

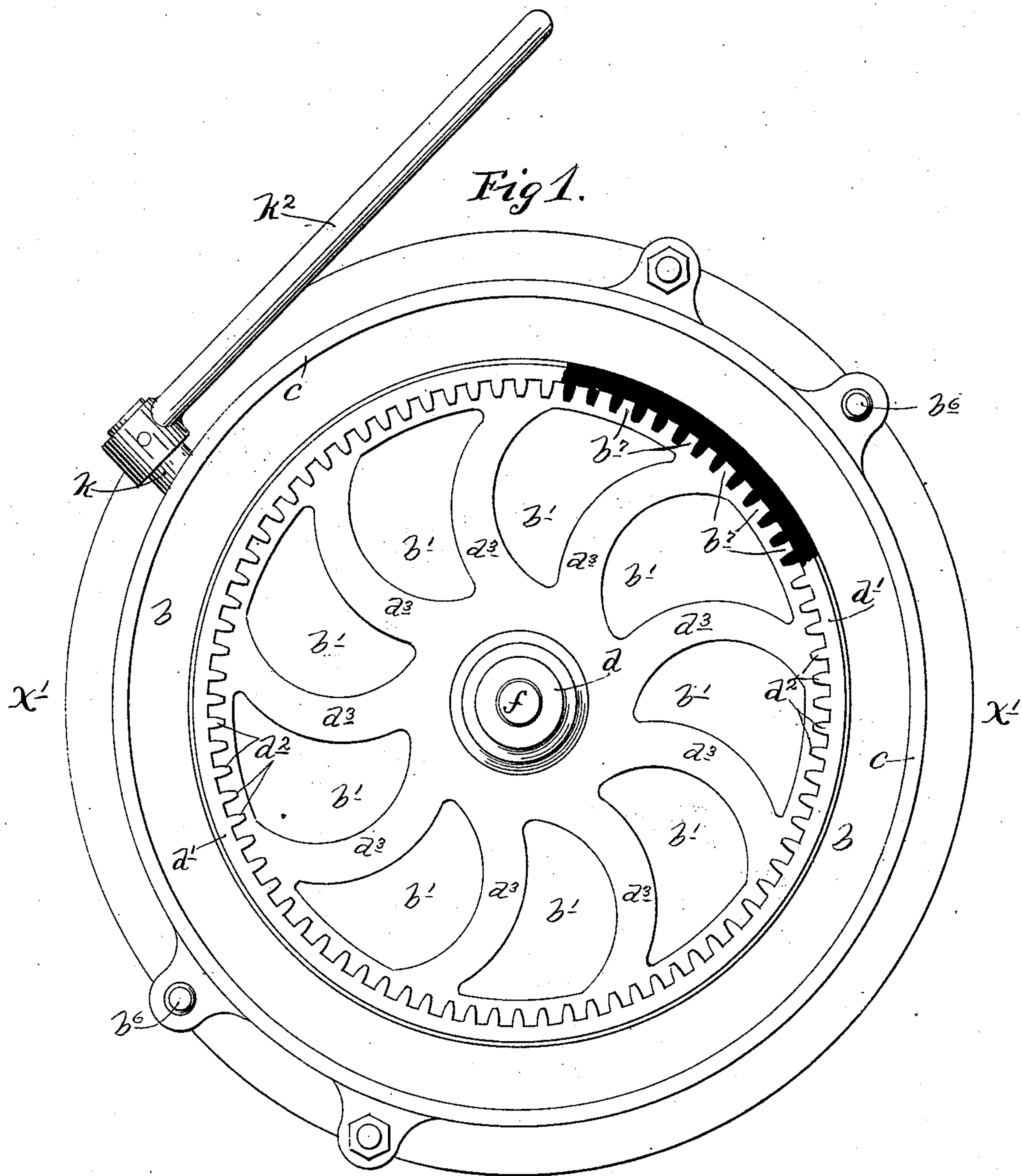
(No Model.)

3 Sheets—Sheet 1.

F. J. SCOTT.  
FOUNDER'S MOLDING MACHINE.

No. 560,433.

Patented May 19, 1896.



Witnesses  
E. F. Elmore  
G. J. Merchant.

Inventor.  
Frank J. Scott  
By his Attorney,  
Jas. F. Williamson

(No Model.)

