



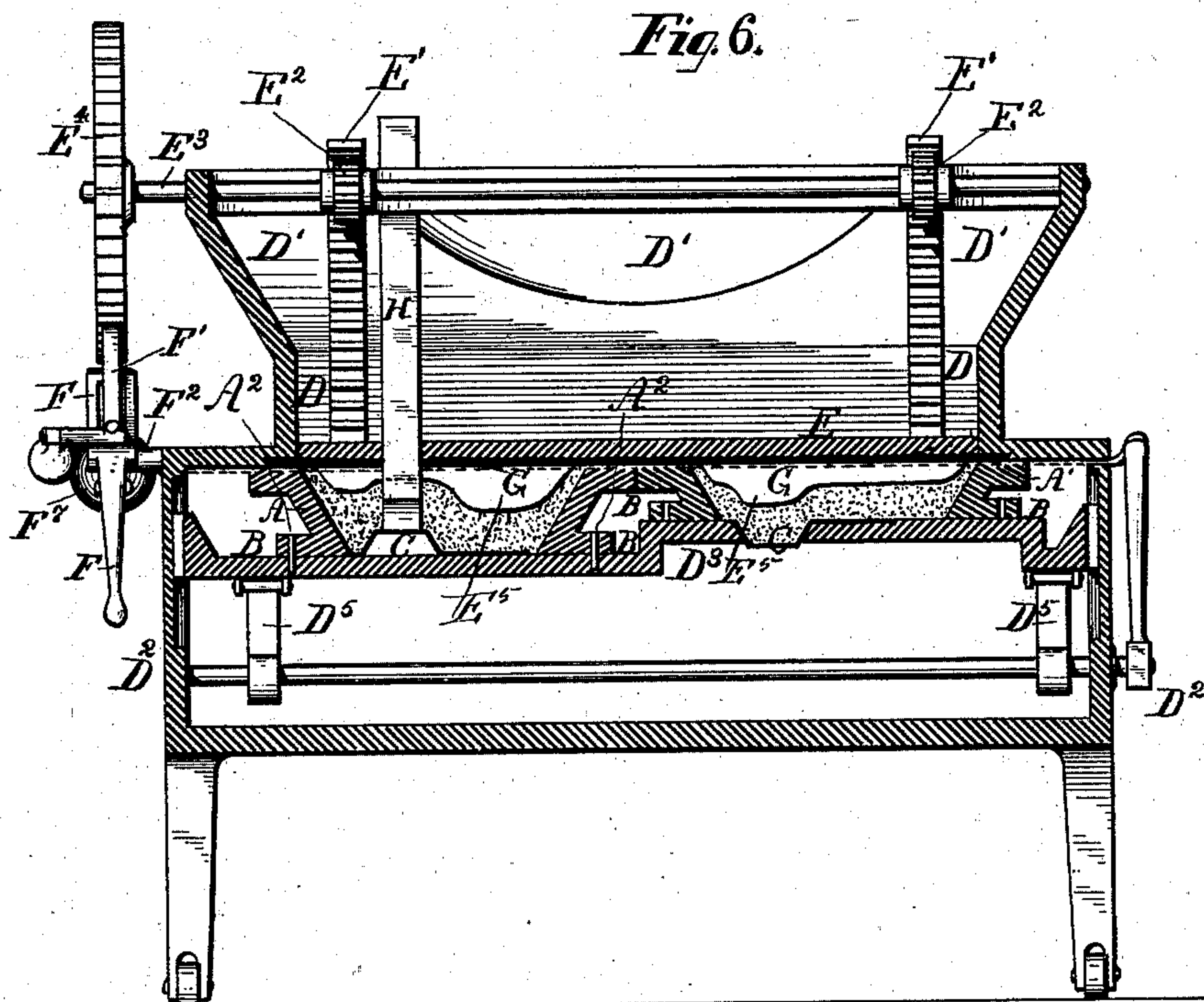
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