

(No Model.)

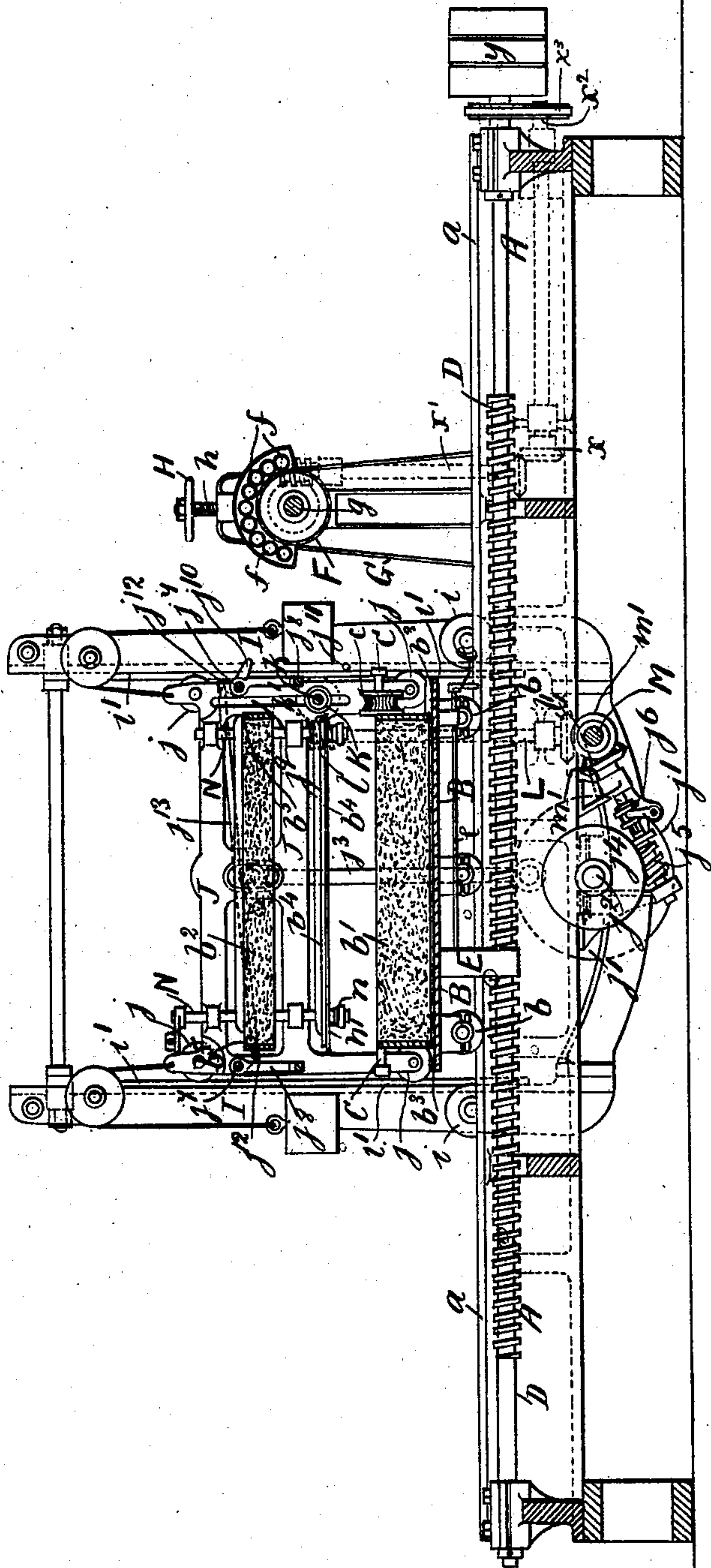
3 Sheets—Sheet 1.

J. D. DUCKETT & W. BADGER.
MACHINE FOR SAND MOLDING.

No. 603,267.

Patented May 3, 1898.

FIG. 1.



Witnesses:
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C. Holloway

Inventors:
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(No Model.)

