

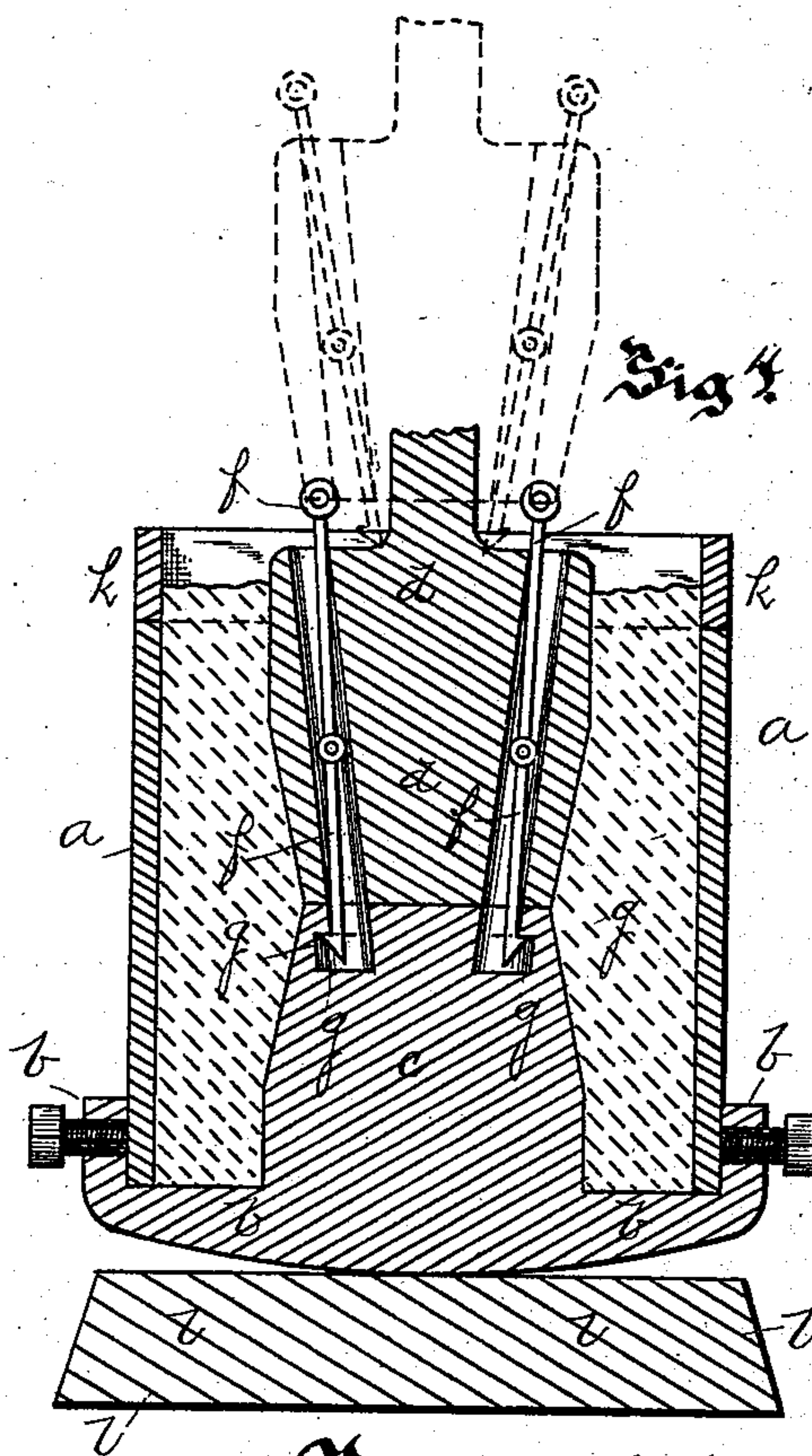
