(Model.)

4 Sheets—Sheet 1.

A. RICE.

SAND MOLDING MACHINE.

No. 322,202. Patented July 14, 1885.

Fig. 1.

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(Model.) 4 Sheets—Sheet 2.

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FIG. 3.

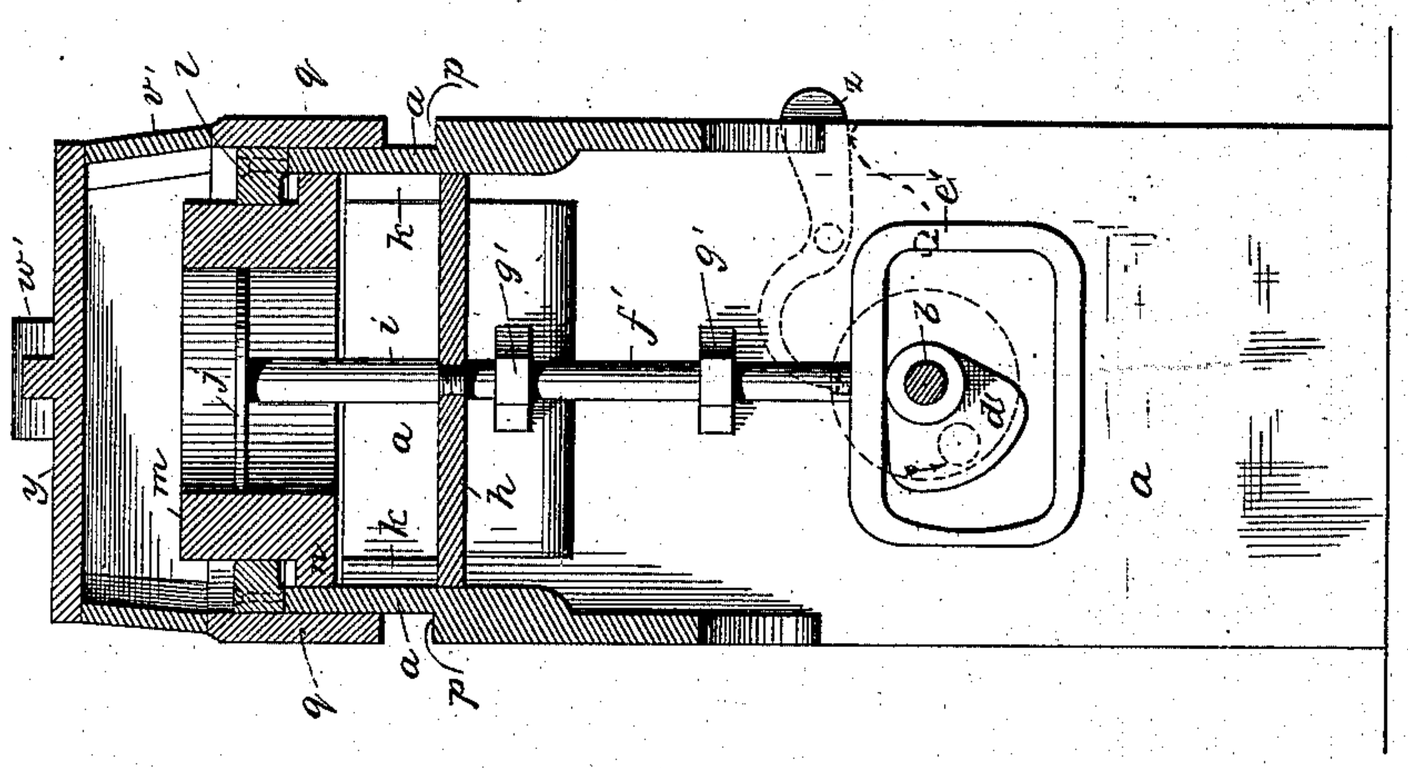

FIG. 2.