3 Sheets—Sheet 2.

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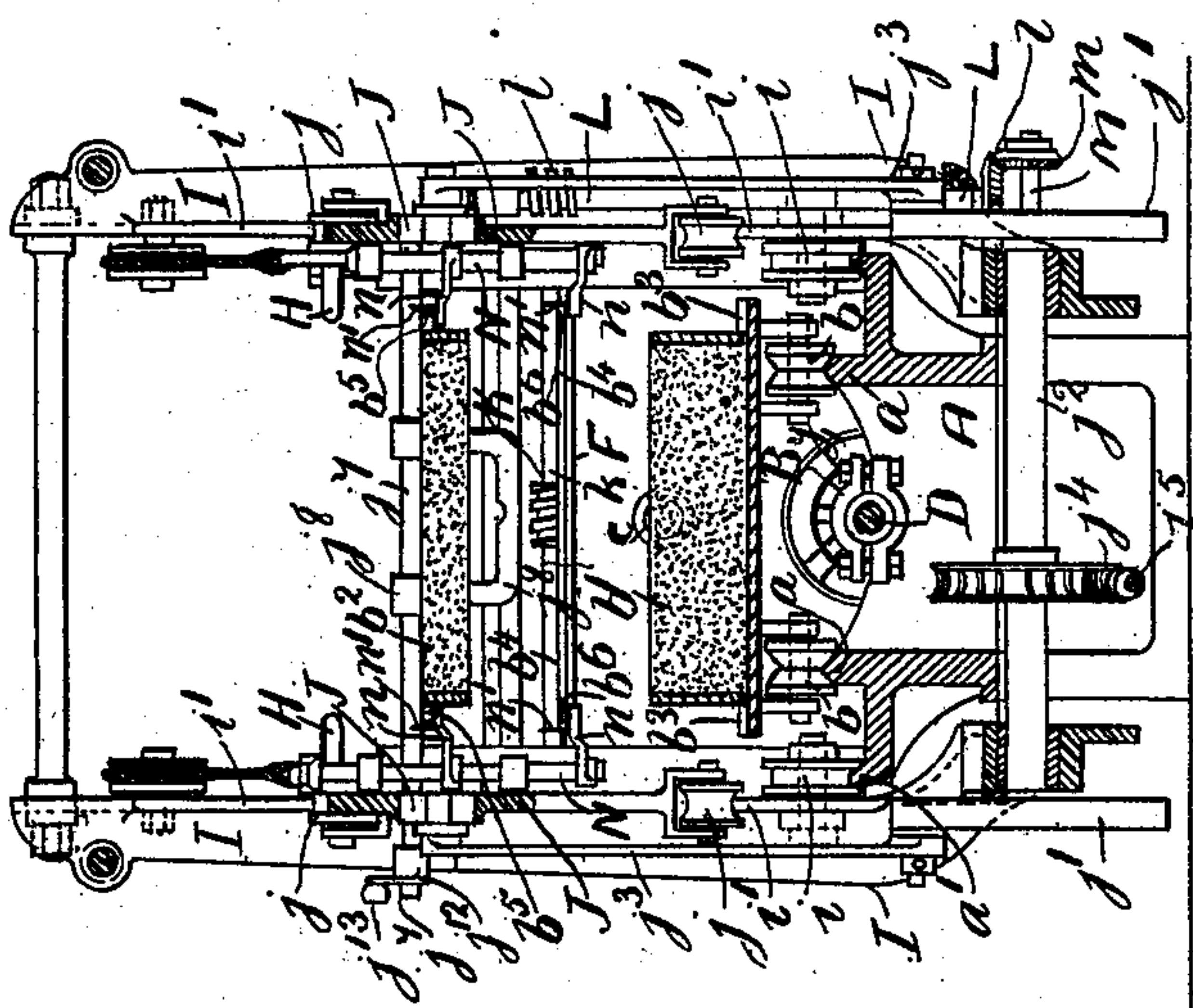


FIG. 2.

