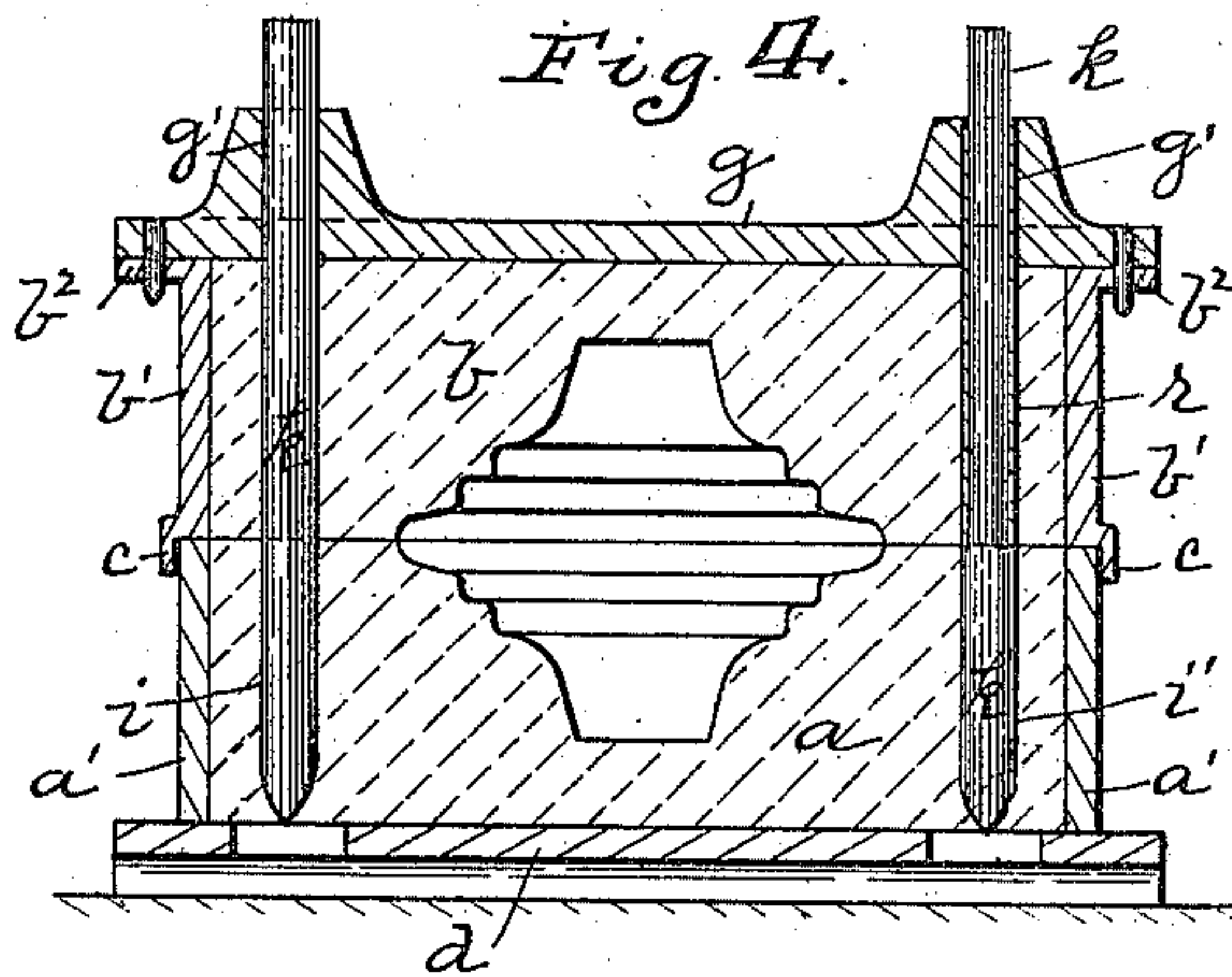