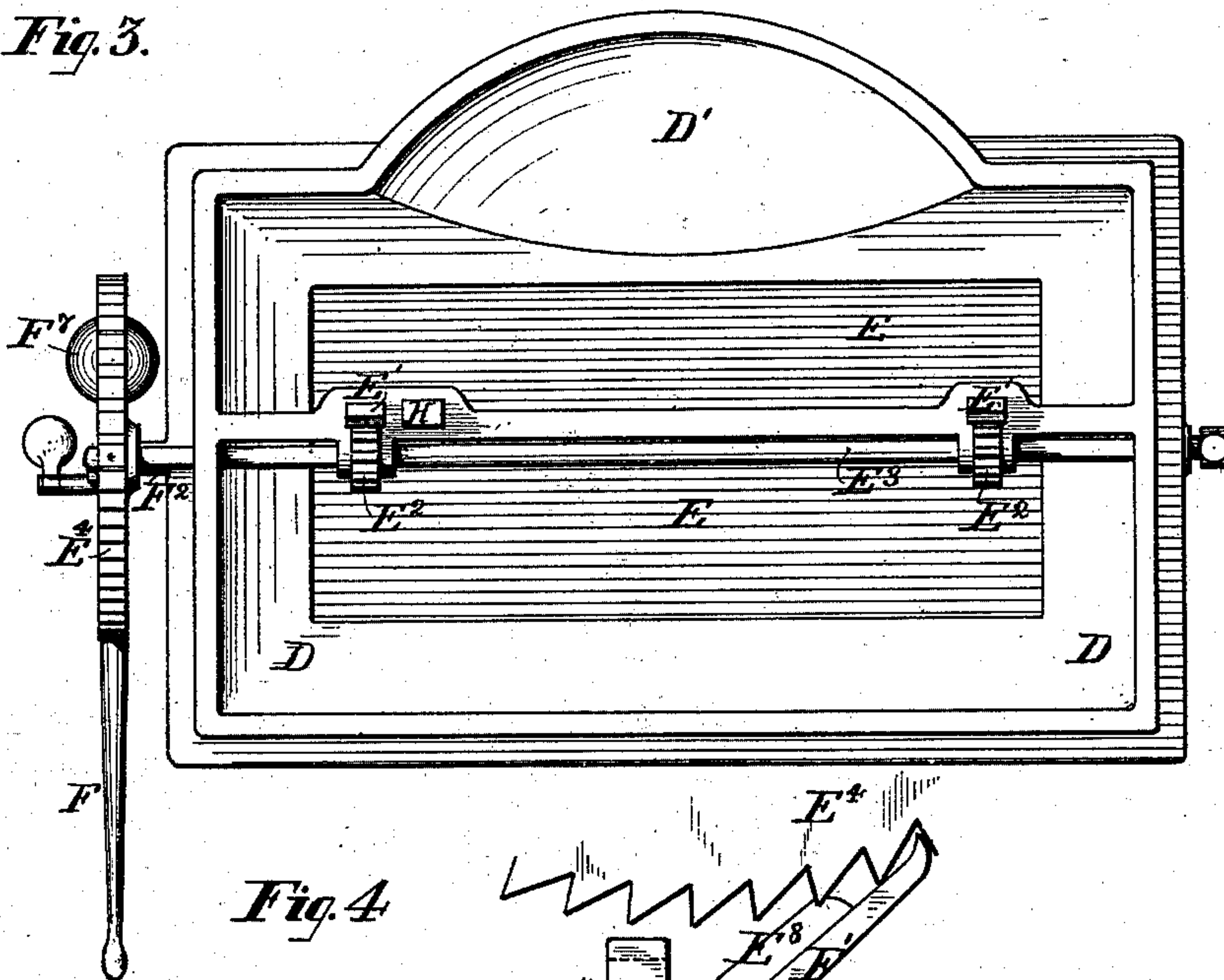
W. N. BARROWS.  
SAND MOLDING MACHINE.