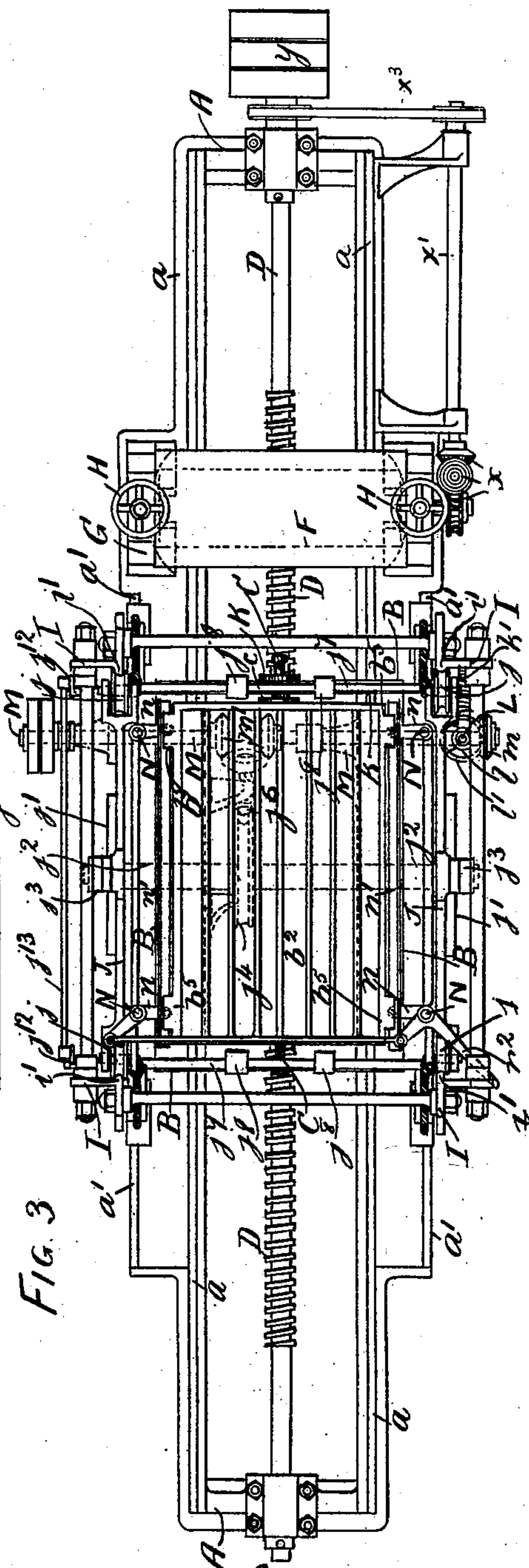


FIG. 3.

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(No Model.)

3 Sheets—Sheet 3.

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FIG. 5.

