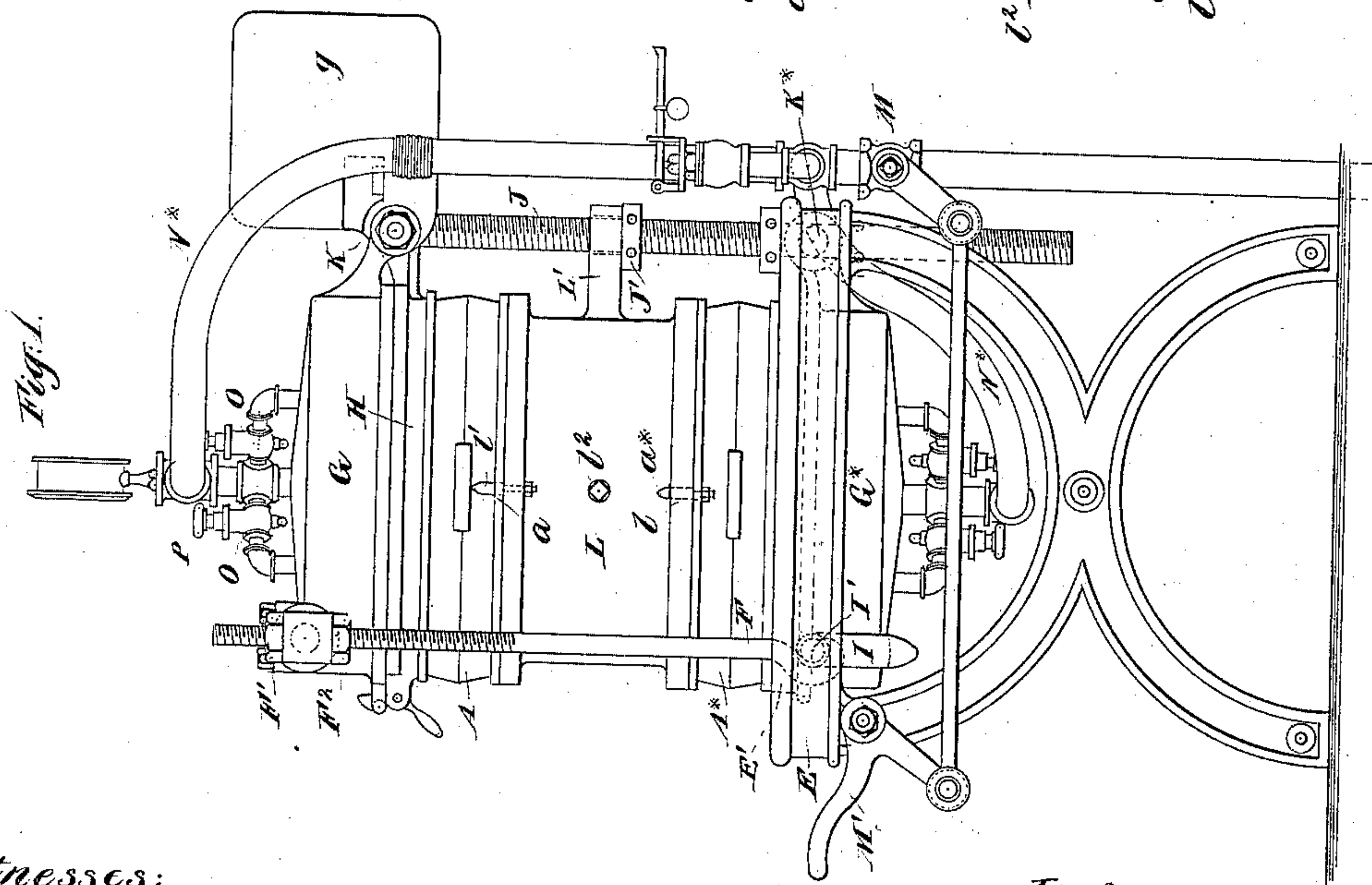