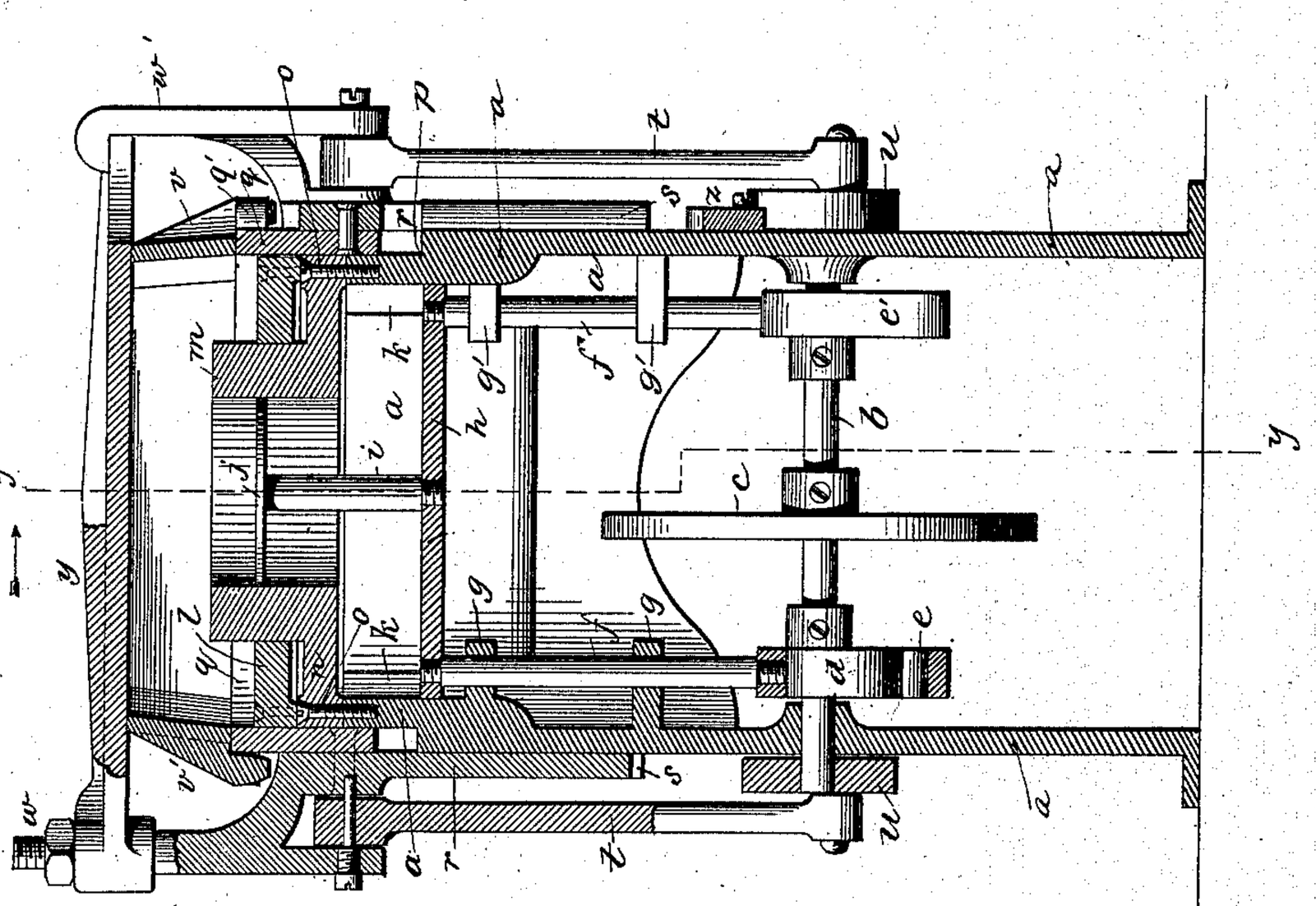

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Fig. 4.

