No. 828,214. PATENTED AUG. 7, 1906.

H. KAROW.

MACHINE FOR MAKING SAND MOLDS.

APPLICATION FILED OCT. 27, 1905.

4 SHEETS—SHEET 1.

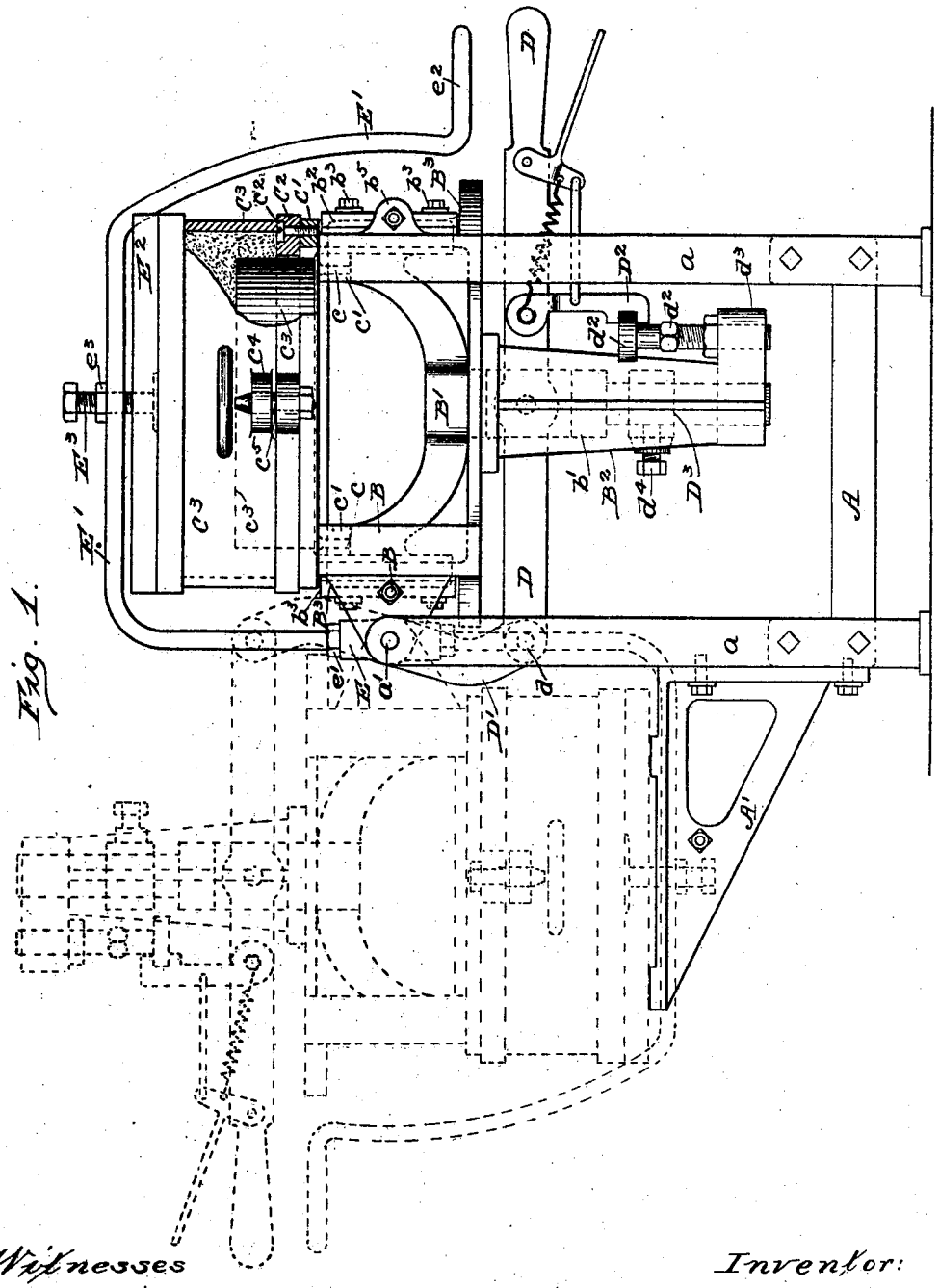

Fig. 1.

