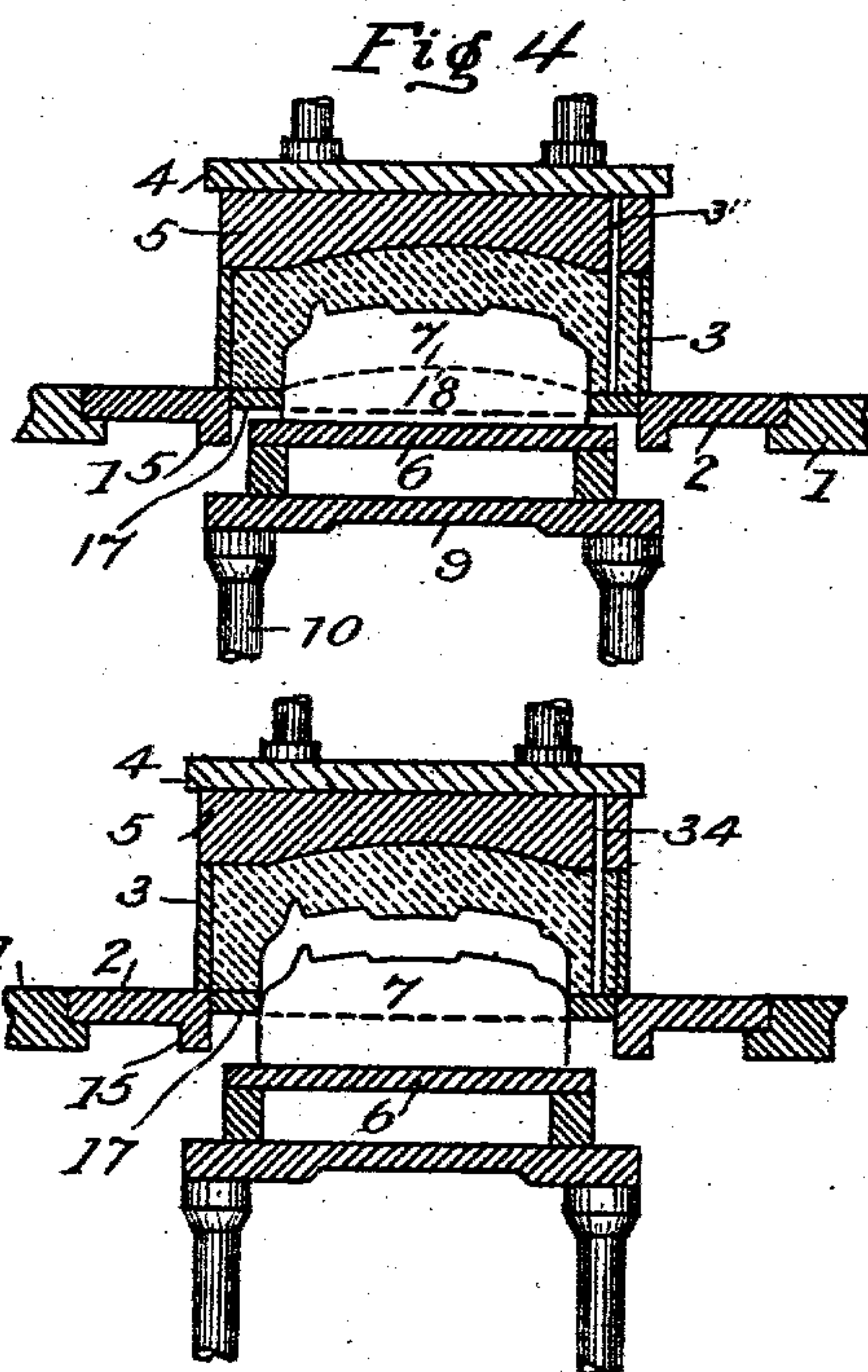
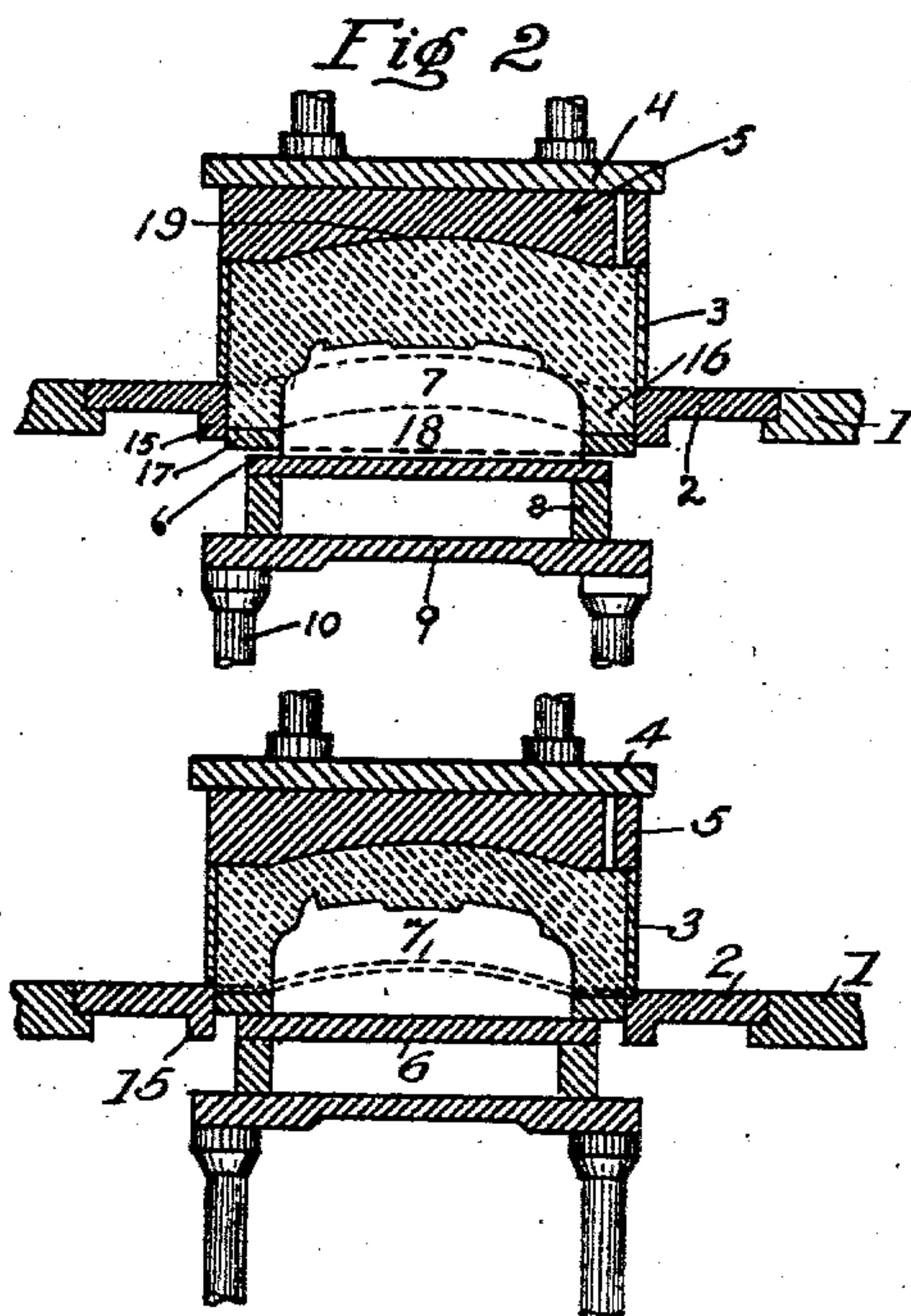