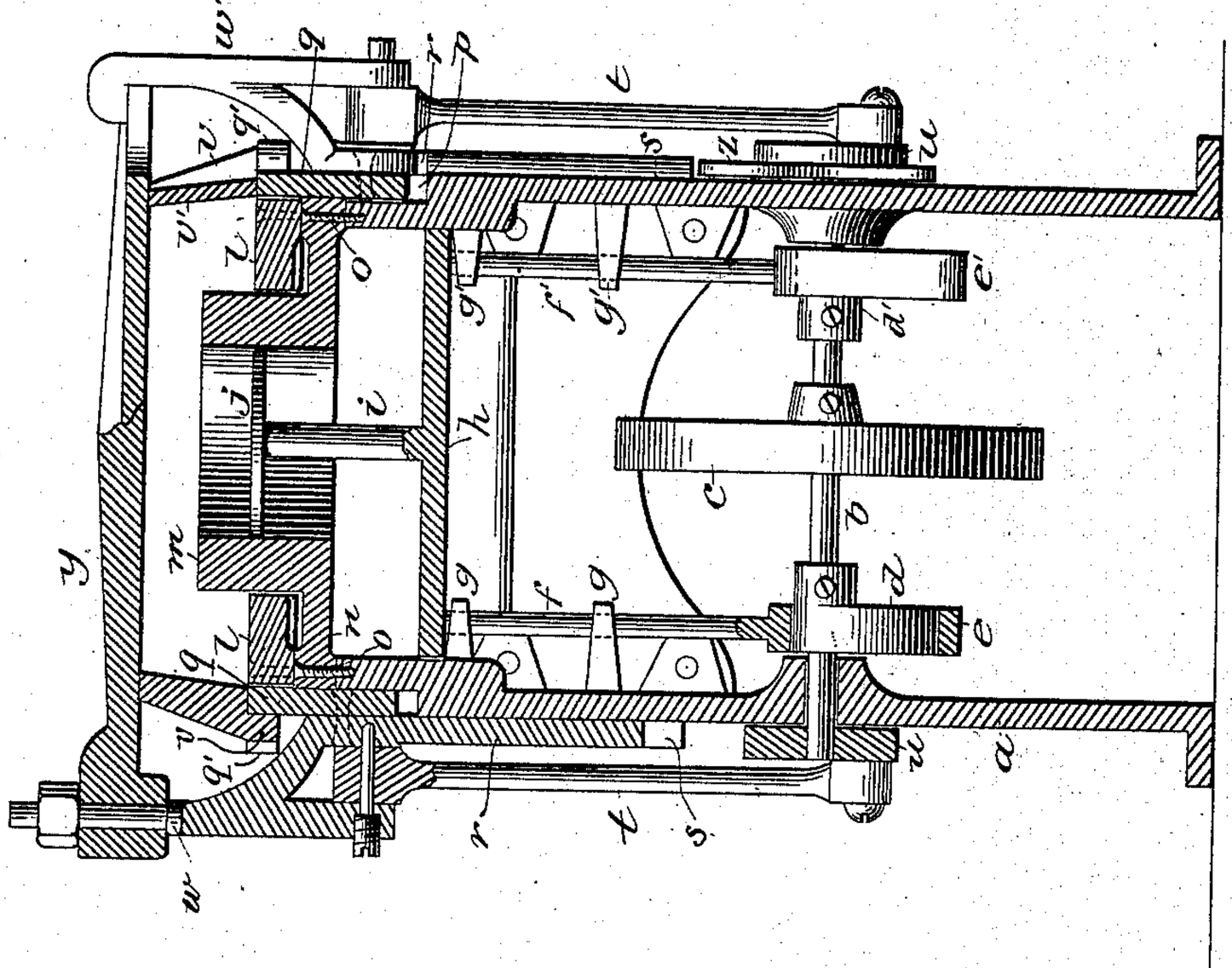