No. 293,401.

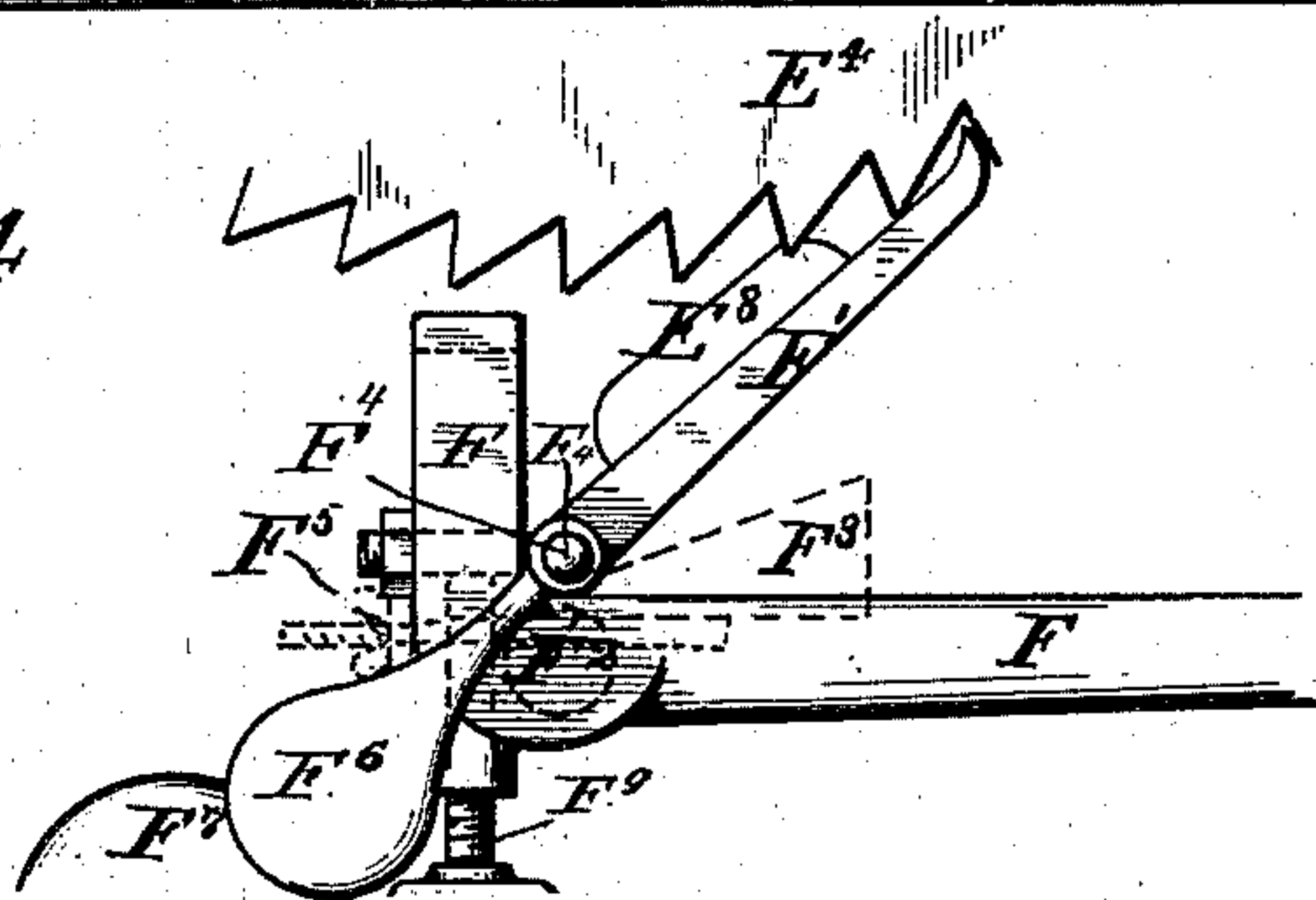
Patented Feb. 12, 1884.



*Fig. 3.*



*Fig. 4.*



WITNESSES:

A. E. Paige  
Linn Wheeler

INVENTOR

W. N. Barrows  
by his atty

Shyde & Mayo



(No Model.)

