

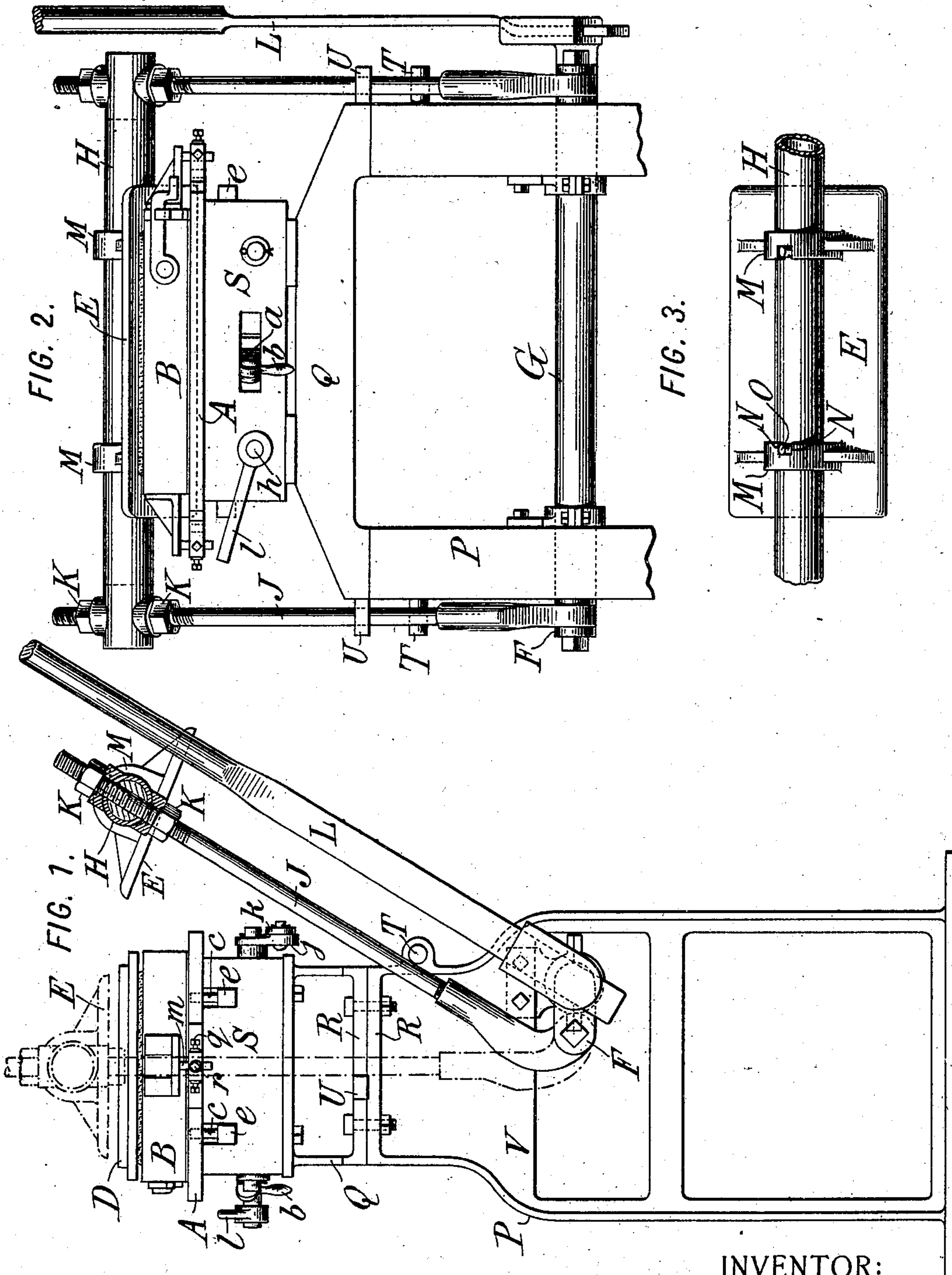
No. 720,690.

PATENTED FEB. 17, 1903.

A. E. HAMMER.
MOLD FORMING MACHINE.
APPLICATION FILED FEB. 4, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

Jed White
Donner H. White

INVENTOR:

Alfred E. Hammer,

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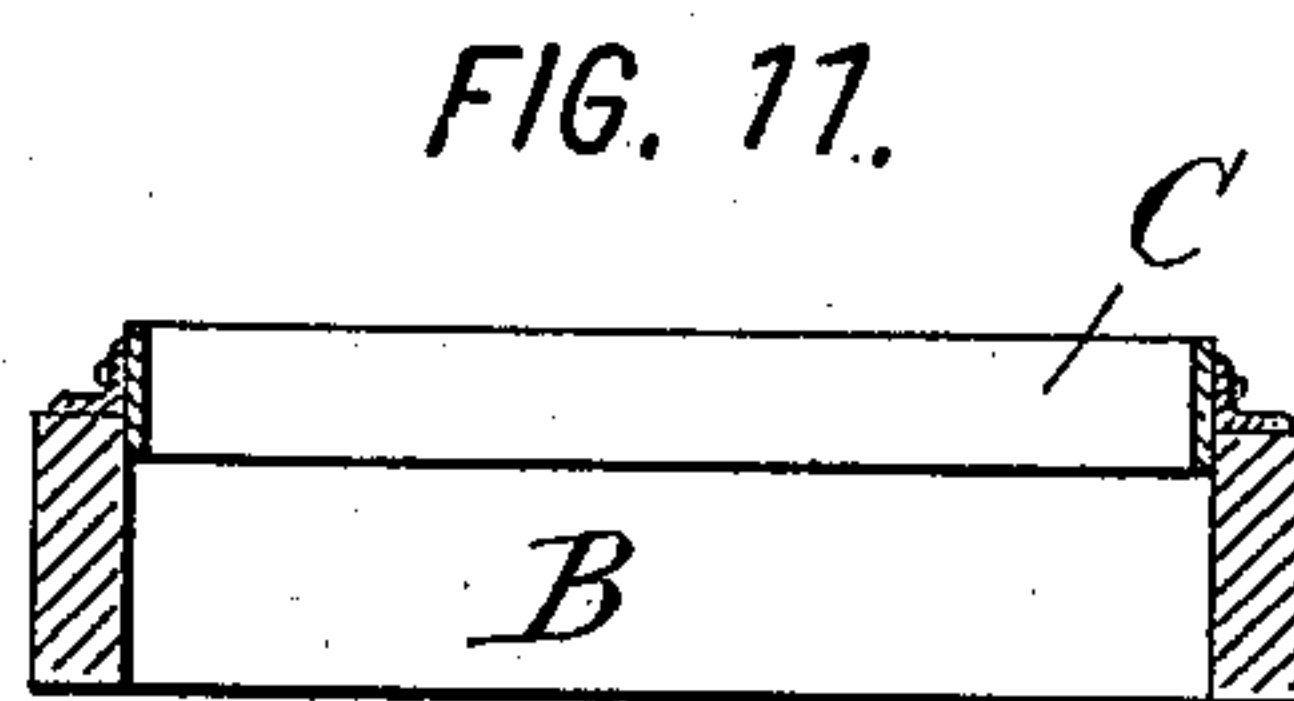