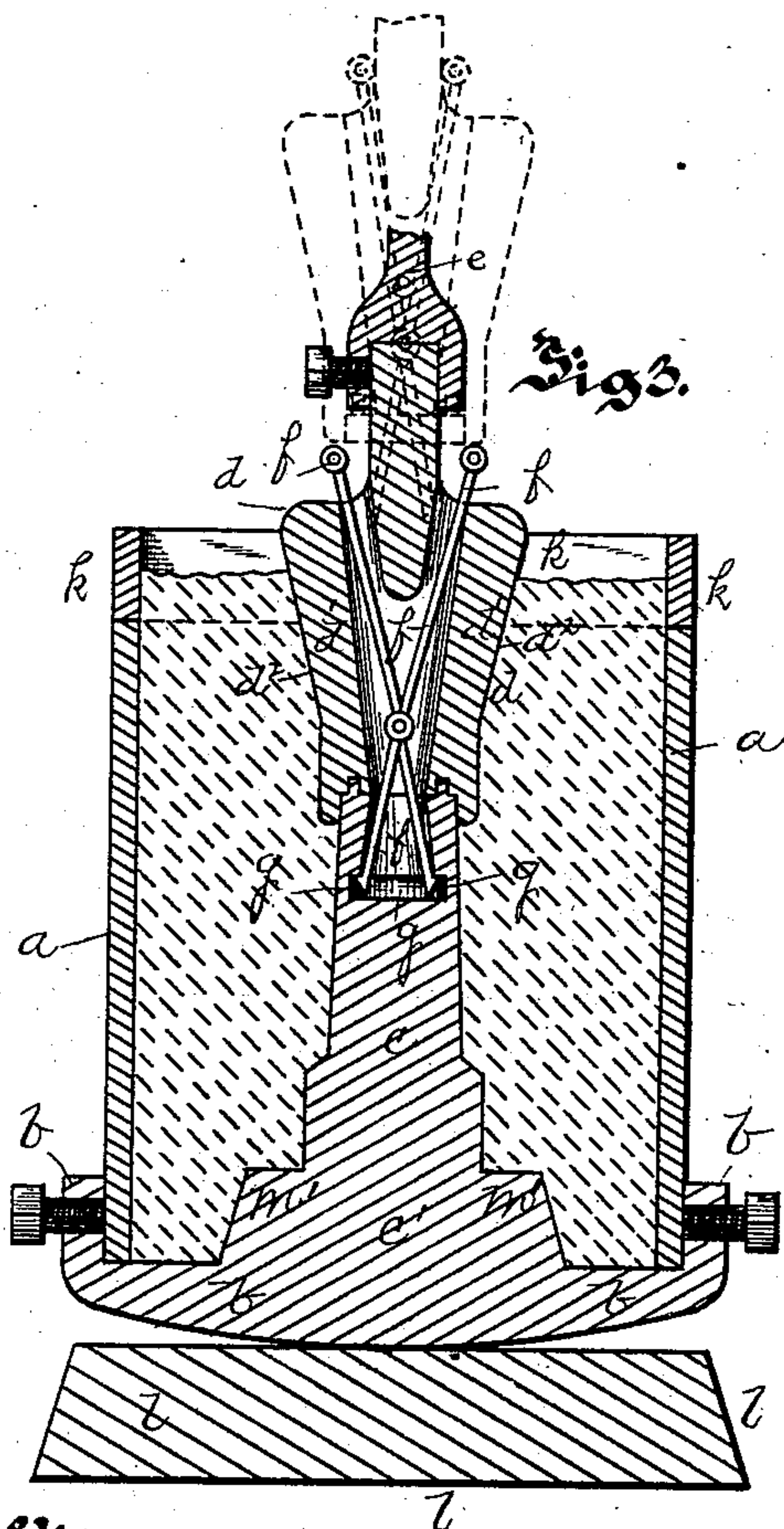
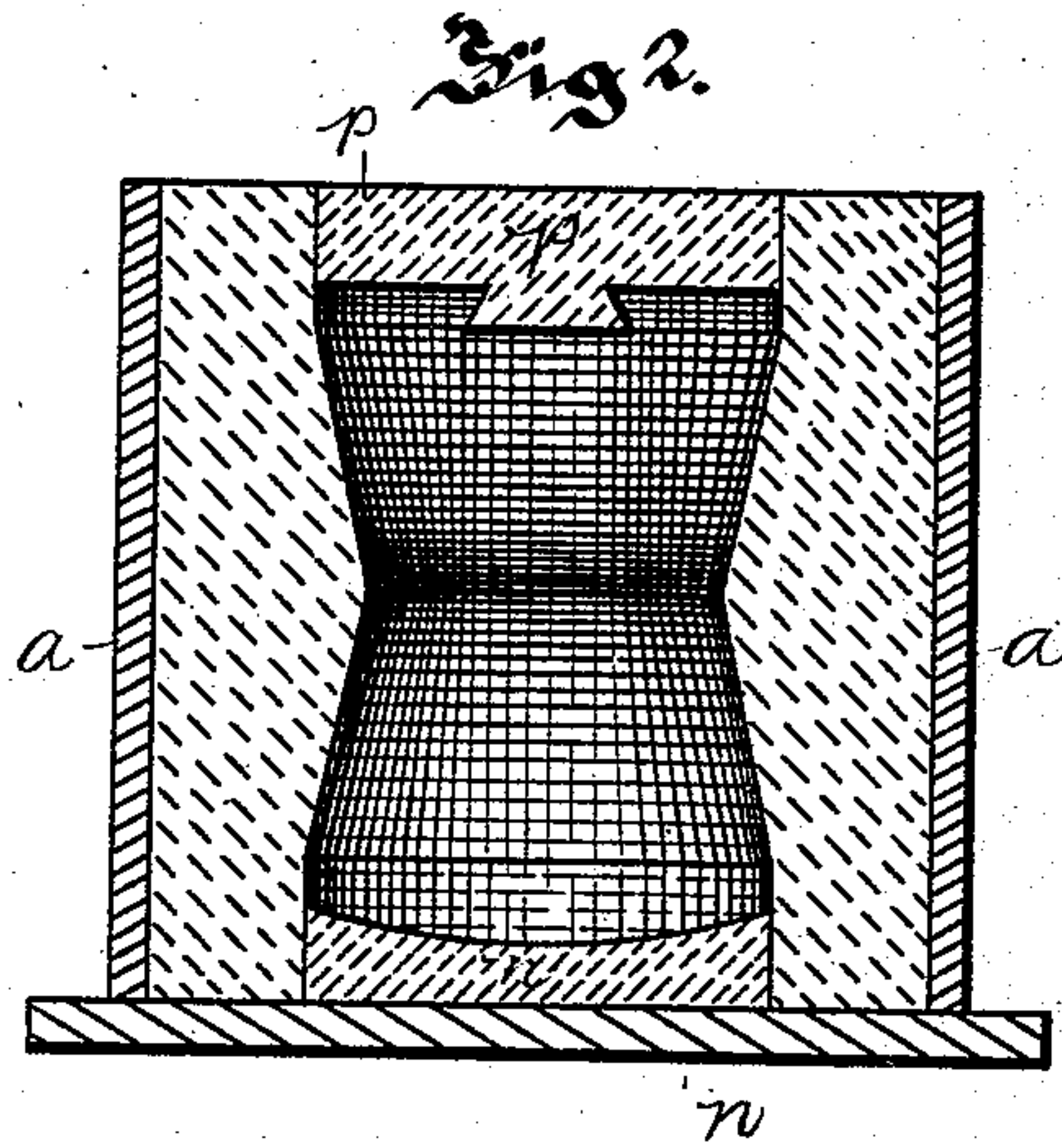