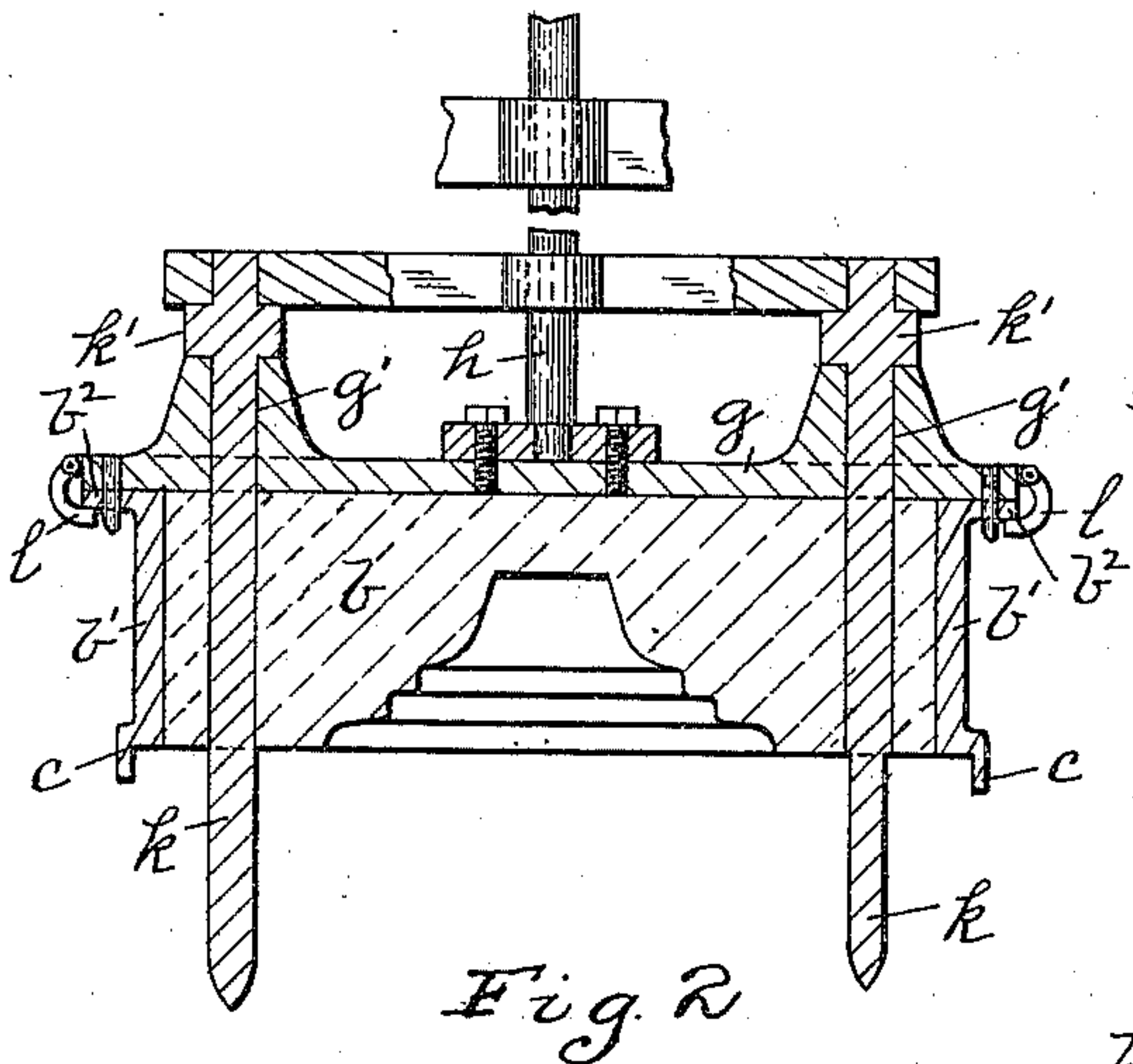
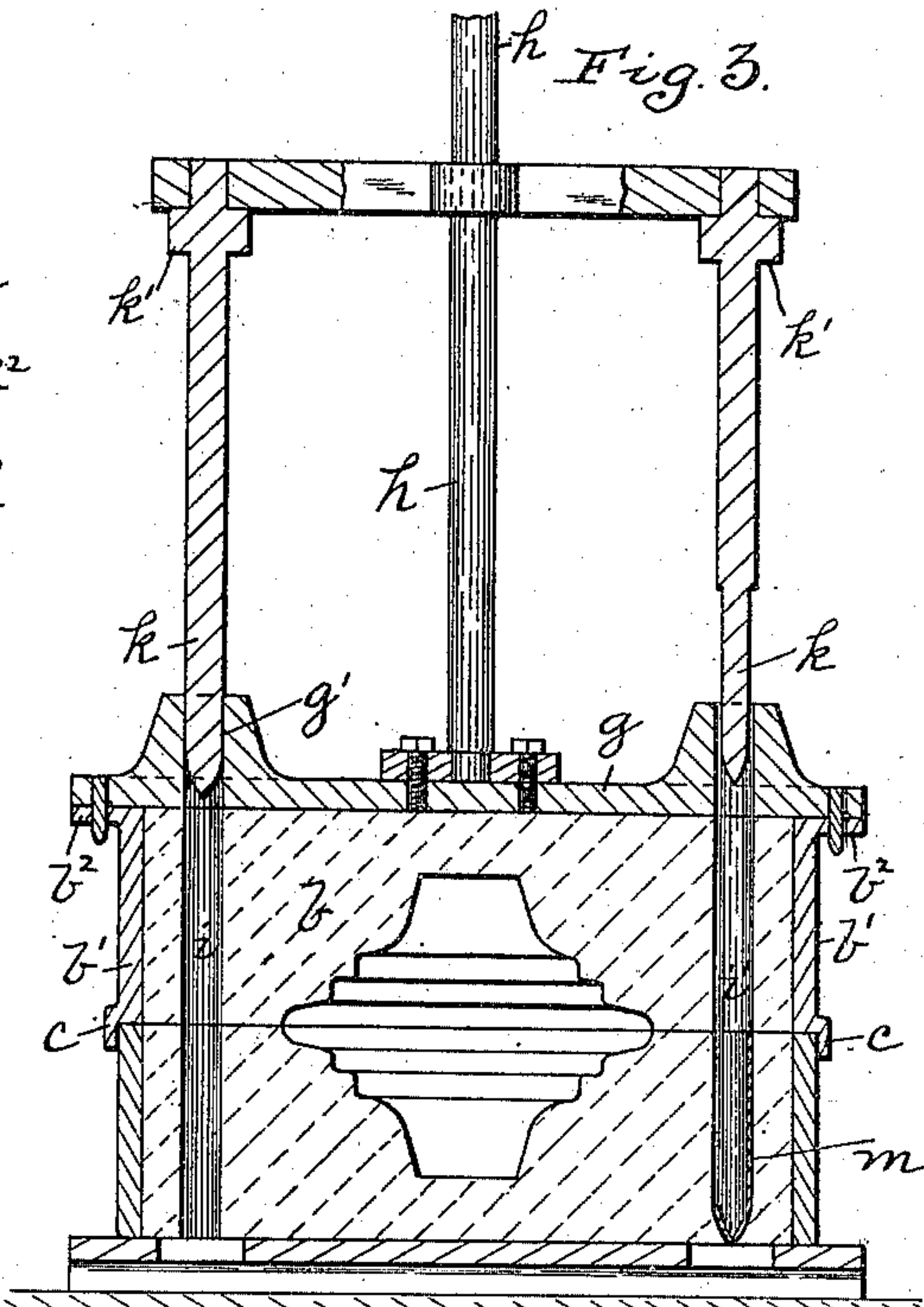