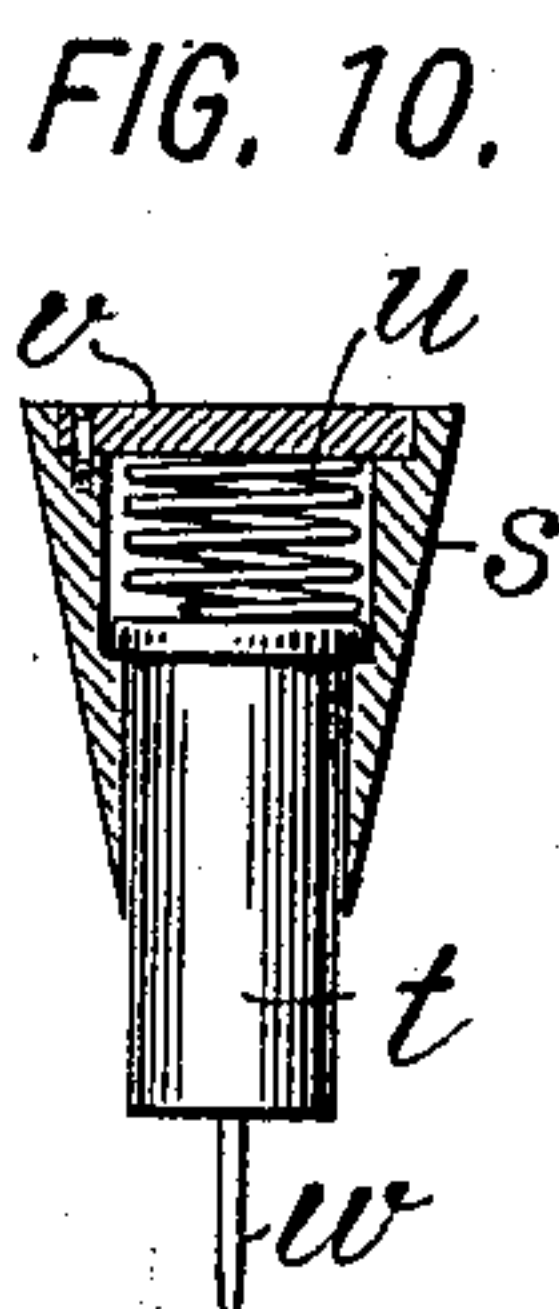
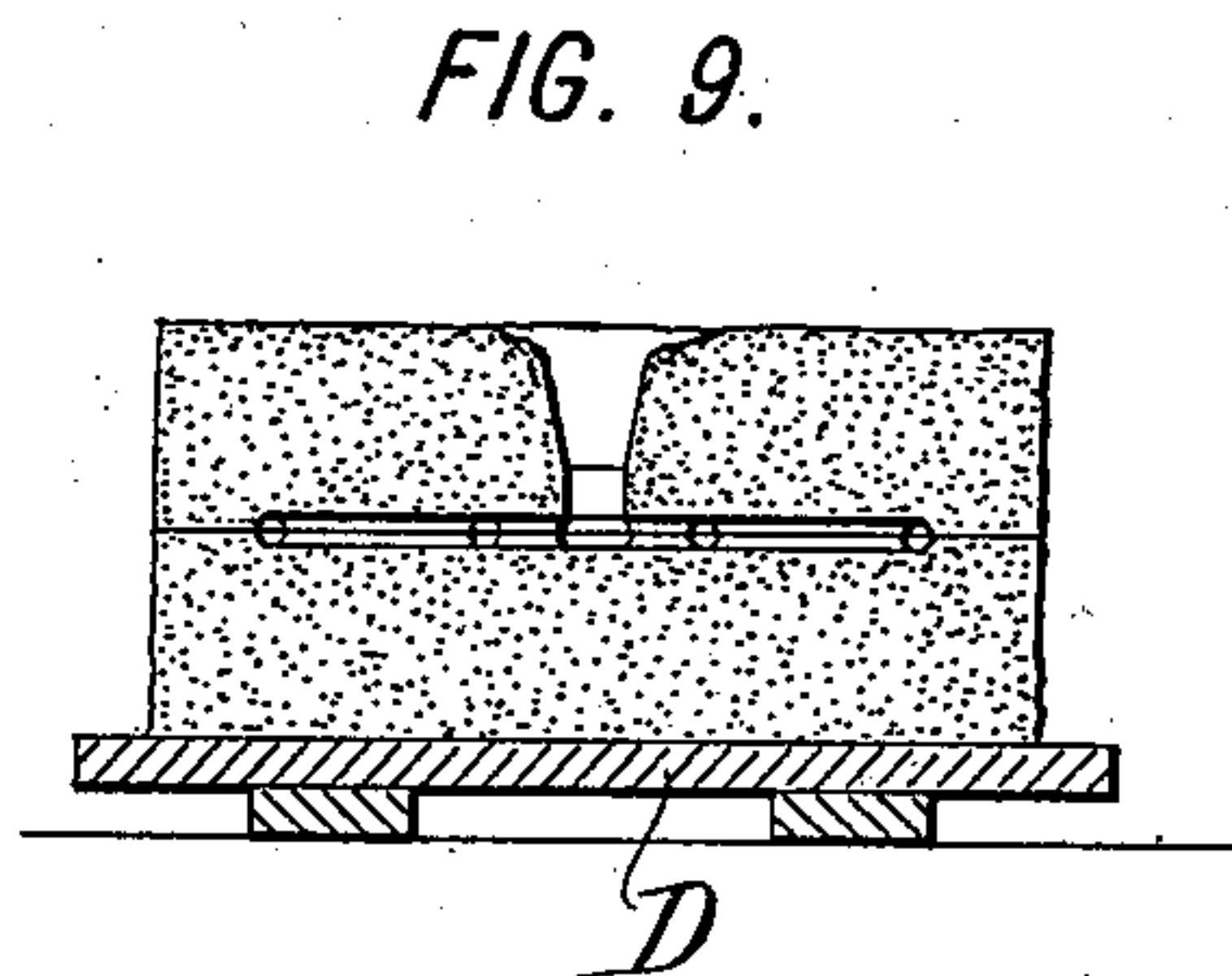