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James F. Bartlett

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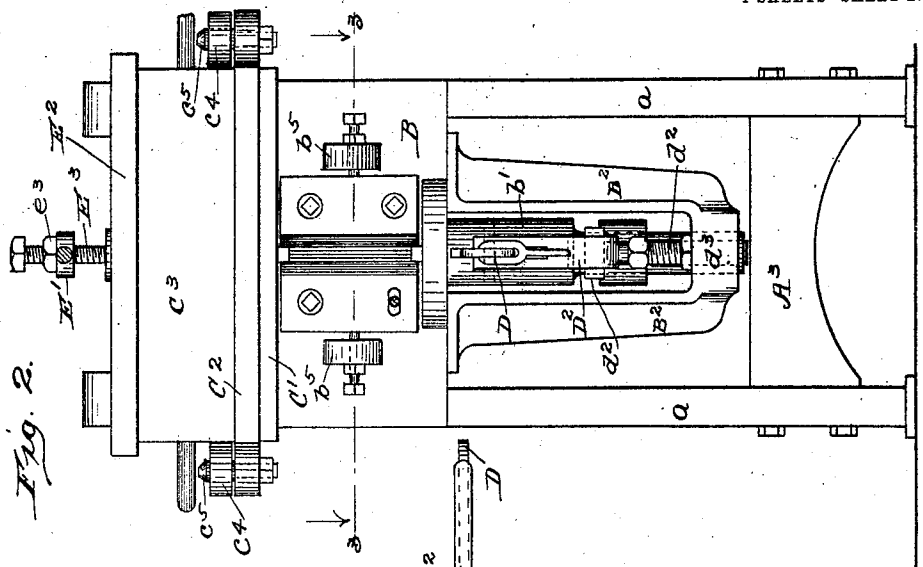

Fig. 2.

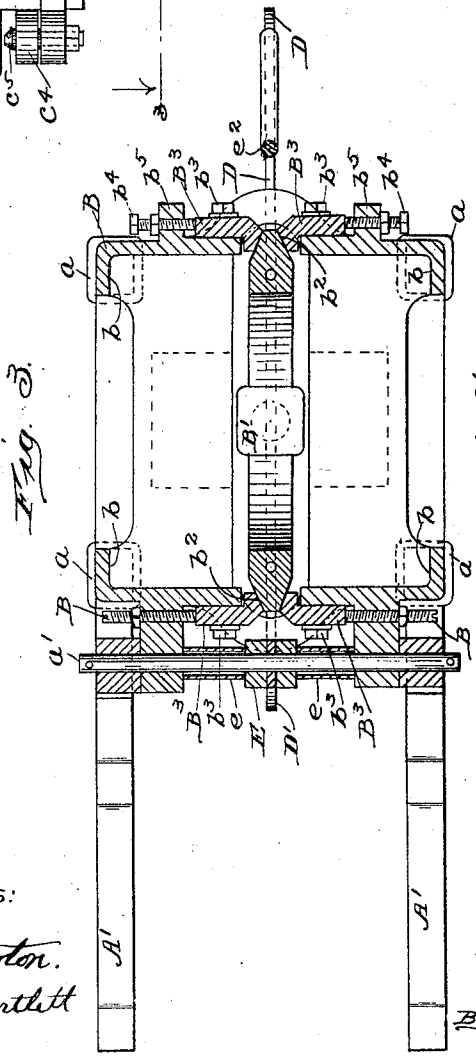

Fig. 3.

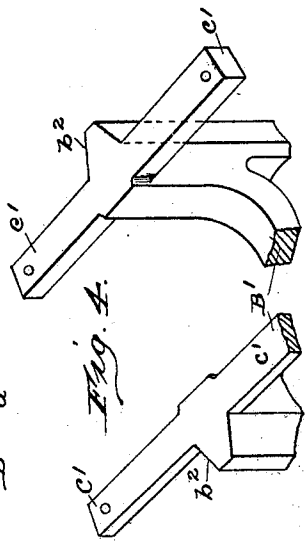

Fig. 4.

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4 SHEETS—SHEET 3.

