

(No Model.)

S. J. ADAMS.
SAND MOLDING APPARATUS.

No. 377,007.

Patented Jan. 31, 1888.

Fig 1.

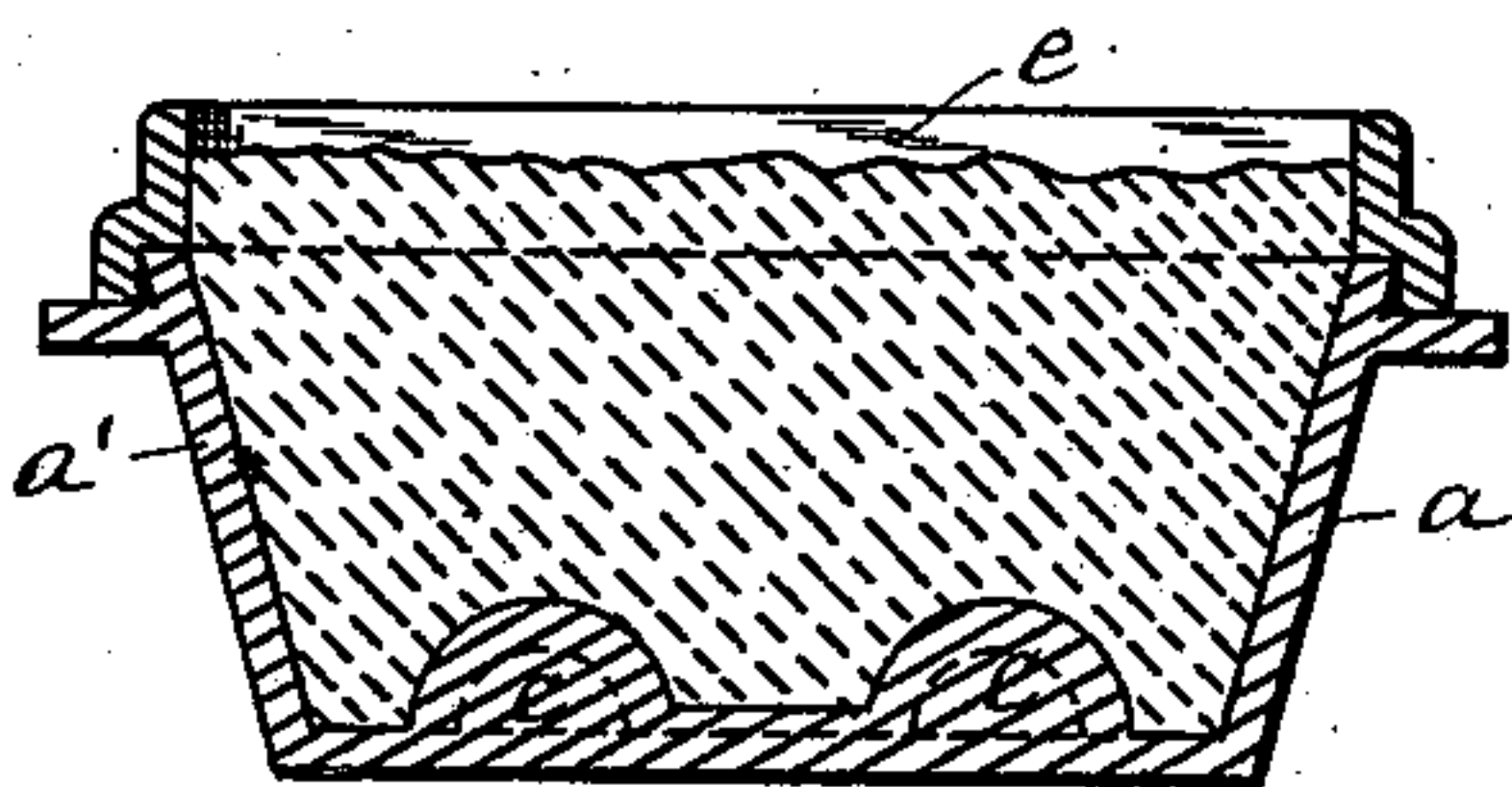


Fig 2.

