

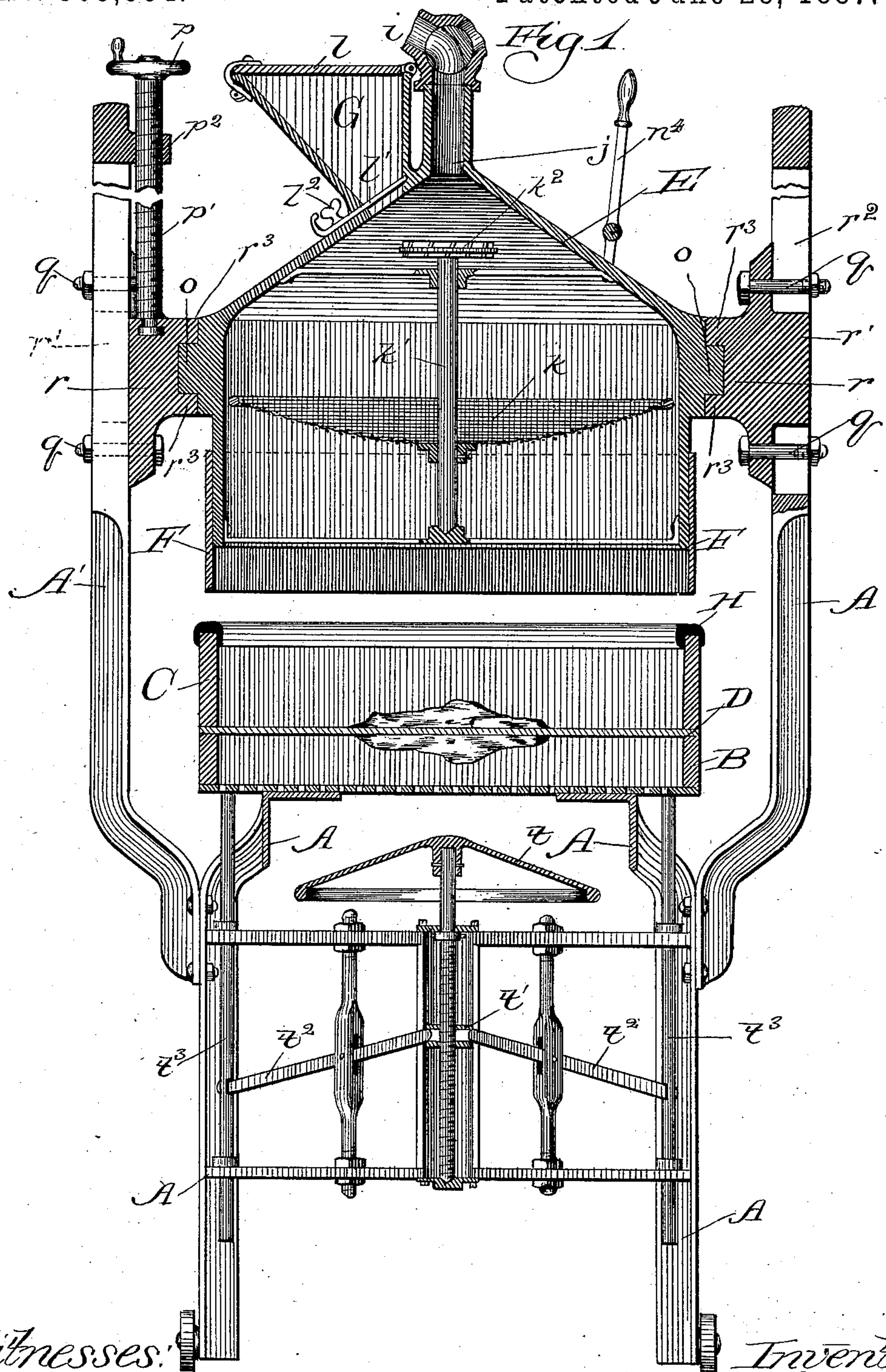
(No Model.)