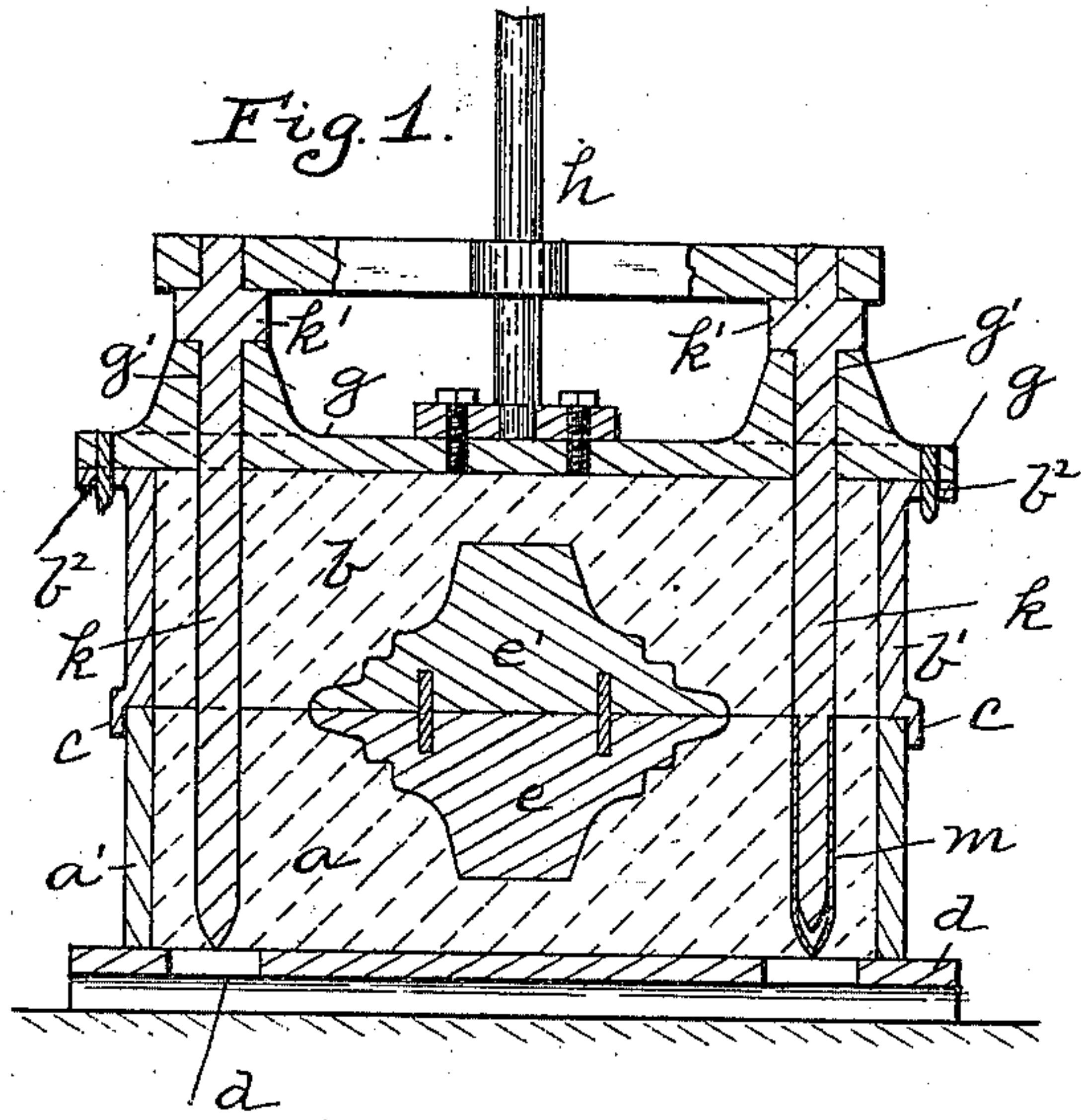