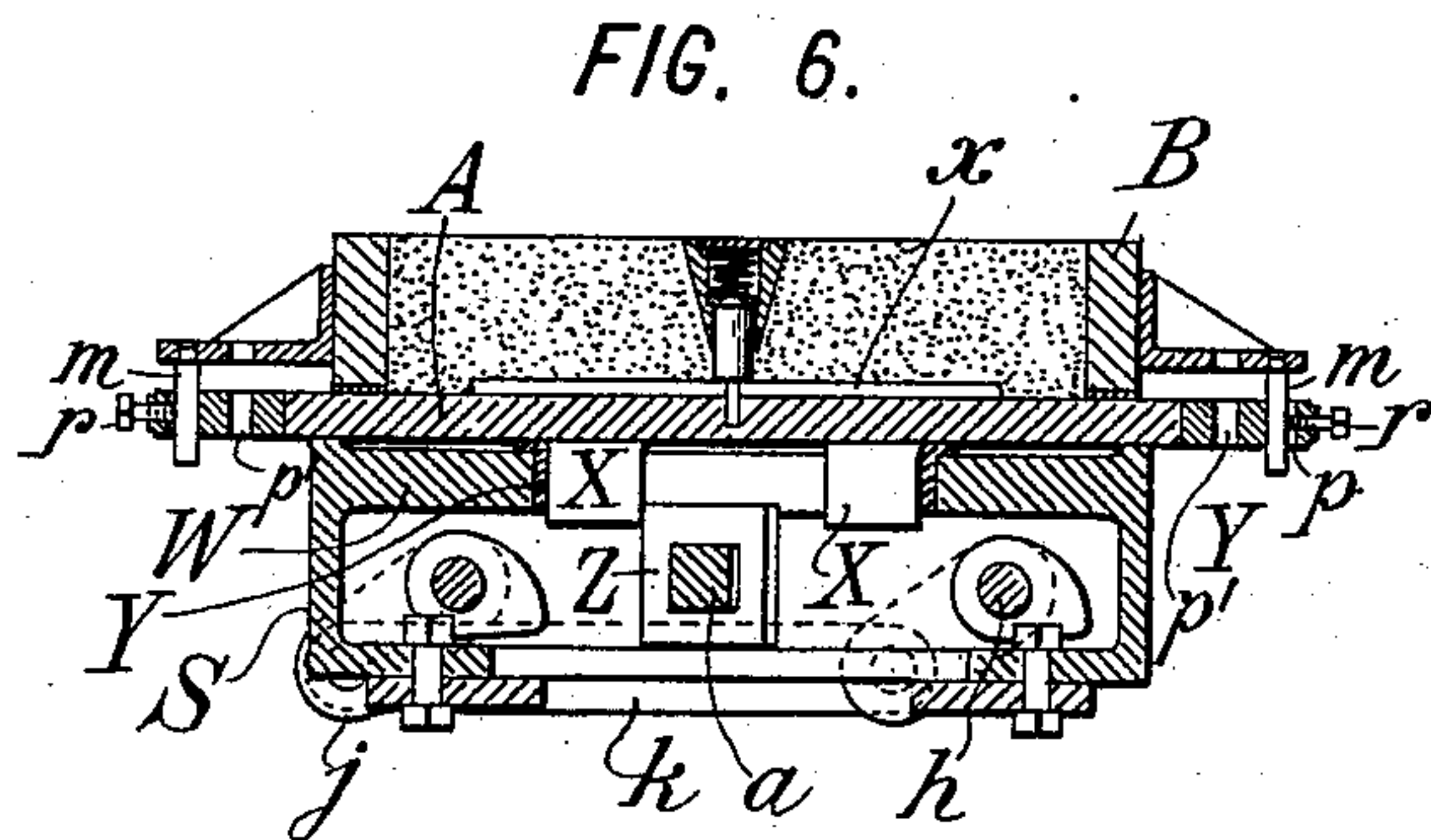
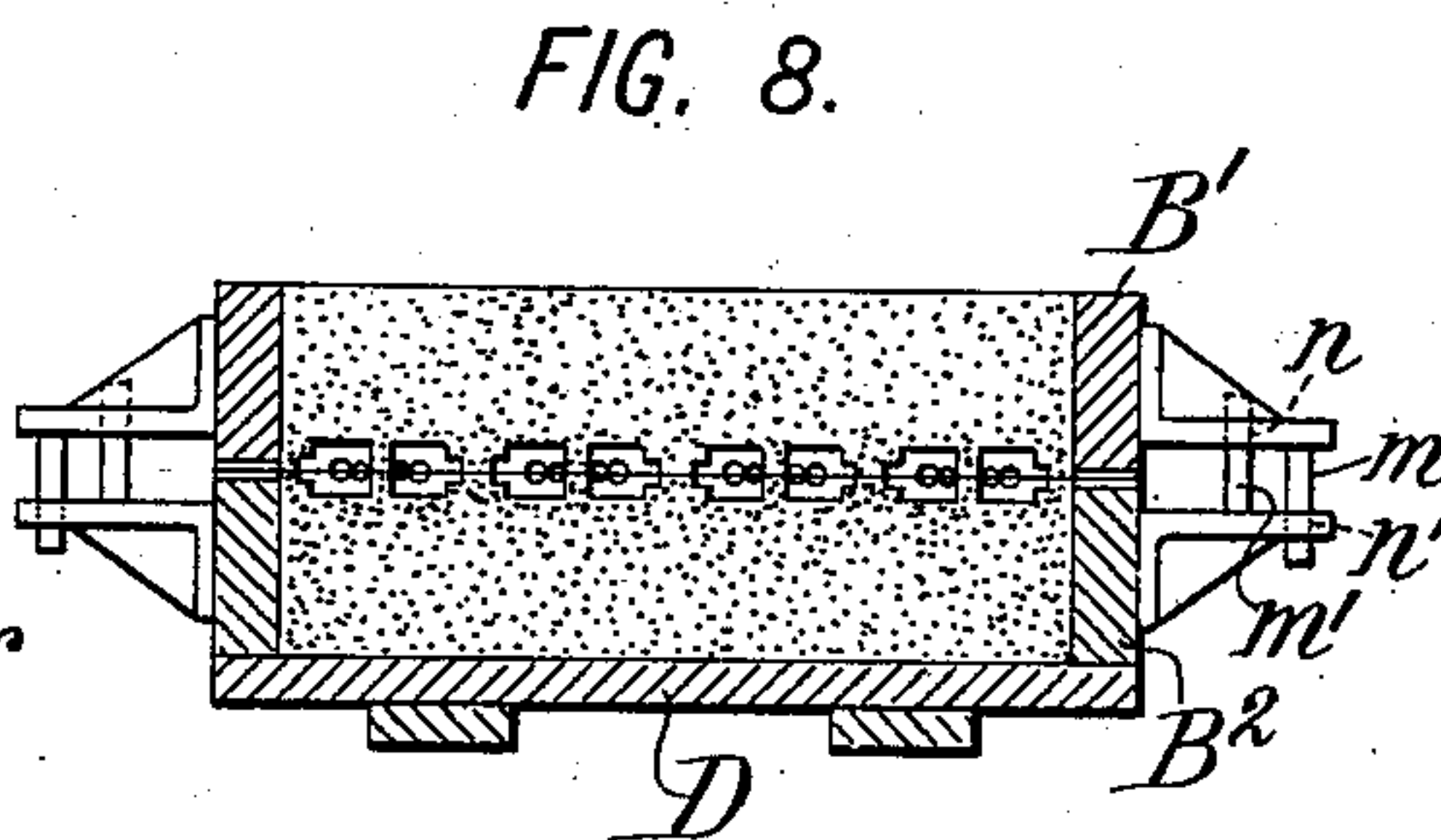
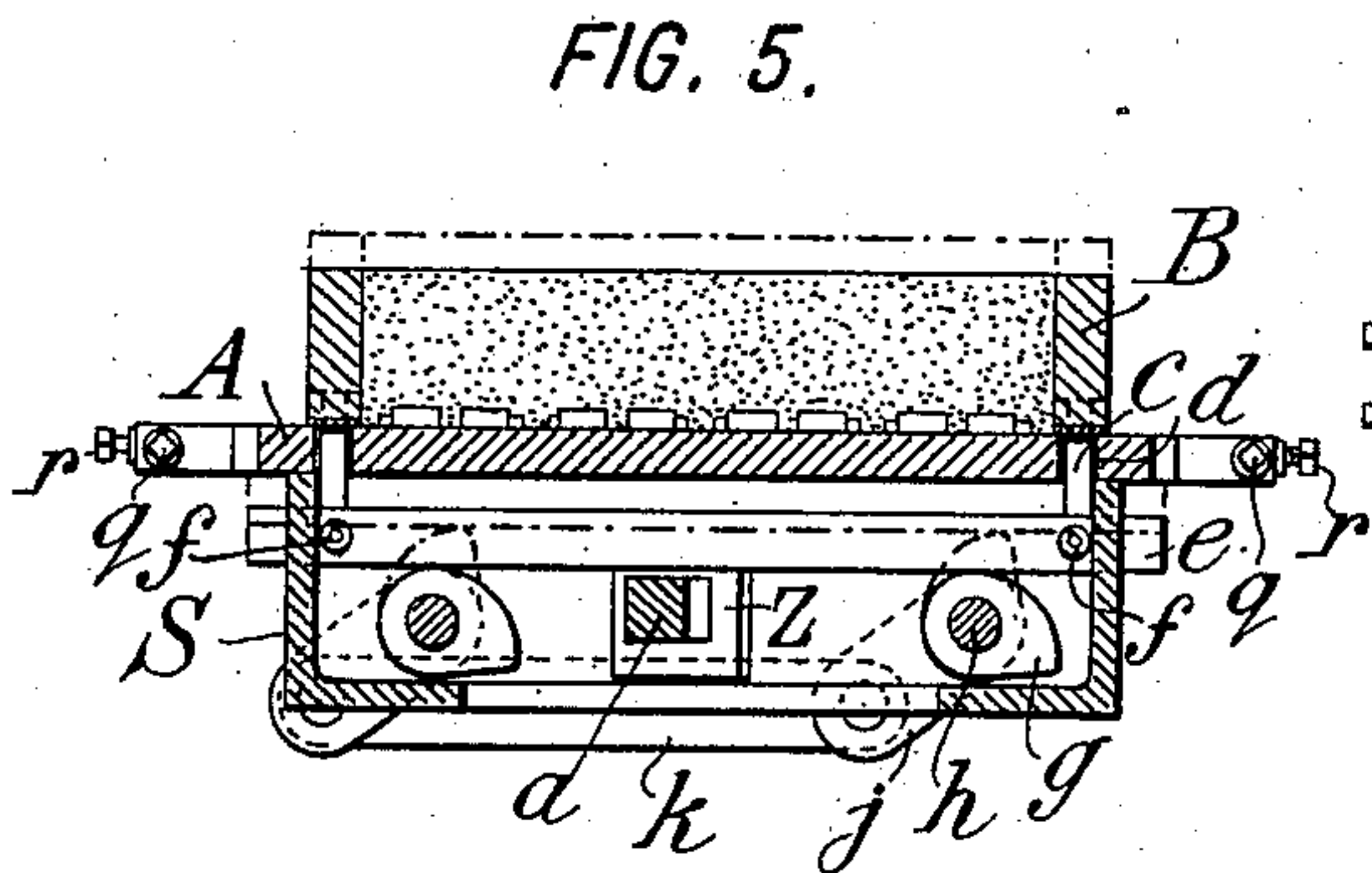