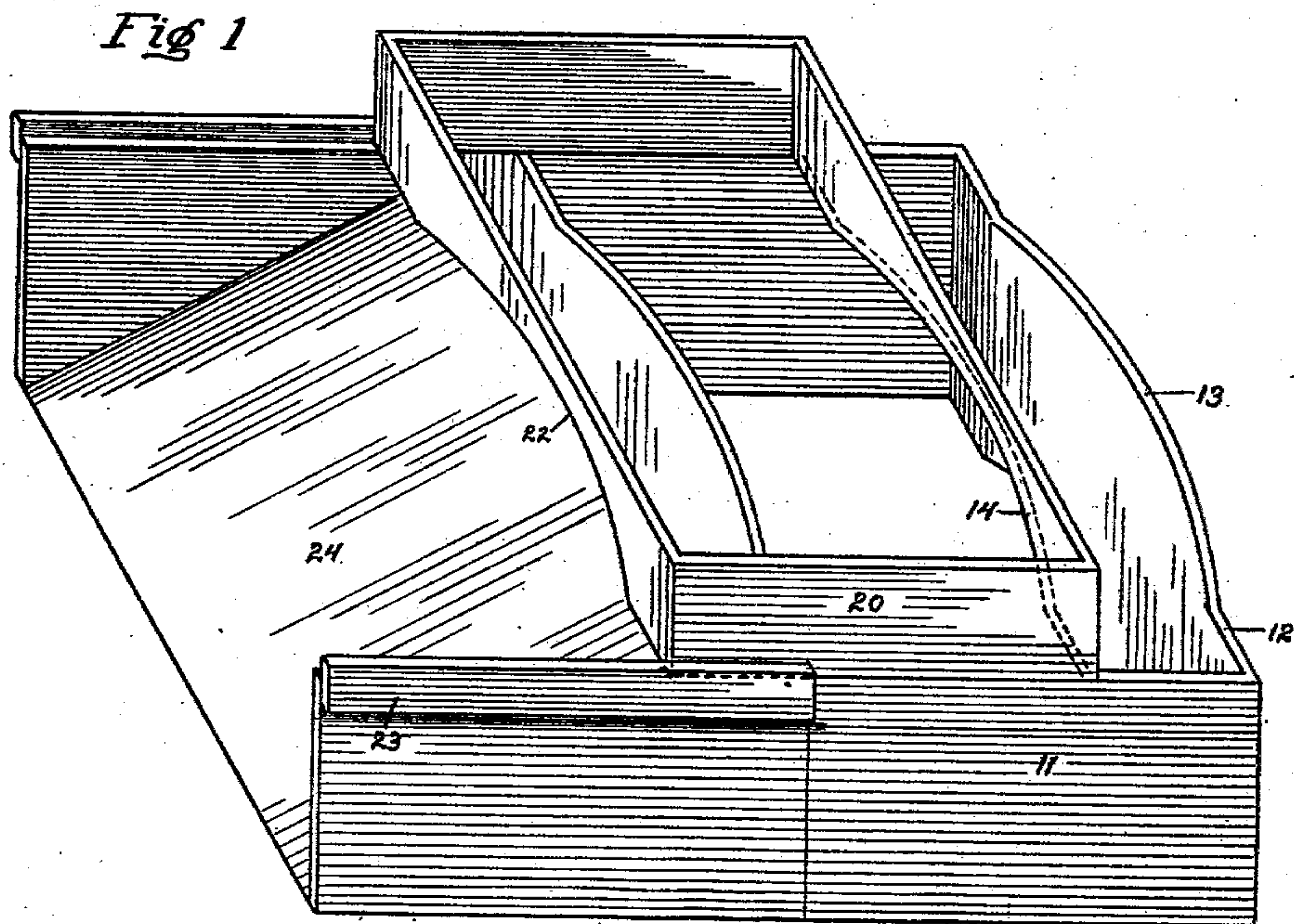