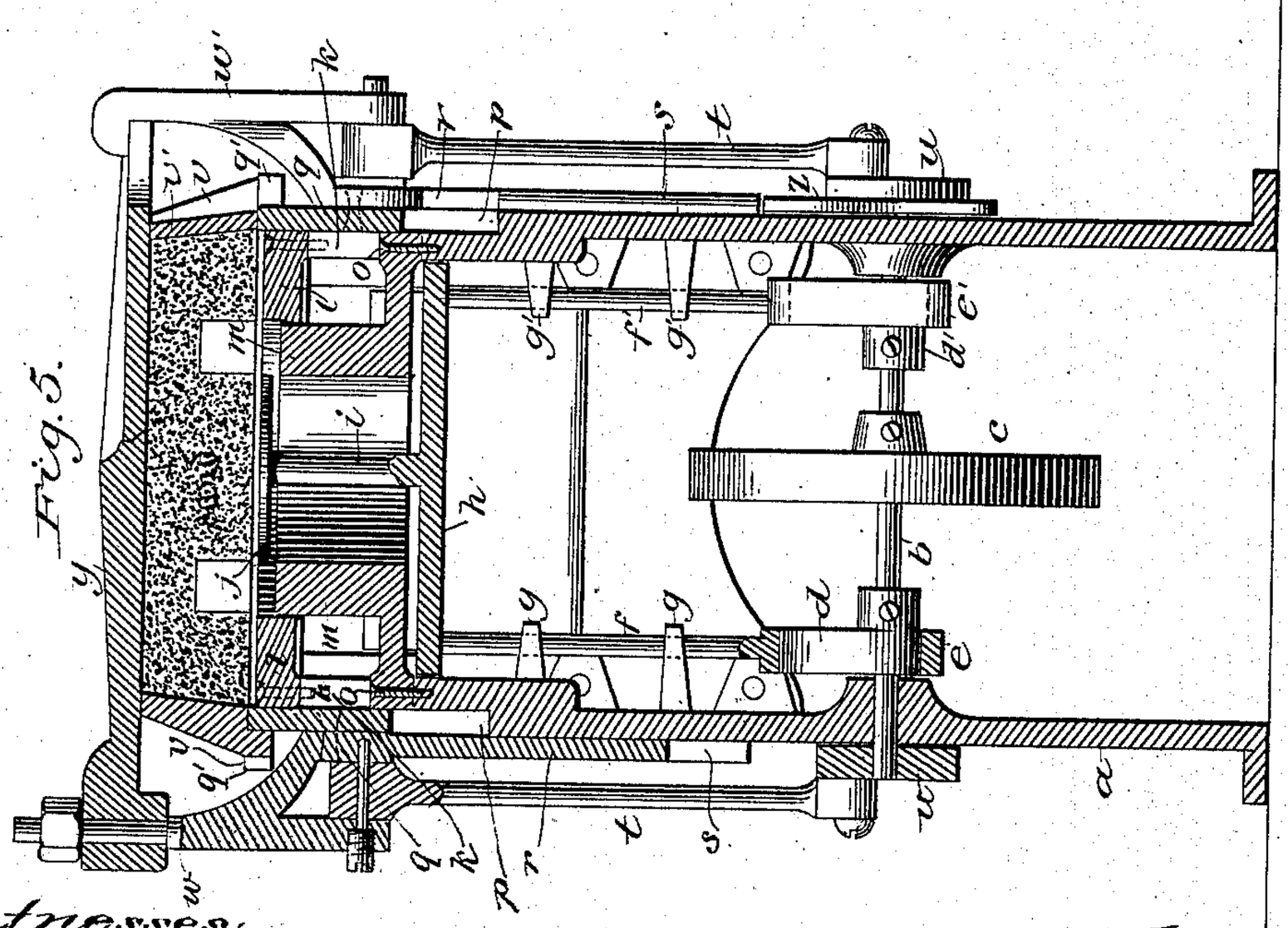