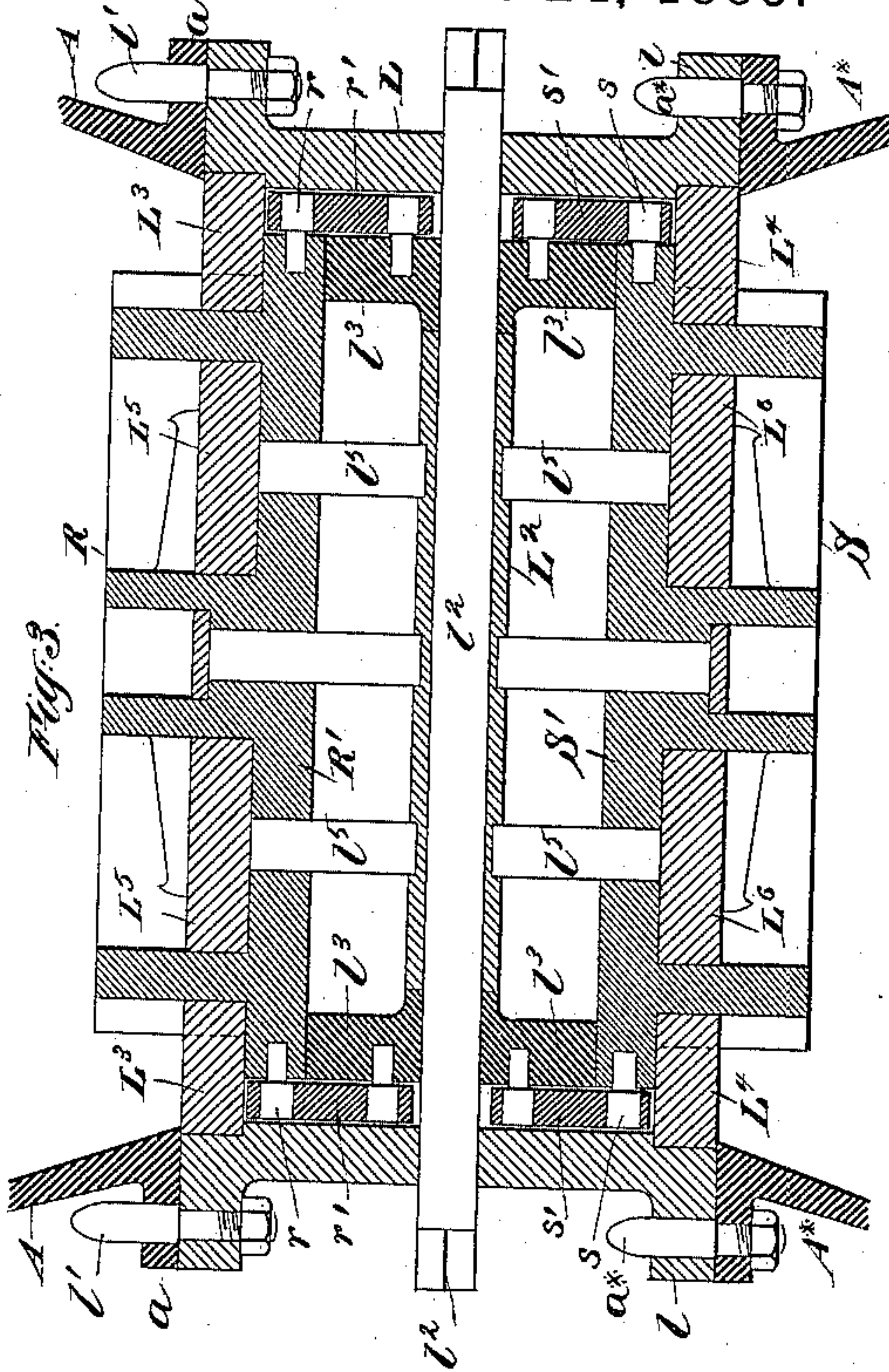