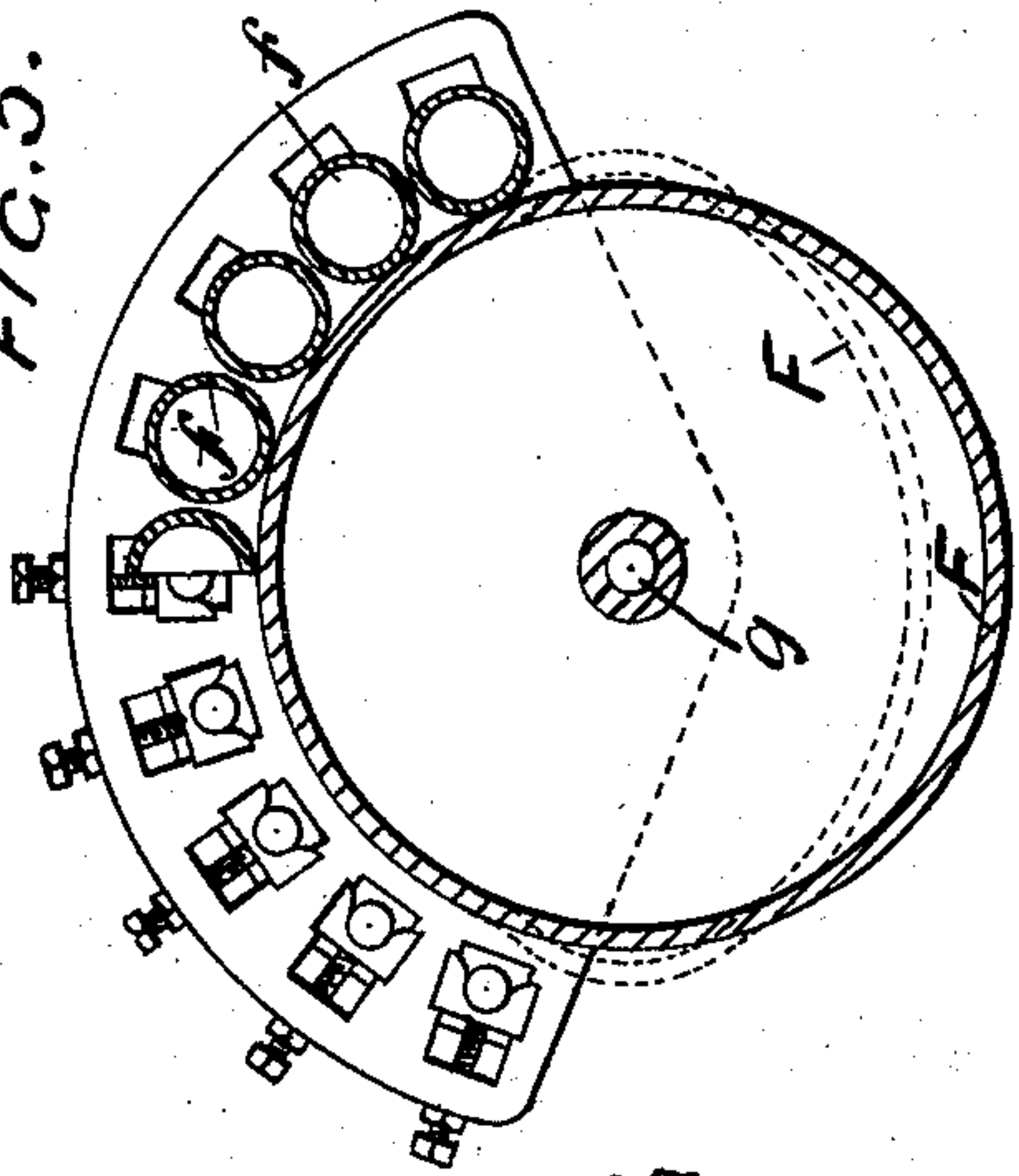
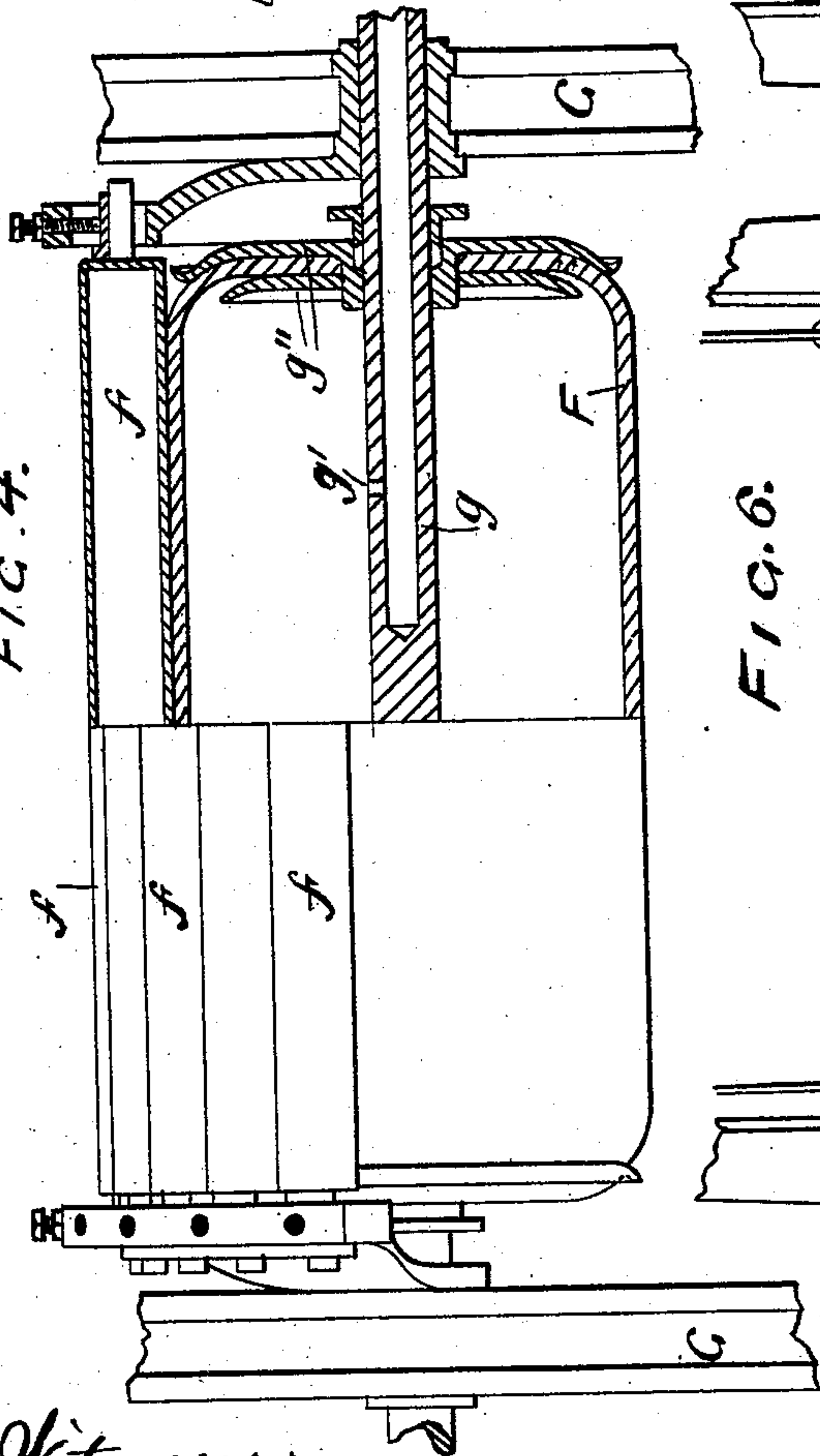


FIG. 4.



Witnesses:
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FIG. 7.