Fig. 5.



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4 Sheets—Sheet 4.

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SAND MOLDING MACHINE.

No. 322,202. Patented July 14, 1885.

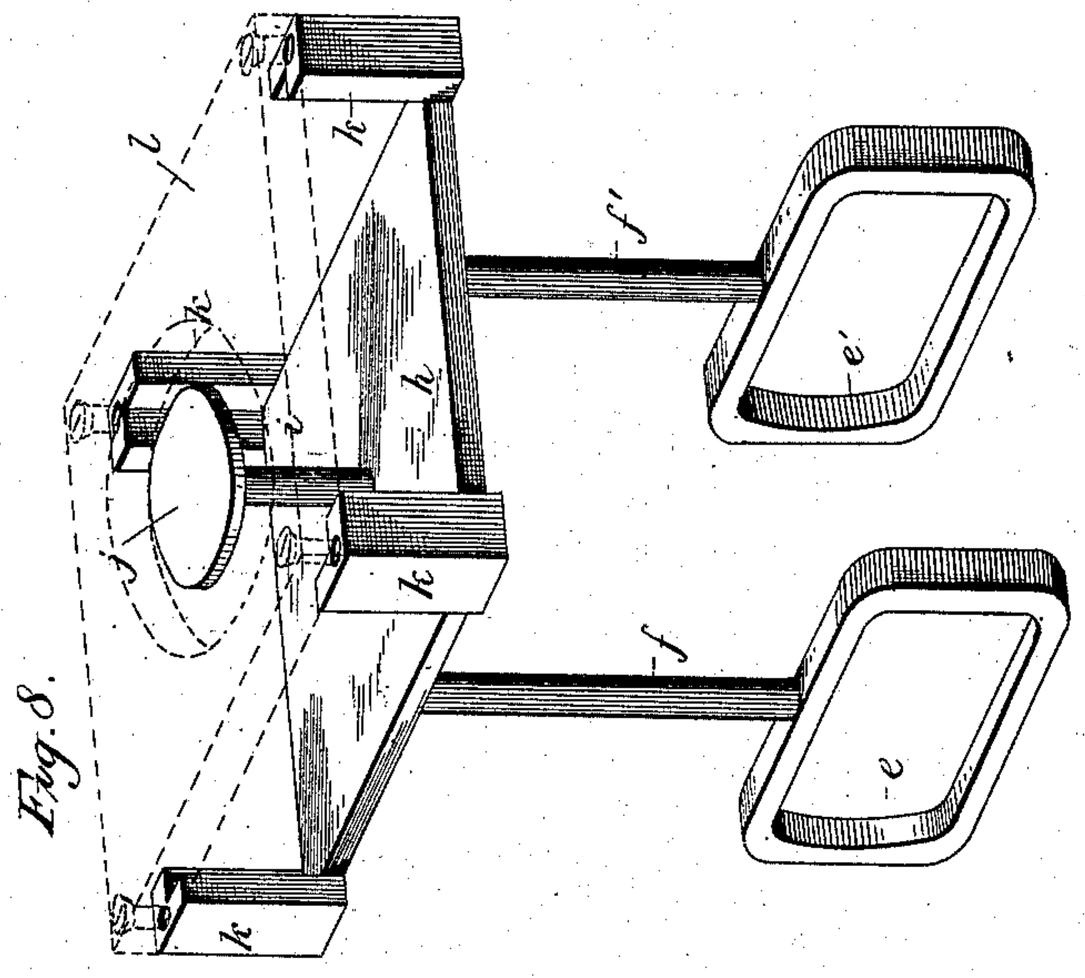

Fig. 8.