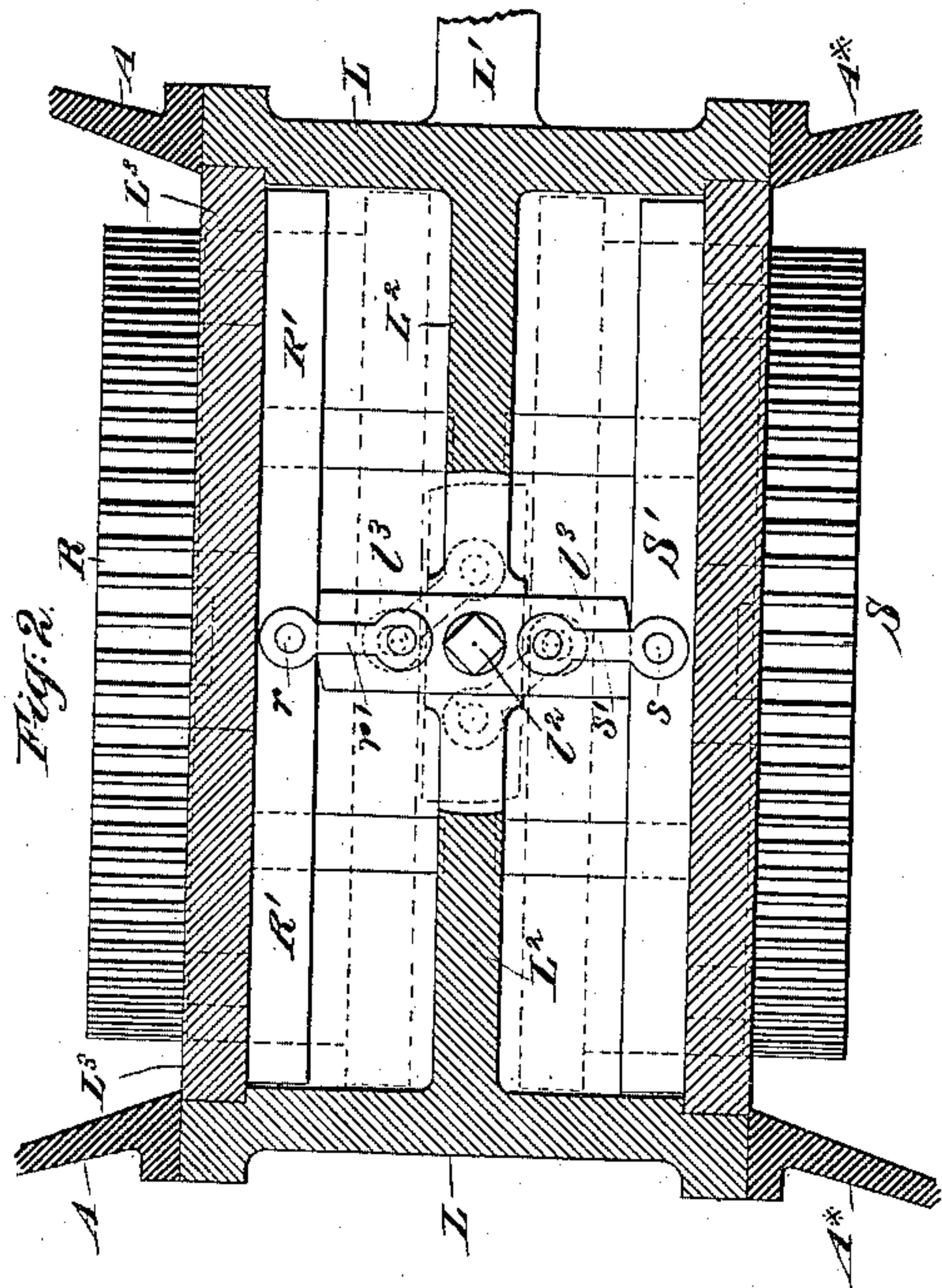