3 Sheets—Sheet 1.

J. R. DAVIES.  
SAND MOLDING MACHINE.

No. 365,584.

Patented June 28, 1887.



Witnesses:  
Chas. E. Gaylord,  
J. W. Tyneforth

Inventor:  
John R. Davies  
By Dyrenforth and Dyrenforth.  
Attorneys

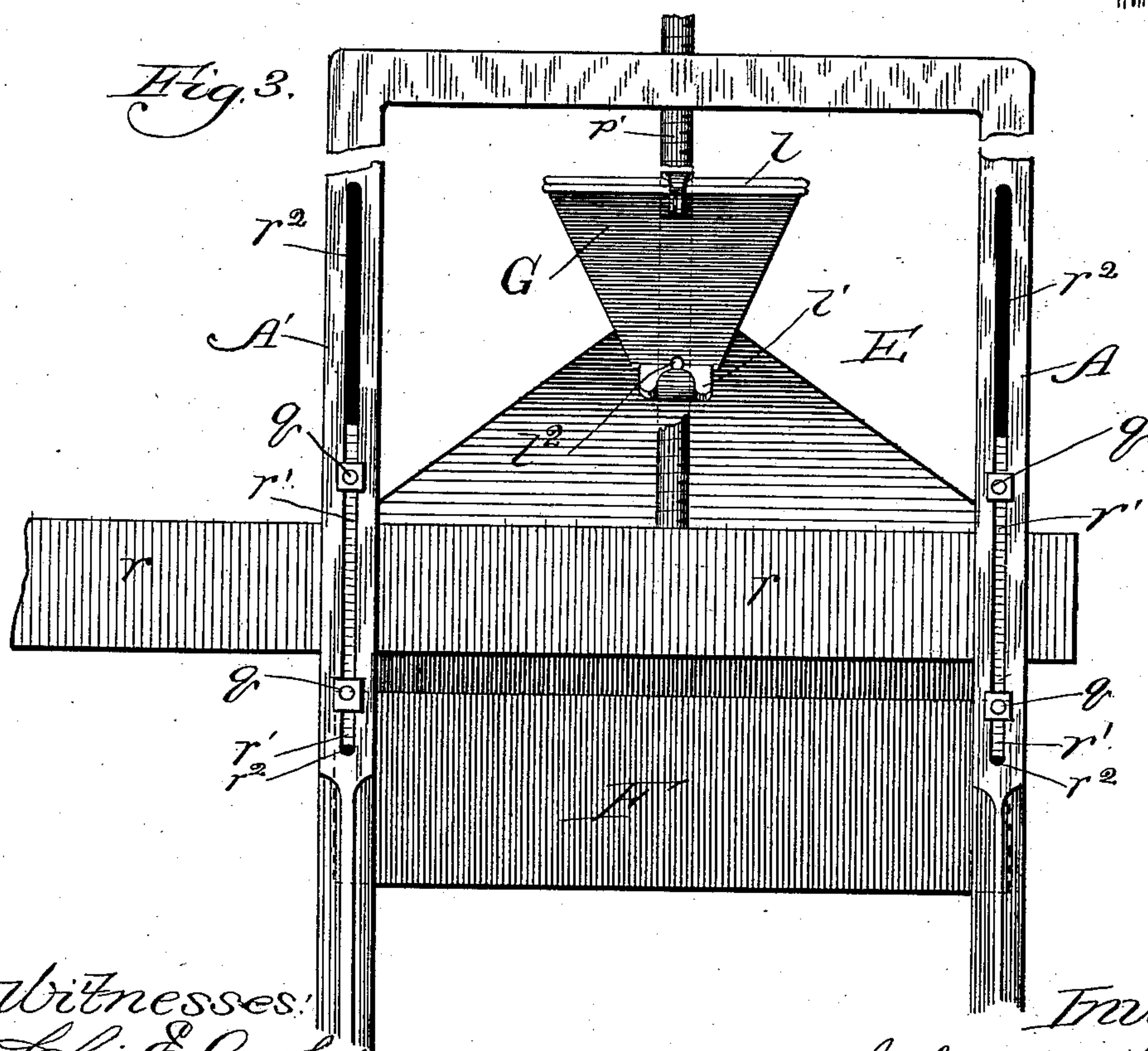
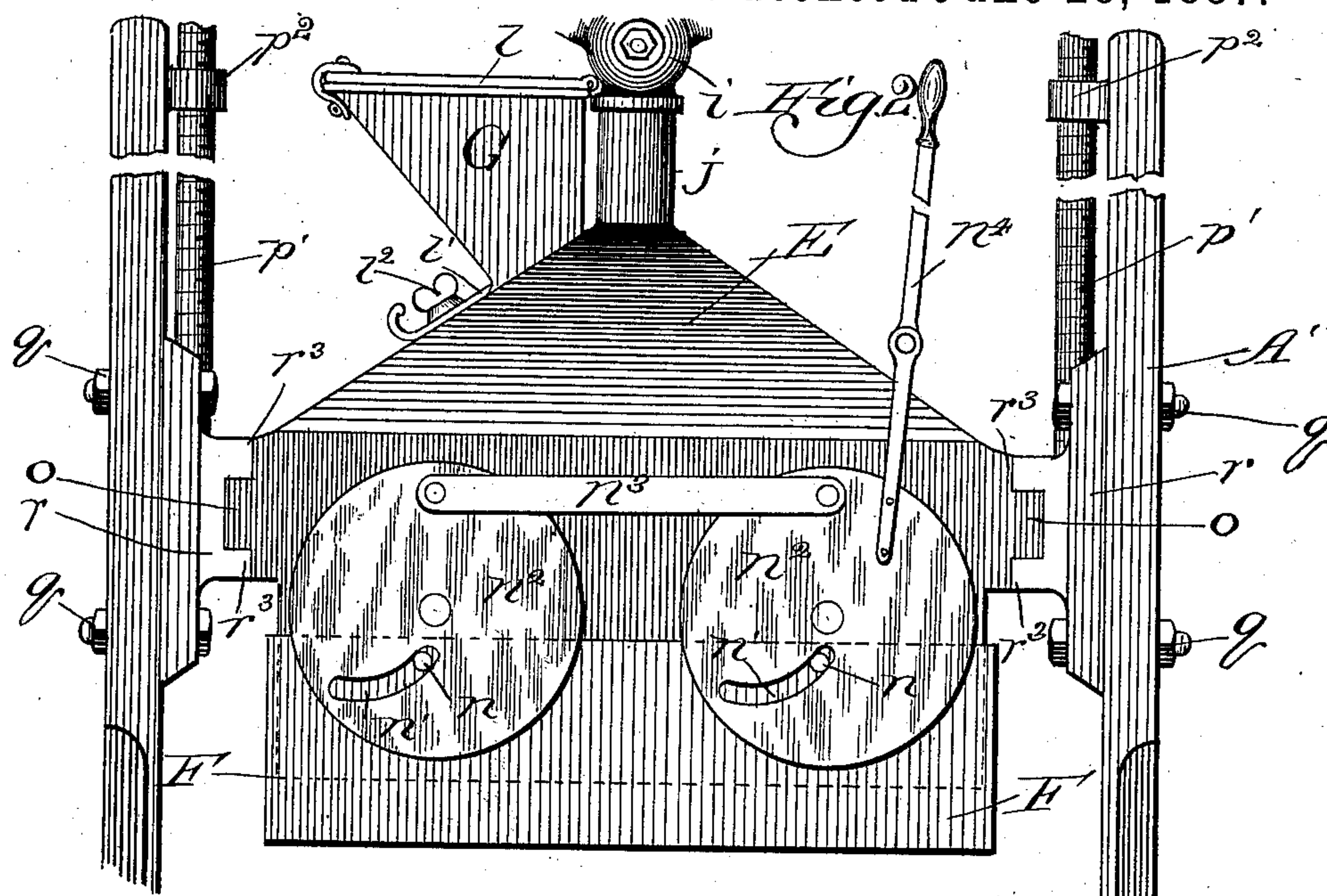
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