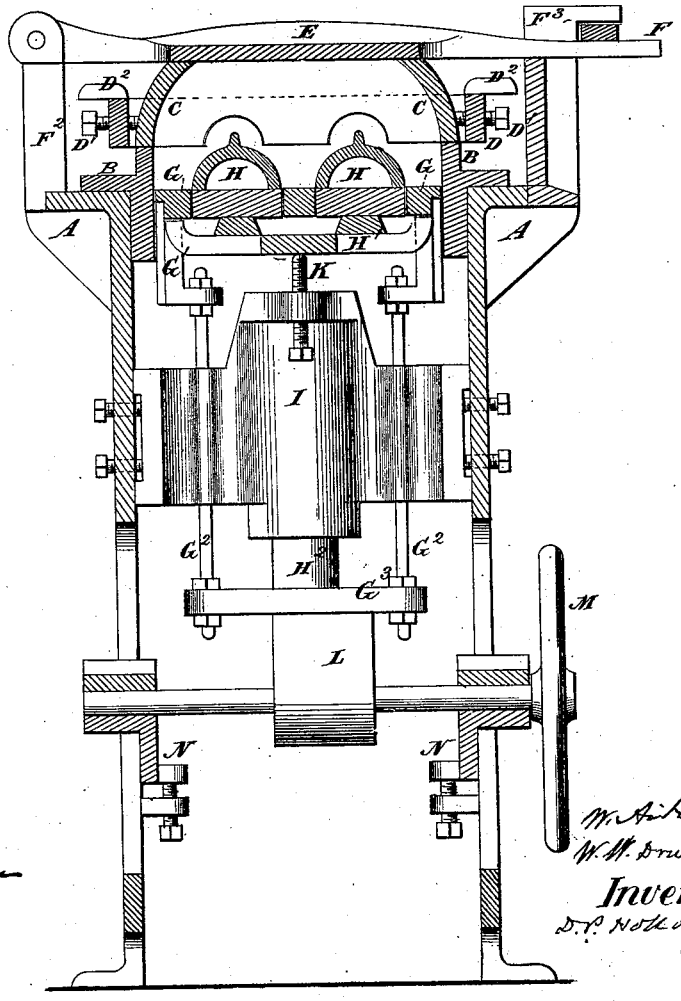


Fig. 2.



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2 Sheets—Sheet 2.

W. AIKIN & W. W. DRUMMOND.

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Fig. 3.

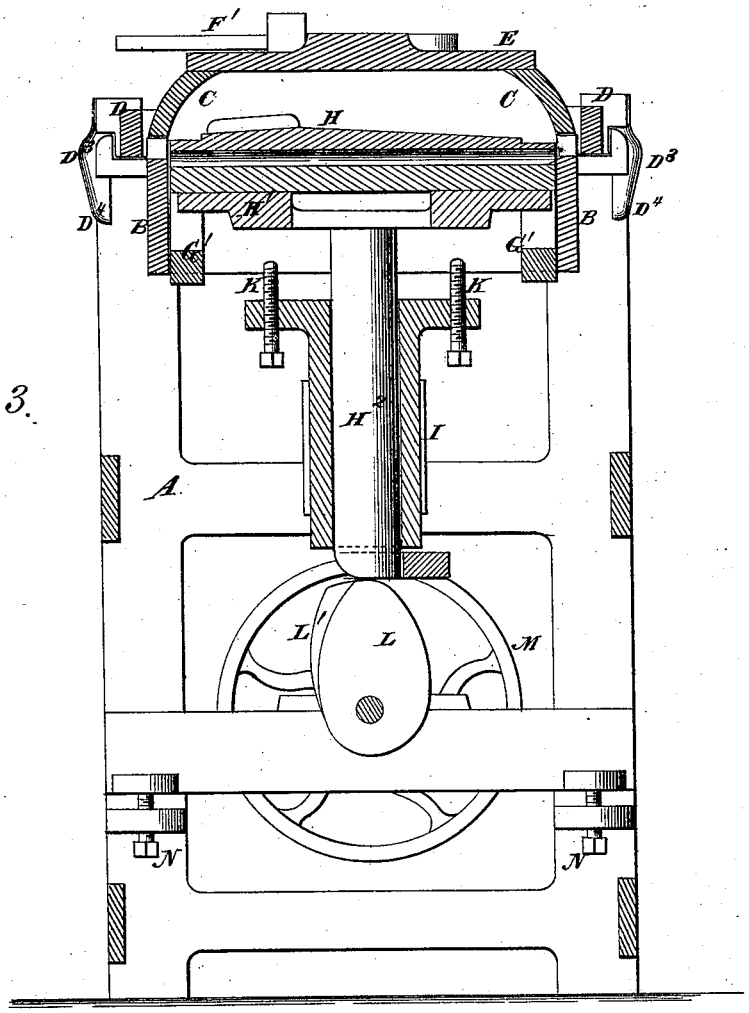
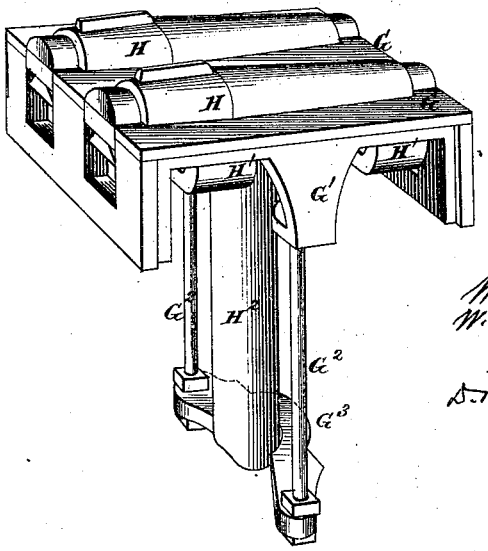