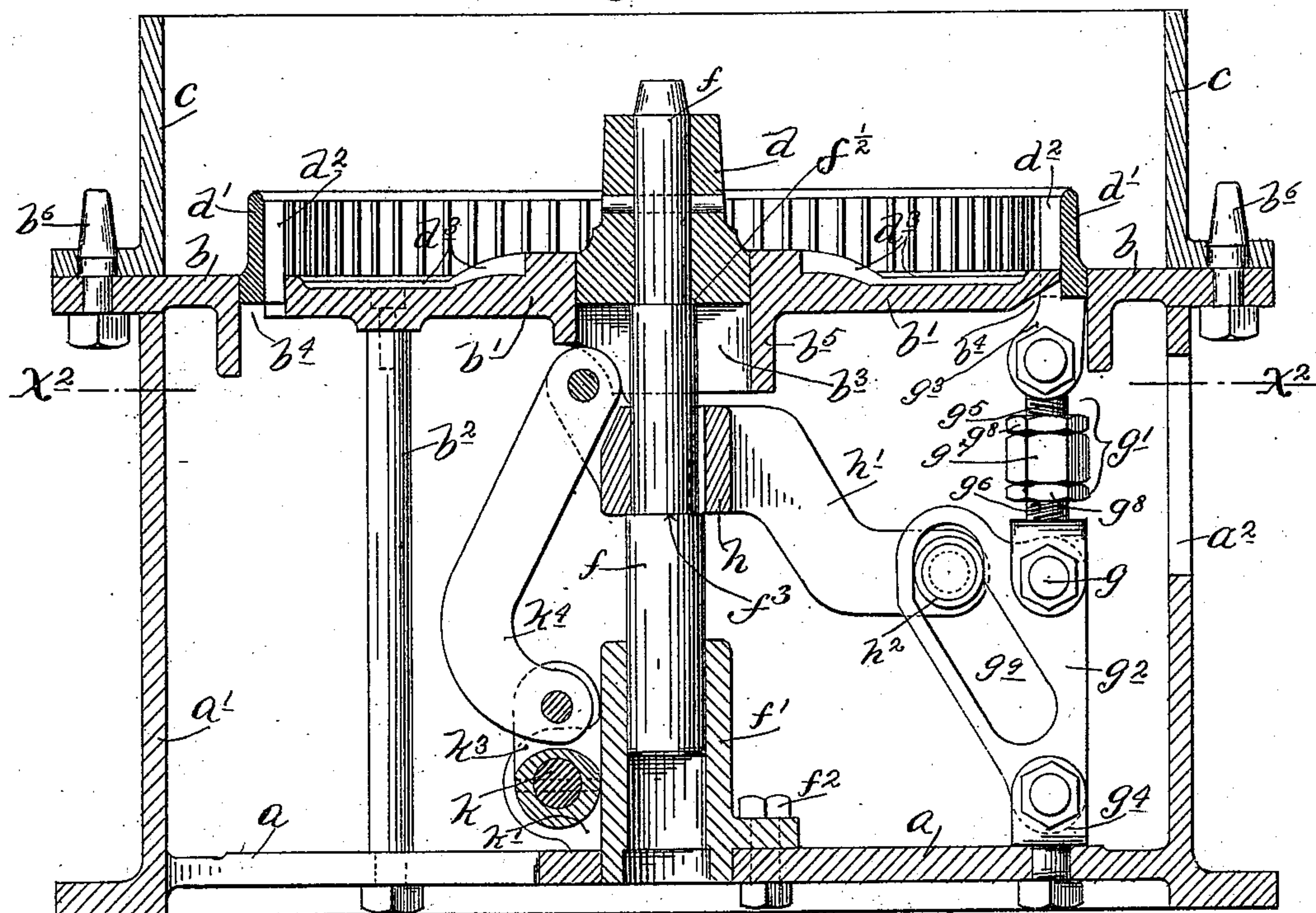
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*Fig. 2.*