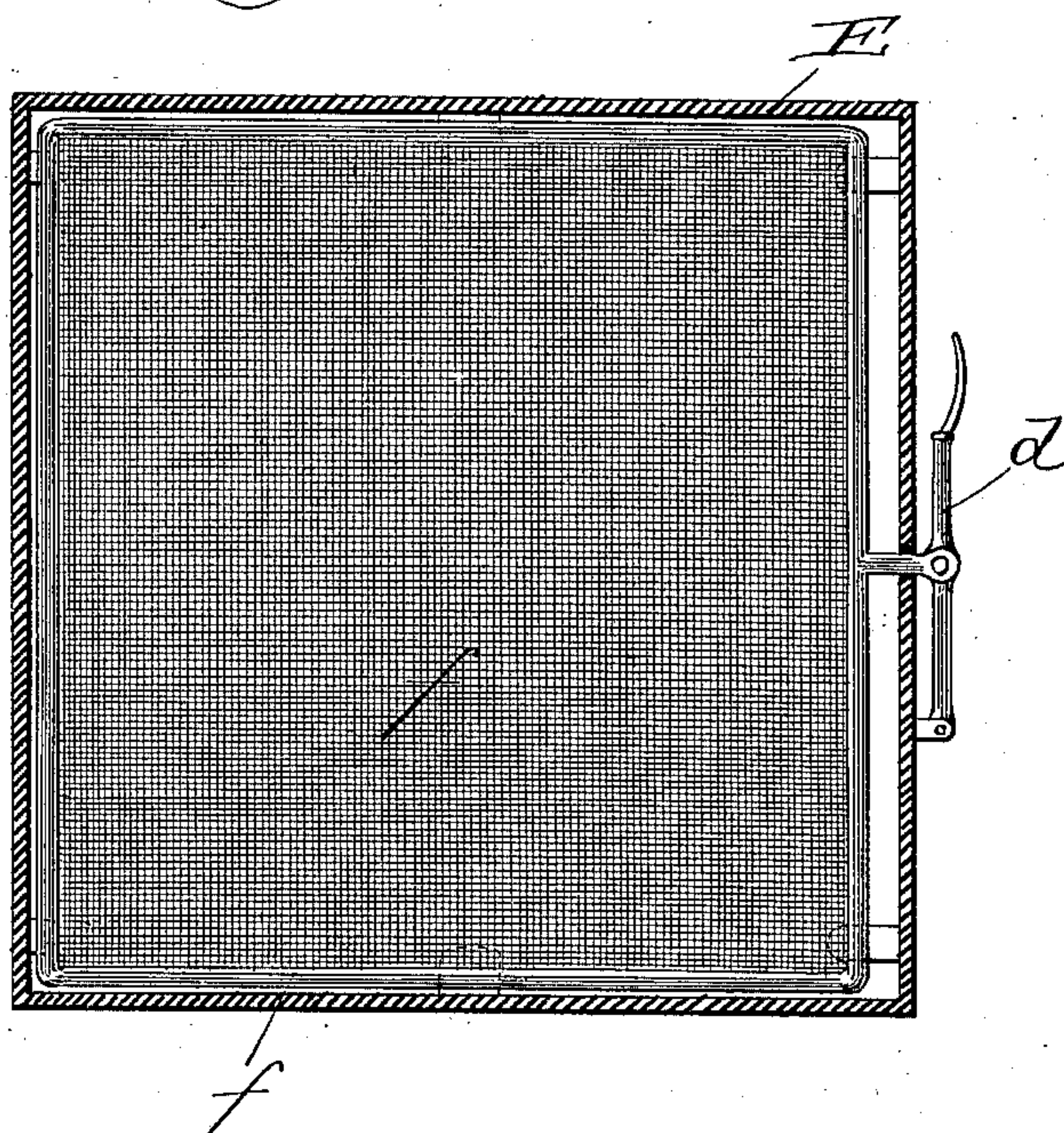
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*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