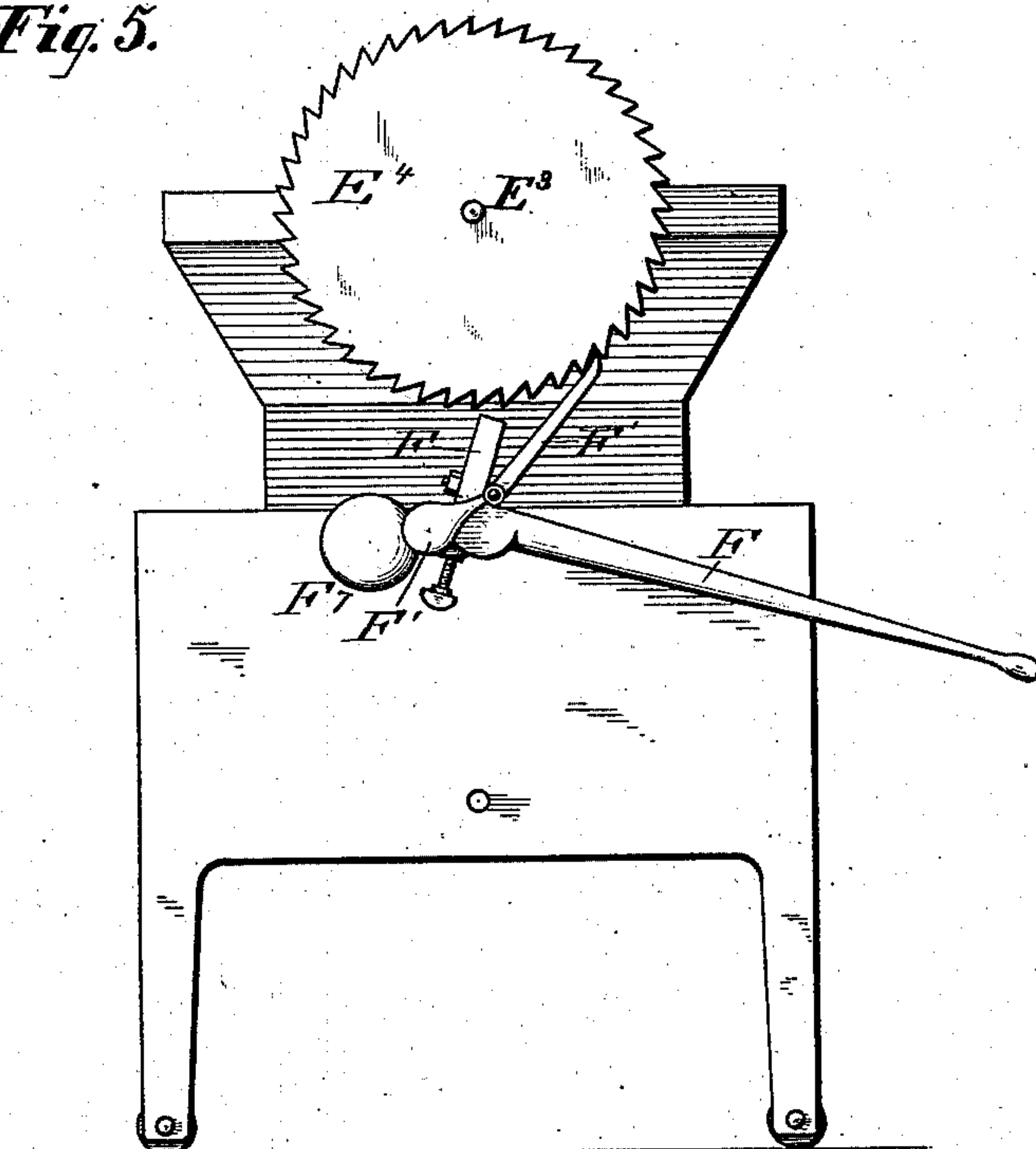
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W. N. BARROWS.  