(No Model.)

M. R. MOORE.  
PATTERN BOX FOR SAND MOLDING MACHINES.

No. 331,209.

Patented Nov. 24, 1885.



Witnesses:  
Charles R. Searle,  
L. O. Smith.

Inventor:  
Matthew R. Moore  
by his attorney  
Thomas Drew Peterson



# UNITED STATES PATENT OFFICE.

MATTHEW R. MOORE, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO THE  
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## PATTERN-BOX FOR SAND-MOLDING MACHINES.

SPECIFICATION forming part of Letters Patent No. 331,209, dated November 24, 1885.

Application filed October 7, 1885. Serial No. 179,186. (No model.)

*To all whom it may concern:*

Be it known that I, MATTHEW R. MOORE, a citizen of the United States, and a resident of Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements relating to Patterns for Making Molds for Castings, of which the following is a specification.

Machines have been recently introduced, and are much approved, which serve to rapidly compress the properly mixed and dampened earth, technically denominated "sand," in the rigid frames, technically denominated "flasks," employed in molding iron and other metals. Such a machine, employing a fluid as a means of transmission of the pressure, is set forth in a patent to me dated July 22, 1884, No. 302,349; reissued February 24, 1885, No. 10,562. I have devised an important improvement applicable to nearly all machines of this class. The present machine provides means for applying a greater pressure on those parts of the mold where the pattern is lowest, and where, consequently, the sand to be compressed is deepest, and also for conveniently compressing the sand in two half-flasks—to wit, both the cope and the drag—at the same time. I make the machine duplex, having a quantity of sand in a drag and in an attachment which I will call a "sand-box," below the pattern, and compressing it against the pattern from below by forcing such sand upward, while another quantity of sand in another half-flask—the cope and attached sand-box or top piece above the pattern—is compressed by a pressure from above by forcing such sand downward. I will designate as "air-bags" the several diaphragms and spaces for fluids to act on them. I employ a device which I term a "pattern-box," so connected as to be readily swung into and out of position for work, capable by a single movement of moving the parts of the pattern reciprocally downward and upward into the flasks, and drawing them by a reverse movement after the pressure has been applied for a sufficient time by the other means. The machine is capable of being adjusted to a considerable range of heights of the flasks and of the pattern-boxes. Both on the under side and upper side, instead of em-

ploying one single diaphragm extending over the whole face of the sand, I divide the area into any required number of separate sections. I will describe them as four. I esteem it preferable, although not absolutely essential to some degree of success, that the aggregate pressure on the under face—pressing up from below against the mass of sand in the lower flask—shall be just equal to the aggregate pressure on the diaphragms which act on the sand in the flask on the upper side of the pattern, with a slight excess of pressure on the lower side to compensate for the weight of the material. The adjustment of the pressures in this manner is to relieve the central portions of the apparatus from strain; but if the parts are strong I can operate successfully with considerable differences in the aggregate pressures.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a side elevation, and shows the novel parts, with so much of the ordinary parts as is necessary to show their relations thereto. Fig. 2 is a vertical section of the central removable portion, which I call the "pattern-box," on a larger scale. It is a section in a plane at right angles to that in Fig. 1. Fig. 3 is a central vertical section in a plane at right angles to that in Fig. 2.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

E is a part of the stationary frame-work.

J are screw-posts stiffly supported on the frame-work E, and adjustable up and down to accommodate flasks of different heights.

K is the hinge-bolt on which the upper platen turns.

The main part of the top of the frame E, I will term a "table." In its middle is a hole of the shape and dimensions of the inside of the flask to be used. Surrounding the hole is a flange or combing, E', which projects downward and forms a sand-box of sufficient depth to contain the surplus sand which is to be forced into the drag in the process of molding.

Below the framing E is attached what I term the "lower platen," G\*, lying face upward,



and carrying on its upper side diaphragms and air-bags, with provisions for inflating them upward, which may be similar to the corresponding parts on the under face of the upper platen, G. The latter is provided with a counter-weight, *g*, and with hooks *F*, which are adjustable with nuts *F'* *F''*.

*N\** is a flexible hose bringing air or other fluid under pressure from a capacious chamber, (not shown,) which receives the fluid constantly or at intervals from a pump or other supplying means. (Not represented.)

The provisions for compressing the sand in the several parts of each flask are the same on the lower platen as on the upper, but in reversed positions.