JOHN R. DAVIES, OF CHICAGO, ILLINOIS.

## SAND-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,584, dated June 28, 1887.

Application filed April 21, 1887. Serial No. 235,685. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN R. DAVIES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have  
5 invented a certain new and useful Improvement in Molding Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My present invention relates to an improvement in sand-molding machines, and it relates particularly to an improvement in the molding apparatus described and claimed in Letters Patent of the United States No. 300,853,  
10 granted to me June 24, 1884.

15 The invention forming the subject-matter of the aforesaid Letters Patent, as also that hereinafter described and claimed in the present application, is designed for molding objects of comparatively small dimensions and consequent light weight.

20 The means heretofore generally employed for packing and compressing the "green sand" about the pattern in forming molds for casting have been attended with many disadvantages and imperfections. When the operation is  
25 conducted by hand, (this being the common practice, and the judgment and skill of the operator form the only reliance for effective work,) the molds produced thereby are often  
30 lacking in the necessary evenness and homogeneity of texture, and flaws in the casting result from such imperfections in the molds, thereby seriously affecting the value of the product. Even where great experience enables the molder with considerable certainty to  
35 avoid these defects merely human judgment is always liable to err, so that the outcome cannot be relied upon for perfection, and, besides, the desired rapidity of execution cannot be  
40 obtained. Realizing these defects in the common method of packing molds by hand, I am aware of certain devices for compressing the dampened sand in a flask around the pattern by means of fluid-pressure exerted upon an  
45 elastic diaphragm in contact with the surface of the sand; but however much may be gained in rapidity of operation by the use of such devices, the molds so formed are lacking in uniformity and subject in considerable degree to the defects incident to the hand process. Where the molds to be formed are of  
50 such size or character that the use of braces

for the sand or ribs is necessary, such means of compression are peculiarly inadequate, since it is not possible by a pressure exerted vertically upon the sand to cause it to unite beneath these obstructions with the same compactness and consistency that the unobstructed pressure will produce between the braces.

It is my object to compress the sand around  
60 and about the pattern in a flask by means of direct fluid-pressure, thereby forming molds of equal compactness throughout with great rapidity.

To carry my invention into effect, I employ a  
65 hollow dome or receptacle movably supported above the flask, so that it can be slid out of the way when the flask is to be manipulated, a suitable connection for the introduction of compressed air or other fluid-pressure, a vertically-sliding jacket about the lower portion  
70 of the dome, provided with means for adjusting at will with relation to the flask, a suitable "embouchure" or packing to insure air-tight union of the flask and jacket and afford an  
75 extension of the flask, and a controllable sand-supply communicating with the dome in connection with sifting mechanism within the dome for properly distributing the sand into the flask.

80 My invention consists, broadly, in means adjustable upon molds, whereby the sand is packed by air-pressure exerted directly upon the sand.

My invention consists, further, in the general  
85 features of construction above outlined, and also in certain details of construction and combinations of parts, all as hereinafter clearly set forth, and illustrated in the accompanying drawings, in which—

90 Figure 1 is a sectional view of my improved device having some parts in elevation, and showing the right-hand support in section through its median line and the left-hand support in section on a line in front of the middle, to permit representation of the screw device for raising and lowering the dome; Fig. 2, a front elevation of the dome portion and attendant mechanism; Fig. 3, a side elevation of the same; and Fig. 4, a sectional plan view  
95 taken through the lower portion of the dome, illustrating a modification.

100 A is the frame-work of the device, supported upon casters, and carrying mechanism



comprising a hand-wheel,  $t$ , operating by means of a nut,  $t'$ , upon its screw-threaded shaft, through levers  $t^2$  and lifters  $t^3$ , to manipulate the drag B and cope portion C of the flask and match-plate D, all as more fully described in my aforesaid Letters Patent.