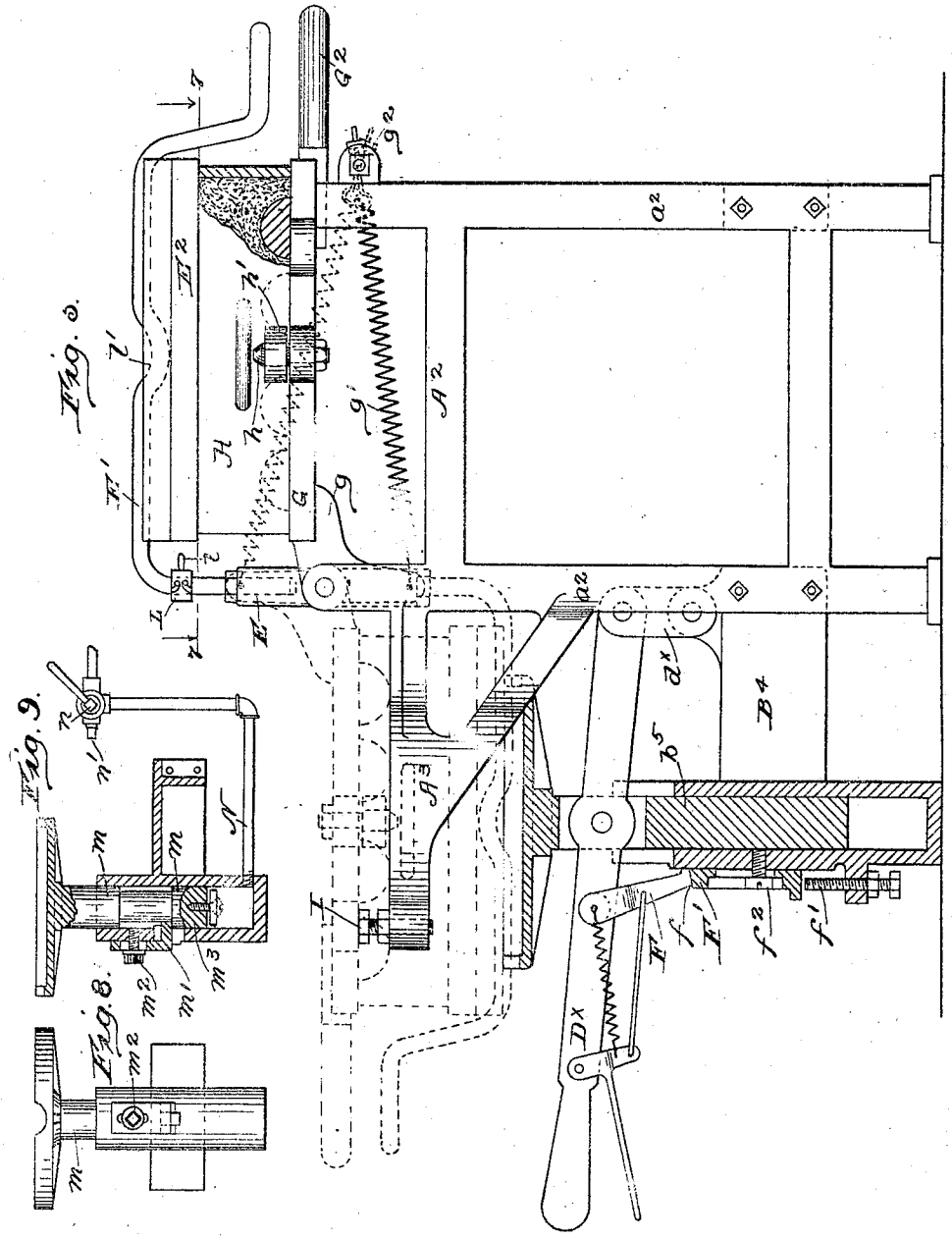

Fig. 9.

Fig. 8.

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4 SHEETS—SHEET 4.

Fig. 6.