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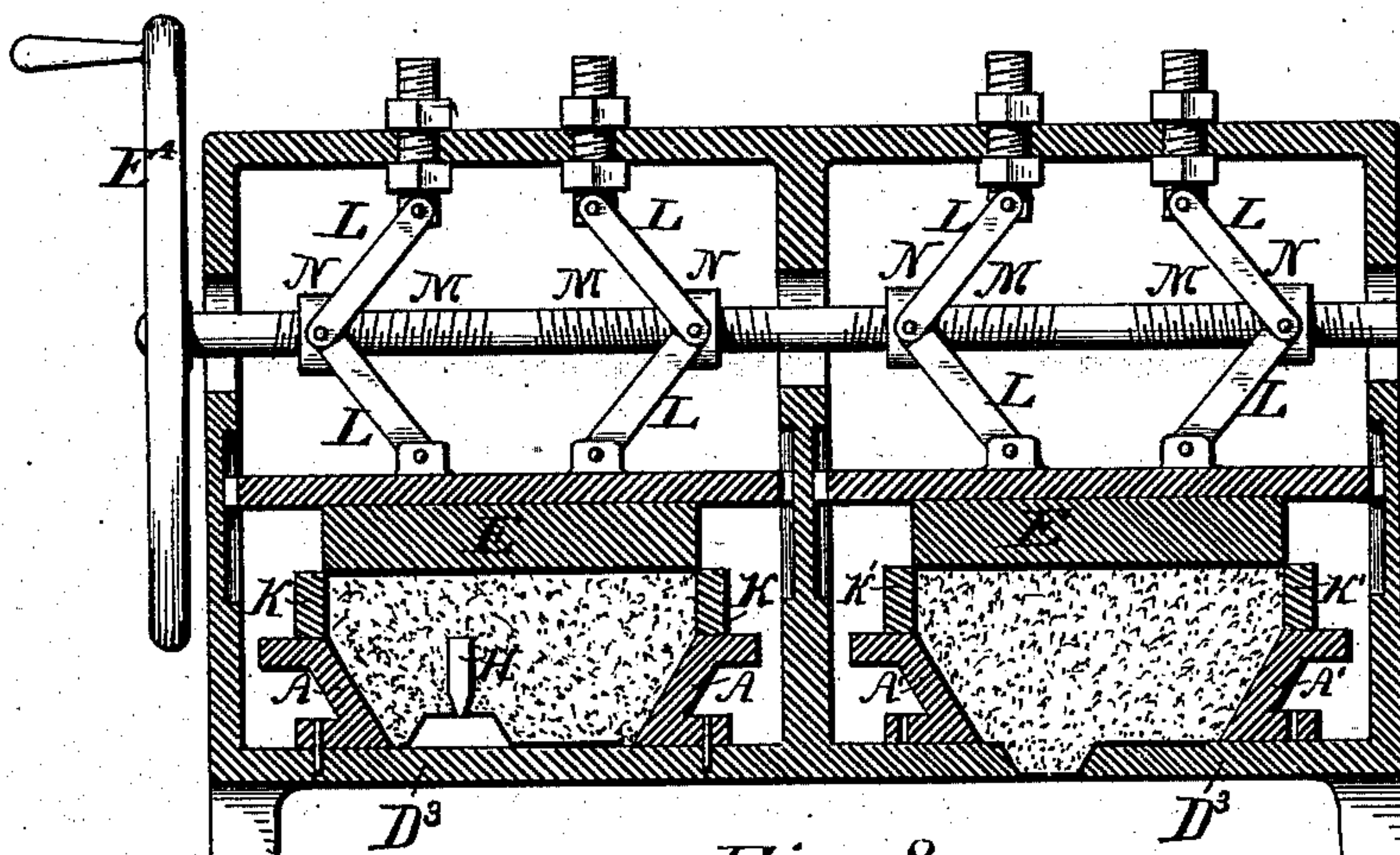
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*Fig. 5.*