S. J. ADAMS.  
METHOD OF FORMING SAND MOLDS.

(Application filed Feb. 1, 1901.)

(No Model.)

2 Sheets—Sheet 1.



*Fig 3*

*Fig 5*

Witnesses.  
Fred D. Sweet.  
Halter Tamariss

Inventor.  
Stephen J. Adams  
By Kay & Zottew  
Attorneys.

S. J. ADAMS.  
METHOD OF FORMING SAND MOLDS.

(Application filed Feb. 1, 1901.)

(No Model.)

2 Sheets—Sheet 2

Fig. 6

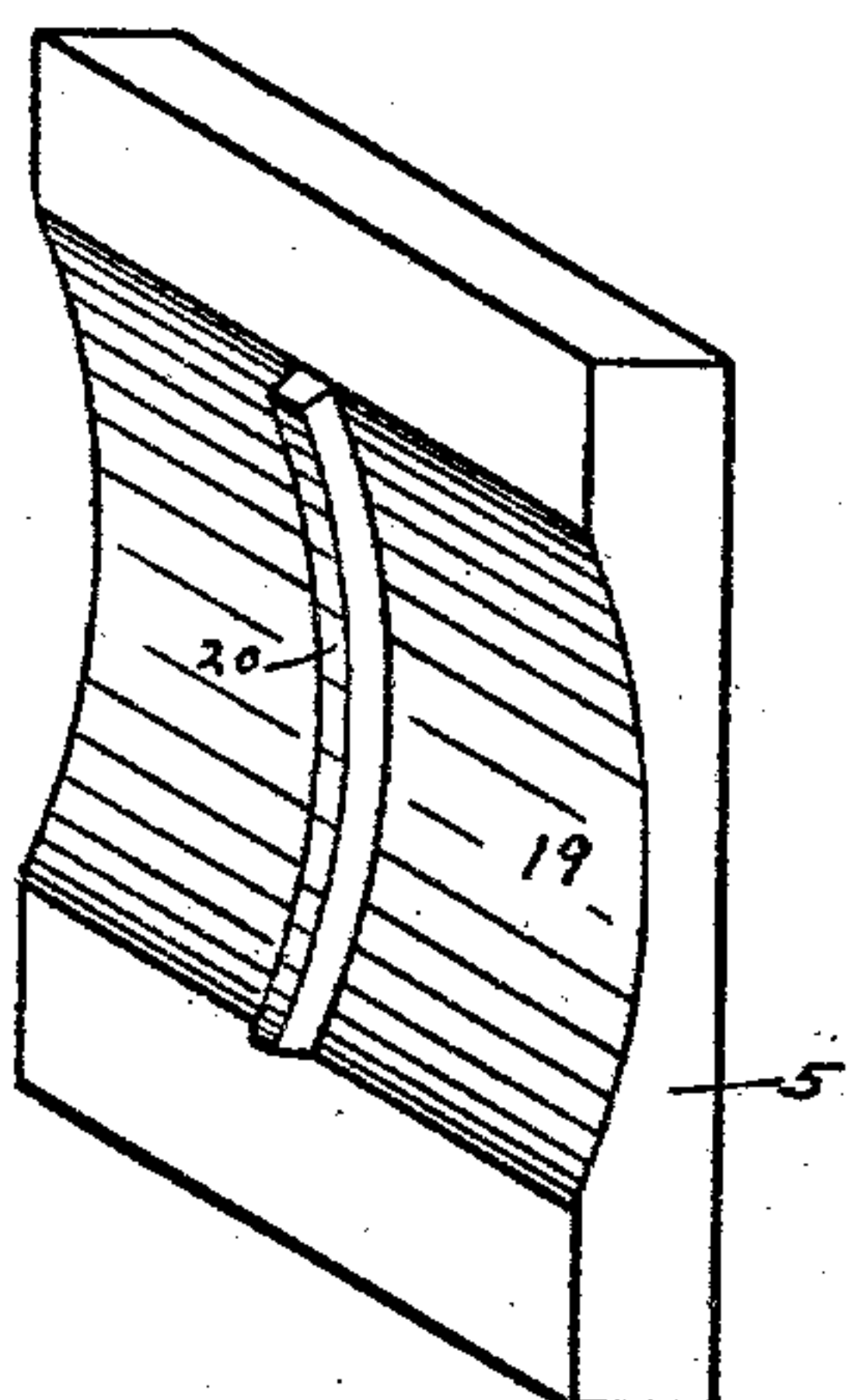