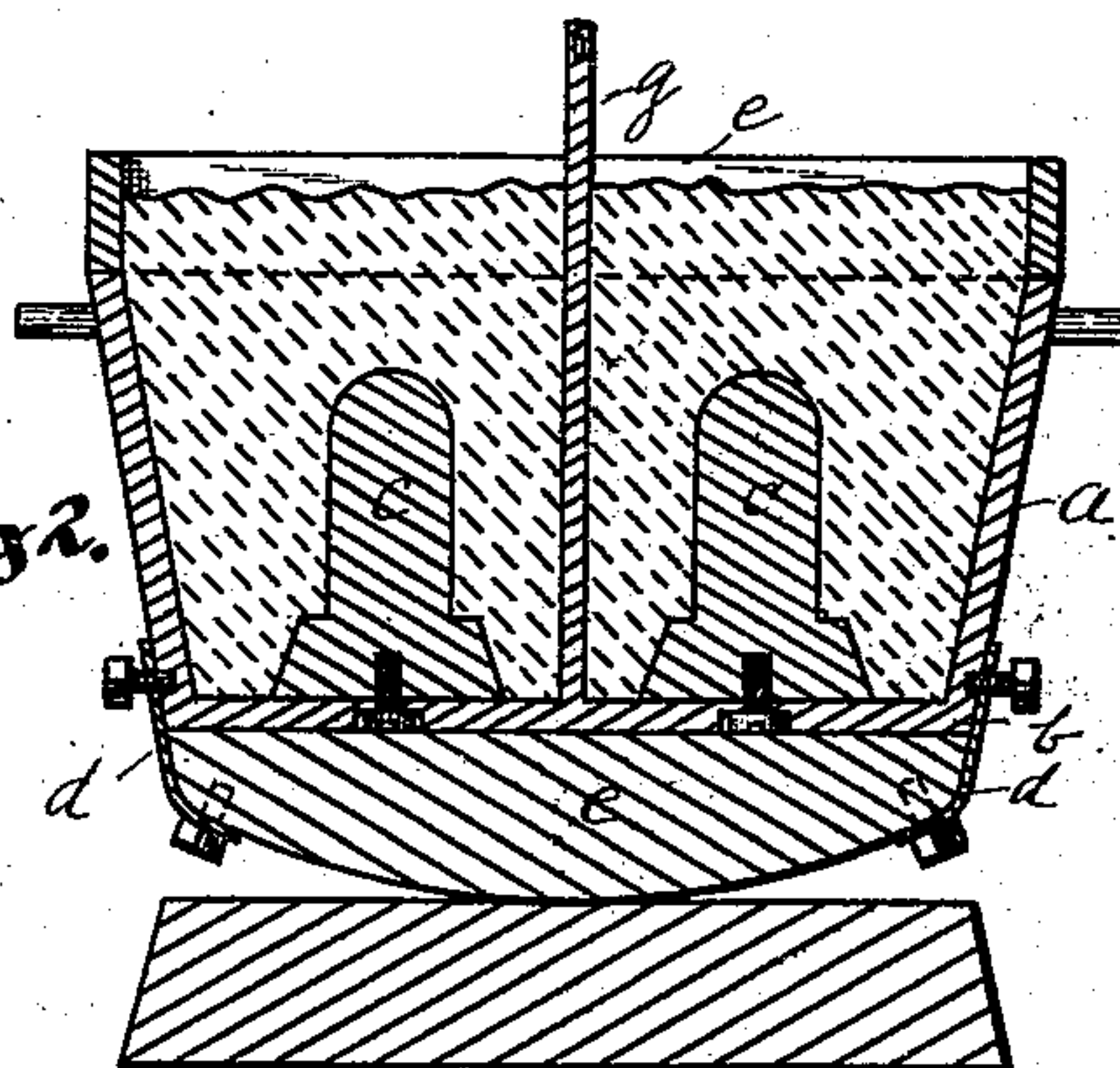


Fig 4.