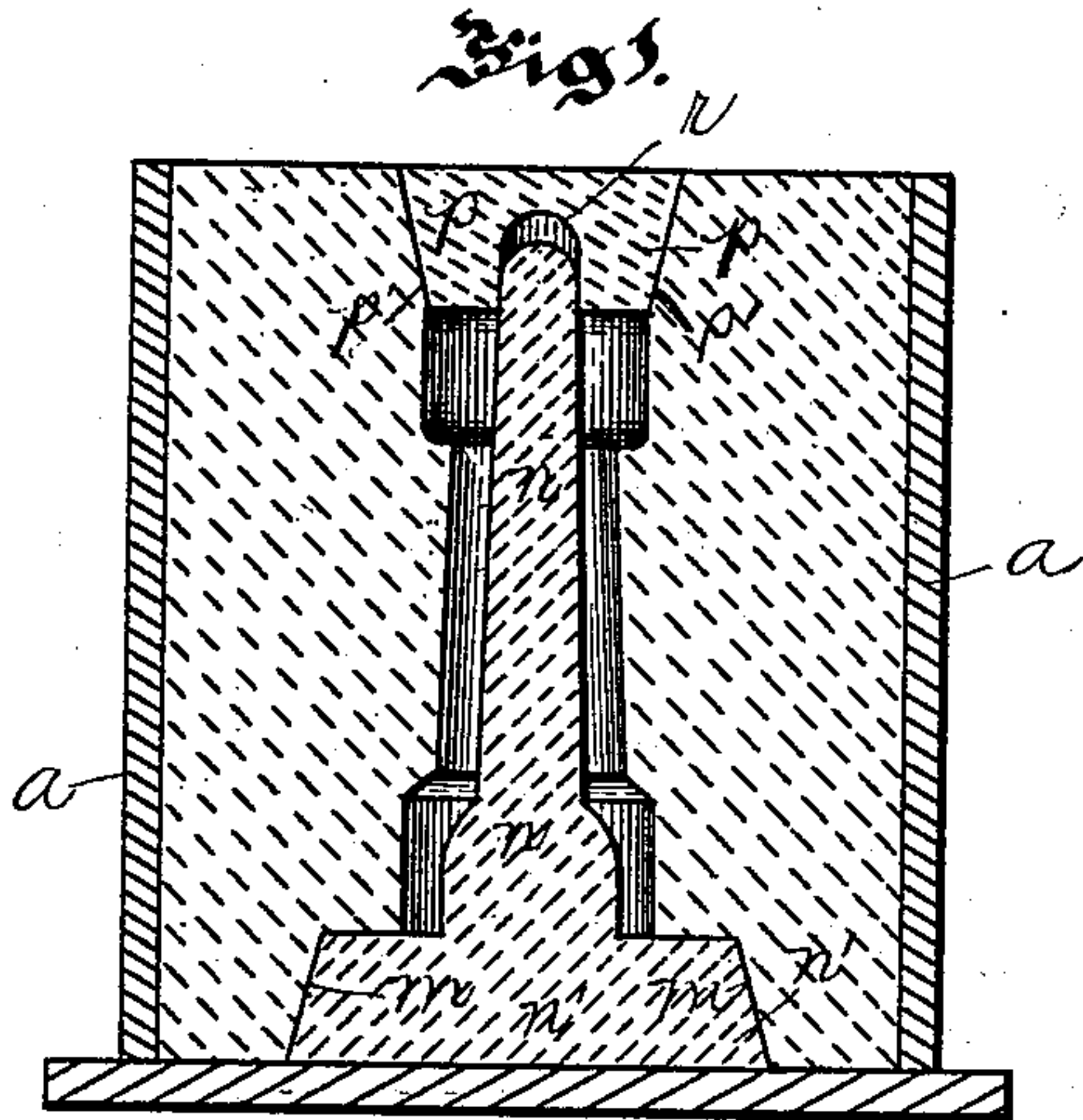
(No Model.)