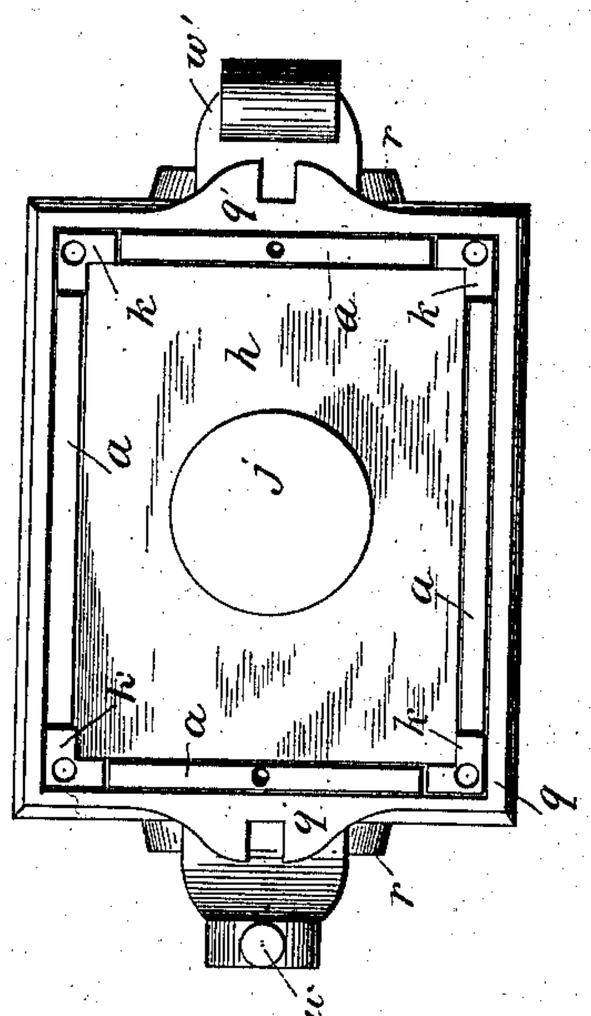

Fig. 6.

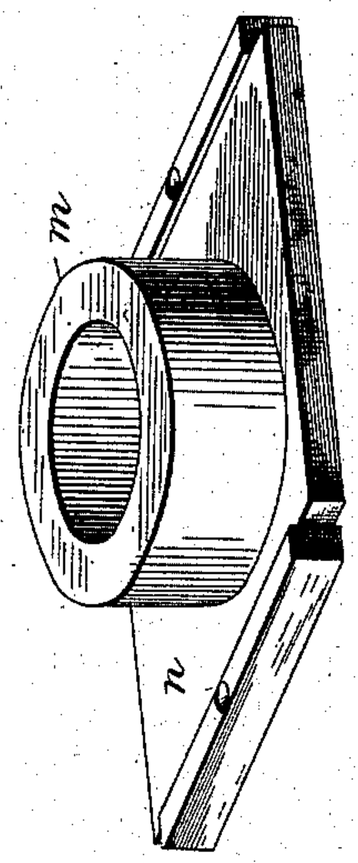

Fig. 7.

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UNITED STATES PATENT OFFICE.

ARTHUR RICE, OF NEW ALBANY, IND., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PEERLESS MANUFACTURING COMPANY, OF LOUISVILLE, KY.

SAND-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 322,202, dated July 14, 1885.

Application filed May 26, 1884. (Model.)

To all whom it may concern:

Be it known that I, ARTHUR RICE, of New Albany, in the county of Floyd, in the State of Indiana, have invented certain new and useful Improvements in Sand-Molding Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings in illustration thereof.

My invention relates to a machine for forming in sand molds for casting iron and other metals. Heretofore in this class of machines the cope of the flask has been put in position and the pattern moved up and pressed into its charge of sand sufficient to leave its impress therein; but in the subsequent withdrawal of the pattern the mold is not always cleanly cleared by it, and thus the impression in the sand is mutilated or defaced. The great power required to operate the machines heretofore used is another objection to them, it being about twelve to fifteen pounds per square inch for the entire surface of the templet and pattern, besides the weight of the pattern, templet, sand, &c. Furthermore, the pattern and templet in such machines being actuated by independent mechanisms under these high pressures, there cannot possibly be an absolute accuracy in the depth of the pattern as compared with the face of the templet, especially after the machine has worn the least bit. In addition to this, the pattern will dodge when forced into the sand.

The object of my invention is to provide against these objections, and to insure uniformity in the depth of the mold according to the pattern, and also uniformity in the weight of the castings made from such mold; and to these ends the invention consists in a sand-molding machine in which the pattern is stationary and rigidly affixed to an immovable member in connection with a moving flask member and moving follower or templet, combined and arranged substantially as hereinafter particularly set forth and claimed.