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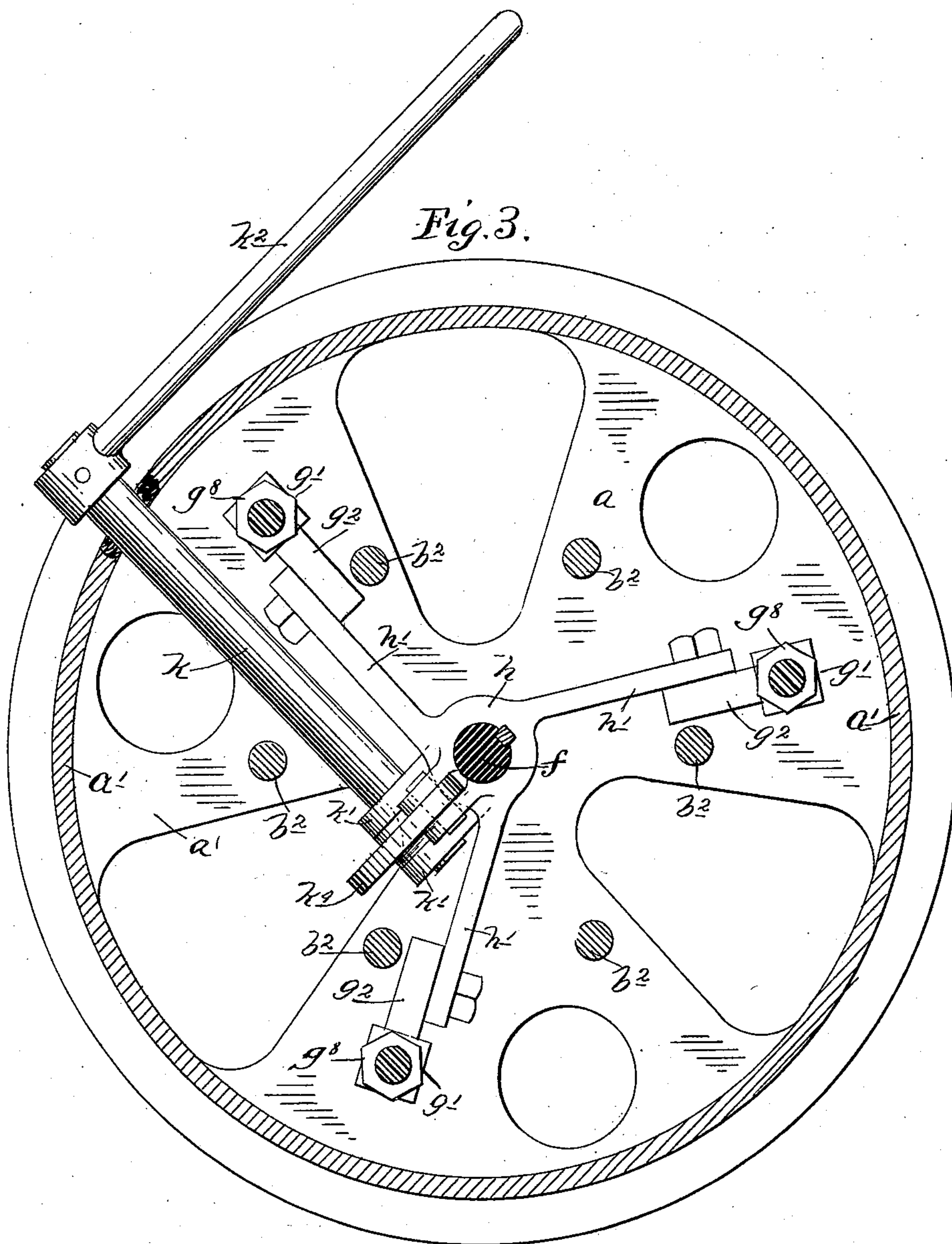
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# UNITED STATES PATENT OFFICE.

FRANK J. SCOTT, OF ST. PAUL, MINNESOTA.

## FOUNDER'S MOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,433, dated May 19, 1896.

Application filed September 10, 1894. Serial No. 522,576. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK J. SCOTT, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Founders' Molding-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to founders' molding-machines, and has for its object to provide an efficient and simple machine of this class.

To these ends my invention consists in the novel features of construction hereinafter fully described, and defined in the claims.

My machine is illustrated in the accompanying drawings, wherein, like letters referring to like parts—

Figure 1 is a plan view of the machine with some parts of the pattern broken away. Fig. 2 is a vertical section of the same on the line X' X' of Fig. 1, and Fig. 3 is a horizontal section on the line X<sup>2</sup> X<sup>2</sup> of Fig. 2.

*a* represents the base-plate, and *a'* the vertical walls or shell, of a suitable frame for the operative parts of the machine. The base-plate *a* is of skeleton-like form or is otherwise provided with openings for the outward passage of the sand. The vertical walls *a'* are also provided with openings *a<sup>2</sup>* for access to the interior of the shell. To the top of the said frame is secured the outside section of a divided or multipart stripper-plate *b b'*. The inside or stool section *b'* of this stripper-plate is supported from the frame-base by stool-rods *b<sup>2</sup>* or in any other suitable way. The stripper-plate is provided with a central passage *b<sup>3</sup>* and with an annular passage *b<sup>4</sup>*, through which work certain movable sections of a multipart pattern, which will be presently noted. The central or stool section *b'* of the stripper-plate is also provided with a downwardly-extended hub *b<sup>5</sup>*, through which extends the passage *b<sup>3</sup>* before noted. The outside section *b* of the stripper-plate extends outward beyond the shell *a'* and is provided, as shown, with dowels *b<sup>6</sup>* for receiving and holding one of the flask-sections *c*, which, as shown, is intended as the drag or nowel.