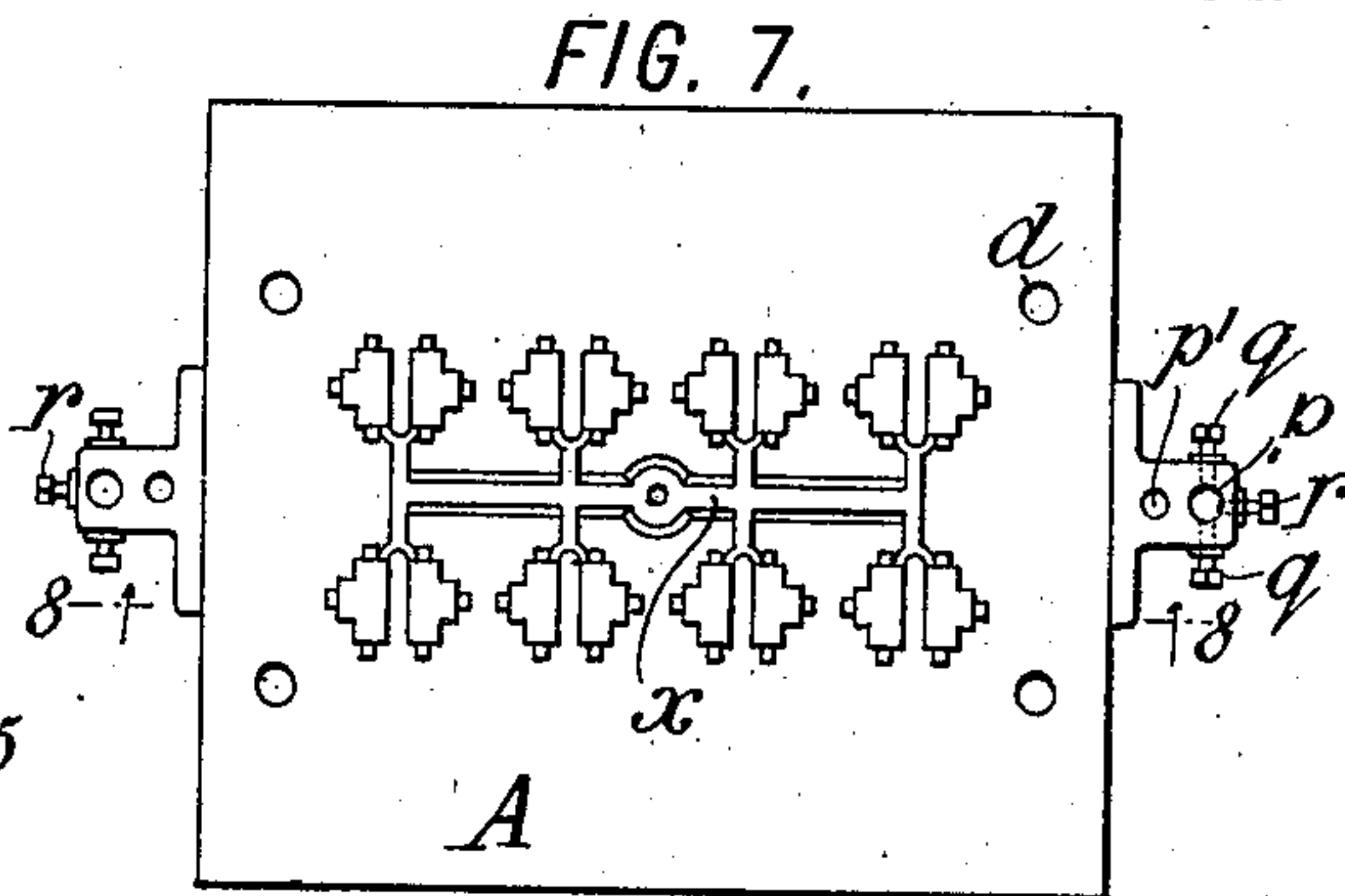
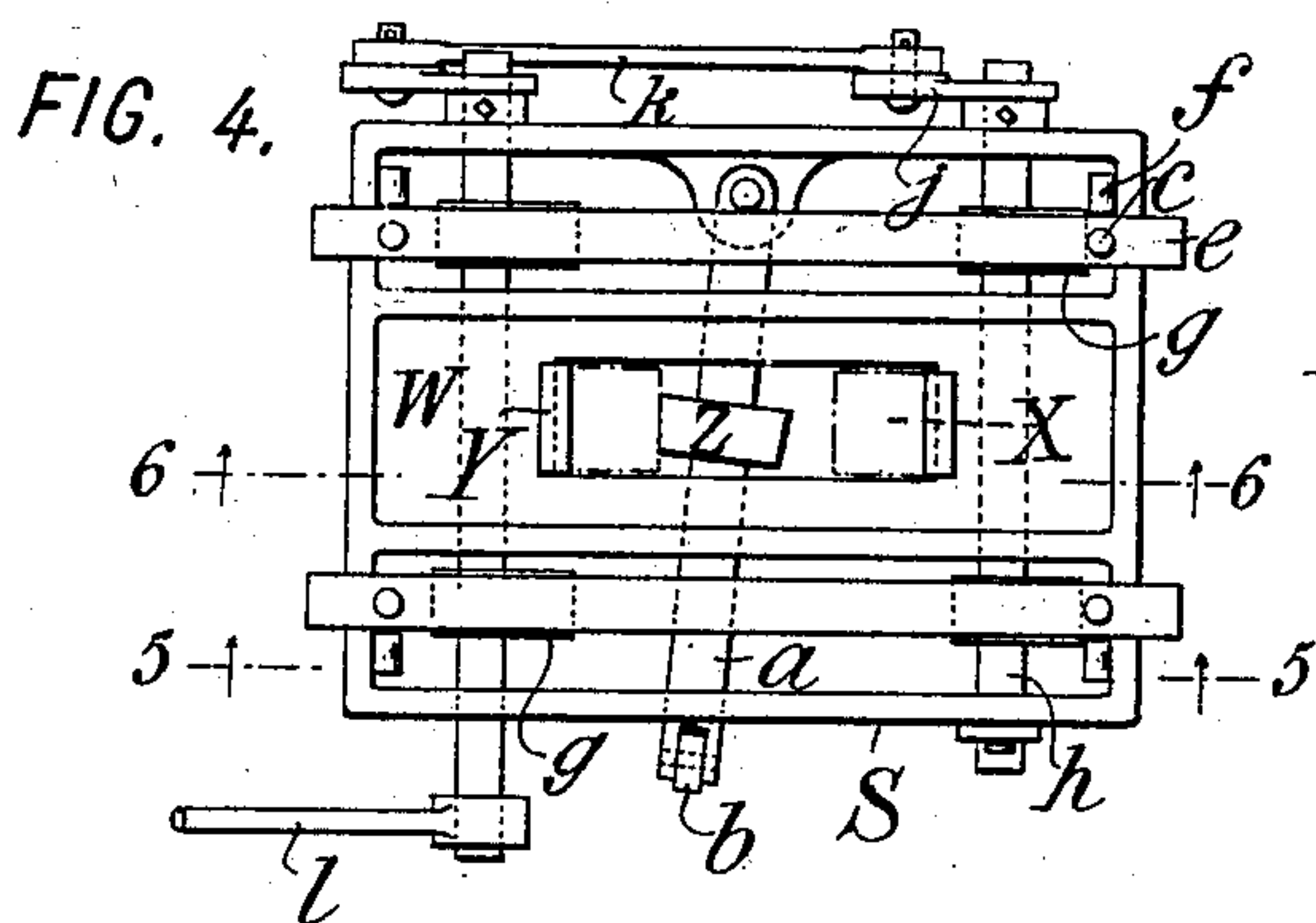
Arthur C. Orin & Co.