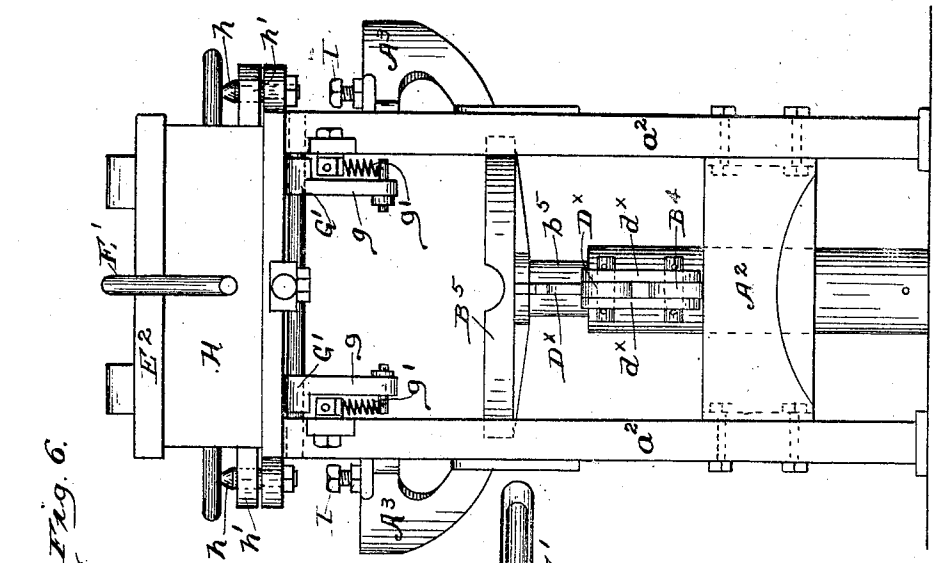
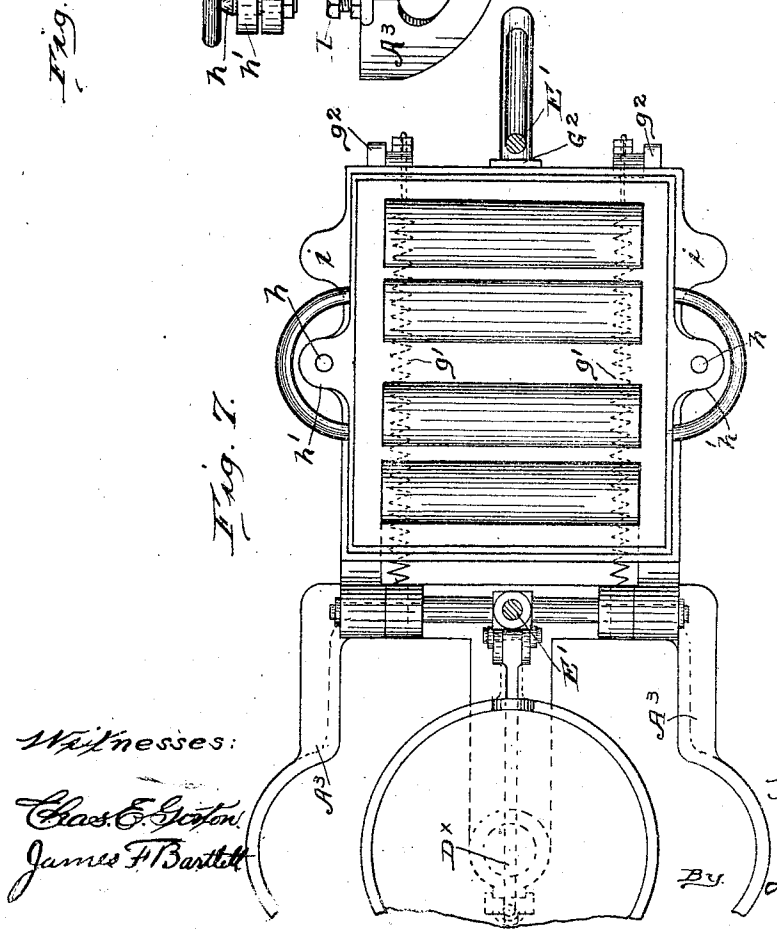


Fig. 7.



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James F. Bartlett.

Inventor:

Henry Karow.

By Donald G. Perkins

Atty.

UNITED STATES PATENT OFFICE.

HENRY KAROW, OF CHICAGO, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO HENRY E. PRIDMORE, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING SAND MOLDS.

No. 828,214. Specification of Letters Patent. Patented Aug. 7, 1906.

Continuation of application Serial No. 160,332, filed June 6, 1903. This application filed October 27, 1905. Serial No. 284,747.

To all whom it may concern:

Be it known that I, HENRY KAROW, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Sand Molds, of which the following is a specification.