(No Model.)

S. J. ADAMS.  
APPARATUS FOR FORMING SAND MOLDS.

No. 598,492.

Patented Feb. 8, 1898.



Witnesses:  
D. L. Dorsey.  
D. F. Patterson

Inventor:  
Stephen Jarvis Adams.  
By Kay, Totten & Cooke,  
Attorneys.



# UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

## APPARATUS FOR FORMING SAND MOLDS.

SPECIFICATION forming part of Letters Patent No. 598,492, dated February 8, 1898.

Application filed February 15, 1893. Serial No. 462,366. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN JARVIS ADAMS, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Forming Sand Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the formation of sand molds, and especially to the guiding of two or more parts of sand molds to place, so that the pattern may be removed and the two or more parts of the mold brought into exact coincidence.

Though my invention will be described in connection with two-part molds, it is to be understood that it may be employed with two or more part molds, as found desirable. It is a well-known fact that in the making of such molds difficulty is experienced in bringing together the different parts of the molds so that they will coincide exactly, this difficulty arising particularly from the fact of wearing from the guide-pins and seats on the flasks and loosening and breaking of these fittings thereon, as the flasks are roughly handled, being piled up within the foundry and very liable to topple over, while the pins extending out beyond the body of the flask are liable to strike against the adjoining flasks, thus leading to the loosening of the pins which effect the proper guiding of the two parts of the mold together, as, even if the two parts are properly molded, in the opening of the mold to withdraw the pattern there is liability that the parts will not be brought together properly in closing the mold. In addition to this, the wood of which these flasks are generally made shrinks and swells from the wet sand contained therein, which causes the flask to get out of shape and disarranges the guide parts attached thereto. All these difficulties lead to the imperfect matching of the two or more parts of the mold, so that the mold-cavities are not brought into proper line with each other and imperfections and irregularities in the shape of the casting are caused thereby, which often leads to the loss of a large amount of the castings formed. This work is necessarily done rapidly, and the workmen are somewhat careless about the work, and even when careful the loosening of the fittings and

like causes lead to the formation of many irregular and imperfect castings.

