(No Model.) 3 Sheets—Sheet 1.

W. N. BARROWS.

SAND MOLDING MACHINE.

No. 293,401. Patented Feb. 12, 1884.

Fig. 2.

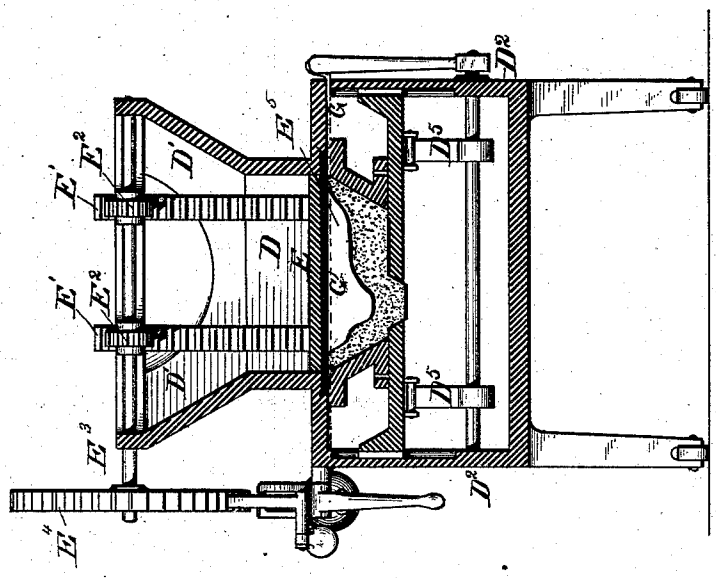
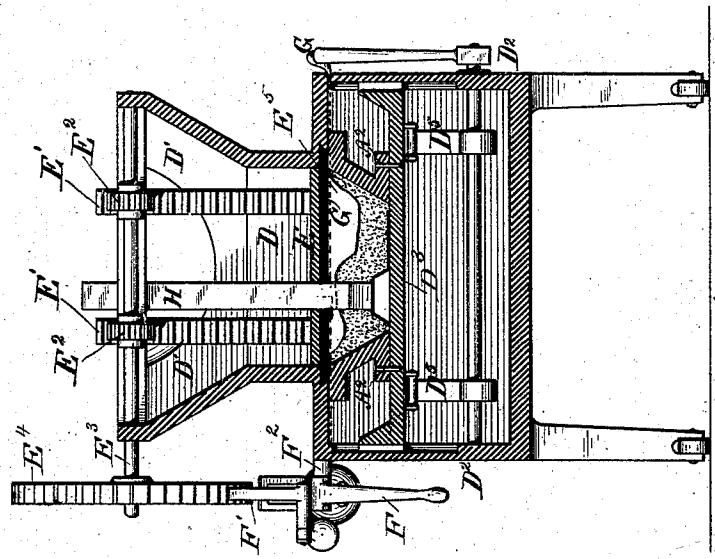


Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 6.