In the drawings referred to, in the several figures of which like parts are similarly designated, Figure 1 is a perspective view of my machine, parts being broken out to expose others behind them, the parts being in the positions they have when the machine, having completed its upstroke, is returning to position for receiving a fresh flask and just prior to assuming such position, this position being chosen in order to show the parts when separated, so that they may be the better seen. Fig. 2 is a vertical longitudinal section in the plane of line *x x*, Fig. 1, with the parts in position for applying the flask. Fig. 3 is a vertical cross-section on line *y y* of Fig. 2, with the parts in the same position. Fig. 4 is a section similar to Fig. 2, but showing the parts in position at the end of the downstroke when the compression is completed. Fig. 5 is a similar view with the parts in position for unclasping and removing the flask and its finished mold from the machine just after the limit of the upstroke has been reached. Fig. 6 is a plan view of the machine with the binder, flask, upper templet-plate, and pattern removed. Fig. 7 is a perspective view of the pattern and its bed removed, and Fig. 8 is a perspective view of the templet-carrier and its yokes detached, with the templet shown in broken lines in position thereon.

The frame-work *a* is of approved construction to receive a main driving-shaft, *b*, to which power may be applied through the band or other wheel, *c*. The shaft *b* is provided with two cams, *d d'*, of similar construction and position and arrangement on said shaft, and each cam is surrounded by a yoke, *e e'*, in this instance four-sided in outline, and wider than high. From these yokes stems *f f'* extend up through guides *g g g' g'* on the frame-work to a carrier-plate, *h*, arranged up near the top of the frame-work, and free to rise and fall therein under the action of the cams on the yokes and their stems. This plate *h* carries on its upper face a post, *i*, on top of which is affixed a plate, *j*, of the internal shape of the pattern to be molded, and to posts *k* on the four corners of the plate *h* is affixed a plate, *l*, of the external contour of the pattern, and these plates *j* and *l* constitute a compound templet moving in unison under and with the rise and fall of their common carrier-plate *h*. In the present example of my invention I employ a purely conventional pattern, *m*, (an annulus,) which by its bed-plate *n* is stationarily and rigidly affixed to the frame-work *a*—as, for example, by screws *o*. The pattern

may be made with or rigidly affixed to its bed-plate. In this example of pattern the member *j* of the templet is a circular disk movable up and down within the pattern, and of close fit to its interior, and the member *l* has a central opening sufficiently in excess of the perimeter of the pattern to permit freedom of movement of said member *l*. The members of this compound templet will vary in number and shape with the requisites of the pattern for the mold to be produced. The frame-work is rabbeted at its upper end externally at *p* to receive a box or "false part," *q*, which latter is provided with beveled edge shanks *r* on opposite sides of the machine, that work in corresponding guides, *s*, on the frame-work, and said box is moved up and down under the guidance of the rabbeted frame-work and its shanks and guides by means of pitmen *t*, eccentrically secured by wrist-pins to disks *u*, fast on the shaft *b* outside the frame-work. The box *q* is provided with ears *q'*, which receive lugs *v* of the half-flask *v'*, to connect the flask to the machine, and prevent lateral movement; and said box is also provided with a vertical post, *w*, to which is pivoted the binder *y*, said binder being thus adapted to be swung around horizontally over the flask under a hook, *w'*, also rising from one of the shanks of the box to hold said binder in place while the mold is being formed. As is obvious, the movement of the box by the pitmen carries also the flask and binder.