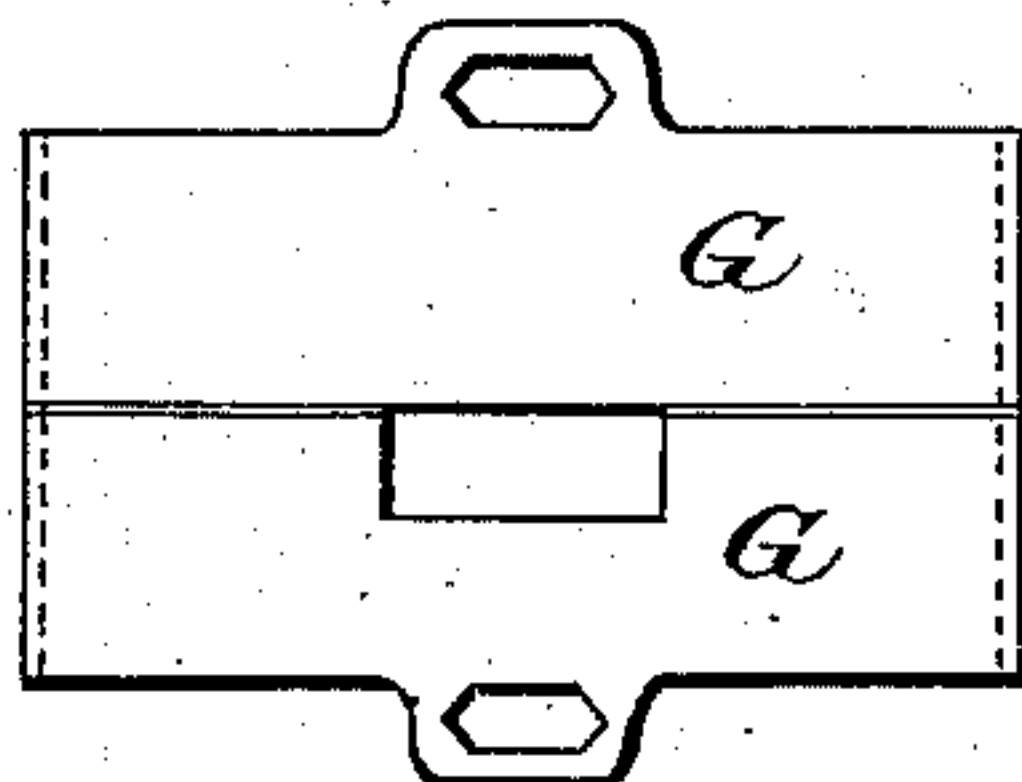


*Fig. 7.*



*Fig. 8.*

WITNESSES:  
A. C. Paige  
Linn Wheeler.



INVENTOR  
W. N. Barrows  
by his atty  
Shay & Weyand



# UNITED STATES PATENT OFFICE.

WILLIAM N. BARROWS, OF PHILADELPHIA, PENNSYLVANIA.

## SAND MOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 293,401, dated February 12, 1884.

Application filed November 7, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM NELSON BARROWS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sand Molding-Machines; and I do hereby declare the following to be a sufficiently full, clear, and exact description thereof as to enable others skilled in the art to make and use the said invention.

This invention relates to the making of molds on damp or green sand for the production of castings, and has for its object the proper and equal compacting or pressing of the sand around the pattern, so that the mold will resist the pressure of metal in casting, will readily vent the gases formed by the heat of the metal, and at the same time be quickly and cheaply made by unskilled labor.

To accomplish these results the invention consists in a flask the sides and ends of which are converging toward the parting or joint, a sand-hopper having the lower portion of the sides and ends vertical and parallel, a plunger fitting in such parallel portion, and mechanism for working the same for supplying and forcing sand downward into the parts of the flask against the pattern, a form attached to the under side of the plunger and moved thereby, of such shape relatively to the flask and pattern that pressure applied by the plunger is distributed through the sand equally against the pattern in all directions, and a retractible gate-pattern arranged to descend and rise through the plunger.

I will now proceed to fully and particularly describe the mode of making and using this invention, referring in so doing to the drawings annexed and the letters of reference marked thereon.

Figure 1 shows a vertical section of the apparatus as applied to forming the cope or upper half of a mold for casting a skillet. Fig. 2 shows a vertical section of the apparatus as used in making the lower half or "drag" of the same mold for casting a skillet. Fig. 3 shows a top view of Fig. 1; Fig. 4, the machine for applying force or pressure. Fig. 5 is a side view of the machine shown in Fig. 1. Fig. 6 is a modification in vertical sec-

tion wherein both the cope and drag are simultaneously molded. Fig. 7 shows a modification in vertical section wherein the sand is measured by a false cope, instead of being supplied from a hopper, and by reason of using a definite quantity of sand a different pressing mechanism is practicable, which is shown in this figure; and Fig. 8 shows the plates used for supporting the sand in the hopper when the flask is removed from the machine.

The same letters of reference apply to the same parts in the several figures.