A. E. HAMMER.
MOLD FORMING MACHINE.

APPLICATION FILED FEB. 4, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

ALFRED E. HAMMER, OF BRANFORD, CONNECTICUT.

MOLD-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 720,690, dated February 17, 1903.

Application filed February 4, 1902. Serial No. 92,503. (No model.)

To all whom it may concern:

Be it known that I, ALFRED E. HAMMER, a citizen of the United States, residing at Branford, in the county of New Haven, in the State of Connecticut, have invented certain new and useful Improvements in Mold-Forming Machines, of which the following is a specification.

My invention aims to provide certain improvements in machines for forming sand molds, whereby the molds may be turned out very rapidly and may at the same time be well made.

My invention aims also to provide certain improvements hereinafter referred to in detail.

Referring to the accompanying drawings, illustrating a machine embodying my invention, Figure 1 is a side elevation of the complete machine. Fig. 2 is a front elevation, the lower part of the standards being cut away. Fig. 3 is a plan of the presser-plate and its supporting-shaft with the parts in the position of Figs. 1 and 2. Fig. 4 is a plan of what I have called the "mechanism-box" with the pattern-plate removed. Fig. 5 is a section on the line 5 5 of Fig. 4 with the half-mold formed thereon. Fig. 6 is a similar section on the line 6 6 of Fig. 4. Fig. 7 is a plan of the pattern-plate. Fig. 8 is a section of the complete mold in the flask, taken approximately on the line 8 8 of Fig. 7. Fig. 9 is a central longitudinal section of the finished mold ready for use. Fig. 10 is a section of the sprue. Fig. 11 is a section of one member of the flask, showing the false rim.

In the use of my invention the molds are formed by impressing the pattern upon sand held in the cope and the drag of the usual molder's flask, the novelty residing in the manner of handling the several parts and compressing the sand in the flask and in certain details hereinafter referred to.

A feature which simplifies the construction greatly as compared with machines now in use and which facilitates changing from one pattern to another is the use of a pattern-plate carrying a stationary pattern thereon and adapted to be supported in a stationary position on the fixed main frame of the machine, the mold being formed and compressed directly on said pattern-plate and being re-

moved without moving said plate. By reason of this operation the pattern-plate does not need to be fixed to the frame and is preferably held down merely by its weight and held against lateral movement by projections on its under side engaging suitable recesses on a fixed portion of the frame. The compressing of the mold on the pattern-plate is preferably accomplished by means of a presser-plate arranged to swing from the free ends of arms on a main shaft to a position above the mold and to be then brought down upon the mold by turning said shaft. Preferably the presser-plate is pivoted loosely on its immediate support, so as to bear on the mold with equal pressure at different points.

I preferably provide also means for lifting the mold and mold-box from the pattern-plate with a uniform gradual motion, which means, as illustrated, comprises a series of pins under the edge of the mold-box and adapted to be projected through the plate to lift the box and with it the mold. Before the box is lifted I subject the pattern-plate to a jarring action to free the mold from the pattern, this being obtained, preferably, by a hammer adapted to be vibrated to strike the pattern-plate without, however, moving the same relatively to the mold-box. This operation frees the mold from the pattern, so that when the lifting means are put into operation the mold separates in perfect shape from the pattern.

A feature of the machine which adds greatly to the ease of assembling the same is a mechanism-box, separable from the main frame of the machine and carrying, preferably, both a complete jarring device for jarring the pattern-plate to free the mold and a complete means for removing the mold from its pattern. This box may be merely an open frame, though preferably it is closed at the sides, as shown. Like the pattern-plate, it does not need to be fixed to the frame, but may be supported on the frame in any suitable manner which will prevent lateral displacement. Preferably, however, it is bolted down, as it is not often necessary to remove it.

Referring to the accompanying drawings, A indicates the pattern-plate, which has preferably a considerable margin around the pattern for receiving and supporting the mold-box B directly thereon, these two parts being held rig-

idly together by means hereinafter described. With the parts in this position the mold-box is filled with sand, which is tamped, and by means of a false rim C, Fig. 11, is filled to a point somewhat above the upper edge of the frame, the rim being then removed, leaving the sand standing, as shown in Figs. 1 and 2. A press-board D is then placed on the sand, this being just an ordinary board with a pair of cleats running across it to distribute the pressure.