The operation of molding with this machine is as follows: To receive the flask the parts are brought to the position shown in Figs. 2 and 3, templet *l* resting solidly on the immovable pattern-plate, and hence on the frame of the machine, and the top of the box or false part *q* being in practice about one and one-half inch above the surface of the templet *l*, so as to furnish space for the surplus sand for compression. This box or false part *q* is held to its position by latch or hook *z*, engaging in notch *z'* in one of the disks *u*, and then the binder *y* is thrown around out of the way, and an empty half-flask placed upon the upper part of box *q*. Then the half-flask is loosely filled with properly-tempered sand, and the binder secured over the half-flask. The shaft *b* is then rotated in the direction of the arrows, Figs. 1 and 3, and the parts thereby moved to the full limit of the downward stroke, Fig. 4, which draws down the half-flask, binder, box *q*, &c., and brings the top edge of the box *q* level with the surface of templet *l*. The surplus sand is thus compressed between the binder above and the pattern and templet below, all the sand being inside the half-flask, and the mold completed, ready to be removed from the pattern. By further revolution of the shaft the templet *l*, box *q*, half-flask with sand, the binder, &c., are caused to rise simultaneously, the pitmen *t* and stems *f* being timed to work even on the upstroke, thereby stripping the finished mold from the stationary pattern, the templet supporting the sand in the flask while the pattern is being stripped. As the upward movement progresses, the cams *d d'* cause the templet *l* to keep up with the flask until after the pattern is stripped. Then its (the templet's) motion is gradually retarded, (the flask, binder, and box keeping up their motion,) causing it to separate slowly from the sand forming the face of the mold before the upward limit of the stroke is reached. At the completion of the upstroke the parts are in the position indicated in Fig. 5, and then the binder may be released and the half-flask containing the finished mold removed. Further revolution of the shaft causes the templet *l* to drop suddenly to its place on the frame of the machine, and the box *q* and its appurtenances follow more slowly to the position as first described, Figs. 2 and 3, thereby setting the machine for another mold. The up-and-down movement of the flask, box *q*, &c., is in practice, say, two to six inches, (more or less,) only about one and one-half inch of the last part of the downstroke being used in compressing the sand in the flask.

With my machine uniform thickness and weight of the castings are obtained by reason of the fact that the templet, resting solidly on the frame of the machine, forms the flat surfaces of the sand in each half-flask where they come together when the half-flasks are joined, and as the pattern and templet at the time of compressing the sand are virtually one solid piece and immovable, there can be no dodging of the pattern in the sand, and the impression in the sand is just the depth that the pattern extends above the templet, which does not vary, and the castings are necessarily alike.

As compared with other machines, not over half the power is required to operate my machine, as only the pitmen *t* are in operation in pulling down the movable parts, and they are assisted by the weight of such parts, including the sand, instead of having to overcome it.

What I claim is—

1. In a sand-molding machine of substantially the construction set forth, having a moving flask and templet, a stationary pattern, in relation to which the flask and templet are moved to make and clear the mold, substantially as described.

2. In a sand-molding machine having a stationary pattern and a movable flask, a templet resting solidly upon the bed of such pattern during the formation of the mold, and means to move it relatively to the pattern and synchronously with the flask, as set forth, to gradually separate the flask or mold from the pattern, substantially as described.

3. In a sand-molding machine, the combination of the stationary pattern *m*, rigidly attached to its bed-plate, with a templet, both the pattern and the templet being supported upon the frame of the machine during the time the sand is being compressed into the flask and about the pattern, and with the box *q*, flask *v*, and binder *y*, and means for moving box, flask, and binder downward to com-

press the sand, whereby is insured uniformity in the depth of the mold and the weight of the finished castings, substantially as and for the purpose set forth.

4. The combination of the stationary pattern *m* with the box *q*, the half-flask *v'*, and binder *y*, and with a movable templet, *j l*, acting synchronously in an upward direction to support the sand in the finished mold during its separation from the pattern, substantially as and for the purpose set forth.

5. The combination, with the rotary shaft having cams *d d'* and disks *u*, of the pitmen *t*, the yokes *e e'*, and carrier-plate *h*, which impart a simultaneous upward movement to the box *q*, flask *v'*, and binder *y*, and templet *j l*, and cause the templet to move in a downward direction faster than the box, thereby setting the machine ready for another mold, substantially as herein described, and for the purpose set forth.

6. The combination, with the stationary pattern, of a templet acting as a follower, a carrier for the latter, and a shaft and cams thereon, acting positively by connecting yokes to raise and lower said templet, a box supporting the flask, and pitmen actuated from the cam-shaft to raise and lower the box and flask harmoniously with the templet, substantially as set forth.

7. The combination, with the frame-work, of a pattern rigidly secured thereto, a templet acting as a follower with respect to the mold made by the pattern, and supported firmly and solidly by the frame-work while the mold is being formed, a flask and binder therefor, and means to raise the templet and flask to gradually separate the mold from the pattern, permitting the templet to support it during its movement from the pattern, and to cause said templet to suddenly drop at the termination of the upward movement of separation, substantially as set forth.

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