S. J. ADAMS.

SAND MOLD.

No. 377,009.

Patented Jan. 31, 1888.



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# UNITED STATES PATENT OFFICE.

S. JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

## SAND MOLD.

SPECIFICATION forming part of Letters Patent No. 377,009, dated January 31, 1888.

Original application filed March 31, 1887, Serial No. 233,098. Divided and this application filed October 29, 1887. Serial No. 253,750.  
(No model.)

*To all whom it may concern:*

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

My invention relates to the manufacture of sand molds, and more especially to the molds themselves, the latter being made, though not necessarily so, in an apparatus described by me in an application filed March 31, 1887, Serial No. 233,098, of which application this is a division.

It is well known that in the manufacture of tubular castings a much more perfect casting can be obtained when the mold is formed vertically within a single flask, so that instead of there being a longitudinal joint within the finished mold along the edges of the mold-cavity (as is the case where the mold is formed in a two-part flask, one cavity of the mold being molded in each part thereof) a perfect mold is formed, as the body of the mold-cavity is molded by a true cylindrical pattern. There are, however, certain classes of molds—such as those for the formation of certain classes of wagon-boxes and forging-dies—which have enlargements at each end—that is, which have the central portion of the body of the casting of less diameter than its ends—which have not heretofore been formed in a one-part flask, it being necessary in molding them to divide the pattern longitudinally and mount it upon a match-plate, and form one half of the mold in each flask, and then place the two half-molds together.