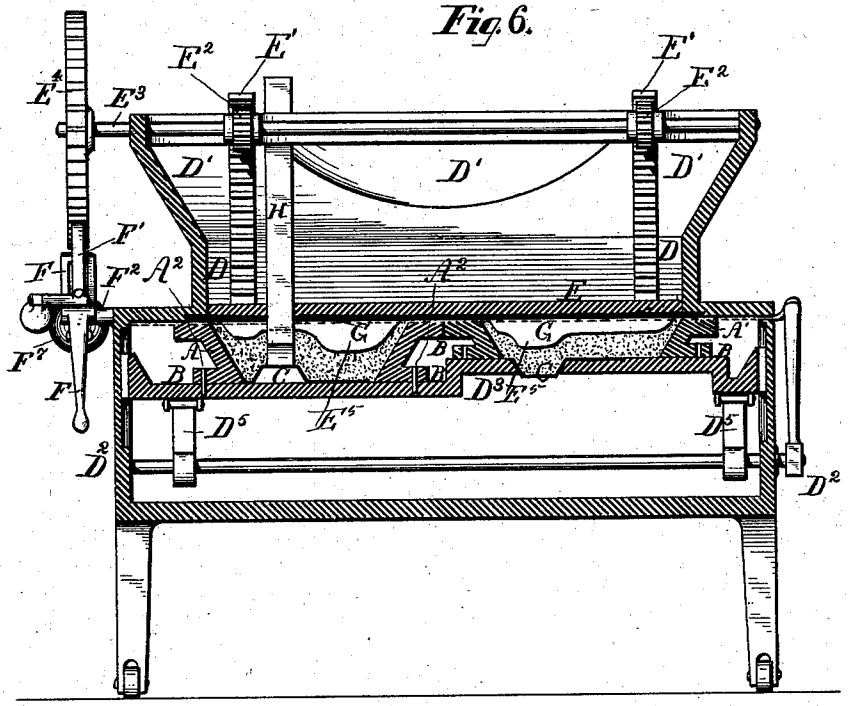


Fig. 3.

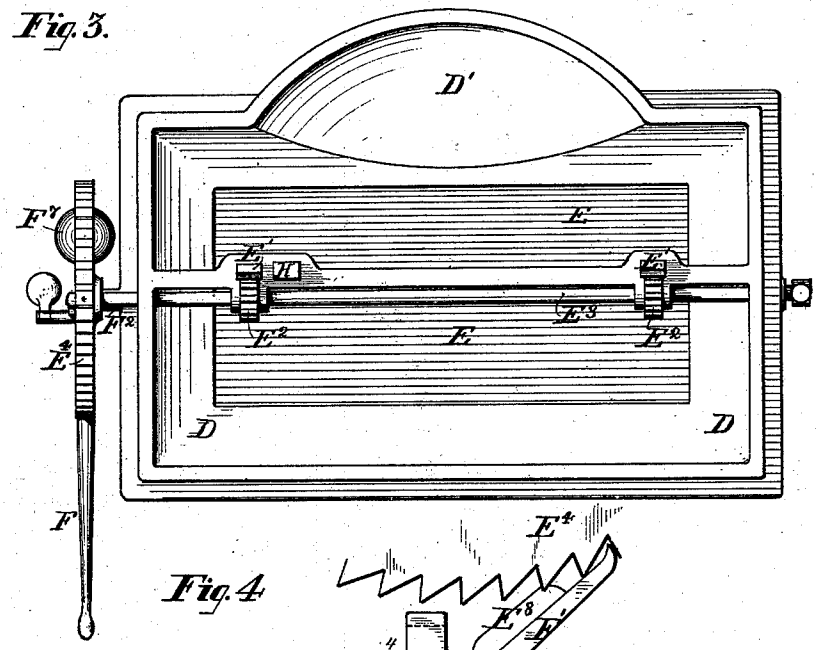
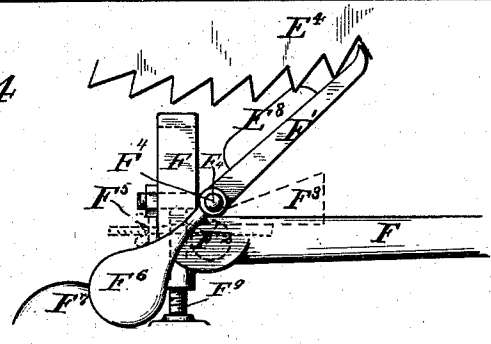


Fig. 4.



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SAND MOLDING MACHINE.

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Fig. 5.