This invention, which was fully described and made the subject of claims in an application filed by me on the 6th day of June, 1903, Serial No. 160,332, but never issued, has for its object to so construct a molding-machine that the cope or drag of a flask after being filled and rammed with sand is removed from the filling-stand with pattern, pattern-plate, and accessory mechanism *in situ*, reversed in position, and deposited upon what may be termed a "parting-stand," whereupon the pattern-plate and pattern are withdrawn from the sand in exact perpendicularity to the parting-face; and it consists in the various combinations and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation, partly broken away, of a machine embodying my invention intended primarily for packing two-part flasks, showing in full lines the cope or drag, whichever it may be, (in the present instance the cope,) the parting-board, pattern, and pattern-plate and other accessories in position for filling and already filled and rammed, and the temporary cover (bottom board with a drag) closed down upon the top of said cope and the struck-off surface of the sand therein, ready for reversing the position and showing also in dotted lines the parts in their reversed position upon the parting-stand, ready for the pattern to be withdrawn. Fig. 2 is an elevation of the machine from the filling-stand end, with the cope and its cover in position thereon. Fig. 3 is a horizontal section on the correspondingly-numbered line in the foregoing figure. Fig. 4 is an enlarged detail in perspective of the pattern-plate carriage or parting-carriage; Fig. 5, a side elevation, partly in section, of the machine for filling and ramming a one-part flask, showing the latter to the right in full lines upon the follow-board and filling and ramming stand, with the mold formed and temporary cover in place, and to the left in dotted lines, in reversed position upon the parting-stand. Fig. 6 is an elevation from the filling-stand end of the machine shown in the preceding figure. Fig. 7 is a top plan view thereof, partly in section, on the correspondingly-numbered line in Fig. 5, with the flask upon the follow-board and empty and both upon the filling-stand; Fig. 8, an elevation of an alternative form of the parting-stand used in the machine last illustrated, adapting it for use with hydraulic power; and Fig. 9, a vertical central section through said latter stand.

Referring to said drawings, and particularly to the first four figures and applying general references of position and relation of parts to the mechanism indicated in full lines, A indicates a strong frame having four uprights a, the two to the right being shorter than the two to the left. This frame constitutes the filling and ramming stand, while the parting-stand is afforded by two brackets A′, bolted to the left-hand uprights at a low elevation. Hinged to said latter uprights by horizontal pivot-rod a' is the parting-frame B, having vertical ways b, in which the parting-carriage B′ moves, and also a central yoke-formed hanger or guide B^2 for the play of the plunger b' of said carriage. The carriage-slides b^2 are truncate in cross-section and the ways therefor are formed of plates B^3 of practically the outline shown in Fig. 3, which by means of slots and clamping-bolts b^3 and the set-screws b^4, working in lugs b^5 upon the parting-frame, may be accurately set up and fixed to compensate for wear or to insure perfect alinement and smooth running. To the top of the parting-carriage is secured the pattern-plate C by means of screws c, entering the plates c', rigid and preferably intergal with the carriage, as shown, and to the top of the parting-frame is fixed a ring C′, (shown as integral therewith,) to which is secured by screws c^2 the parting-board C^2, having perforations of the contour of and alined with the pattern c^3, secured to the pattern-plate. Upon the parting-board rests the cope C^3, positioned relatively thereto by means of eyes c^4, taking over dowel-pins c^5, rising from lateral ears thereon. The parting-carriage is normally locked at its full elevation with the pattern projecting through the parting-board and into the cope by means of a latch or lifting-lever D, pivoted to the plunger mediately of its length and fulcrumed at d on the lower end of a link

D′, depending from the before-mentioned pivot-rod a', upon which the parting-frame swings. The latch d' of this lifting-lever engages an adjustable catch D^2, (shown as the head of a screw-bolt d^2,) which takes into a step d^3 from the yoke-hanger and is secured in adjusted position by means of a jam-nut or other suitable means. When the lever D is unlatched, it is evident that the parting-carriage may be allowed to fall from the position shown in full lines or be lifted up from the position shown in dotted lines, in either case being guided perpendicularly to the parting board or face of the mold by the vertical ways, the fulcrum-link swinging to compensate for the resultant movement of the latch-lever. A collar D^3, secured to the stem of the plunger by set-screw d^4, determines by contact with the union of the yoke-hanger the distance to which the carrier can fall or to which it may be lifted without affecting the position of the parting-frame. Mounted upon the pivot-rod a' is an internally-screw-threaded thimble E, bifurcated at the end, where it embraces the corresponding end of the fulcrum-link and spaced medianly by distance-sleeves e between the two uprights supporting said rod. Into the screw-threaded bore of this thimble is let and held thereto by the jam-nut e' the threaded end of a clamping-lever E′, bridging the inverted cope and the cover E^2, placed thereon after the sand has been rammed down and struck off and terminating in a handle e^2, adjacent to and parallel with the handhold of the latch-lever, so that the two may be held in one grasp and the cover and cope held firmly against the parting-board and parting-frame as the whole movable structure is swung over from the position shown in full lines to that shown in dotted lines, where it rests horizontally upon the parting-stand. The contact of the clamping-lever with the cover may be made by means of the set-screw E^3, secured by the jam-nut e^3 and taking against a central seat on said cover.