Fig. 7

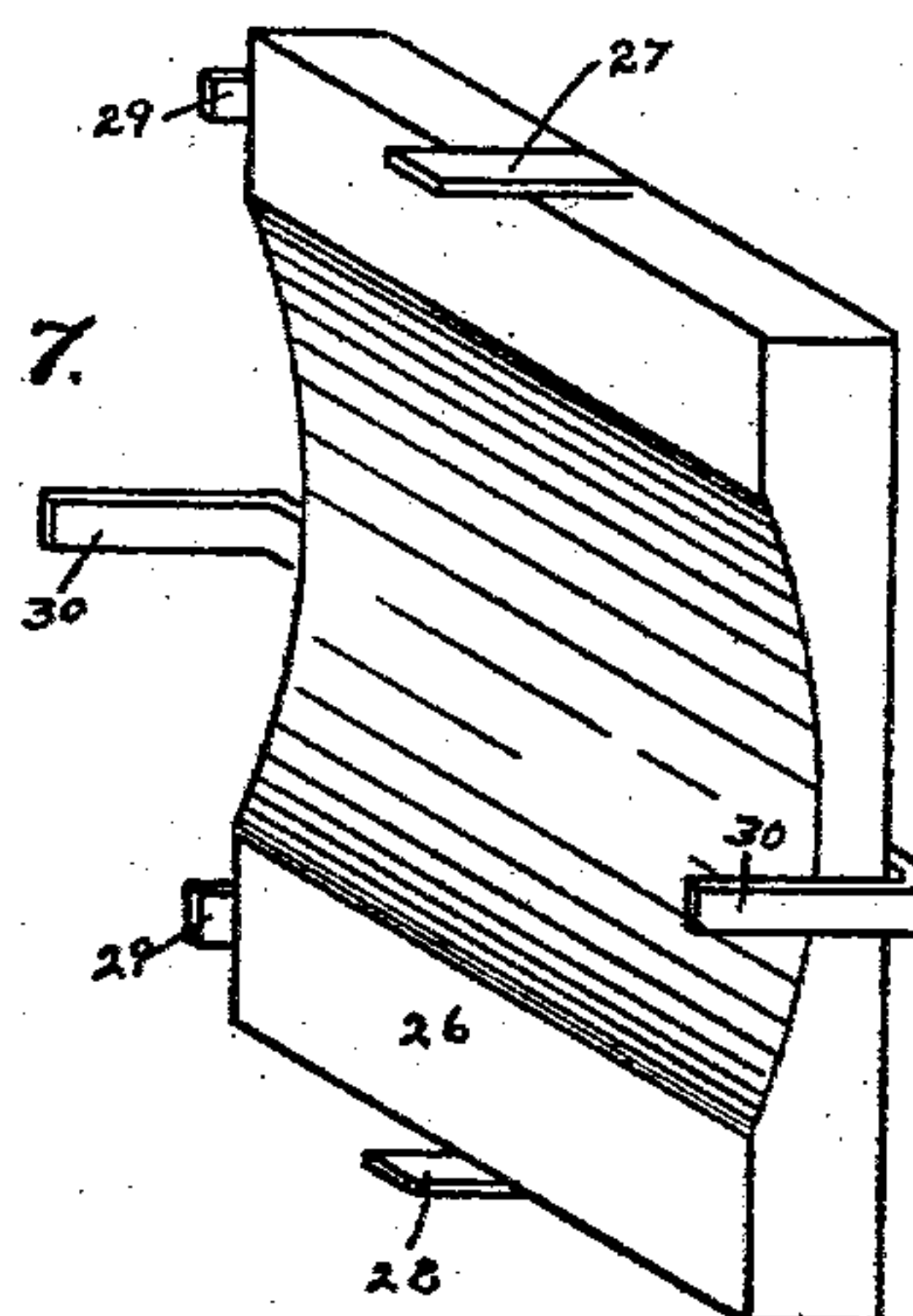


Fig. 8

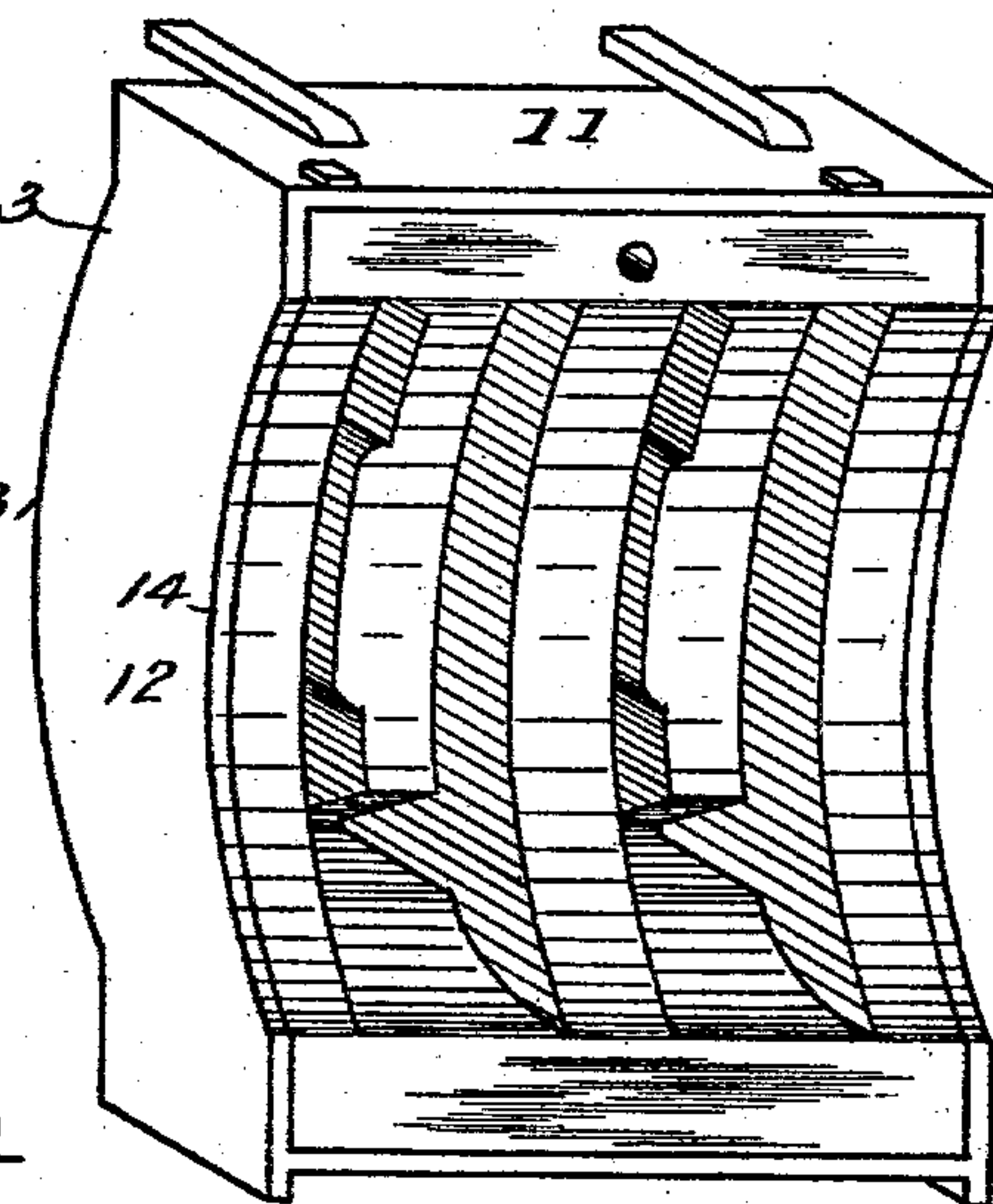


Fig. 9

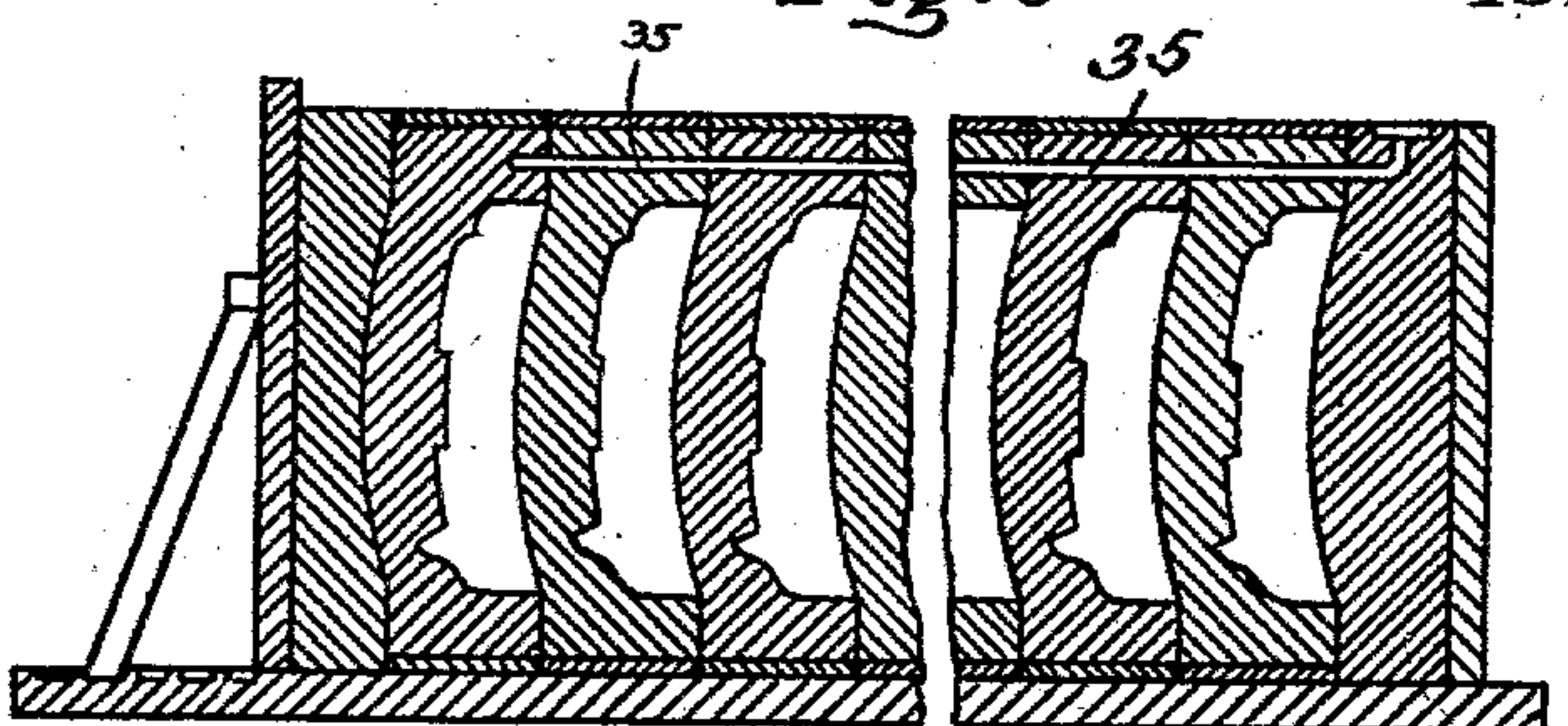
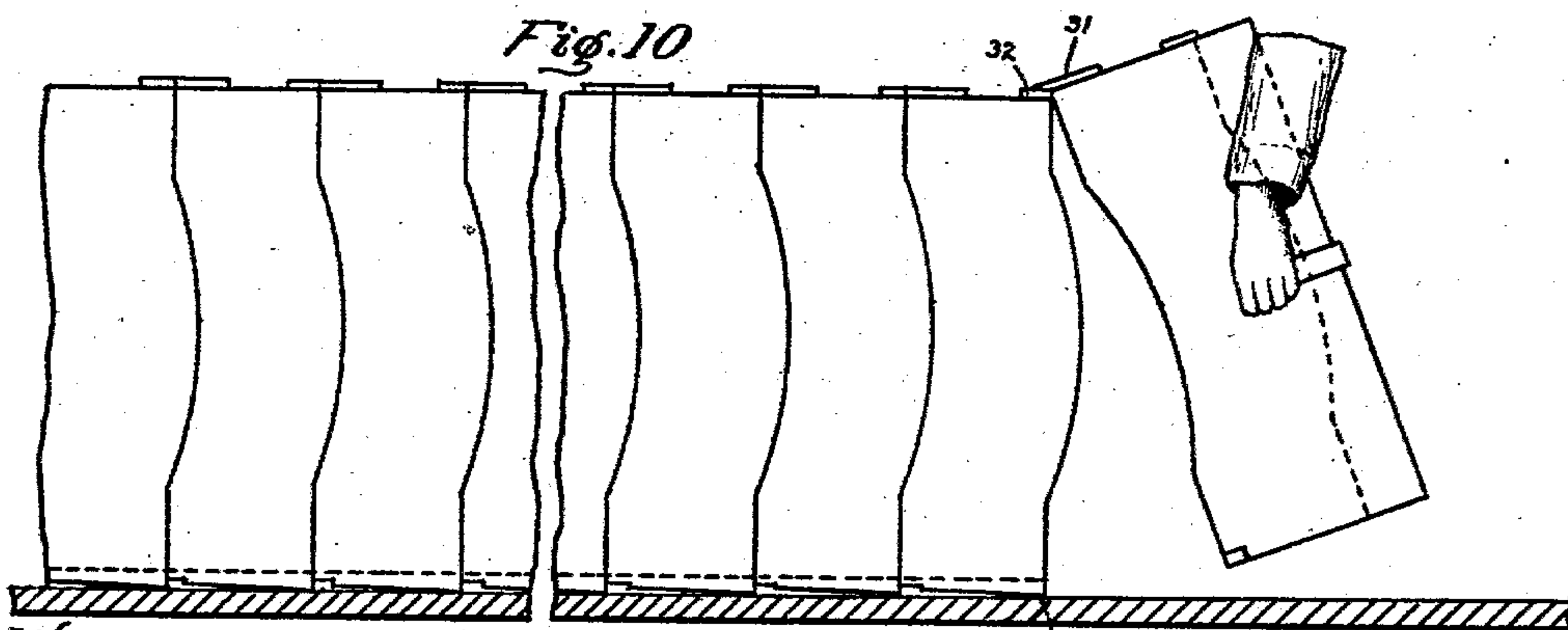