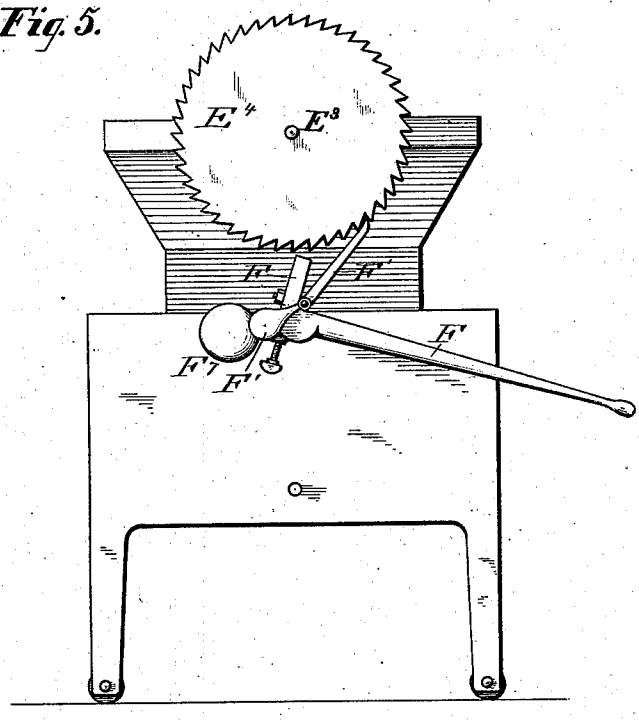


Fig. 7.

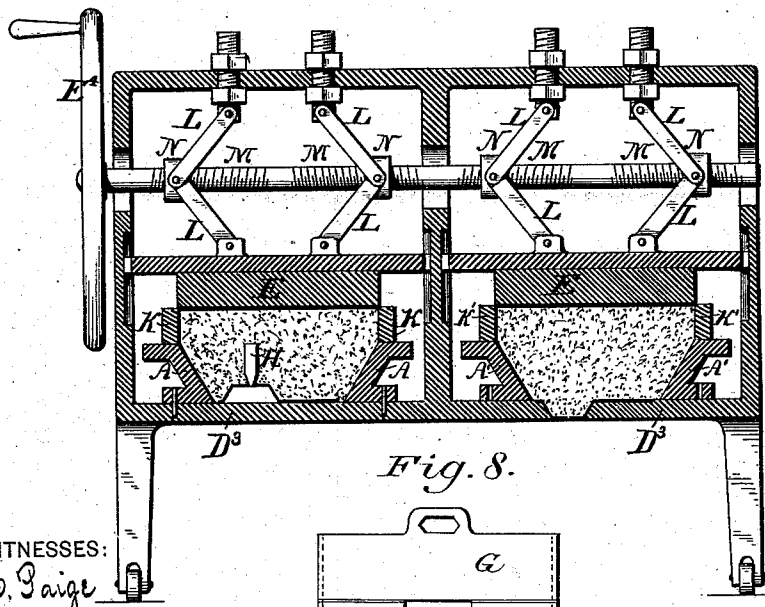
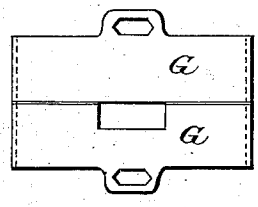


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM N. BARROWS, OF PHILADELPHIA, PENNSYLVANIA.

SAND MOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 293,401, dated February 12, 1884.

Application filed November 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM NELSON BARROWS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sand Molding-Machines; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof as to enable others skilled in the art to make and use the said invention.

This invention relates to the making of molds on damp or green sand for the production of castings, and has for its object the proper and equal compacting or pressing of the sand around the pattern, so that the mold will resist the pressure of metal in casting, will readily vent the gases formed by the heat of the metal, and at the same time be quickly and cheaply made by unskilled labor.

To accomplish these results the invention consists in a flask the sides and ends of which are converging toward the parting or joint, a sand-hopper having the lower portion of the sides and ends vertical and parallel, a plunger fitting in such parallel portion, and mechanism for working the same for supplying and forcing sand downward into the parts of the flask against the pattern, a form attached to the under side of the plunger and moved thereby, of such shape relatively to the flask and pattern that pressure applied by the plunger is distributed through the sand equally against the pattern in all directions, and a retractible gate-pattern arranged to descend and rise through the plunger.

I will now proceed to fully and particularly describe the mode of making and using this invention, referring in so doing to the drawings annexed and the letters of reference marked thereon.