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM AIKIN AND WILLIAM W. DRUMMOND, OF LOUISVILLE, KY.

IMPROVEMENT IN SAND-MOLDING MACHINES FOR METAL CASTINGS.

Specification forming part of Letters Patent No. **195,070**, dated September 11, 1877; application filed March 9, 1877.

CASE A.

To all whom it may concern:

Be it known that we, WILLIAM AIKIN and WILLIAM W. DRUMMOND, of Louisville, in the county of Jefferson and State of Kentucky, have invented new and useful Improvements in the Art and in Machines for Making Molds in Sand, of which the following is a specification:

This invention is intended for use in making molds in sand for castings in metal, and especially in making molds for matched work by compression. It consists in connecting the follower-plate, made in sections, with mechanism which actuates the portions of the follower carrying the patterns simultaneously with the intermediate sections of the follower-plate in rising to force the pattern into the sand, but, in the reverse movement, first withdraws the patterns, leaving the intermediate sections of the follower-plate in contact with and supporting the sand until, the patterns having been withdrawn, the followers are withdrawn also, leaving the sand in the flask with the pattern duly molded therein.

The peculiar combinations of mechanism employed will be clearly indicated in the following description and claims.

In the annexed drawings, making part of this specification, Figure 1 is a plan, showing the top of the machine. Fig. 2 is a vertical section of the machine. Fig. 3 is a similar section on a plane at right angles to that of Fig. 2; and Fig. 4 is a perspective view of the follower with patterns attached, and pistons for operating the sections independently.

The same letters are employed in all the figures in the indication of identical parts.

A is the frame of the machine, on top of which is a box, B, open at the top and bottom, which is intended to contain and gage the quantity of sand resting upon the follower, which is made in sections G H, and also serving as a guide for the follower, which is made to rise and fall, compressing the sand into the section C of the flask, which rests upon the upper edge of the box B. The flask is held in a frame, D, by the adjusting-screws D^1. On the sides of the frame are handles D^2, by which the flask can be lifted, and on the ends are the double steady-pins D^3 and D^4, which are formed as shown for the performance of their functions—first, while the half-flask is on the machine, in which case the part of the pin D^3 enters a guide on the box B adapted to receive it; and, secondly, to hold the sections of the flask together when the molds are finished and the parts put together for casting, when the part D^4 serves the ordinary duty of steady-pins, being received in the eyes always attached to the drag.

A lid, E, attached to a lever, F, is intended to shut down onto the top of the flask. The lever is hinged or pivoted on the standard F^2 attached to the frame A, and when the lid is on the flask the lever F is confined by a latch, F^1, which is secured to the standard F^3, also attached to frame A in such manner as to permit its ready adjustment to confine or release the lever.

The follower is formed in sections G and H, the latter having the half-pattern fitted and fastened to its upper face. The pattern shown in the drawings as an illustration is the half of an axle-skein; but any other pattern may be used the form of which is adapted to make a mold or part of one by compression in the sand. The form of sections H being adapted to the outline of the pattern, the sections G are formed to close the spaces between the sections H, and between the latter and the sides of the flask. These sections G and H form a plunger for forcing the sand into the flask; but they are moved independently when, the mold having been formed, they are withdrawn.