Fig. 10



Witnesses.  
Fred D. Sweet.  
Walter Tamaris

Inventor.  
Stephen J. Adams  
By Kay & Totten  
Attorneys.



# UNITED STATES PATENT OFFICE.

STEPHEN JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO  
MARCELLIN C. ADAMS, OF PITTSBURG, PENNSYLVANIA.

## METHOD OF FORMING SAND MOLDS.

SPECIFICATION forming part of Letters Patent No. 704,952, dated July 15, 1902.

Original application filed May 11, 1894, Serial No. 510,846. Divided and this application filed February 1, 1901. Serial No. 45,591. (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 Methods of Forming Sand Molds; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to a method of forming sand molds; and its object is to provide an especially-rapid method for forming sand molds having in or on one side thereof one mold-face and in or on the opposite side thereof another mold-face, the respective mold-faces of the series of molds fitting together, so as to make a complete mold-cavity—such, for example, as a mold for forming brake-shoes. The molds thus formed are inclosed within flasks which stand on end, and said flasks are arranged in such a manner that the two faces of the respective molds are placed together to form a mold-cavity.

The object of the present invention is to perform the necessary steps of the method in a manner to insure the rapid making of molds of this kind.

Mechanism for conveniently, practically, and automatically carrying out the said method is disclosed in my application filed May 11, 1894, Serial No. 510,846, of which application the present one is a division.

The method, generally stated, consists in filling the space within the flask and around and over the patterns with sand, then cutting or planing off the sand to an irregular shape corresponding to one face of the mold, then confining the sand by a mold-plate corresponding to the shape of this face of the mold to be formed, and then completing the mold by forcing the pattern and its plate into the same from the opposite side, so as to compact the sand against such confining-plate. In this manner the mold is rapidly formed and the sand is evenly packed, and it is made possible by the planing off of the sand in a line corresponding substantially to one face of the mold and then supporting the sand by a pattern-plate conforming to that face and then compressing the pattern into the same from the opposite side to obtain an evenly-

compacted mold in which the defect of compacting the sand above the pattern more than around the same is overcome.

In the accompanying drawings, Figure 1 is a perspective view illustrating the cutting off of the upper face of the mold. Figs. 2 to 5 are detail sectional views illustrating the operations of forming the mold. Fig. 6 is a perspective view of the top confining-plate. Fig. 7 is a perspective view of the guard-plate for the mold. Fig. 8 is a perspective view of the formed mold. Fig. 9 is a sectional view of a line of molds, and Fig. 10 is a side view of the same.

In the parent application referred to is shown, described, and claimed mechanism which is largely automatic for carrying out this method; but in the present case only so much of said apparatus is disclosed as will make clear the manner of forming the mold, it being understood that any suitable mechanism or implements may be employed in place of the mechanical elements shown.

In said drawings, 1 represents a table for supporting the removable and interchangeable plate 2, upon which the flask 3 rests.