A represents the cope of a flask; A', the drag thereof, fitted together detachably by the usual dowel-pins, A<sup>2</sup>. The sides of the flask are made converging toward the line of parting B, so that sand pressed downwardly in them is forced by the oblique sides toward and against the pattern C. The sand is introduced from a hopper, D, having a flaring or funnel-shaped top, D', and the sides and ends parallel at the lower part, and fitted with a plunger, E, which is raised and lowered by racks E', worked by pinions E<sup>2</sup> on a shaft, E<sup>3</sup>, turned by a wheel, E<sup>4</sup>, by hand, to introduce the charge of sand into the flask, and to effect the required compression a pawl pivotally connected to a lever, F, turning upon a fulcrum, F<sup>2</sup>, is used. The pivot F<sup>4</sup> of the pawl F' is adjusted as to its distance from the axis of the fulcrum F<sup>2</sup> by a key or wedge, F<sup>3</sup>, operated by a nut, F<sup>5</sup>, turning upon a screw formed on the tail of the key F<sup>3</sup>, and passing through a slot in the vertical arm of the lever F. A counter-balance, F', serves to hold the lever F up out of the way of the workman when not in use, and when the handle of the lever F is raised to its greatest height the end of the pawl F' is disengaged from the notches in the wheel E<sup>4</sup> by a projection, E<sup>8</sup>, attached to the side of the sand-hopper, against which the rear end of the pawl F' rests and holds the pawl F' clear of the wheel E<sup>4</sup>. Instead of the wedge F<sup>3</sup>, provided with the screwed tail and nut F<sup>5</sup> for adjusting the height of the pivot F<sup>4</sup> of the pawl F', a screw, F<sup>9</sup>, passing upwardly through the lever F, under the pivot F<sup>4</sup> of the pawl F', may be substituted. Upon the under side of the piston E are placed projections E<sup>5</sup>, correspondingly shaped to con-



form to the outline of the pattern, and dis-  
place the sand laterally on the descent of the  
piston, so that by the form of the flask A and  
the form of the pattern the sand is equally  
5 compacted against all parts of the pattern.  
Through the plunger E is an opening through  
which is fitted a vertically-sliding block, H,  
the lower part of which, that projects into  
the sand of the cope and reaches the pattern,  
10 is made tapering, and serves the purpose of  
forming the gate through which molten metal  
is poured in casting. The hopper D is sup-  
ported by a frame, D<sup>2</sup>, and the flask is sup-  
ported by a table, D<sup>3</sup>, susceptible of a rising-  
15 and-falling movement by cams D<sup>5</sup>, the releas-  
ing of which permits the easy removal of the  
flask after being rammed. The sand which  
fills the flask is separated from that remain-  
ing in the hopper D by plates G, having the  
20 edges beveled, and fitting as dovetail in a cor-  
respondingly-beveled space in the bottom of  
the hopper D, which, when closed together,  
shut up the bottom of the hopper D and pre-  
vent the sand therein contained from falling  
25 out when the flask is removed. The plates G  
are thin flat plates of metal, which have notches  
cut in them, through which the gate-former  
H fits when the plates G are placed together,  
and to facilitate their introduction these plates  
30 should have their edges beveled or brought  
to an edge, so as to operate as a knife to cut  
the compacted sand in the flask loose from  
the sand remaining in the hopper D.

The operation of this machine is as follows:  
35 The pattern C is placed on the table D<sup>3</sup> and  
dusted and the cope A placed around it. The  
table D<sup>3</sup> is raised, so as to fit closely to the bot-  
tom of the hopper D. The plunger E is raised  
and the hopper D filled with sifted molding-  
40 sand. The wheel E<sup>4</sup> is turned quickly, so as  
to depress the piston E, by means of the racks  
E<sup>1</sup> and the pinions E<sup>2</sup> on the shaft E<sup>3</sup>, and thus  
fill the mold with sand. A form, H, fitting  
through the plunger D, for making the gate, is  
45 pressed down upon the pattern C, and the  
plunger D is further depressed and the mold  
compactly rammed by forcing down the lever  
F, and the pawl F', engaging in notches in the  
wheel E<sup>4</sup>, turns it with great force. Upon  
50 raising the lever and closing the plates G to-  
gether, the sand in the flask is severed from  
that in the hopper, and the cope A, and the  
pattern C, and the table D<sup>3</sup>, depressed by the  
action of the cam D<sup>5</sup>, turned upon its back on  
55 the table D<sup>3</sup>, and the drag A' placed on the  
cope, and the operation of filling it is re-  
peated in precisely the same manner, with  
the gate-former H not being used in the oper-  
ation. Upon the removal of the mold it is  
60 opened, the pattern withdrawn, and the mold  
is ready for casting.