E is a presser-plate adapted to swing, as shown in Fig. 1, to and from a position over the press-board D. For this purpose the presser-plate is pivoted to swing from arms F on a main shaft G, Fig. 2, the presser-plate being carried directly upon a shaft H, which has arms J pivoted to the arms F of the main shaft. The shaft H is adjustable on the arm J for use with mold-boxes of different heights by means of nuts K screwing on the threaded ends of the arms J. When the plate E has been pulled over to the dotted-line position of Fig. 1 over the press-board D, the main shaft G is turned by means of the operating-arm L, which, through the arms F, depresses the plate and presses the mold solidly down against the pattern-plate to make a hard sharp mold. The compressed mold is shown in Figs. 5 and 6.

In order to equalize the pressure of the presser-plate E upon the various parts of the mold, in which there may be varying quantities of sand, it is preferably pivoted on its support. This arrangement may be simply accomplished in the manner shown in Fig. 3, in which the plate E is carried on the shaft H by means of sleeves M, preferably cast integral with the plate and loose on the shaft, so as to permit the plate to assume any desired position relatively to the shaft when it is pressed down upon the matrix. It is desirable, however, that the movement of the presser-plate on the shaft should be restricted, so that in the open position of Fig. 1 the plate should not be horizontal, but should be somewhat inclined upward at the edge nearest the machine, so that the plate may be drawn easily and without obstruction up and over the rear edge of the press-board. This may be accomplished by forming the sleeves M with stops or shoulders N and by providing similar stops in the form of pins O upon the shaft, the movement of the plate being restricted in proportion to the arc between the two opposite stops N. These stops serve at the same time to prevent longitudinal movement of the plate relatively to the shaft. The whole provides an extremely simple manner of mounting and connecting these parts.

The frame of the machine is constructed strongly and rigidly with a pair of upright side supports P, connected at the top by a bridge Q, these parts being preferably connected together by means of webs R, Fig. 1, which are bolted to each other. The mechanism-box S is supported upon and bolted di-

rectly to similar webs formed at the top of the bridge Q. Suitable stops are provided on the frame, such as T and U, for limiting the movement of the arms J of the presser-plate. The shaft G is preferably supported in bearings bolted to vertical webs V, Fig. 1, on the uprights P.

Preferably the mechanism for freeing and lifting the mold from the plate is all mounted in a frame S, which I have called a "mechanism-box" and which is closed at the sides, so as to prevent sand getting into the mechanism, but which is open at the bottom, being preferably flanged and bolted to the webs of the bridge, as indicated in Fig. 6. The box is provided with a diaphragm W in its upper portion, the edges of the box and of the diaphragm being planed to give an even bearing to the pattern-plate. The pattern-plate is provided on its under side with a pair of lugs X, which extend downward through a slot in the center of the diaphragm W and hold the pattern-plate rigidly in position on the box, the outer faces of the lugs fitting against the outer edges of the slot and preferably packing-strips Y of leather or the like being inserted between the lugs and the edges of the slot to make a good fit and to prevent excessive noise when the plate is jarred to free the pattern from the mold.

For jarring the pattern-plate a hammer Z is provided which is mounted on an arm a, pivoted to the rear side of the box and extending through a slot in the front thereof, Fig. 2, its outer end being provided with a pivoted handle b. By swinging the handle b back and forth the hammer is vibrated between the lugs X, and striking these lugs jars the plate, with the result stated. During this jarring no relative movement of the plate and matrix-frame can take place, these two being rigidly connected, as explained hereinafter. This arrangement of a horizontally-vibrating hammer positioned below the plate makes the entire mechanism very compact.

The lifting of the mold-box from the pattern-plate is preferably accomplished by a series of pins c, which project through holes d in the pattern-plate at points below the edge of the mold-box. These pins are supported upon bars e in the mechanism-box, the ends of which are supported in slots in the sides of the box, Fig. 1. These bars are guided in their vertical movement by guide-rollers f bearing against the side walls of the box. The lifting movement of the bars e is produced by means of a series of cams g on shafts h running from front to rear of the box and connected for simultaneous movement by means of cranks j and a link k. One of the shafts h is provided with an operating-crank l at the front of the machine, as shown. The two operating members or handles b and l, by which the jarring and lifting actions are produced, are near together and at the front of the machine, so as to be readily accessible from the same point.

For fixing the two parts of the flask together and also for fixing the parts of the flask separately on the pattern-plate I provide an improved arrangement of steadying-pins or similar projections. As shown in Fig. 8, the cope B' has at each end a steadying-pin *m* and a recess or hole *n*, adapted to engage a similar pin *m'* on the drag B², the drag having also a hole *n'* for receiving the pin *m*. These pins and holes are preferably formed on brackets at opposite sides of the flask. Coöperating with the pins *m* and *m'* there are provided on brackets at opposite sides of the pattern-plate holes *p* and *p'*, the outer hole being in a position to receive the pin *m* of the cope, and the inner hole *p* being in position to receive the pin *m'* of the drag. One of the holes (in this case *p*) is made adjustable, so that if there be any slight lack of symmetry in the two parts of the flask it may be corrected by slightly changing the position of the half-mold in one of such parts. The bolts *q* extend into the hole *p* from opposite sides to effect any desired lateral adjustment, while the bolts *r* at opposite ends of the plate effect the desired endwise adjustment.

The sprue which I use is preferably composed of an upper conical member *s* and a lower cylindrical member *t*, arranged to telescope in the upper member and to be held in the extended position by means of a spring *u*, held in place by a top plate *v*. The lower member *t* has the usual pin *w* at its lower end, which enters a hole provided for it in the gate *x*, Figs. 6 and 7. This sprue is especially useful with my improved machine, since it yields to any pressure which comes upon it either during the tamping by hand or the pressing operation of the machine.