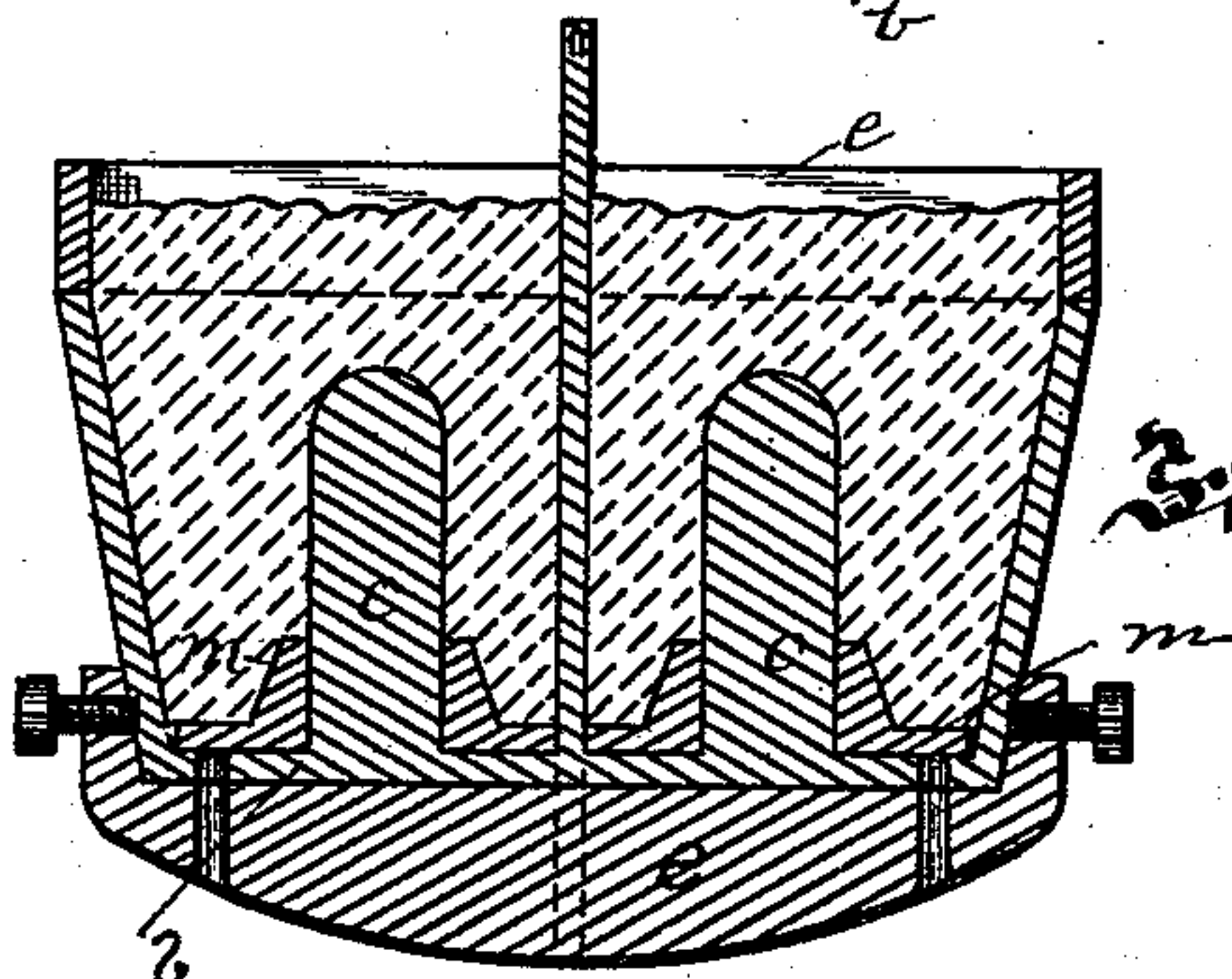


Fig 3.