The parting-frame and its accessories are supported upon the filling-stand by means of the pivotal connection with the left-hand uprights and by resting upon the top of the shorter or right-hand uprights of said stand.

As will be gathered from the foregoing, the cope or the drag, as the case may be, is filled and rammed on the filling-stand, the sand is struck off at the top, the cover (or bottom board) placed thereover, and the clamping-lever engaged with said cover. Then both levers are taken in one grasp, and the whole movable structure is swung over until the cover rests upon the parting-stand, as represented in dotted lines in Fig. 1, supporting the cope and mold and parting-frame with its accessories. Now the lifting-lever is unlatched and raised, carrying with it the parting-carriage and drawing the pattern perpendicularly from the mold and through the parting-board which, as before stated, is secured to the parting-frame. The pattern having been fully withdrawn from the mold, the collar D^3 comes in contact with the yoke union, and in the further movement of the lifting-lever the parting-frame and parting-board are lifted from the finished mold and swung back upon the filling-stand ready to receive an empty cope or drag, while the filled flask-section is removed, thus making the process of manufacture continuous.

Coming next to the structure represented in Figs. 5 to 7, the general principle and mode of operation—to wit, the filling of the mold upon a ramming-stand and then its being swung from the said stand and reversed upon a parting-stand, the parts being so bound together as to prevent all possibility of jar or disturbance of the mold during the reversing swing, and finally the withdrawal of the pattern along a line normal to the parting face—are the same as in the foregoing construction; but the specific mechanism employed differs in some respects, as will now be described. A^2 represents the filling and ramming stand, (shown to the right in Fig. 5,) resembling the stand A first described, except that its four uprights a^2 are of equal or about equal length. Brackets A^3 from this stand serve herein as the parting-stand, as will presently be explained, and beneath these is another bracket B^4, supporting at its end a guide-socket for the play of the plunger b^5, carrying the parting carriage or table B^5, which is raised and lowered by a lifting-lever $D^\times$, pivoted thereto and fulcrumed on a compensating link $d^\times$, pivoted to the above bracket. This lifting-lever has a hand-controlled dog F, which engages a stop f to hold the lever and parting-carriage in elevated position, as indicated in full lines at the left-hand end of Fig. 5, and this stop is formed upon the upper edge of a plate F′, adjustable vertically along the socket by set-screw f' and slot and clamping-screw f^2, so that the elevation of the parting-carriage may be closely determined. As no parting-board is employed in this construction, the purpose being to form one-part molds, the follower-board or pattern-plate G is hinged directly to the pivot-rod a', connecting the left-hand uprights by means of intervening knee-pieces G′, the lower arms g of which are connected by springs g' with lugs g^2 upon the right-hand uprights. It has also a lever-handle G^2 to serve in the capacity of lifting and rocking lever. The pattern is laid upon or secured to this follower-board, the flask H is set thereon and positioned by means of the dowel-pins h and eyes h', and the sand filled in and rammed as before. Then, after striking off the bottom board E^2 is placed upon the flask and the clamping-lever E′ engaged with it, and the flask, mold, and follower-board, firmly united, are thrown over

upon the parting-carriage and parting-stand, in which movement they are aided by the springs until they reach the vertical, after which they are lowered to the parting-platform against the resistance of these springs, insuring steadiness of motion. Means are provided for altering the tension of the springs, as shown. At the outer ends of the brackets composing the parting-stand are adjustable stops I, with which ears *i* from the follow-board come in contact at the moment the latter reaches the exact horizontal. It will then be supported upon said stops and by pivot-rod *a'* in such position. The parting-carriage will be adjusted to such height that it will simultaneously receive and support the bottom board, flask, and mold therein, so that the pattern will not be jarred in or started from the mold. Now by undogging the lifting-lever and slowly depressing it the parting-carriage is lowered, withdrawing the mold and flask from the patterns and leaving the follow-board and patterns supported on the parting-stand, from which they will be swung over upon the filling-stand to receive a fresh empty flask. A vent is provided, as shown at the bottom of the guide-socket, to allow the air to escape in front of the plunger b^5, and the resistance of this air-cushion contributes toward preventing a jerky movement during the withdrawing of the mold. In this downward movement the parting-carriage carries with it the bottom board and clamping-lever, which latter must therefore be separable from its thimble E, to which it is otherwise secured in the same manner as the first-recited example. The simplest way known to me to accomplish this uncoupling effectively and speedily is by parting the lever adjacent to the jam-nut and uniting the two sections by a bayonet-joint sleeve L, operated by a handle *l*, and requiring but a simple twist to uncouple or couple together the two parts. In this construction also the adjusting-screw through the clamping-lever is not so necessary and has been replaced by a downward bulge *l'* in the lever.