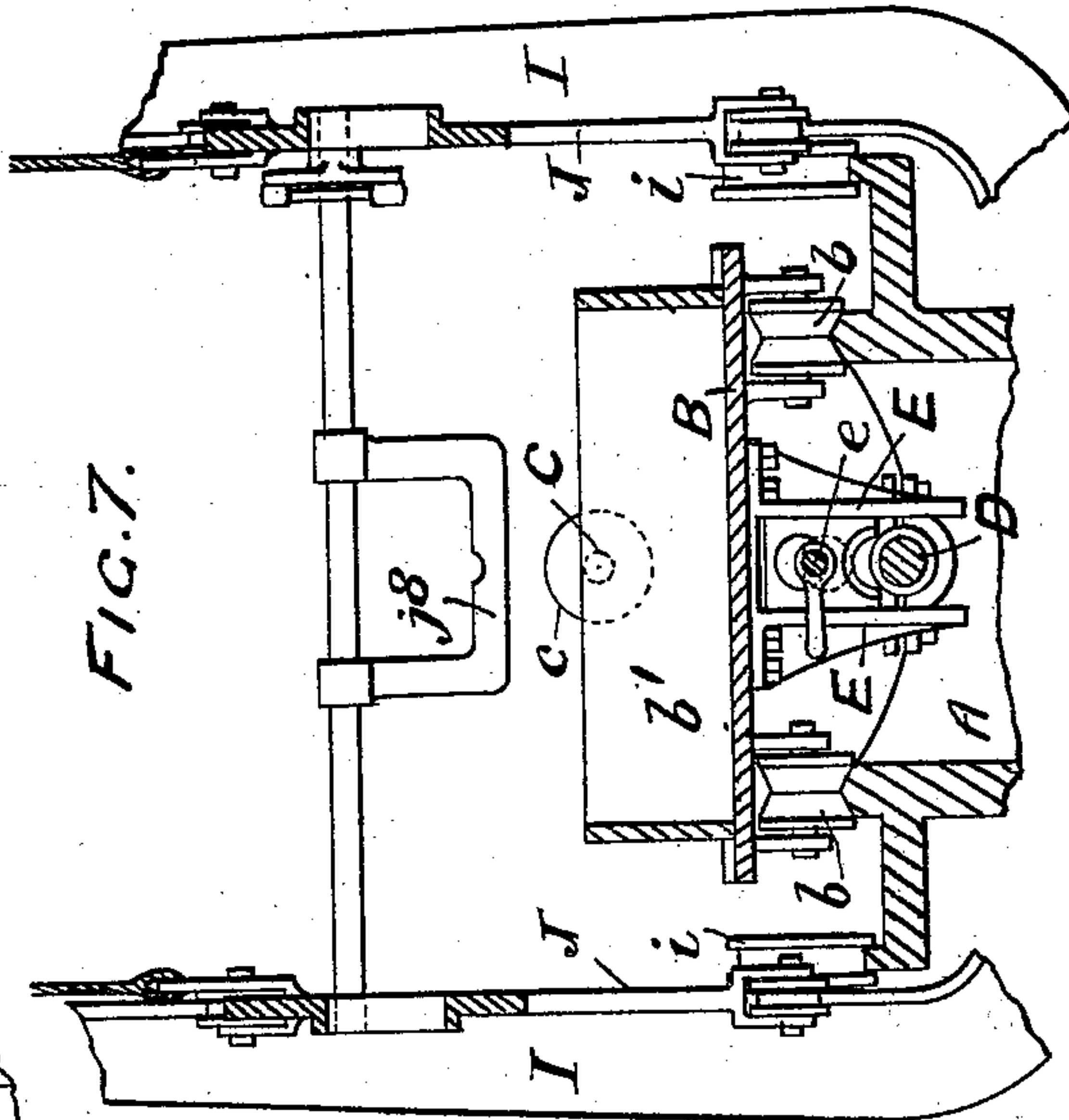
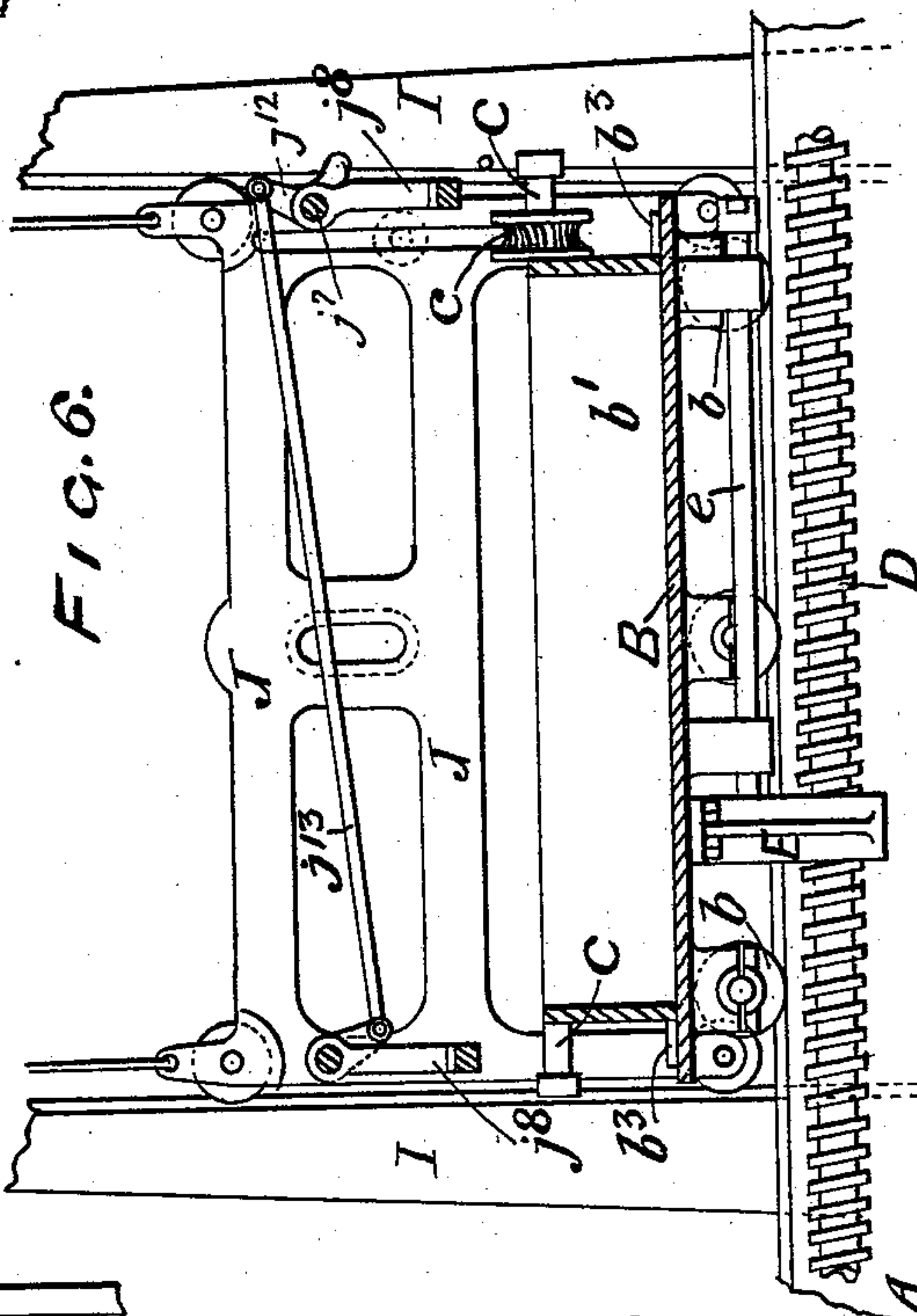