The present invention relates more particularly to that class of molds in which no pattern-plate is employed, though the invention may be employed with molds having pattern-plates by having suitable openings formed in the plates, as hereinafter described. The ordinary method of forming such molds without the use of pattern-plates is generally as follows: The pattern is placed in a suitable match-block, or by other suitable means brought into the desired position with relation to the flask. The drag portion is first molded. It is turned and the cope portion molded, the parts being held in line by the guide-pins of the flask and suitable parting-sand being employed between the two mold parts and it being evident that the matching of the mold parts depends upon the guiding devices on the flask.

The object of the present invention is to form guide openings or holes in the mold parts after the formation of such mold parts, and by which the two parts may be guided to place independent of any guiding devices on the flask.

To these ends my invention consists in combining with a two-part mold a guide-pin plate held in proper line with the mold and guide-pins adapted to pass through one mold part and into the other mold part and adapted to be forced through the guide-pin plate into the mold parts, so as to form guiding means for opening the mold to withdraw the pattern and bring the two parts of the mold together again.

It also consists in certain other improvements, as hereinafter described.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a sectional view of a mold which has been formed and into which the guiding patterns or pins have been forced. Fig. 2 is a view of a like mold which has been separated to permit of the withdrawal of the pattern and from which the pattern has been withdrawn, showing the parts in position for the closing of the mold. Fig. 3 shows the mold closed and illustrates the withdrawal



of the guiding-pins therefrom. Fig. 4 is a sectional view illustrating another form of mold.

Like letters of reference indicate like parts in each of the figures.

My preferred apparatus is illustrated in Figs. 1, 2, and 3, and I will describe the same particularly, referring afterward to the other figure in the drawings. In said drawings, *a* represents the drag and *a'* the drag-flask, and *b* the cope and *b'* the cope-flask, which are of the usual construction and may be held in approximate line with each other by any suitable guiding means, such as lips or dowel-pins *c*. The cope-flask *b'* is also preferably provided with suitable guide-seats *b<sup>2</sup>*, for the purpose hereinafter described. The pattern shown is either a pattern to enter within a suitable match-block, on which the drag-flask rests and around which the sand is compacted, or is a partible pattern, one-half of which is placed upon a suitable board or pattern-support and the drag-flask placed over the same, and the sand is compacted, after which the bottom board *d* is placed upon the drag-flask, the flask turned over, the cope-flask *b'* placed upon the drag-flask, and the other part of the pattern, such as the part *e'*, placed upon the part *e*, being guided to place by suitable pins, or, if a single pattern is employed, as first referred to, the part of the pattern which has been fitting within the match-block extending up within the cope-flask *b'*. The sand is then compacted within the cope, the mold being thus completed, except for the withdrawal of the pattern. Upon the mold so formed I then place the guide-pin plate *g*, which is preferably brought to approximate line with the flask by pins entering the seats *b<sup>2</sup>* of the cope-flask and which plate is preferably attached to a vertically-reciprocating bar *h*, which is lowered upon the flask, the guide-forming apparatus being supported above the flask when the mold is being formed and being operated either by hand or by suitable power. This plate *g* has suitable guiding-sockets *g'* thereon, and while it rests upon the flask the guide pins or patterns *k* are forced through the sand of both the cope and drag, so as to form the guiding-holes *i i'*. This may be done by hand, or it may be done by suitable power devices, as found most desirable. It is also preferred to employ heads or shoulders *k'* upon the guide pins or patterns to limit their entrance into the mold and also to provide a catch or other suitable device to lock the same in place. When hand mechanism is employed, it is evident that the pins may be formed without such heads, and after the withdrawal of the pattern the pins be forced through openings in the bottom board, as described in application of even date herewith, Serial No. 462,365. When power mechanism is employed, these two pins may be connected in a suitable frame and forced down together. In the latter case I prefer to provide the plate *g* with catches *l*, adapted to

extend under the lips *b<sup>2</sup>* and so connect the plate *g* to the cope-flask, and as soon as the guide-pins are forced to place to lift the cope with the plate *g*, so withdrawing the cope from the drag, or the drag may be withdrawn from the cope on a lowering-machine. The pattern *e* is then withdrawn and the two parts of the mold closed together, the guide-pins entering the guide-holes *i* as the cope is lowered upon the drag. Where the guide-pins are operated by hand, they may then be withdrawn through the plate *g*, or, when operated by machinery, may be lifted with the plate *g*, the catches *l* between the plate and cope-flask being withdrawn.