The machine, as shown, was designed for

casting the main gear of a mower. Hence the multipart pattern shown is suitable for producing the said casting, and comprises the central or hub section *d*, which is made to closely fit and is movable through the stripper-plate in the central passage *b<sup>3</sup>* thereof, an external or rim section *d'* with teeth *d<sup>2</sup>*, which closely fits and works through the stripper-plate passage *d<sup>4</sup>*, and radial or spoke portions *d<sup>3</sup>*, which are formed on the face of the stool-section *b'* of the stripper-plate. The stool-section of the stripper-plate is of course provided with teeth *b<sup>7</sup>*, which work in the teeth of the rim-section *d'* of the pattern. The central pattern-piece *d* is carried on the upper end or reduced shoulder *f<sup>1</sup>* of a central plunger *f*, the lower end of which works in a sleeve-like guide *f'*, fixed to the base-plate *a* by bolts *f<sup>2</sup>* or in any other suitable way. The pattern-piece *d*, fitting the central passage *b<sup>3</sup>* in the stripper-plate, as hitherto noted, causes the stripper-plate to form a guide for the upper end of the plunger and the said central pattern-piece *d*. The pattern-piece *d'* *d<sup>2</sup>* or rim of the gear is carried by a series of three sets of toggle-levers, the central pivots of which are indicated at *g*. These toggles are in circular arrangement with respect to each other, are equally spaced, and their central or pivotal points move radially. The upper arms *g'* of these toggle-levers are pivotally connected to lugs *g<sup>3</sup>*, projecting from the pattern-section *d' d<sup>2</sup>*. The lower arms *g<sup>2</sup>* of the said toggles are pivotally connected to bearing-lugs *g<sup>4</sup>*, fixed to the base-plate *a*. The upper toggle-arms *g'* are each composed of two sections *g<sup>5</sup> g<sup>6</sup>*, having screw-threaded engagement, with right and left threads, with an adjusting-nut *g<sup>7</sup>*, which is held where set by jam-nuts *g<sup>8</sup>*. This construction permits the upper arms *g'* of the toggles to be varied in length, so as to hold and carry the pattern-section *d' d<sup>2</sup>* at the proper levels. The lower arms *g<sup>2</sup>* of the said toggles are enlarged or expanded radially, and have in their expanded portions cam-slots *g<sup>9</sup>*.

To the central plunger *f* is fixed a three-armed spider *h h'*, the hub portion *h* of which engages a shoulder *f<sup>3</sup>* on the plunger *f*. The spider-arms *h'* are radial and in the same radial planes as the sets of toggle-levers, and the said spider-arms *h'* have at their outer



ends lateral projections, preferably in the form of rollers  $h^2$ , which engage with the cam-slots  $g^9$  in the toggle-arms  $g^2$ .

A rock-shaft  $k$  is mounted in bearing-lugs  $k'$ , fixed to the base-plate  $a$  or sleeve  $f'$ , and extends outward at one end beyond the frame of the machine. To the projecting part of said rock-shaft  $k$  is fixed a hand-lever  $k^2$ . The said shaft  $k$  is provided with a central crank-arm  $k^3$ , which is connected by a link  $k^4$  to the spider-head  $h$ , which, as already noted, is fixed to the plunger  $f$ . The hand-lever  $k^2$  is so applied to the rock-shaft  $k$  that when the parts are in the position shown in the drawings the said lever will stand to the right of its vertical position and all the parts operated thereby will be in their highest position. Hence when the lever is thrown toward the left the crank-arm  $k^3$  on the shaft  $k$  will be turned downward, and all the parts operated thereby will be pulled downward therewith. The upward movement of the parts is limited by the crank-arm  $k^3$  coming in contact with the sleeve  $f'$ , and the downward movement of the crank-arm  $k^3$  and the parts operated thereby is limited by the spider-head  $h$  coming in contact with the top of the guide-sleeve  $f'$ . This guide-sleeve  $f'$  is made of the desired height to limit the downward stroke of the plunger  $f$  for the desired length of draw to be given to the central or hub section  $d$  of the pattern. The cam-slot  $g^9$  in the toggle-arms  $g^2$  is made of the desired angle and shape for coöperation with the cam-lever spider-arms  $h'$  to give the desired amount of movement to the rim or pattern section  $d'$   $d^2$  under the movement of the plunger  $f$ . As shown, these parts are arranged for a differential movement of the pattern-piece  $d$  and the pattern-piece  $d'$   $d^2$ . Otherwise stated, the hub-section  $d$  of the pattern is drawn a greater distance than the rim-section  $d'$   $d^2$ . The relation of the cam-slots  $g^9$  and spider-arms  $h'$  may be such as to make this differential movement more or less, according to the requirements of the case.