FIG. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH DANIEL DUCKETT, OF GLASGOW, SCOTLAND, AND WILLIAM
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MACHINE FOR SAND-MOLDING.

SPECIFICATION forming part of Letters Patent No. 603,267, dated May 3, 1898.

Application filed September 26, 1896. Serial No. 607,060. (No model.) Patented in England December 12, 1895, No. 23,799.

To all whom it may concern:

Be it known that we, JOSEPH DANIEL DUCKETT, foundry manager, of 12 Oxford Terrace, Helvinside North, in the city of Glasgow, Scotland, and WILLIAM BADGER, consulting mechanical engineer, of 16 Hardy street, Rotherham, Yorkshire, England, have invented certain new and useful Improvements in Machines for Sand-Molding, (for which we have obtained Letters Patent of Great Britain, No. 23,799, dated December 12, 1895,) of which the following is a specification.

This invention relates to machines for the expeditious production of sand molds in mold boxes or flasks ready for casting.

In this arrangement the molding-boxes are temporarily fixed upon a machine-table mounted on wheels, which is propelled along the machine-bed by rack, screw, or other suitable mechanical motion. At a suitable position on this machine-bed are fixed strong standards, within which is mounted a cylindrical sand-compressing pneumatic roller, having either plain or irregular surface, under which the molding-boxes when filled with sand are made to pass. Upon the same machine-bed is fixed also the machinery for lifting and turning over the molding-boxes in order to receive a supply of sand in the other box part or parts, which is then passed under the sand-compression roller, as described.

Within the framing of lifting-gear the pattern-plate-withdrawal levers are worked. After withdrawal of the pattern-plate or patterns the molding-box parts are brought together, secured, and removed for casting.

A small air-pump is preferably attached to the machine-bed to supply compressed air to the pneumatic sand-compression roller. A pneumatic blast is also used to spread parting sand, coal-dust, or other suitable material on the face of the mold.