The sections G are attached to a cross-head, G^1, so formed as to support them independently of the supports of sections H. They are actuated by the reciprocating rods G^2 passing through holes in the stationary guide I firmly bolted to the main frame. The lower ends of the rods G^2 are securely fastened to the yoke G^3, which embraces the piston H^2, but is capable of being moved independently of the latter.

The sections H, carrying the patterns, are attached to an independent cross-head, H^1, underlying the cross-head G^1, so as to permit

the patterns to be withdrawn from the sand after compression in the flask, while the sections G of the follower remain in position, supporting the sand until the pattern has been withdrawn. These movements are provided for in the case illustrated by the cam L, which is formed with eccentric surfaces of different radii, as shown at L and L′ in Fig. 3, on that side which bears against the plunger H^2 and yoke G^3 after the sections of the follower have been simultaneously raised to compress the sand and form the mold. The radius of the cam L^1, which bears against and supports the yoke G^3, being greater than that of the surface which supports the piston H^2, it follows that as the cam is revolved the follower-plates will be simultaneously raised, and then the piston H^2 will fall first, withdrawing the pattern from the mold, and then the yoke G^3 will fall, removing the follower-sections G from the face of the sand in the flask, leaving it suspended and the mold completed, so that it is only necessary to remove this section of the flask and introduce another part.

In order to regulate the quantity of sand to be introduced into the box, temper-screws K are passed through lugs on the upper end of the guide I, through which the plungers H^2 G^2 pass. The upper end of the temper-screws supports the cross-head H^1, and, as this engages the cross-head G^1 as it falls, we will have the follower stopped at any point in the box B which may be desired, and as more or less sand is required to fill the flask when the compression takes place. As the flask is filled with sand in its loose state, it follows that the box shall be graduated to contain sand enough only to supply a quantity equal to the difference in bulk of the flask-full of sand in its loose and in its compressed state.

The cam is actuated by the wheel M, and its shaft is hung in bearings which are vertically adjustable on the main frame at N by means of screws, so as to adjust the cams to the plungers.

In working the machine, the half-patterns having been attached to the follower-plates H, a sufficient quantity of sand being thrown into box B, and the temper-screws K having been adjusted, the flask is placed on the box and secured by the cap E, fastened down on it. The wheel M being turned, the cam will lift the follower-plates G and H, compress the damp sand into the flask, and set it about the pattern by the force of its compression; then, as the wheel M is revolved, the pattern will be drawn out, and then the follower-plates be withdrawn. It is now only necessary to remove this section of the flask and repeat the operation in the match section, form the gates in proper section, and unite them to form a mold ready to receive the molten metal.

It is obvious that, instead of having the plungers fall by gravity, by changing the form of the cam and connections they may be positively actuated in both directions. Other changes in detail may be made which will still embody the principle of our invention, which is distinguished from that involved in all prior machines for molding in sand in this, that the follower or plunger plate by which the sand is compressed is made in sections independently actuated in such manner that, while acting simultaneously in compressing the sand, the patterns are withdrawn from the sand while it is yet supported by the intermediate sections; whereas in former machines, instead of using half-patterns fastened to one or more of the sections of a sectional follower, as we do, the patterns have been entire patterns, mounted upon rods, toggle-levers, or similar devices which were raised with the sections of the plunger fitted to their edges, the follower-plates proper being entirely disconnected from the pattern, and forming a single set only, all moved simultaneously.

The process applicable to this machine is the subject-matter of another patent issued to us, of this date, to which reference is made for a full description, and is not claimed.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In combination, the box B, the flask C, and cap E, with the sectional follower G H, the sections of which are simultaneously actuated in one direction and alternately in the other, substantially as set forth.

2. In combination with the sectional follower G H, the cross-heads G^1 H^1, rods G^2 and piston H^2, yoke G^3, and double cam L L′, for allowing the sections to be separately withdrawn, substantially as set forth.

3. In combination with the plungers and cam, the adjustable bearings of the latter, for regulating the action of the plungers upon the sand in the flask, substantially as set forth.

4. In combination with frame D, the double steady-pins D^3 D^4, of which section D^3 engages the guides on the box B in operating the machine, and section D^4 enters guides on the drag in closing the flask.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM AIKIN.
WILLIAM WHYTE DRUMMOND.

Witnesses:
DAVID LANE,
OWEN MCBRIDE.