My invention has for its object the formation of this class of molds in one-part flasks, so that a more perfect and truly cylindrical or other shaped mold-cavity is obtained, and the liability of the formation of fins on the casting—such as occur when a match-plate is employed—is overcome.

To this end my invention consists in combining with the mold having a mold-cavity of greater diameter at each end than in the central part thereof and formed in a one-part flask separate cores introduced within the said mold-cavity from the opposite ends thereof, so as to form the mold-cavity corre-

sponding to the shape of the article desired to cast.

It also consists in forming these cores of such shape corresponding to each other that the one will fit within the other, and thus center the core passing through the mold-cavity, so as to form a proper mold for a hollow cylindrical casting, as will be more fully hereinafter set forth.

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

Figure 1 is a central vertical section of one form of mold embodying my invention; Fig. 2, a similar view of another form. Fig. 3 shows a vertical section of an apparatus employed in forming the molds, and Fig. 4 is a like view of the same.

Like letters refer to like parts in each of the figures.

In forming molds embodying my invention I prefer to employ the form of apparatus shown by me in an application filed March 31, 1887, Serial No. 233,098; but I do not wish to confine my invention to any particular form of apparatus, as the molds may be made in other forms. In this apparatus the flask *a* is made of suitable size and length, according to the size and length of the patterns employed within the same flask. At the base of this flask is the pattern-block *b*, to which the lower part, *c*, of the two-part pattern is secured, the upper part, *d*, of said pattern being secured to the lower part, *c*, by any suitable means and extending up above the flask *a*. In making my mold I prefer to connect the flask and the patterns to the lifting and dropping mechanism for imparting the jar through this upper pattern, *d*, the pattern having an extension, as shown in the drawings, which can either be rigidly secured to the vertically-moving rod *e* of the lifting and dropping mechanism or be connected thereto by a suitable joint, the form of lifting and dropping mechanism shown being the same as that illustrated in my application for patent, Serial No. 101,323, filed February 9, 1886.

In the construction shown in Figs. 3 and 4 the upper part, *d*, of the pattern is connected to the lower part, *c*, thereof by suitable catches,



*f*, which fit within seats *g*, formed at the upper end of the lower pattern, *c*, and secure the two parts rigidly together during the formation of the mold, the two parts being further held in line, if so desired, by one part entering within the other, as in Fig. 3, so as to preclude the formation of a fin or other imperfection in the casting at the junction of the two patterns, or by pins in one part entering seats in the other part of the pattern. These catches *f* can be withdrawn by any suitable means operated from the upper end of the pattern, the catches shown in the drawings being mounted on levers, the handle ends of which are within reach of the operator above the flask, and after the formation of the mold these catches may be drawn in to permit the upper portion, *c*, to be withdrawn at the upper end of the flask, as indicated in dotted lines, Figs. 3 and 4.

The particular form of engaging devices between the upper and lower parts of the pattern may of course be varied, as would be well known to the skilled mechanic, any suitable engaging device by which the two parts can be separated without requiring the turning of either part of the pattern, when in the sand, being suitable for the purpose.

The pattern shown in Fig. 3 is for the molding of what is known as a "wagon-box," Fig. 1, this box having an enlargement at the base, as at *c'*, and an enlargement at the top, as at *d'*, while the body between these enlargements is formed of less diameter than the enlargements, and this part or body, if tapering, as shown, is generally formed as part of the lower pattern, *c*, though it may of course be formed as part of the upper pattern, the pattern shown being simply reversed in its position.

In forming the mold by this apparatus a pattern-block, with its part pattern *c*, is secured to the flask, the upper part, *d*, of the pattern secured to the lower part, *c*, thereof, and the flask is filled with sand, a suitable reservoir, *k*, being preferably employed to feed the sand to the flask and insure the uniform compacting of the same therein. The upper part, *d*, of the pattern is then secured to the lifting and dropping mechanism, and by means of this mechanism the flask, with its pattern, is raised and dropped upon the jarring-block *l* until the sand is properly compacted within the flask. The operator then disconnects the apparatus from the lifting and dropping mechanism and removes the reservoir, leveling off the sand even with the upper end of the flask. He then disconnects the upper part, *d*, of the pattern from the lower part, *c*, thereof, and withdraws this part *d* of the pattern vertically through the top of the mold formed as indicated in dotted lines, Figs. 3 and 4. The lower part, *c*, of the pattern can then be withdrawn from the mold by any suitable means—such as by dropping out of the mold—and the mold is then ready to receive its cores. In the formation of these tubular wagon-boxes it is of course necessary to em-