The valve *M* is a two-way valve. Turning it in one position allows the air to be admitted from the hose *N\** through the several regulating devices *O P*, and act on the several diaphragms connected with each platen. The lower platen, *G\**, is hinged to the framing *Eat* *K\** on the back side, (the right-hand side in Fig. 1,) while at the front it is supported by the yoke *I*, which is attached to the framing by trunnions *I'*. When the mold is to be pressed, the hooks *F* are extended through slots in the table, and grasp the trunnions *I'* of the yoke *I* between their bearings and the body of the yoke. Thus the strain of pressing is taken off the frame and confined to the platens and their attachments, which are made strong enough to withstand it.

On the right-hand back screw, adjustably supported by a nut, *J'*, is a flanged collar, *L'*, to which the pattern-box *L* is bolted. This allows the patterns to be either placed in the flask or swung back out of the way at will, and holds them always within convenient reach of the workman operating the machine.

The parts thus far described are made subject-matter of a separate application. The pattern-box has the same horizontal dimensions as the flask with which it is to be used, and such depth as may be required by the class of work to be done. At the bottom edges of the pattern-box are lugs *l*, perforated to fit the steady-pins *a\** of the drag, and at the top are corresponding steady-pins, *l'*, to fit the lugs *a* of the cope. The pattern-box is open both at top and bottom, except as explained below, but contains a horizontal septum or partition, *L<sup>2</sup>*, through its middle, dividing it into two equal parts. In the plane of this partition lies a shaft, *l<sup>2</sup>*, having double-ended cranks or tumblers *l<sup>3</sup>*. These tumblers work through holes provided for that purpose in the septum *L<sup>2</sup>*. The ends of the shafts project through the sides of the box, and are squared to receive a handle or wrench, whereby the shaft may be partially turned. The patterns are divided along the line where the parting of the mold will come, and the parts *R* and *S* are fastened upon two pattern-plates, *R'* and *S'*, which are of such size as to fit easily within the pattern-box. In the edges of each pattern-plate, opposite the ends of the tumbler-shaft, are

slots containing wrist-pins *r s*, whereby the pattern-plates are connected to the tumblers *l<sup>3</sup>* by means of the links *r' s'*. When in position shown in full lines in Fig. 2, the tumblers or cams *l<sup>3</sup>* form distance-pieces between the two pattern-plates, holding them firmly apart in opposition to the pressure brought against the patterns in pressing the mold. Two silhouette-plates, *L<sup>3</sup> L<sup>4</sup>*, fitting rabbets in the upper and lower edges, form the top and bottom of the pattern-box, to which they are fastened, and through them the parts of the pattern *R S* project. These important parts are fully described in a patent to me dated May 26, 1885, No. 318,783. Each is a plain plate with an aperture or apertures matching closely to the shape of the pattern or patterns to be moved smoothly and strongly through it. When the shaft *l<sup>2</sup>* is turned a quarter-revolution, the tumblers, links, and plates assume the relation shown by dotted lines in Fig. 2, thus withdrawing the patterns. Parts *L<sup>5</sup> L<sup>6</sup>* of the silhouette, which lie within the pattern, and are cut off from the silhouette by the pattern, or which for any reason require to be supported when the pattern is withdrawn, are held up by "stools" or stems *l<sup>5</sup>*, connecting them with the septum *L<sup>2</sup>* through holes in the pattern-plates. The arm or web of the gear shown, and also the core which forms the hub, are supported by stools *l<sup>5</sup>*. It will be readily seen how the patterns are projected and withdrawn by oscillating the shaft.

Instead of making the silhouettes always plane, they can be variously curved or dished, taking care that they properly match together. Parts of the pattern may in molding some forms be mounted on the silhouettes, which thus to a limited extent serve as match-plates, while other parts of the pattern are carried on the pattern-plate. The construction in this respect may be similar to that fully shown in my patent of May 26, 1885, referred to.