With the guide-pin patterns above described suitable sleeves may also be employed—such, for example, as the sleeves *m*—which may fit over the lower ends of the guide-pins *k* and be forced with them through the cope and into the drag, and will act as sleeve-linings for the guide-holes *i* in the drag and insure the rigid guide for the guide-pins in case the sand is not sufficiently compacted.

Where the apparatus is operated by hand, after the plate *g* has been placed upon the mold, as shown in Fig. 4, the guide-pins are forced through the same and the cope is lifted off, being guided in its movement by the guide-pins, the pattern is withdrawn, and the cope replaced. When the apparatus is employed in this way, sleeves may be placed on the upper, lower, or both parts of the guide-pins, as found most desirable, the sleeve being shown on the upper part of the pin in Fig. 4, the sleeve *r* fitting around the upper part of the pin and resting upon the shoulder on the pin and being forced to place with the pin, and in such case the pin remains within the drag, and as the cope is raised from the drag the sleeve *r* slides over the pin, and after the removal of the pattern the cope is brought into approximate line with the drag, the pins entering the sleeve-linings *r* and the cope being lowered to place. The pins can then be withdrawn upwardly, as above described, or they with their sleeves may be forced through an opening in the bottom board, as described in said application, Serial No. 462,365. In Fig. 2 the sleeve is shown on the lower part of the pin, and the pins are withdrawn with the cope.

I thus provide simple and efficient means for guiding the two parts of the mold together, the guides being formed in the sand as each mold is formed, and means for so guiding the mold parts to place being provided, even though no pattern-plate is employed. It is to be understood, however, that, if desired, a pattern-plate may be employed, the pattern-plate having holes therein to permit the passage of the guide-pins. The parts can thus be accurately matched and liability of the formation of imperfect castings on account of the breaking, warping, wearing, loosening, &c., of the guiding mechanism on the flask be overcome.



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

1. In sand-molding apparatus, the combination of a two-part mold and guide-pins of sufficient length to pass through one mold part and into the other mold part, and pushing mechanism for forcing said guide-pins into the mold parts after the formation of the mold, substantially as set forth.
2. In sand-molding apparatus, the combination of a two-part mold, a guide-pin plate held in proper line with the mold parts, and guide-pins of sufficient length to pass through one mold part and into the other mold part and adapted to be forced downwardly through the plate into the mold parts, substantially as set forth.
3. In sand-molding apparatus, the combination of a two-part mold, a guide-pin plate resting on the top of the flask containing the mold, guide-pins of sufficient length to pass through one mold part and into the other mold part, and adapted to be forced downwardly through the plate into the mold parts, substantially as set forth.
4. In sand-molding apparatus, the combination of a two-part mold, a guide-pin plate adapted to be placed in line with the mold and guide-pins adapted to be forced through such plate into the mold parts, and having shoulders thereon to limit their movement, substantially as set forth.
5. In sand-molding apparatus, the combination of a two-part mold, and guide-pins connected to a bar and adapted to be forced together through the mold, substantially as and for the purposes set forth.

6. In sand-molding apparatus, the combination of a two-part mold, a guide-pin plate, carried by a vertically-moving bar, adapted to be placed in line with the mold, and guide-pins adapted to be forced through said plate into the mold, substantially as set forth.

7. In sand-molding apparatus, the combination of a cope and drag, and guide-pins entering the mold parts from above, and carrying means adapted to raise the cope and guide-pins and subsequently to guide the parts together by entering guide-holes formed in the drag, substantially as set forth.

8. In sand-molding apparatus, the combination of a two-part mold, guide-pins of sufficient length to pass through one mold part and into the other mold part and means for forcing the same into the mold parts, and sleeves carried by the guide-pins and adapted to be forced therewith into the mold and form linings for the guide-holes in one of the guide parts, substantially as set forth.

9. In sand-molding apparatus, the combination of a two-part mold, a guide-pin plate, carried by a vertically-moving bar, adapted to be placed in line with the mold, guide-pins adapted to be forced through said plate into the mold, and catches to connect said plate and the cope of the mold, substantially as set forth.

In testimony whereof I, the said STEPHEN JARVIS ADAMS, have hereunto set my hand.

STEPHEN JARVIS ADAMS.

Witnesses:

JAMES I. KAY,  
J. N. COOKE.