The machinery is driven by suitable belts, gearing, and motive power.

The invention is illustrated by the accompanying drawings, Figure 1 of which is a longitudinal vertical section, Fig. 2 a transverse vertical section, and Fig. 3 a plan, of the improved machine. Figs. 4 to 7 are details hereinafter referred to.

A cast-iron or steel girder gauntree or box-bed A, having cone-shaped rails a formed or fixed upon its upper surface, constitutes the bed of the machine. Tables or carriages B, of which there are preferably two, (one only being shown in the drawings,) are mounted upon grooved rollers b and are adapted to travel upon the rails a of the gauntree A. Each of the tables B carries mold-boxes consisting of two or more parts $b' b^2$, one of these parts, b' , being temporarily fixed upon the carriages by clasps b^3 , which act merely to position the box upon its table, and having trunnion-axes C fixed to its ends or sides near the center of the vertical height of the boxes when these are bound together and lying in their normal positions. A worm-wheel c is keyed or otherwise fixed to one or both ends of these trunnion-axes for a purpose hereinafter described. A spindle D, extending the entire length of the bed A of the machine and carried in bearings therein, has a portion of its length formed as a screw, with which engage screw nuts or boxes E, capable of disconnection therefrom by means of the levers and rods e , these boxes E being secured on the under sides of the traveling tables B. The tables B are by this means traversed to and fro under a cylindrical pneumatic, hydraulic, steam, or other sand-compression roller F. This compression-roller, which is preferably pneumatic and has one chamber only, as illustrated in detail at Figs. 4 and 5, containing air under pressure, has its axle g in bearings in vertical standards G on the bed A of the machine, these bearings being adjustable to regulate the height of the compression-roller F to suit different sizes of mold-boxes by means of screws h and hand-wheels H, and has a slow revolving motion imparted to it by gear x , shafts x' , and pulleys x^2 , with their belt x^3 .

g' is an opening by which the hollow shaft g communicates with roller F.

g'' are disks closely fitting the shaft g and clamping the ends of roller F to said shaft.

The roller F has arranged over the upper part of its circumference a number of hollow steel rollers f , which rotate in adjustable bearings formed in quadrant plates at

tached to the journals of the axle of the sand-compression roller. These rollers rotate in contact with the circumference of the compression-roller, as shown at Fig. 5, forming
 5 an abutment against which the upper portion of the circumference of the compression-roller is pressed, thereby preventing it from springing too freely when the mold-boxes filled with sand pass under for compression
 10 and also tending to return it to the true cylindrical form when the boxes pass from beneath the compression-roller.

When the parts $b'b^2$, or more, of the mold-box parts have been bound together in the
 15 usual way with the pattern-plate b^4 between them and parting sand and blacking blown on said plate, the box b' is filled with sand and traversed by the action of the screw-spindle D (which is rotated by belt-pulleys y
 20 or otherwise) under the compression-roller F until clear thereof, and is brought between the two sides of a frame I, which may be fixed to the bed of the machine or may, as shown, be carried upon wheels i , which render it adjustable horizontally upon the machine-bed A. Within this framing I rectangular lifting-frames J are situated, having
 25 wheels j , which bear upon rails i' on the frame I. The lifting-frames J and mold-boxes $b'b^2$ are counterbalanced by weights. These lifting-frames J have their vertical motion imparted to them through crank-disks j' , centered on a transverse shaft j^2 , and connecting-rods j^3 , the shaft j^2 being rotated
 30 by gearing j^4j^5 , the gear j^5 being capable of disconnection from its source of power by means of a clutch j^6 or other suitable device. Two transverse shafts j^7 , carried in bearings on the sides of the lifting-frames J, have suspension-arms j^8 fixed on them, which are held
 40 in a horizontal position by the action of studs j^{11} (fixed on the upright framing I) on levers j^{10} , secured on the shafts j^7 , and when the frames J are raised these arms are released
 45 automatically and fall under and engage with the trunnion-axles C on the mold-box b' and raise both or more parts of the box the distance necessary to permit of these being turned over to fill the box part b^2 with sand.
 50 The suspension-arms j^8 are actuated simultaneously by means of levers j^{12} , secured on the shafts j^7 and connected together by a rod j^{13} . The turning over of the boxes is effected by a worm K, keyed on a transverse shaft k ,
 55 passing through slots j^9 in the lifting-frames J and carried in bearings in the frame I, the worm K engaging with the worm-wheel c , already mentioned as fixed on one or both of the trunnion-axles C on the mold-box part b'
 60 and now brought into gear with the worm K on the transverse shaft k by the raising of the lifting-frames J. The mold-box parts $b'b^2$, or more, which are at this time pivoted on the suspension-arms j^8 , are thus turned over
 65 and again lowered onto the table B to permit of the box b^2 being filled, and the suspension-arms are automatically raised to their former