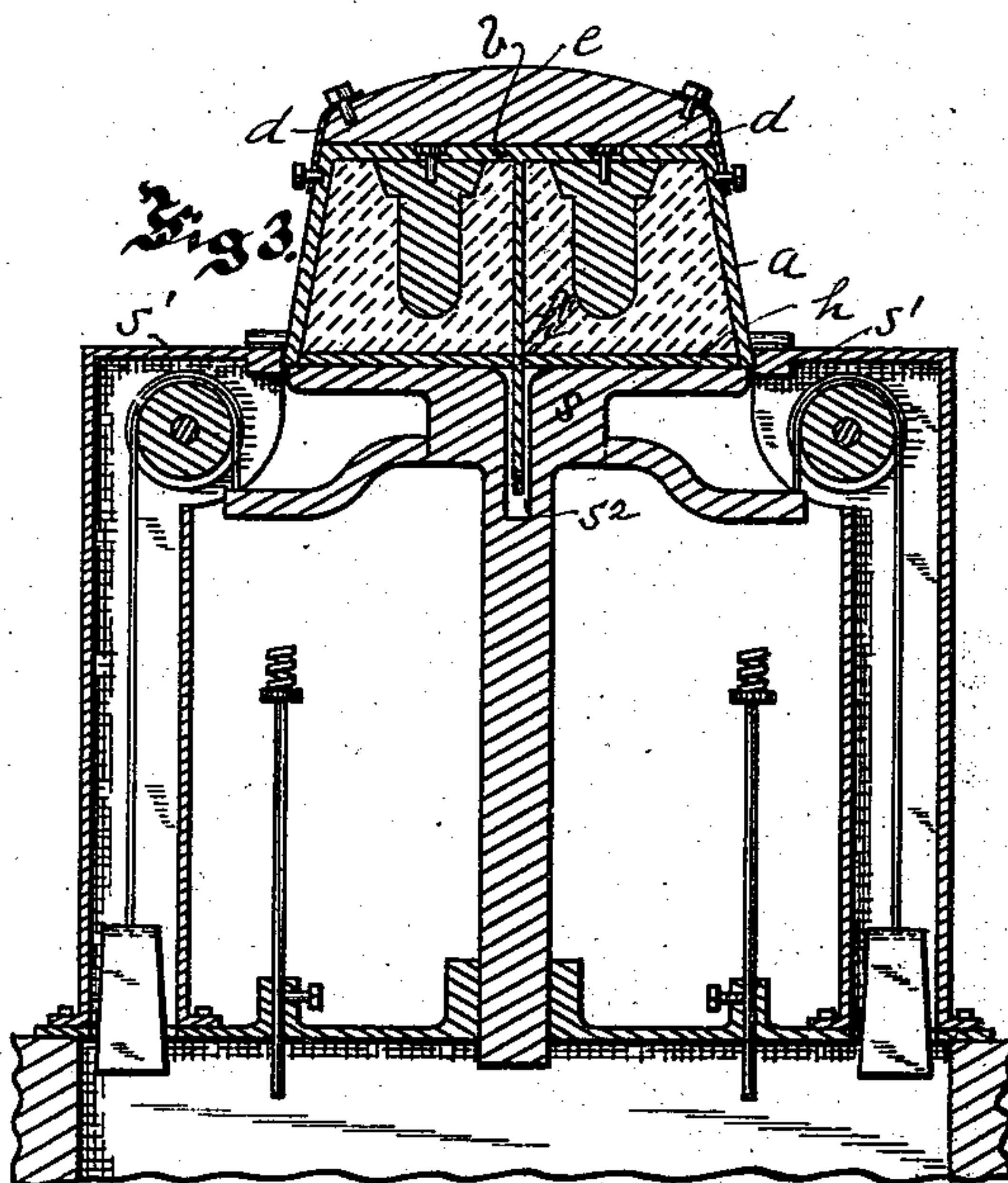


Fig 5.