Instead of employing a lifting-lever to operate the parting-carriage in the construction last described the plunger may be turned down between shoulders *m* to receive a stop-pin *m'*, adjustable up and down along the socket by slot and clamping-screw m^2 to limit the rise and fall of the carriage, and the lower end of said plunger may be formed as a piston m^3 with suitable packing to fit closely in the socket. (See Figs. 8 and 9.) The socket may be connected by a pipe N with a source for supplying hydraulic or pneumatic force, so that by turning the cock *n* is one direction or the other actuating fluid may be directed into the socket to elevate and support the carriage or drawn off therefrom at any desired rate through outlet *n'* in order to let said carriage down easily and regularly for the purpose of withdrawing the mold from the pattern and follow-board.

As already stated, the two forms of construction described are substantially identical in principle and mode of operation. The object in each form is to provide mechanical means for expeditiously and safely separating a machine-made sand mold from its pattern without injuring the mold. In the rapid manufacture of sand molds by machinery the processes hitherto used result in numerous injuries to the mold either by jarring the sand in turning the mold or in attempting to start the pattern or by "rapping" the pattern or again by failing to withdraw it steadily and while keeping the pattern parallel to the plane of parting. To diminish these losses, hard ramming down of the sand has been resorted to or a fine closely-packing sand has been used, which will give the more delicate parts of the mold strength sufficient to prevent their being marred; but both these methods result in making mold-walls so hard and impervious to gases that the natural venting is insufficient, again causing defective castings. The present device affords means for inverting the mold after ramming without any danger of the sand being jarred, for placing the inverted mold in a secure position for withdrawing, the separating parts thereof being rigidly held in their respective moving appliances, and, finally, for rectilinearly separating the pattern from the mold by controllable pull operating uniformly at all points of the separating-surfaces. An especially meritorious feature is that the device requires very immaterial additions to be made to machines now in use to fit them for this method of stripping and combines all the parts necessary for rapidly turning out the completed molds in a practically continuous operation performed throughout on one machine.

I do not limit myself to the specific construction herein set forth, considering that my invention is not limited thereto in its nature; but

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

1. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a pattern-support having a horizontal hinged connection between the two stands, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, means for holding the cover and section against the support and for swinging the support from the filling-stand to the parting-stand, reversing the position of the parts, a carriage for withdrawing one of the parting elements from the other in a line perpendicular to the parting-face while the pattern-support is in the latter reversed position, a plunger supporting said carriage, a locking-lever

pivoted to the plunger, and a compensating link on one end of which the lever is fulcrumed while the other end is pivoted to the frame, whereby said carriage may be moved by the lever in a line perpendicular to the parting-face of the mold.

2. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a pattern-support having a horizontal hinged connection between the two stands, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, means for holding the cover and section against the support and for swinging the support from the filling-stand to the parting-stand, reversing the position of parts, a carriage for withdrawing one of the parting elements from the other in a line perpendicular to the parting-face while the pattern-support is in the latter reversed position, a plunger supporting said carriage, a locking-lever pivoted to the plunger, a compensating link to one end of which the lever is fulcrumed while the other end is pivoted to the frame, whereby said carriage may be moved by the lever in a line perpendicular to the parting-face of the mold, and an adjustable stop with which said lever latches to hold the carriage at a variable elevation.

3. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands, a pattern-support movable vertically in said parting-frame, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, a clamping-lever having a common pivoted axis with the parting-frame and serving to clamp the cover (or bottom board) upon the flask-section, and provided with a horizontally-projecting handhold, a locking-lever fulcrumed to a compensating link and pivotally connected with the pattern-support, having a handhold normally parallel with and in proximity to the handhold of the clamping-lever, whereby the finished mold may be clamped against the pattern-support and the two swung bodily with the levers over from the filling to the parting stand, and the pattern-support and pattern thereon then separated from the mold, by means of the locking-lever, in a line perpendicular to the parting-face of said mold.

4. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands, a pattern-support movable vertically in said parting-frame, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, a clamping-lever having a common pivoted axis with the parting-frame, serving to clamp the cover (or bottom board) upon the flask-section, and provided with a horizontally-projecting handhold, a locking-lever fulcrumed to a compensating link and pivotally connected with the pattern-support, having a handhold normally parallel with and in proximity to the handhold of the clamping-lever, whereby the filled flask-section may be clamped against the pattern-support and the two swung bodily over from the filling-stand to the parting-stand, and means whereby the pattern-support and pattern thereon being first separated from the mold by the locking-lever, the parting-frame is next engaged in the continued movement of said lever and thrown over with said pattern-support upon the filling-stand.

5. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands, a pattern-support movable vertically in said parting-frame, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, a locking-lever fulcrumed to a compensating link and pivotally connected with the pattern-support, and a catch for said locking-lever upon the parting-frame, whereby the locking-lever holds up the pattern-support upon the filling-stand and serves to separate it from the mold upon the parting-stand.

6. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands, a pattern-support movable vertically in said parting-frame, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, a locking-lever fulcrumed to a compensating link and pivotally connected with the pattern-support, a catch for said locking-lever upon the parting-frame, whereby the locking-lever holds up the pattern-support upon the filling-stand and serves to separate it from the mold upon the parting-stand, and a stop upon the plunger of the pattern-support whereby, the pattern-support and pattern thereon being first separated from the mold by the locking-lever, the parting-frame is next engaged by the stop in the continued movement of said lever and carried up thereby, away from the mold and over toward and to the filling-stand.

7. The combination, in a machine for making sand-molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands, a pattern-support movable vertically

in said parting-frame, a flask or flask-section adapted to be placed and positioned over said support, a cover for said section, a locking-lever fulcrumed to a compensating link and pivotally connected with the pattern-support, an adjustable catch on the parting-frame for said locking-lever, and means whereby the filled flask-section may be clamped against the pattern-support and the two swung bodily over from the filling to the parting stand and the pattern-support and pattern thereon then separated from the mold by means of the locking-lever.

8. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands and formed with a guide-yoke, a pattern-support having a plunger playing in said guide-yoke, and slides parallel therewith engaging vertical ways in said parting-frame, a flask or flask-section adapted to be placed and positioned over said pattern-support, a cover for said section, a clamping-lever having a common pivotal axis with the parting-frame, serving to clamp the cover (or bottom board) upon the flask-section, and provided with a horizontally-projecting handhold, a locking-lever fulcrumed to a compensating link and pivotally connected with the plunger, and an adjustable catch for the lever-latch, upon the guide-yoke, said lever having a handhold normally parallel with and in proximity to the handhold of the clamping-lever, whereby the filled flask-section may be clamped against the pattern-support and the two swung bodily from the filling to the parting stand, and the pattern-support and pattern thereon then separated from the mold by means of the locking-lever.

9. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands and formed with a guide-yoke, a pattern-support having a plunger playing in said guide-yoke, and slides parallel therewith engaging vertical ways in said parting-frame, a flask or flask-section adapted to be placed and positioned over said pattern-support, a cover for said section, a clamping-lever having a common pivotal axis with the parting-frame, serving to clamp the cover (or bottom board) upon the flask-section, and provided with a horizontally-projecting handhold, a locking-lever fulcrumed to a compensating link and pivotally connected with the plunger, an adjustable catch upon the guide-yoke for the lever-latch, the handhold of the lever being normally parallel with and in proximity to the handhold of the clamping-lever, whereby the filled flask-section may be clamped against the pattern-support and the two swung bodily over from the filling to the parting stand, and the pattern-support and pattern thereon then separated from the mold by means of the locking-lever, and an adjustable collar or stop upon the plunger, whereby the pattern-support and pattern thereon being first separated from the mold by the locking-lever, the parting-frame is next engaged by said collar or stop in continued movement of said lever, away from the mold and toward the filling-stand.

10. The combination, in a machine for making sand molds, of a machine-frame embracing a filling and ramming stand and a parting-stand, a parting-frame having a horizontal hinged connection between the two stands and formed with a guide-yoke, a pattern-support having a plunger playing in said guide-yoke, and slides parallel therewith engaging vertical ways in said parting-frame, adjustable wear-plates facing said ways, a flask or flask-section adapted to be placed and positioned over said pattern-support, a cover for said section, a locking-lever fulcrumed to a compensating link and pivotally connected to the pattern-support, and a catch upon the parting-frame for said locking-lever, whereby the locking-lever holds the pattern-support in place in the parting-stand, and serves to move it in the guide-yoke and ways thereof.

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