Figure 1 shows a vertical section of the apparatus as applied to forming the cope or upper half of a mold for casting a skillet. Fig. 2 shows a vertical section of the apparatus as used in making the lower half or "drag" of the same mold for casting a skillet. Fig. 3 shows a top view of Fig. 1; Fig. 4, the machine for applying force or pressure. Fig. 5 is a side view of the machine shown in Fig. 1. Fig. 6 is a modification in vertical section wherein both the cope and drag are simultaneously molded. Fig. 7 shows a modification in vertical section wherein the sand is measured by a false cope, instead of being supplied from a hopper, and by reason of using a definite quantity of sand a different pressing mechanism is practicable, which is shown in this figure; and Fig. 8 shows the plates used for supporting the sand in the hopper when the flask is removed from the machine.

The same letters of reference apply to the same parts in the several figures.

A represents the cope of a flask; A′, the drag thereof, fitted together detachably by the usual dowel-pins, A^2. The sides of the flask are made converging toward the line of parting B, so that sand pressed downwardly in them is forced by the oblique sides toward and against the pattern C. The sand is introduced from a hopper, D, having a flaring or funnel-shaped top, D′, and the sides and ends parallel at the lower part, and fitted with a plunger, E, which is raised and lowered by racks E′, worked by pinions E^2 on a shaft, E^3, turned by a wheel, E^4, by hand, to introduce the charge of sand into the flask, and to effect the required compression a pawl pivotally connected to a lever, F, turning upon a fulcrum, F^2, is used. The pivot F^4 of the pawl F′ is adjusted as to its distance from the axis of the fulcrum F^2 by a key or wedge, F^3, operated by a nut, F^5, turning upon a screw formed on the tail of the key F^3, and passing through a slot in the vertical arm of the lever F. A counter-balance, F^7, serves to hold the lever F up out of the way of the workman when not in use, and when the handle of the lever F is raised to its greatest height the end of the pawl F′ is disengaged from the notches in the wheel E^4 by a projection, E^8, attached to the side of the sand-hopper, against which the rear end of the pawl F′ rests and holds the pawl F′ clear of the wheel E^4. Instead of the wedge F^3, provided with the screwed tail and nut F^5 for adjusting the height of the pivot F^4 of the pawl F′, a screw, F^9, passing upwardly through the lever F, under the pivot F^4 of the pawl F′, may be substituted. Upon the under side of the piston E are placed projections E^5, correspondingly shaped to con-

form to the outline of the pattern, and displace the sand laterally on the descent of the piston, so that by the form of the flask A and the form of the pattern the sand is equally compacted against all parts of the pattern. Through the plunger E is an opening through which is fitted a vertically-sliding block, H, the lower part of which, that projects into the sand of the cope and reaches the pattern, is made tapering, and serves the purpose of forming the gate through which molten metal is poured in casting. The hopper D is supported by a frame, D^2, and the flask is supported by a table, D^3, susceptible of a rising-and-falling movement by cams D^5, the releasing of which permits the easy removal of the flask after being rammed. The sand which fills the flask is separated from that remaining in the hopper D by plates G, having the edges beveled, and fitting as dovetail in a correspondingly-beveled space in the bottom of the hopper D, which, when closed together, shut up the bottom of the hopper D and prevent the sand therein contained from falling out when the flask is removed. The plates G are thin flat plates of metal, which have notches cut in them, through which the gate-former H fits when the plates G are placed together, and to facilitate their introduction these plates should have their edges beveled or brought to an edge, so as to operate as a knife to cut the compacted sand in the flask loose from the sand remaining in the hopper D.