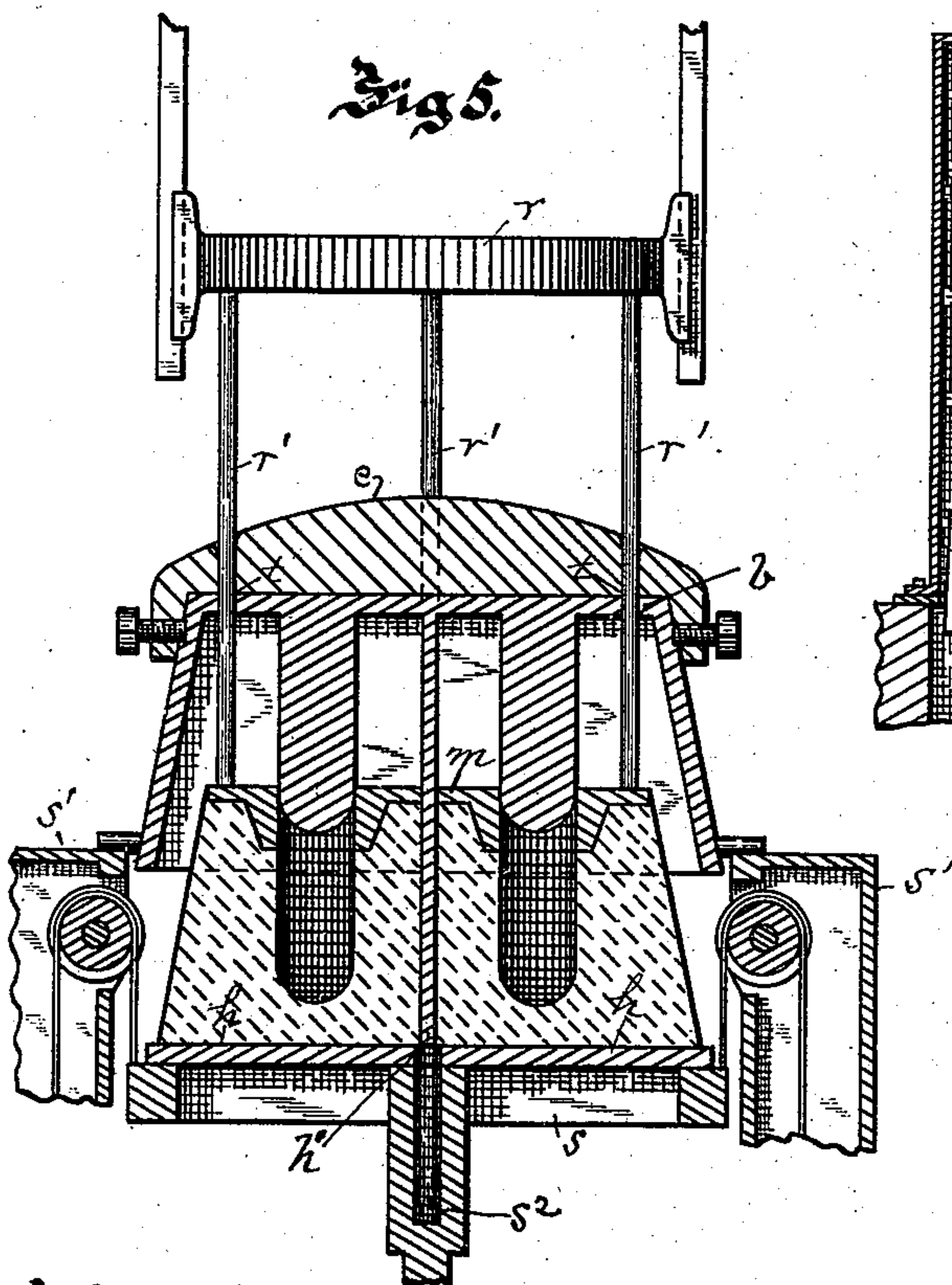
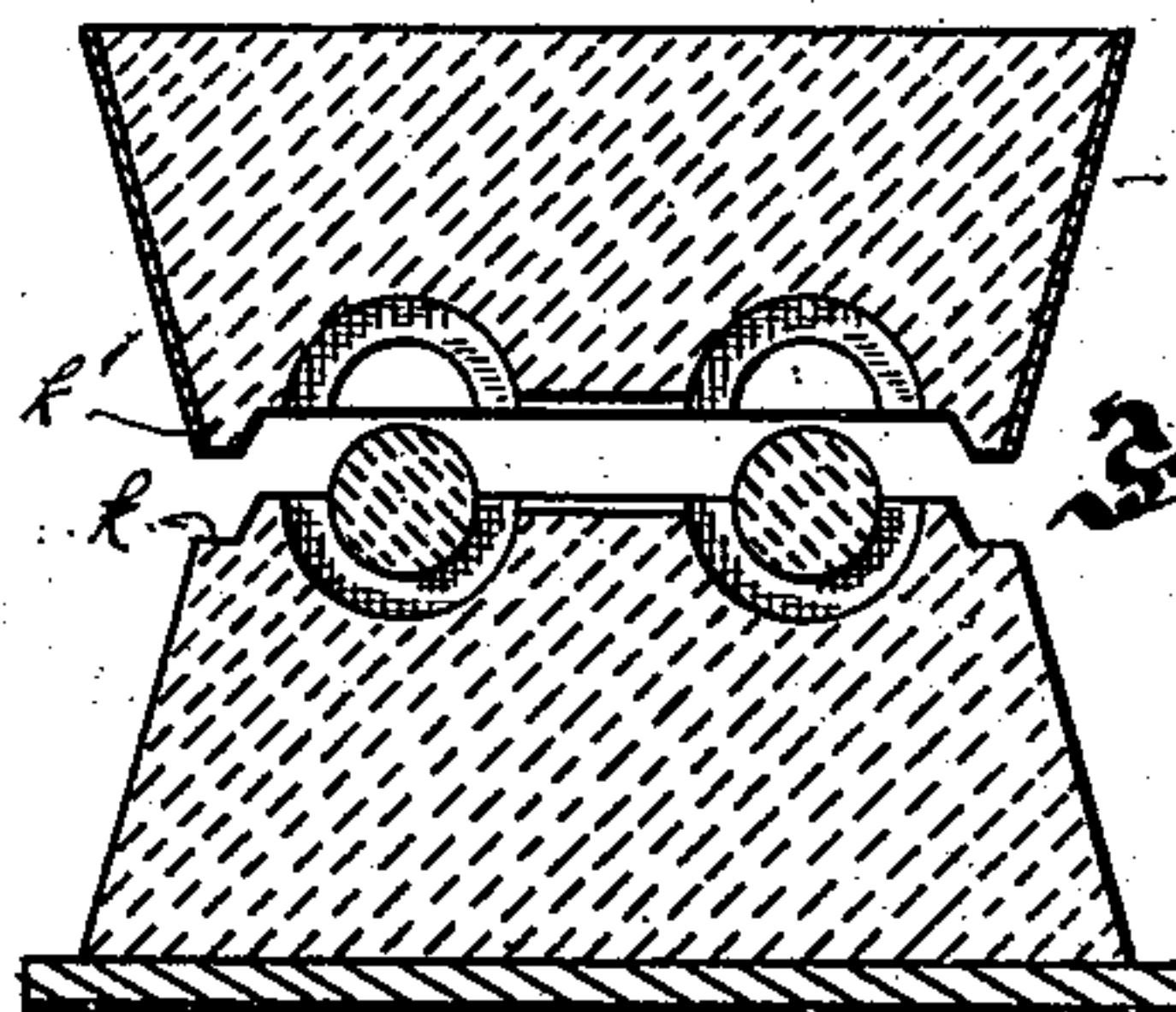