In the form shown in Fig. 6 the machine is  
made of such breadth as to mold both the cope  
and drag of the flask simultaneously. There is  
65 no difference in its construction and mode of  
operation, excepting that duplicate patterns are  
used, which patterns should be made accu-

ately alike and adjusted to the table D<sup>3</sup>, to in-  
sure the proper registering of the two parts  
of the mold when placed together to be used. 70  
In the form shown in Fig. 7 the sand is meas-  
ured by false copes or frames K and K', which  
are placed upon the top of the cope and drag  
of the flask, and are of such dimensions as to  
contain the requisite volume of sand to sup- 75  
ply the amount required to be compressed into  
the parts of the flask in addition to that placed  
in the flask in a loose state. The employment  
of the false copes K and K', which are in effect  
equivalent to the hopper D, (shown in the pre- 80  
ceding figures,) enables me to dispense with the  
plate for cutting the compressed sand of the  
mold in the cope A and drag A' from that re-  
maining in the hopper D; and, to effect the de-  
sired definite length of stroke, a system of tog- 85  
gle-levers, LL, operated by screws M and nuts  
N, are used, so that when the toggles LL are  
straightened or in perpendicular line the plun-  
ger E will have its under face level with the  
top of the cope and the drag and the lower 90  
edges of the false copes K and K'. By setting  
the nuts N upon the screws M, so that the tog-  
gles forcing the plunger down into one of the  
false copes before the other has reached a  
similar point, the labor is divided and the 95  
strain diminished, as the greatest pressure then  
takes place in the two parts of the mold suc-  
cessively and not simultaneously. In this form  
of the invention the gate-former need not be  
fitted through the plunger E, but may at its 100  
lower end be inserted detachably in a mortise  
or cleft made in the pattern C, and be of the  
height of the cope A.

Having described my invention and the  
mode of operating the same, what I claim is— 105

1. In a machine for making green-sand  
molds, the combination of a flask, having sides  
converging toward the parting of the mold,  
with a sand-supplying vessel and plunger, and  
a mechanism for depressing the same, and 110  
bearing forms corresponding to the shape of  
the patterns, for the purpose of distributing  
and regulating the pressure in the sand in the  
flask, substantially as and for the purpose set  
forth. 115

2. In combination with a flask having sides  
converging toward the parting thereof, a false  
cope adapted to measure the quantity of sand  
to be compressed into the flask, and a plunger  
fitting in said false cope, and an actuating 120  
mechanism arranged to displace the sand from  
the said false cope into the flask and compact  
the sand therein, substantially as and for the  
purpose set forth.

3. In a machine for making sand molds for 125  
casting metals, the combination of a pattern, a  
flask having sides converging toward the part-  
ing thereof, and a sand-supplying vessel hav-  
ing a plunger fitting therein, provided with  
forms adapted to compact the sand equally 130  
against the pattern, with a gate-former fitting  
through said plunger, substantially as and for  
the purpose set forth.

4. In a machine for making sand molds for



casting metal, the combination of a pattern, a flask having sides converging toward the parting thereof, a sand-supplying vessel provided with a plunger, having projections conforming to the shape of the pattern, a gate-former, plates for separating the sand in the flask from the sand in the supply-vessel, a mechanism for raising and lowering the plunger, and a mechanism for supporting and lowering the flask, substantially as and for the purpose set forth.

5. In a machine for molding in sand, the flask shown and described, having sides converging toward the parting or joint between the cope and drag, for the purpose of permit-

ting lateral compression of the sand against the pattern and of better retaining the sand, as and for the purpose set forth.

6. In a machine for molding in sand, the combination of a flask having sides converging toward the parting thereof, and a false cope for measuring the quantity of sand placed in the mold, with a pressing mechanism and plunger adapted to press sand in said false cope and flask, substantially as and for the purpose set forth.

WM. N. BARROWS.

Witnesses:

J. DANIEL EBY,  
LINN WHEELER.