ploy a core extending entirely through the part of the mold-cavity in which the casting is to be formed and to center this core properly within the mold-cavity. For this purpose a seat or core-print is generally formed at the base of the mold, as at *m*, this core-print being molded by the enlargement *m'* at the base of the lower part, *c*, of the pattern, and the core *n*, when inserted, is brought to a central position within the mold-cavity by means of a corresponding core-head, *n'*, which fits within the seat *m*, the core extending up through the mold-cavity and above the enlargement formed by the base *d'* of the upper pattern, *d*. In order to close the upper end of the mold, it is also necessary to employ a core, *p*, and the seat *p'* for this core is formed by the portion *d''* of the pattern *d*, which is preferably made tapering to form a tapering seat to direct the core to place. In order to center the core *n* with the core *p*, I form a core-seat, *r*, within the core *p*, into which the upper end of the core *n* enters, this core-seat acting to hold the core *n* centrally within the cavity of the mold. After the formation of the mold and the withdrawing of the patterns, as above described, the core *n* is inserted within the cavity of the mold, its head *n'* fitting into the seat *m* at the base of the mold, and the core *p* is then inserted in the upper end of the mold-cavity, fitting within the seat *p'*, and the upper end of the core *n* fitting within the core-seat *r* of the core *p* when the mold is finished.

In Fig. 4 is shown a form of apparatus used for making a mold embodying my invention, this apparatus being for the formation of a mold for casting what is known as a "forging-die," and the parts thereof corresponding substantially to the two parts of the apparatus shown in Fig. 3, except that a different shape of pattern is employed. In this case the lower part, *c*, of the pattern is connected to the upper part, *d*, thereof at the narrowest part of the pattern, so that each part of the pattern can be withdrawn from the mold without injuring the same, the two parts of the pattern being connected as above described, and after the formation of the mold the upper part, *d*, is disconnected from the lower part, *c*, and withdrawn through the upper part of the flask. The flask is then turned over and the lower part, *c*, thereof withdrawn, and suitable cores, *n* *p*, are inserted within seats formed in the mold, these cores being of proper shape to form the top and bottom faces of the die, the bottom core, *n*, being generally formed of a metal block or "chill," which acts to chill and case-harden one face of the die, while the other core, *p*, is provided with a suitable dovetail extension, which forms a dovetail recess in the finished casting, by means of which it can be secured to the forging apparatus. As heretofore formed this class of molds required what is known as a "four-part" flask for its manufacture, and it was exceedingly difficult to bring all the parts in proper relative posi-



tion, so that the casting of this class of articles presented difficulties which are entirely overcome by my improved apparatus.

5 I am thus enabled, by employing a two-part pattern within the one-part flask, to mold the articles to be formed much more accurately and to overcome the formation of fins along the edges of the finished casting, while at the same time I am enabled to form the molds  
10 more rapidly, and as all the parts are arranged so that the mold can be formed by jarring, I am enabled to form more perfect molds, and can employ, practically, unskilled labor for the work.

15 I do not claim in this application the apparatus heretofore described, as that forms the subject-matter of a separate application filed by me March 31, 1887, Serial No. 233,098, of which application this is a division.

20 Having now described my invention, what I claim is—

1. In a sand mold, the combination, with a one-part flask having a mold-cavity formed therein of greater diameter at each end than in the central part thereof, of separate cores 25 located in the opposite ends of the mold-cavity and closing its ends, substantially as and for the purpose set forth.

2. In a sand mold, the combination, with a mold having its cavity extending through the 30 flask, of a core located in one end and extending within said mold-cavity, and a core located in the opposite end of said mold-cavity and provided with a seat for the reception of the end of the other core, substantially as and for the 35 purpose set forth.

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

S. JARVIS ADAMS.

Witnesses:

JAMES I. KAY,  
J. N. COOKE.