The immediate purpose of the mechanism hereinafter described is to supplement the operation of the device for handling the flask described in my aforesaid Letters Patent by providing means for packing the same by direct air pressure.

A' are vertical extensions of the frame work A, provided with slots  $r^2$ , as shown in Fig. 3, to receive tongues  $r'$  of horizontal bolsters  $r$ , passing at each end of the device from front to rear, and afford guides for vertical adjustment of the bolsters within the limits of the slots. Hand-wheels  $p$  upon screws  $p'$ , passing through nuts  $p^2$  at the upper ends of the extensions A', afford adjusting means for the bolsters  $r$ , and when properly adjusted the bolsters are firmly secured in the desired position by bolts  $q$ .

E is a square dome or receptacle, having, preferably, the pyramidal-shaped top shown, and supported at each end by tongues  $o$ , moving within guides  $r^3$  of the bolsters  $r$ , which latter extend backward sufficiently far, as shown in Fig. 3, to permit the dome E to be slid out of the way while the flasks are being placed in position or removed. A jacket, F, provided with a suitable packing to prevent escape of air, surrounds the lower portion of the dome E, and is vertically adjustable upon it by means of pins  $n$ , (see Fig. 2,) formed upon the jacket, passing through eccentric slots  $n'$  in disks  $n^2$ , pivoted at their centers in pairs upon opposite sides of the dome E, the members of each pair being connected by a pitman,  $n^3$ , the operation of the disks being controlled by a lever,  $n^4$ , which thus controls the raising and lowering of the jacket.

G is a hopper provided upon the dome E for the supply of sand to be used in forming the mold, having a cover,  $l$ , capable of being securely locked, and provided with a slide,  $l'$ , adjustable by means of a set-screw,  $l^2$ , to control at will entrance of sand to the dome. A sieve,  $k$ , supported upon a shaft,  $k'$ , journaled within suitable bearings upon the interior of the dome, is revolved by a propeller-wheel,  $k^2$ , at the upper extremity of the shaft, which latter is immediately beneath an opening,  $j$ , communicating with a suitable air-supply, and is given motion by the air-current entering the dome. A three-way cock,  $i$ , is provided to control the air-supply and permit, when desired, escape of air from the interior of the dome.

H is an embouchure, comprising, preferably, a wooden frame covered with rubber, provided to embrace the upper portion of the flask and insure, when the jacket F is lowered upon it, air-tight union of the jacket with the flask. The embouchure forms also an extension

of the flask, thus enabling it to contain all the sand necessary for the formation of the mold when loosely placed therein before being compacted by the introduction of the air-pressure, in which state, of course, it is more bulky than after compression.

The operation of my device is as follows: The match-plate having the pattern adjusted upon it, as described in my Letters Patent hereinbefore mentioned, is adjusted upon the flask, and both are placed upon the bed-rails of the machine, all as therein described. The dome E, having been previously slid back out of the way upon the bolsters  $r$ , is now brought forward, the embouchure H adjusted upon the flask, the jacket F lowered upon the embouchure by means of the lever  $n^4$ , acting upon it through the medium of the eccentric slots  $n'$  in the disks  $n^2$ , thus forcing downward the pins  $n$ , and with them the jacket. The flask is now surmounted by an air-tight covering comprising the dome E and jacket F, brought into air-tight union with it by means of the embouchure H. The hopper G, containing a supply of sand necessary for the formation of the mold, is closed by the cover  $l$ , and the slide  $l'$  being withdrawn, entrance of sand is permitted to the interior of the dome. At the same time the three-way cock  $i$  is opened and the air-supply also permitted entrance. On entering the dome the sand falls upon the sieve  $k$ , while the air-current striking against the propeller-wheel  $k^2$  revolves the shaft  $k'$ , and with it the sieve  $k$ , thus properly distributing the sand about the pattern within the flask. The sand, being forced downward by direct air-pressure, fills all the interstices of the pattern and easily passes any ribs or sand-cleats which the form of the pattern may have rendered necessary in the flask, thus forming a mold of homogeneous texture with great rapidity. One part of the flask having been filled, the three-way cock  $i$  is opened, the air-pressure is withdrawn from the interior of the dome, the jacket F lifted, the embouchure H removed from the flask, the dome E slid back upon the bolsters  $r$  out of the way of the flask, and the latter turned over, when the operation may be repeated upon the other side of the flask. The finished mold is then withdrawn and set one side preparatory to pouring.