The operation of this machine is as follows: The pattern C is placed on the table D^3 and dusted and the cope A placed around it. The table D^3 is raised, so as to fit closely to the bottom of the hopper D. The plunger E is raised and the hopper D filled with sifted molding-sand. The wheel E^4 is turned quickly, so as to depress the piston E, by means of the racks E′ and the pinions E^2 on the shaft E^3, and thus fill the mold with sand. A form, H, fitting through the plunger D, for making the gate, is pressed down upon the pattern C, and the plunger D is further depressed and the mold compactly rammed by forcing down the lever F, and the pawl F′, engaging in notches in the wheel E^4, turns it with great force. Upon raising the lever and closing the plates G together, the sand in the flask is severed from that in the hopper, and the cope A, and the pattern C, and the table D^3, depressed by the action of the cam D^5, turned upon its back on the table D^3, and the drag A′ placed on the cope, and the operation of filling it is repeated in precisely the same manner, with the gate-former H not being used in the operation. Upon the removal of the mold it is opened, the pattern withdrawn, and the mold is ready for casting.

In the form shown in Fig. 6 the machine is made of such breadth as to mold both the cope and drag of the flask simultaneously. There is no difference in its construction and mode of operation, excepting that duplicate patterns are used, which patterns should be made accurately alike and adjusted to the table D^3, to insure the proper registering of the two parts of the mold when placed together to be used. In the form shown in Fig. 7 the sand is measured by false copes or frames K and K′, which are placed upon the top of the cope and drag of the flask, and are of such dimensions as to contain the requisite volume of sand to supply the amount required to be compressed into the parts of the flask in addition to that placed in the flask in a loose state. The employment of the false copes K and K′, which are in effect equivalent to the hopper D, (shown in the preceding figures,) enables me to dispense with the plate for cutting the compressed sand of the mold in the cope A and drag A′ from that remaining in the hopper D; and, to effect the desired definite length of stroke, a system of toggle-levers, L L, operated by screws M and nuts N, are used, so that when the toggles L L are straightened or in perpendicular line the plunger E will have its under face level with the top of the cope and the drag and the lower edges of the false copes K and K′. By setting the nuts N upon the screws M, so that the toggles forcing the plunger down into one of the false copes before the other has reached a similar point, the labor is divided and the strain diminished, as the greatest pressure then takes place in the two parts of the mold successively and not simultaneously. In this form of the invention the gate-former need not be fitted through the plunger E, but may at its lower end be inserted detachably in a mortise or cleft made in the pattern C, and be of the height of the cope A.

Having described my invention and the mode of operating the same, what I claim is—

1. In a machine for making green-sand molds, the combination of a flask, having sides converging toward the parting of the mold, with a sand-supplying vessel and plunger, and a mechanism for depressing the same, and bearing forms corresponding to the shape of the patterns, for the purpose of distributing and regulating the pressure in the sand in the flask, substantially as and for the purpose set forth.

2. In combination with a flask having sides converging toward the parting thereof, a false cope adapted to measure the quantity of sand to be compressed into the flask, and a plunger fitting in said false cope, and an actuating mechanism arranged to displace the sand from the said false cope into the flask and compact the sand therein, substantially as and for the purpose set forth.

3. In a machine for making sand molds for casting metals, the combination of a pattern, a flask having sides converging toward the parting thereof, and a sand-supplying vessel having a plunger fitting therein, provided with forms adapted to compact the sand equally against the pattern, with a gate-former fitting through said plunger, substantially as and for the purpose set forth.

4. In a machine for making sand molds for

casting metal, the combination of a pattern, a flask having sides converging toward the parting thereof, a sand-supplying vessel provided with a plunger, having projections conforming to the shape of the pattern, a gate-former, plates for separating the sand in the flask from the sand in the supply-vessel, a mechanism for raising and lowering the plunger, and a mechanism for supporting and lowering the flask, substantially as and for the purpose set forth.

5. In a machine for molding in sand, the flask shown and described, having sides converging toward the parting or joint between the cope and drag, for the purpose of permitting lateral compression of the sand against the pattern and of better retaining the sand, as and for the purpose set forth.

6. In a machine for molding in sand, the combination of a flask having sides converging toward the parting thereof, and a false cope for measuring the quantity of sand placed in the mold, with a pressing mechanism and plunger adapted to press sand in said false cope and flask, substantially as and for the purpose set forth.

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Witnesses:
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