Having regard further to the operation of the machine, the parts as shown in Fig. 2 are in position to receive the sand into the flask  $c$ . When the sand has been properly set, by ramming, &c., in the usual manner, the movable pattern-pieces  $d$   $d'$  are drawn down through the stripper-plate by simply throwing the hand-lever  $k^2$  over into its left-hand position. The drag  $c$  or other flask-section may then be removed from the machine, and the mold-cavity will be properly formed in so far as required to be made in the drag. The dowels  $b^6$  would insure the proper movement of the drag for drawing the shallow portions  $d^3$  of the pattern, which are formed on the face of the stripper-plate. Inasmuch as the movable pattern-sections  $d$  and  $d'$  are held by the coöperating guiding-surfaces of the stripper-plate sections  $b$   $b'$ , with the teeth  $b^7$  of the stripper-plate working in the teeth  $d^2$  of the rim  $d'$ , it is of course

obvious that the said pattern-sections must be drawn on absolutely true lines.

From the foregoing it is obvious that an ordinary unskilled laborer can operate this machine. Better results can also be secured, or be more reliably secured, at every action than by the most expert molders. Even the most expert molder cannot always effect the draw on exactly the same true lines. The machine will also do more work than an expert molder. In a considerable experience I have found that these machines will effect an average saving of over twelve dollars per day for the same work as compared with hand-molding. Otherwise stated, I have found by my experience that in a large foundry, such as is used in the manufacture of harvesters, molding-machines such as I have herein shown will, considering the whole range of large and small pieces, effect an average saving of about fifty per cent. over hand-molding. The first cost of the machines is just about equal to what it would otherwise cost to provide the necessary number of duplicate patterns if hand-molding was employed for the same work.

It will of course be understood that a suitable companion machine would be provided for producing the coöperating part of the mold-cavity in the other section or cope of the flask; but for the purposes of this case it has not been deemed necessary to show the companion machine.

It will of course be understood that the parts of the stripper-plate and of the pattern and the relations of the carriers to such of the said parts as may be movable, for effecting the draw, will be changed in practice, as required, for adapting the machine to the different kinds of castings intended to be produced. The principle of a multipart pattern or several distinct pattern-pieces, which coöperate to produce a single integral casting, the principle of the differential draw or different pattern-pieces, the principle of some parts of the pattern being formed on the stripper-plate, the principle of the toggle-levers for carrying the parts requiring movement in order to effect the draw, and the principle of the cam-lever connections from the toggles to the plunger would or could remain the same, while permitting a large diversity in the details of the construction and in the arrangement of the different parts. Any and all of such changes would be within the scope of my invention, as I herein intend to claim the same.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a founder's molding-machine the combination with a series of toggle-levers, carrying a pattern-piece, of a central plunger carrying a spider with radial arms, and cam-slots in said toggles engaged by said arms, whereby said pattern may be drawn by said toggles, under the movement of said plunger, substantially as described.



2. In a founder's molding-machine the combination with a multipart pattern, of a central plunger, carrying one of the pattern-pieces, a series of toggle-levers carrying another pattern-piece, a spider with cam-lever arms fixed to said plunger, and cam-slots in said toggles engaged by said arms, with the parts arranged to effect the movement of said parts from a common source, substantially as described.

3. In a founder's molding-machine, the combination with a multipart pattern, of a central plunger carrying one of the pattern-pieces, a series of toggle-levers carrying another pattern-piece, a spider with cam-lever arms fixed to said plunger, and cam-slots in said toggles engaged by said arms, with the

parts arranged to effect a differential movement of the plunger and the toggles, substantially as described.

4. In a founder's molding-machine, the combination with the pattern and parts movable therewith, of a series of toggle-levers carrying the same, one arm of each of which toggles is provided with means for longitudinally extending it, and connections to said toggle for actuating the same, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK J. SCOTT.

Witnesses:

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FRANK D. MERCHANT.