With the more common forms of patterns, where the outlines are comparatively unbroken and there are no deep recesses or under-cuts, I prefer to dispense with the use of the controllable sand blast and distributing mechanism within the dome or receptacle and form the mold by placing the same loosely within the flask and embouchure and about the pattern-connecting the dome with the flask in the manner hereinbefore described through the medium of the embouchure and introducing the direct air-pressure only.

Fig. 4 of the drawings illustrates a modification, in which a distributing-sieve,  $f$ , hav-



ing a laterally-shifting motion by means of a hand-lever, *d*, is substituted for the rotary distributing mechanism within the dome.

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

1. The combination, with a mold for casting, of air-pressure mechanism, substantially as described, for packing sand to form molds and cores by air-pressure applied directly to the sand, substantially as set forth.

2. The combination, with a mold for casting, of a compressed-air receptacle open at one end and connected with a suitable air-compressor, whereby when the receptacle is adjusted upon the mold sand may be packed by direct air-pressure to form molds and cores, substantially as described.

3. The combination, with a mold for casting, of a compressed-air receptacle provided with an adjustable jacket, *F*, and connected with a suitable air-compressor, whereby when the jacket is adjusted upon the mold sand may be packed to form molds and cores by direct contact with the sand of air-pressure, substantially as described.

4. The combination, with a mold for casting, of a compressed-air receptacle communicating with a suitable air-compressor and supported to slide over the mold in a suitable frame and vertically adjustable with relation to the flask, and an adjustable jacket, *F*, upon the receptacle, whereby when the jacket is adjusted sand may be packed to form molds and cores by direct contact with the sand of air-pressure, substantially as described.

5. The combination, with a mold for casting, of air-pressure mechanism for forming molds and cores by packing the sand by direct air-pressure exerted upon the sand, and comprising a dome, *E*, communicating with a suitable air-compressor and adjustably supported over the mold, and provided with a jacket, *F*, adjustable by means of connected slotted disks *n*<sup>2</sup>, pivoted upon the dome, and pins *n* upon the

jacket, extending into the slots in the disks, substantially as described.

6. The combination, with a mold for casting, of air-pressure mechanism for forming molds and cores by packing the sand by direct air-pressure exerted upon the sand, and comprising a dome, *E*, communicating with a suitable air-compressor and adjustably supported over the mold, a jacket, *F*, adjustable by means of connected slotted disks *n*<sup>2</sup>, pivoted upon the dome, and pins *n* upon the jacket, extending into the slots in the disks, and a hopper, *G*, upon the dome, having a sliding valve and adjustable cover, the whole being constructed and arranged to operate substantially as described.

7. The combination, with a mold for casting, of air-pressure mechanism for forming molds and cores by packing the sand by direct air-pressure exerted upon the sand, and comprising a dome, *E*, communicating with a suitable air-compressor and adjustably supported over the mold, a jacket, *F*, adjustable by means of connected slotted disks *n*<sup>2</sup>, pivoted upon the dome, and pins *n* upon the jacket extending into the slots in the disks, a hopper, *G*, upon the dome, having a sliding valve and adjustable cover, and a distributor within the dome, the whole being constructed and arranged to operate substantially as described.

8. The combination, with a mold for casting and the air-receptacle for receiving the compressed air to pack the sand by its direct contact with the same and form molds and cores, of an embouchure, *H*, adjustable upon the flask of the mold to afford an extension of the flask and produce an air-tight junction with the flask of the receptacle, substantially as described.

JOHN R. DAVIES.

In presence of—

MASON BROSS,  
JAMES THORPE.