Fig 6.



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S. JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

SAND-MOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 377,007, dated January 31, 1888.

Application filed March 31, 1887. Serial No. 233,100. (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-Molding Apparatus; 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, its object being to provide a combined flask and pattern which shall be held rigidly together and which can together be withdrawn from the mold when formed. It is well known to those engaged in making this class of molds that where the pattern-plate and patterns and the flask are formed separate it is exceedingly difficult to hold them rigidly in line with each other, as the sand will wear upon the parts connecting the pattern-plate and flask and will finally wear out and loosen the connection between the pattern and flask or the guides by which they are held in line, so that there is a liability of the pattern getting out of true line with the flask and sagging within the same, this being specially noticeable in the manufacture of molds by what is known as the "jarring process," where the flask and patterns are raised and dropped upon a block to impart the jar to the sand within the flask and pack it around the pattern, the parts having, in addition to the ordinary wear of the sand, the jar, which will finally shake the parts out of proper relative position. In forming these molds it is in almost all cases necessary to turn over the flask after the formation of the molds, and unless the guides or connections between the flask and the pattern plate or block are sufficiently rigid and exact to hold the parts in proper relative position there is a liability of the pattern, which on account of the accuracy required is generally made of iron and secured rigidly to a plate, sagging when the flask is turned over, and, even though a perfect mold has been formed, pressing the mold slightly out of shape by its weight. This principle of forming molds by jarring is specially applicable to the formation of long cylindrical molds—such as for pipe-balls and wagon-boxes—and this class of castings is necessarily made very exact, it being desirable, especially in pipe-welding balls, that they should be cast to

within the one-hundredth part of an inch, as it is desirable to bring them to the exact size required and to do away with the necessity of turning or grinding off the surface of the ball, for the reason that the outer skin of the welding-ball is harder and less liable to be cut or worn during the welding operation than the metal underneath this skin. It is also desirable to hold the pattern and flask rigidly in proper line with each other for the further reason that when they are so connected the molding apparatus can be operated by unskilled labor, and as good molds formed by those who have used the apparatus for but one or two days as by those who have operated it for a much longer period.

The object of my invention is to provide a combined flask and pattern overcoming the objections and having the advantages above set forth; and to these ends it consists, generally, in the combination, with a flask, of a pattern plate or block formed with or permanently secured to the flask and carrying the patterns within the flask, so that the flask and patterns are always held in proper line with each other, and there is no liability of the sagging of the pattern even when the flask containing the finished mold is turned over, as is necessary in withdrawing the pattern therefrom.

It also consists in the combination of a flask having side walls tapering outwardly from the base to the open end, and a pattern plate or block formed with or permanently secured to the flask and carrying the patterns, so that the mold formed can be more easily discharged from the flask.

It also consists in combining with the flask having the pattern-block formed with or permanently secured to the flask a stripping-plate at the base of the flask, fitting around the pattern, whereby the mold formed may be forced out of the flask, the stripping-plate being subsequently removed from the mold.

It also consists in forming on this stripping-plate the patterns for the cope prints or seats for the cores employed with the mold formed.

It also consists in combining with this flask, having the pattern-block formed with or permanently secured thereto and carrying the patterns and the stripping-plate fitting around the patterns, bars extending through the pattern-block and engaging with the stripping-

plate in order to force the finished mold out of the flask.