horizontal position. The transverse shaft k is actuated by worm or other gearing $k'l$ from a vertical shaft L, which is in turn driven by
 70 a vertical shaft L, which is in turn driven by bevel-gearing $l'm$ from a horizontal shaft M, actuated by belt or other gearing, this shaft M also actuating, by means of bevel-wheels m' , the gearing j^5j^4 , arranged to rotate the shaft j^2 and disks j' for raising the lifting-
 75 frames J. The two shafts j^7 are connected together by levers j^{12} and a connecting-rod j^{13} and act simultaneously. When the sand in the box part b^2 has been pressed, the box is returned within the lifting-frames J in order
 80 to remove the pattern-plate b^4 from the mold. This is accomplished as follows: Within bearings on the lifting-frames J vertical shafts N are carried, upon which are fixed levers n , pivoted to horizontal angle-bar pivoted shelves n' , so connected together on
 85 either side of the framing J as to be operated simultaneously by means of a hand-lever n^2 to advance the pivoted shelves under projections b^5b^6 on the upper box and on the pattern-plate, respectively. The clutch j^6 is then
 90 operated so as to gear with the worm j^5 , and through the worm-wheel j^4 on the shaft j^2 and the crank-disks j' and connecting-rods j^3 the lifting-frames J are raised, the first set of shelves n' acting on the upper box b^2 , and later the second set, acting on the pattern-plate b^4 , separate the mold-box parts and pattern-plate b^4 , as shown by Figs. 1 and 2. The
 95 pattern-plate b^4 is then removed, the top box part or parts lowered upon the under one and secured thereto, the pivoted shelves turned back, and the mold-box with the complete mold removed from between the frames J to the casting-floor. A second pneumatic or
 100 other sand-compression roller, similar to that shown, situated on the other side of the lifting-frames J, may be used, and a supplementary solid roller may be used in conjunction with each of the pneumatic rollers to act upon
 105 the sand afterward.

The mode of operation is as follows: The molding-box parts, with pattern-plate in position, are placed on the trolley. Parting sand and blacking are blown onto the pattern-plate
 115 or mold by means of the air-pump and blow-pipes connected therewith. The molding-sand is now filled into the upper part of molding-box from a "hopper" above or by hand. The machine is set in motion, then the molding-
 120 boxes pass under the sand-compression roller and to the required position within the framing of the lifting and turning-over machinery, which, (in its turn,) being set in motion, raises and turns over the molding-box
 125 and lowers it onto the trolley. The box parts now uppermost are supplied with sand, as before, and again passed under the compression-roller and to the lifting machinery for the withdrawal of pattern-plate, as previously described. After withdrawal of pattern-plate
 130 the parts of molding-boxes are brought together, securely fastened, and removed from the machine ready for casting.

Having now described the invention, what we desire to claim and secure by Letters Patent is—

1. In a machine for making sand molds, the combination of a platform B carrying mold-boxes b' , b^2 , box b' being positioned on the platform, the other box being above box b' with means for moving it toward and from the same, means for raising both boxes from the platform, inverting and then lowering them, a machine-bed having rails on which said platform can travel under and out from under said means, a screw D in said bed, a nut engaging the screw and operatively connected to the platform, and a compression-roller above the track and adapted to press sand into the mold-boxes.

2. In a machine for making sand molds the combination of lifting-frames J actuated by crank-disks j' and connecting-rods, suspension-arms j^8 pivoted on said frames, and engaging trunnion-axles C formed on the parts of the mold-box to raise it, a worm-wheel c on one of said trunnions, and a transverse spindle k and worm K thereon and engaging worm-wheel c, to effect the turning of said box when it is desired to fill the other box part or parts with sand, substantially as described.

3. In a machine for making sand molds, the

combination with the lifting-frames J of devices for separating the mold-box parts and removing the pattern-plate b^4 , said devices consisting of vertical shafts N in bearings on the lifting-frames J carrying levers n to which are pivoted horizontal shelves n' adapted to engage with the pattern-plate b^4 and upper box part or parts, substantially as described.

4. In a machine for making sand molds, the combination of a platform B carrying mold-boxes b' , b^2 , box b' being positioned on the platform, the other box being above box b' , means for moving it toward and from box b' , means for raising both boxes from the platform and turning them, a machine-bed having rails on which said platform can travel under and out from under said means, means for moving said platform and parts carried thereby on said track, a pneumatic roller above said track arranged to press the contents into said boxes when the platform and boxes are moved under it.

Signed at Glasgow, Scotland, this 10th day of April, 1896.

JOSEPH DANIEL DUCKETT.
WILLIAM BADGER.

Witnesses:

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