4 represents a top plate or abutment adapted to bear against the confining or pattern plate 5, and 6 represents a plate upon which the patterns 7 rest, which plate in turn is supported by blocks or bars 8 upon a reciprocating table 9, mounted upon suitable rods 10, which are elevated at the proper time by cam mechanism, (not shown,) as described in the parent application, the operation being that after the preliminary forming of the mold, as hereinafter described, the top plate or abutment 4 is brought against the confining or pattern plate 5, and the rods 10 are reciprocated by suitable mechanism in order to press the pattern up into the flask, the flask being supported during the entire operation upon the plate 2. The mechanism so far described, however, is no part of the invention claimed in this application and may be replaced by any other suitable mechanism for supporting the flask, confining the pattern-plate 5, and pressing the pattern 7 into the sand in the flask.

The drawings illustrate the method in con-



nection with the formation of molds for making brake-shoes, and in the making of such molds it is necessary that there shall be a flask in which the mold is to be formed and a proper means to support the same, the flask 3 being preferably made of cast-iron and rests upon the removable and interchangeable flask-supporting plate 2, which is supported on the table 1 and which corresponds in shape to the edge of the flask, it being preferable, as described in the parent application above referred to, to employ a flask the lower edges of which are irregular and which correspond approximately to the shape of the mold to be formed, so as to give better support therefor. As the invention is illustrated in connection with the making of brake-shoes which have one face concave corresponding to the curve of the wheel and the body made of substantially the same curve, the flasks have the end walls 11 and the side walls 12, the central edges of the side walls being curved, corresponding to the general curve or general contour of the brake-shoe—that is, they have on one edge the curved projecting portion 13 and at the other edge the curved depression 14. The flask-plate 2 corresponds in shape to the lower edge of the flask, having a curved projection (not shown) fitting into the curved recess 14 of the flask-body in order to give better support to the same and so closing that part of the flask. The interior faces of the flask and the walls of the opening in the flask-plate correspond, and the flask-plate has a downwardly-hanging flange 15, forming a pocket or reservoir 16 for sand below the flask, the base of which pocket or reservoir is formed by the stripping-plate 17. The flask-plate carries suitable guides (not shown) for centering the flask thereupon, as will be readily understood. As the two faces of the molds beyond the mold-cavities must of course correspond with each other, and in this method of molding the face on one side of the mold is a counterpart of that on the other side, and as the stripping-plate 17 forms the mold-face around the mold-cavity this stripping-plate corresponds in outline to the two corresponding faces to be formed upon the mold, and therefore has the curved projecting portions 18 on each side of and between the patterns 7, which impart the necessary curvature or form to the mold-face to fit the opposite face of the adjoining mold. The other or opposite surface of the mold is formed by the plate 5, which is irregular in shape and corresponds to the mold-face desired to be formed. This plate 5 is shown as resting on the flask 3 and has the curved depression 19 corresponding to the curved portions 13 of the flask and corresponding to the curve of the brake-shoe face, and its molding position is even with the top edge of the flask. This confining or pattern plate is illustrated as having a rib 20 thereon to form a runner on that mold-face. This runner may, however, be formed by a projection on the stripping-plate 17, if de-

sired, a plain top plate of the desired curve or general outline being used. Such rib, however, serves to illustrate any desired projection to form any desired cavity in that mold-face.

In the formation of molds it is very desirable that the amount of sand to be compressed in any part of the same shall be such that when the pressure is applied it will be evenly compacted throughout, and as the patterns for brake-shoes are formed on a curve and the top surface of the mold is to be curved I bring the top surface of the mold before it is compressed to substantially the form of the finished mold—that is, I even off the sand, so that its top face is irregular in shape, corresponding substantially in shape to the confining or pattern plate 5. This I accomplish by placing on the flask a feeding-reservoir 20, having the lower edges of its sides formed with curved depressions 22, corresponding in shape to the depression 19 on the lower face of the plate 5 and having its front lower edge forming a cutter or planer. The sand is filled into this feeding-reservoir, it being preferred that the sand be fed from a suitable overhead carrier, so that it is brought in the mold-cavity in a mealy condition, and as soon as the mold is filled to the proper height the operator slides off said top reservoir over the surface of the flask, which planes or cuts off the sand to a shape corresponding to the lower face of the confining or pattern plate 5. In order to hold the reservoir in line for such planing or cutting off operation, guideways 23 are arranged back of the flask, being supported on the table 1, and the feeding-reservoir travels along such guideways which correspond in line to the top of the flask, so giving support to the feeding-reservoir in its stroke across the flask. The sand which is cut or planed off in this way passes down the chute 24 into a suitable hopper and may be carried back again to the overhead hopper.

It will thus be seen that in the formation of the molds the patterns extend up within the molding-space of the flask and the stripping-plate 17 fits around such patterns, leaving below the flask the sand-space 16 around and between the patterns, this being the position in which the parts of the molding apparatus rest in preparing to make the mold and the steps being to place the flask upon the flask-plate 2, place the feeding-reservoir thereon, feed the sand into the molding-space, slide the feeding-reservoir 21 over the flask, so bringing the top of the sand to the proper contour and discharging the surplus sand down the chute 24, place the top pattern-plate 5 upon the flask and hold the same by any suitable retaining means, such as the plate 4 shown, and then force the patterns and stripping-plate 17 into the opposite side of the flask by any suitable means, such as the plate 6 shown, thereby compressing the sand between the top pattern-plate 5 on the one side and the stripping-plate 17 and patterns