It also consists in other details of construction, as hereinafter more specifically set forth.

5 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 vertical section of the flask embodying my invention, wherein an ordinary jarring apparatus, heretofore employed by me in forming molds, and covered by Letters Patent heretofore granted to me, is employed. Fig. 2 is a like view of the flask embodying my invention, wherein the flask carries the block and is itself raised by means above the flask and dropped upon the jarring-block, as is illustrated in certain applications for patents filed by me February 9, 1886, Serial Nos. 191,322 and 191,323. Fig. 3 shows the means of lowering the mold out of the flask carrying the patterns. Fig. 4 shows my improved mold apparatus where the stripping-plate is employed. Fig. 5 shows the means of forcing the mold out of the flask, and Fig. 6 is a view of the mold formed by the flask shown in Fig. 1.

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

The simplest form of my improved apparatus is shown in Fig. 1, in which the flask *a* has cast with it the pattern plate or block *b*, which carries the patterns *c*, or the pattern-plate is riveted to the flask or otherwise irremovably secured, so that the flask and pattern-plate form one piece during the whole operation of forming the mold, these patterns *c* extending up within the flask, so that the sand when filled within the flask can be packed around the patterns. I prefer to form the walls of the flask *a* tapering outwardly or flaring from the base or pattern block *b* to the mouth of the flask, as shown at *a'*, as by so doing the finished mold can be more easily withdrawn from the flask, though the walls of the flask may, if desired, be formed straight. In forming molds by jarring with this form of combined flask and pattern-block, where a regular jarring-table is employed, as shown in Letters Patent Reissue No. 9,978, granted to me December 20, 1881, this flask containing the patterns is placed upon the jarring-table, and a reservoir, *e*, is preferably employed therewith, the reservoir containing a body of sand to pack within the flask. The flask is then raised and dropped, as is usual in forming molds by this process. The flask and patterns can be removed from the mold, as hereinafter described.

In Fig. 2 is shown the form of mold generally used in employing my invention with the jarring process where the apparatus for imparting the jar to the sand within the flask is arranged above the flask, as fully described in application for Letters Patent filed by me February 9, 1886, Serial No. 191,323. In it the flask *a* has also the solid base *b*, which, as shown in said figure, is cast with the flask and car-

ries the patterns *c* therein, the flask also having the curved or other shaped base *e* for receiving the jars, this base being either cast to the pattern-plate *b* and forming a part thereof, or, as preferred by me, being formed of wood and secured upon the flask, straps *d*, extending up the sides of the flask and being firmly secured thereto. Extending within the flask is the rod *g*, which is secured either to the pattern or to the pattern-plate *b*, and extends above the flask, so that this rod may be connected to a vertically-moving rod, which forms part of the lifting and dropping mechanism described in the said application last referred to. In forming molds with this form of combined flask and pattern the flask, with its reservoir, is filled with sand, the rod *g* connected to the vertically-moving rod of the lifting and dropping mechanism, and the flask, with its sand, subjected to a sufficient number of jars to compact the sand. The reservoir is then removed, the upper surface of the mold leveled off, and a bottom board, *h*, placed thereon, said bottom board having formed therein an opening, *h'*, through which the rod *g* extends.

In order to remove the mold from the flask I generally employ apparatus, such as that shown in application for patent filed by me on the 27th day of January, 1885, Serial No. 154,153, the flask containing the mold being inverted and placed upon the counterbalanced platform *s*, the flask itself being supported on the stationary standards *s'* thereon, while the rod *g* fits within a recess, *s''*, on the said platform *s*, the bottom board, *h*, resting on the platform, and the sand mold formed is then dropped out of the flask, as shown, being directed in its movement by the platform *s*, which moves in true line with the mold, and also by the rod *g* as it is withdrawn from the sand mold.

Where my invention is employed in forming molds, which are made in two parts, as is in some cases desirable, it is evident that in order to put the two parts of the mold together it is necessary that the sand mold, after it is removed from the flask, shall be supported in such way that it may be lifted and placed upon the other half of the mold which has been formed; and to accomplish this I generally employ within one or both half-molds formed a thin sheet-metal casing, *i*, which fits against the side walls of the flask, and when the mold is withdrawn from the flask is retained around the mold, so that the mold can be handled by it and can be turned over and placed upon the other half of the mold formed, this casing being hinged in such manner that it can be withdrawn from the mold after it is placed in position. This is clearly shown in Fig. 6, the casting *i* fitting around the upper half or cope mold formed. As in this case there is no means of guiding the parts together, such as the dowel-pins generally employed in two-part flasks, I employ for the purpose of bringing the two parts

of the mold in proper line with each other a seat, *k*, in one-half of the mold, into which the extension *k'*, corresponding in shape thereto, fits, as shown in Letters Patent No. 239,302, granted to me March 29, 1881.