The function and operation of the several elements of my machine having been described in detail, I will briefly state the mode of operation of the machine as a whole. Any suitable pattern-plate is first placed upon the mechanism-box S, with its lugs X in the slot of the diaphragm. A drag is then placed in inverted position upon the pattern-plate, with its pins *m'* entering the holes *p'* to fix it against lateral movement. Sand is then filled in and tamped by hand in the usual way, being filled to a height somewhat above the edge of the drag by means of the rim C. The press-board D, which is afterward to serve as a bottom board for the finished mold, is then placed on the sand, the presser-plate E pulled over onto the press-board, and the lever L pulled forward, compressing the sand. The lever L and plate E are then returned to their original position. The hammer Z is vibrated to jar the pattern, and either simultaneously with such jarring or immediately thereafter the crank *l* is depressed gradually to lift the drag slowly and evenly from the pattern-plate. The operator then holding the board D in place inverts the drag upon a suitable table or other place. The cope is then laid with its lower face on the face of the pattern-

plate, the sprue is inserted in the gate, and the same operations of the machine are repeated, the sprue being withdrawn at the end. Cores, if any are necessary, are placed in the cavities of the drag, and the cope is placed on the drag, with the pins *m* and *m'* in proper engagement with their holes. The flask is then opened and taken away from the mold, leaving the mold in the shape shown in Fig. 9, when it is ready for pouring in the metal.

Though I have described with great particularity of detail an apparatus embodying my invention, yet I am not to be understood as limiting the same to the specific embodiment disclosed. Various modifications in the details and combinations of the parts are possible to those skilled in the art without departing from the invention.

What I claim is—

1. In a mold-forming machine, the combination with a fixed portion of the frame, of a pattern-plate supported in a stationary position on said frame and removable therefrom to permit the ready substitution of another plate therefor, said plate carrying a stationary pattern thereon, means for forming a mold directly on said removable plate, means for removing said mold without moving said plate, a presser-plate adapted to move to and from a position over said mold, and means for depressing said presser-plate to compress said mold on said pattern-plate.

2. In a mold-forming machine, the combination with means for forming and supporting a mold, of means for compressing said mold comprising a presser-plate support mounted to swing to and from a position over said mold, a presser-plate pivoted loosely on said support so as to equalize the pressure on said mold, means for restricting the movement of said presser-plate on its support to hold it in position to swing over the mold, and means for moving said support to press said plate against said mold.

3. In a mold-forming machine, the combination with means for forming and supporting a mold, of means for compressing said mold comprising a presser-plate shaft mounted to swing to and from a position over said mold, a presser-plate pivoted loosely on said shaft so as to equalize the pressure on said mold, stops on said shaft engaging coacting stops connected to said plate to restrict the movement of said presser-plate on its support to hold it in position to swing over the mold, and means for moving said shaft to press said plate against said mold.

4. In a mold-forming machine, the combination of a stationary pattern-plate carrying a stationary pattern thereon, means for supporting a mold-box in position to form a mold directly on said plate, a series of pins normally below said box, horizontal bars *e* each supporting a plurality of said pins and guided in the frame of the machine, cams *g* adapted to raise said bars and thereby to lift said mold and box from said plate, and shafts *h* carry-

ing said cams and connected together to move simultaneously.

5. In a mold-forming machine, the combination with a frame, of a pattern-plate supported in a stationary position on said frame and removable therefrom to permit the ready substitution of another plate therefor, said plate carrying a stationary pattern thereon, means for supporting a mold-box directly on said plate in position to form a mold thereon, and means for jarring said plate to free the pattern from the mold.

6. In a mold-forming machine, the combination with a frame, of a pattern-plate supported in a stationary position on said frame and removable therefrom to permit the ready substitution of another plate therefor, said plate carrying a stationary pattern thereon, means for supporting a mold-box directly on said plate in position to form a mold thereon, and a hammer adapted to strike said plate to jar the same and free the pattern from the mold.

7. In a mold-forming machine, the combination with a frame, of a pattern-plate supported in a stationary position on said frame and removable therefrom to permit the ready substitution of another plate therefor, and means for supporting a mold-box in position to form a mold directly on said plate, said plate having depending lugs X, a hammer Z below said plate, and a lever *a* carrying said hammer and arranged to oscillate the same between said lugs to jar said plate and free the pattern from the mold.

8. In a mold-forming machine, the combination of a pattern-plate, means for supporting a mold-box in position to form a mold thereon, said plate having depending lugs X, a hammer Z below said plate, and a lever *a* carrying said hammer and arranged to oscillate the same between said lugs to jar said plate and free the pattern from the mold, a series of pins normally below said box, horizontal bars *e* each supporting a plurality of said pins and guided in the frame of the machine, cams *g* adapted to raise said bars and thereby to lift said mold and mold-box from said plate, and shafts *h* carrying said cams and connected together to move simultaneously.

9. In a mold-forming machine, the combination of a pattern-plate, means for forming a mold directly on said plate, a mechanism-box, and mechanism in said box for lifting a mold from said pattern-plate, said mechanism-box and plate having interengaging provisions whereby said plate is supported on

said box in fixed position to render said mechanism operative and is readily removable therefrom to permit the substitution of another plate therefor.

10. In a mold-forming machine, the combination of a pattern-plate, a mechanism-box, said box being slotted and said plate having lugs on its under side adapted to enter said slot and hold said plate in position, and a hammer in said box mounted to vibrate between said lugs to jar said plate.

11. The combination with a pattern-plate, of a flask comprising a cope and a drag, said cope having a projection and a recess, said drag having a projection and recess adapted to engage the recess and projection on said cope, and said plate having recesses adapted to engage the projections on said cope and drag.

12. The combination with a pattern-plate, of a flask comprising a cope and a drag, said cope having a projection and a recess, said drag having a projection and recess adapted to engage the recess and projection on said cope, and said plate having recesses adapted to engage the projections on said cope and drag, one of said recesses of the plate being adjustable.

13. In a mold-forming machine, the combination of a pattern-plate having a lug depending from its under side, of a hammer arranged to vibrate in a substantially horizontal direction and under said plate and to strike said depending lug whereby to jar said plate and free the pattern from the mold.

14. In a mold-forming machine, the combination with a hammer for jarring a pattern-plate to free it from a mold formed thereon, and a handle for said hammer, of a box carrying said hammer and said handle and separable from the main frame of the machine.

15. In a mold-forming machine, the combination with a hammer for jarring a pattern-plate to free it from a mold formed thereon, and a handle for said hammer, of mechanism for removing the mold from its pattern, an operating-lever for said mechanism permanently connected thereto, and a box carrying said hammer and handle and said mechanism and lever and separable from the main frame of the machine.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALFRED E. HAMMER.

Witnesses:

A. E. ROWE,
L. J. NICHOLS.