on the opposite side, said pattern-plate 5 forming one face of the finished mold and the stripping-plate forming the opposite face of the mold, which conforms to the face 5 formed by the pattern-plate, while the patterns form the desired cavities therein. In the mechanism shown in the parent application referred to the movement of the patterns is made shorter than that of the stripping-plate and the patterns and the stripping-plate travel together at about the same speed until the patterns are raised to their full height, and as it is desirable to have the sand packed firmly around the edges of the mold-cavities 15 and on the front face of the mold the stripping-plate 17 continues to move after the pattern ceases for a short distance until said plate is brought even with the flask-plate 2. The mold so made has one face formed by 20 the top pattern-plate 5 and has been packed by the pressure of the sand against that plate as the patterns were raised and the other face having the cavities formed therein by the patterns, the two faces being thus formed 25 in the mold at one operation. If desired, slight depressions or projections can be formed by means of the top pattern-plate, the hollow or curved portion of the same giving the curved face for forming the concave face 30 of the brake-shoe, and the rib extending along said plate, forming a runner leading to the mold-cavities. In Figs. 2 to 5 the different positions of the patterns and stripping-plate are shown in diagrammatic views, Fig. 2 35 showing the position to receive the sand, the patterns extending slightly into the flask and the stripping-plate being at its lowest position so as to form the reservoir 16 below the flask, Fig. 3 showing the upward movement 40 of the patterns and stripping-plate and the point at which the patterns stop, the stripping-plate not having reached its highest position, Fig. 4 showing the stripping-plate raised to its highest position, and Fig. 5 showing the patterns withdrawn to their lowest position, the stripping-plate remaining in its highest position, and the next position being that shown in Fig. 2, the patterns being again 45 raised and the stripping-plate lowered with the parts again in position to receive sand. The mold is then ready to be removed. To protect the mold while being removed, a guard-plate 26, corresponding substantially to the shape of the upper face of the mold, is first 55 placed upon the flask and the flask rocked over until it rests thereon. This guard-plate has lugs 27 28 29 fitting above, below, and at the side of the flask to hold it in position thereon, and has also handles 30 for carrying 60 the flask by means of the guard-plate and placing it on the foundry-floor, as shown in Fig. 10. It will be noticed in said figure that the flasks have guide-lips 31 projecting out therefrom and fitting against guide-lugs 32, 65 by which the flask when carried out by the guard-plate is directed to exact position in

the line of molds. It will also be noticed that the lower edges of these flasks diagonally opposite the projecting guide-lips 31 rest upon the support, while the bases directly under 70 said projecting guide-lips recede, so that each flask when placed in position rests upon its outer lower edge 33, while it is closed to the mold against which it is placed and is raised from the support, and there is therefore a 75 tendency for the flask with the mold therein to press against the adjacent mold in building up the row or series of molds, the outer lower edges 33, above referred to, so forming a supporting-bearing for the flask only at one 80 side of the lower end thereof and causing such flask to swing or press against the adjoining flask.

If a section of a continuous runner is to be formed in the mold, this may be accomplished 85 by forcing a cutter or prod through a guide-hole 34 in the top pattern-plate until it strikes the stripping-plate 17. The orifices formed by such cutter or prod when the molds are placed face to face, as shown in Fig. 9, form 90 the continuous runner 35 shown in said figure.

It will be seen from the above that I am enabled to form these sand molds having mold-faces on each side thereof rapidly and by unskilled labor. Though the mold-faces 95 are of irregular shape, I am enabled by the cutting off of the sand surface corresponding to one face of the mold to provide proper proportions of sand above the patterns and stripping-plate for packing and to bring one face 100 of the mold to practically the desired shape, so that there is no necessity of movement of that portion of sand in the pressing operation. By cutting off the sand to practically the shape of the finished mold and employing 105 the pocket or reservoir below the flask the apparatus can be arranged so that an even packing of the sand within the flask sufficient to withstand the pressure of the mold and yet permit proper venting of the mold can be ob- 110 tained. The mold parts can be made so rapidly that the expense of this class of molds is very materially reduced, and when employed with the continuous runner extending 115 through the series of molds on the foundry-floor and the downtake-runners leading into the mold-cavities, as described in my Patent No. 539,209, the necessity of skilled labor either for the making or pouring of the molds is done away with. 120

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

1. The herein-described method of making sand molds having irregular faces on both sides thereof each forming part of the walls 125 of a mold-cavity, which consists in cutting or planing off one side of the sand to an irregular shape corresponding to the face to be formed on that side of the mold, confining the sand in that shape, applying pressure from 130 the opposite side of the mold in such a way as to shape the irregular face on that side of



the mold and to compact the mold, and then assembling two or more of such molds face to face to form the mold-cavity.

2. The herein-described method of forming sand molds having faces on both sides thereof each forming part of the walls of a mold-cavity, which consists in filling a flask with sand, then cutting or planing off one surface of said sand to an irregular shape corresponding to the face to be formed on that side of the mold, confining the sand in that shape, and then forcing a pattern from the opposite side of the mold toward the confining means to compact the mold and form the irregular mold-faces upon both sides thereof.

3. The herein-described method of forming sand molds having faces on both sides thereof each forming part of the walls of the mold-cav-

ity, which consists in filling the space within a flask above the stripping-plate and around and above the pattern with sand, then cutting or planing off the top surface of the sand to an irregular shape corresponding to the face to be formed on that side of the mold, confining the sand in that shape and then forcing the pattern and stripping-plate upwardly toward the top confining means to compact the mold and form the irregular mold-faces upon both sides thereof.

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

STEPHEN JARVIS ADAMS.

Witnesses:

ROBERT C. TOTTEN,  
F. W. WINTER.