As it is desirable in many cases to form what are known as "cope prints or seats" in the sand mold to receive the heads of the cores which enter the mold-cavities to complete them—such as for wagon-boxes or other tubular or hollow articles—I either form the patterns for these cope prints or seats solid with the patterns within the flasks, or I form them on separate plates, known as "stripping-plates," this latter form being shown in Fig. 4 of the drawings. In said figure this stripping-plate *m* fits around the pattern proper, *c*, at the base of the flask, and against the pattern-plate *b*, and the flask is filled and the mold formed, as above described. After the formation of the mold the bottom board, *h*, is placed thereon and the flask inverted and placed on a suitable table, such as shown in Fig. 5, this table being similar to that shown in Fig. 3, the flask being supported on the stationary standards *s'* thereof, while the bottom board, *h*, and mold rest on the platform *s*, which is in this case preferably overweighted, so that it will nearly support the mold.

Above the table, sliding vertically in suitable guides, is the frame *r*, carrying the vertical bars *r'*, and in order to insure the delivery of both the mold and the stripping-plate from the flask this frame is drawn down, the bars *r'* entering the openings *t* in the pattern-plate *b* and curved base *c* and pressing against the stripping-plate *m*, and so forcing both the mold and stripping-plate out of the flask and at the same time pressing down the platform *s*, this stripper-plate thus insuring the proper delivery of the finished mold from the flask, and having the further advantages over the mold where the cope-prints are formed solid with the patterns that it prevents the sticking of any sand within the flask. The stripping-plate can be lifted off the mold as soon as it is delivered from the flask.

It is thus seen that in forming molds by the employment of a stationary pattern block or plate carrying the patterns I am enabled to simplify the formation of these molds by having all the parts rigidly secured together, so that when the flask is removed the patterns also are removed with it, and there is no liability whatever of the patterns getting out of alignment with the flask, so that an imperfect mold will be formed. I am also enabled, when inverting the flask containing the mold, to hold all the parts in perfect line with each other, so that there is no liability whatever of the sagging of patterns and the pressing of the mold formed out of shape. I am also enabled to withdraw the patterns by the same mechanism by which the flask is lifted off the fin-

ished mold; and, as it is practically necessary to employ mechanism for this purpose, I insure the proper withdrawal of the patterns even though unskilled labor is employed, thus enabling unskilled workmen to form the mold, hold the parts in proper alignment so that there is no danger of injury by sagging, and withdraw the flask from the pattern without injuring in any way whatever the molds formed. By the employment of a separate stripping-plate I am also enabled to deliver the mold from the flask without danger of any of the parts thereof sticking to the flask or pattern, and can for these reasons form a much more perfect mold. Where the inner casing fitting around the flask is employed, I am enabled to employ my invention in the formation of two-part molds, thus extending its utility beyond the formation of only one-part molds, which it would otherwise only be applicable to.

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

1. In a sand-molding apparatus, the combination, with a flask, of a pattern-plate formed in one piece with the flask and carrying patterns within the flask, substantially as and for the purpose set forth.

2. In sand-molding apparatus, the combination, with a flask, of a pattern plate or block formed with or permanently secured to the flask and carrying patterns within the flask, and a stripping-plate fitting within the flask, substantially as and for the purposes set forth.

3. In sand-molding apparatus, the combination, with a flask, of a pattern plate or block formed with or permanently secured to the flask and carrying patterns within the flask, and a stripping-plate fitting within the flask and having the pattern for cope-prints formed thereon, substantially as and for the purposes set forth.

4. In sand-molding apparatus, the combination, with the flask, of a pattern block or plate permanently secured thereto and carrying patterns within the flask, a stripping-plate fitting around the patterns, and bars extending through the pattern-plate and engaging with the stripping-plate, substantially as and for the purposes set forth.

5. In sand-molding apparatus, the combination, with a flask having a pattern-plate formed with or permanently secured to the flask and carrying patterns therein, of a base-block secured to the flask and adapted to receive the blows in jarring, substantially as and for the purposes set forth.

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

S. JARVIS ADAMS.

Witnesses:

JAMES I. KAY,
J. NEGLEY COOKE.