The mode of operating the machine is as follows: The lower platen, *G\**, being in the position shown, and the upper one, *G*, with sand-box attached, thrown up to a vertical position, and the pattern-box swung aside, the half-flask, serving as the drag, is placed on the table squarely over the lower sand-box, and it and the lower sand-box, formed by the lip *E'*, are filled with screened molding-sand let down from a hopper (not shown) suspended over the machine or supplied in any other convenient way. The pattern-box *L* is then swung around, lifted a little, and gently dropped over the steady-pins of the flask. Then the half-flask *A* for the cope is placed upon it, the upper sand-box, *H*, unlatched and brought down upon it. Next the flask and upper sand-box are evenly filled with screened sand from the same source as before or from any other source. The platen *G* is then brought down upon the flask, and the hooks *F* are engaged firmly with the yoke *I*. Then, after giving a quarter-revolution to the shaft *l<sup>2</sup>* to depress the lower pattern, *S*, through its silhouette-plate *L<sup>4</sup>* to the proper



extent toward or into the sand of the lower part or drag, A\*, and to raise the upper pattern, R, to the proper extent through its silhouette-plate into the sand of the upper part or cope, A, a touch on the lever M' throws on the air-pressure and instantly rams both parts of the mold, the air-bags D expanding upward from the lower platen, G\*, and compressing the sand in the drag A\* at the same time as the air-bags (similarly lettered D) expand downward from the upper platen, G, and compress the sand in the cope A. After the sand in a flask has been thus compressed, which may be effected in a few seconds, the valve M is turned into the position to release the pressure, allowing the air to escape from all the air-bags. The hooks F are then detached, the platen G raised, and the cope removed. A piece of fine steel wire having convenient handles attached is then drawn between the upper sand-box, H, and the cope A, and also between the table and the drag A\*, thus cutting off evenly the sand not pressed into the mold. The upper platen, G, is then lifted by turning on the axis K, taking the upper sand-box, H, with it. The patterns are now withdrawn, as before described, by turning the shaft  $\ell^2$  a quarter-revolution in the reverse direction, the cope is lifted off, the pattern-box lifted slightly to clear the pins, and swung around out of the way. The completed cope and drag are taken off, either together or separately, and properly placed together on the casting-floor. If there are cores to be set, the parts of the flask will of course be carried away separately. If snap-flasks are used, they are opened, leaving the mold, and brought back to the machine. Three or more snap-flasks will be required to keep one machine running. A mold can usually be made while one is being carried away.

Pattern-plates and silhouettes for many different patterns may be fitted to and used with the same pattern-box.

Modifications may be made in the forms and

proportions within wide limits. The number of separate sections or diaphragms  $G' G^2$ , &c., may be increased indefinitely.

I can in some cases use with advantage two or more tumbler-shafts,  $\ell^2$ , with corresponding connections to the pattern. When more than one tumbler-shaft is used, they should be geared together, so as to be operated by one hand.

The framing E, with its two platens and sectional diaphragms, is made the subject of a separate application for patent.

The general means for operating the pressure and the flasks, illustrated and described in this application, are made subject-matter for a separate application, Serial No. 172,512, filed July 24, 1885, and such construction is herein disclaimed.

I claim as my invention—

1. In an apparatus for making molds for castings, a flask, A, a pattern-box, L, mounted with liberty to turn on a center, J, silhouette-plate  $L^3$ , sections  $L^5$ , and stools  $\ell^3$ , combined and arranged to serve relatively to each other and to one or more patterns, and means for operating the same through the silhouette-plate, substantially as herein specified.

2. In an apparatus for making molds for castings, the pattern-box L, silhouette-plate  $L^3$ , and pattern R, in combination with links  $r'$ , and with the shaft  $\ell^2$ , having projections  $\ell^3$ , arranged to serve both as cams to support the pattern and as levers to operate the links, all substantially as herein specified.

3. In a machine for making molds for castings, the pattern-box described, having the two silhouette-plates  $L^3 L^4$ , the septum  $L^2$ , and two movable patterns or sets of patterns, R S, in combination with each other and with the shaft  $\ell^2$ , tumblers  $\ell^3$ , pins  $r^3$ , and links  $r' s'$ , for forcing them outward and withdrawing them, as herein specified.

MATTHEW R. MOORE.

Witnesses:

THOMAS DREW STETSON,  
CHARLES R. SEARLE.