

No. 697,593.

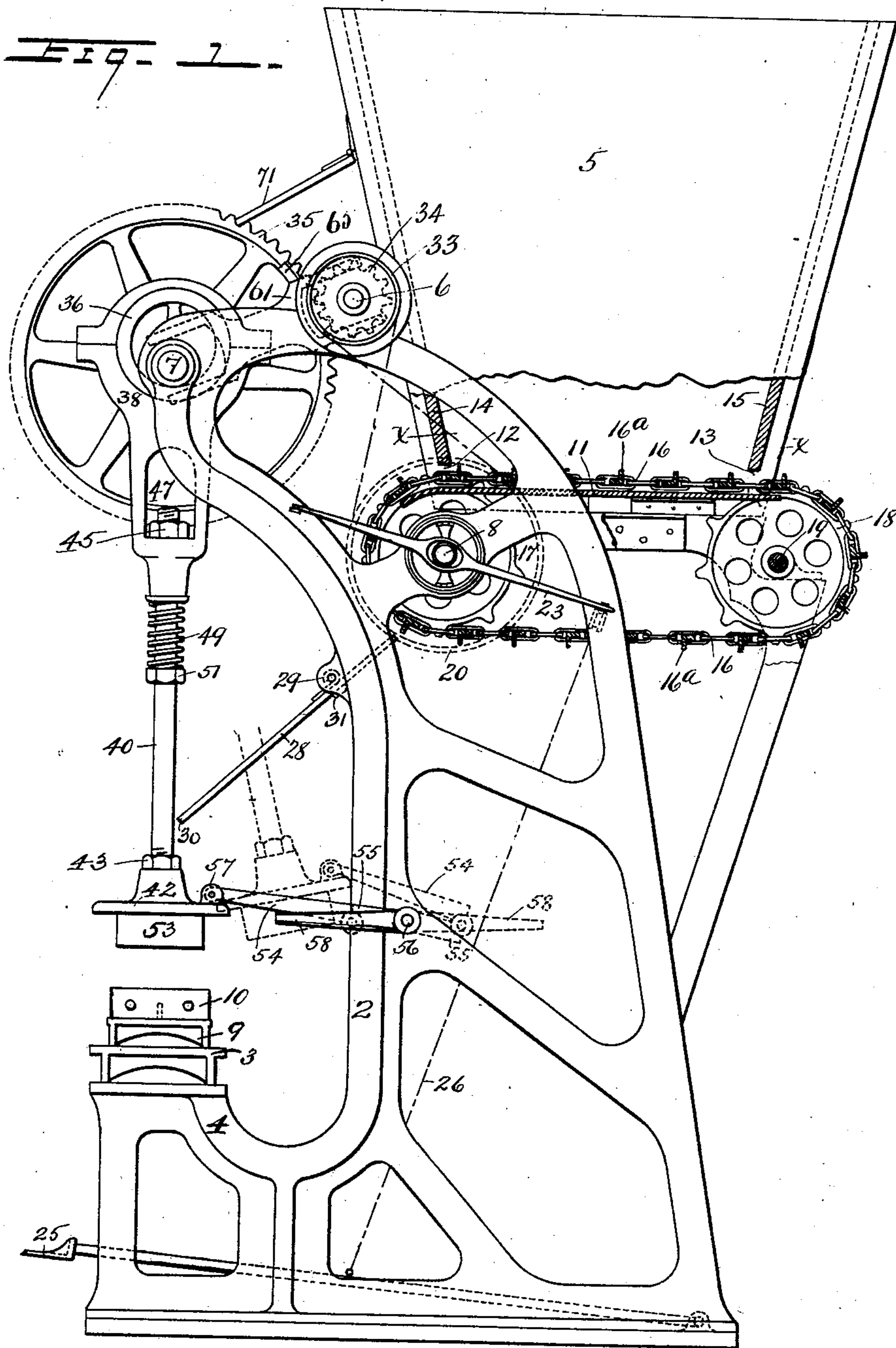
Patented Apr. 15, 1902.

D. L. ADAMS.
SAND MOLDING MACHINE.

(Application filed June 27, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
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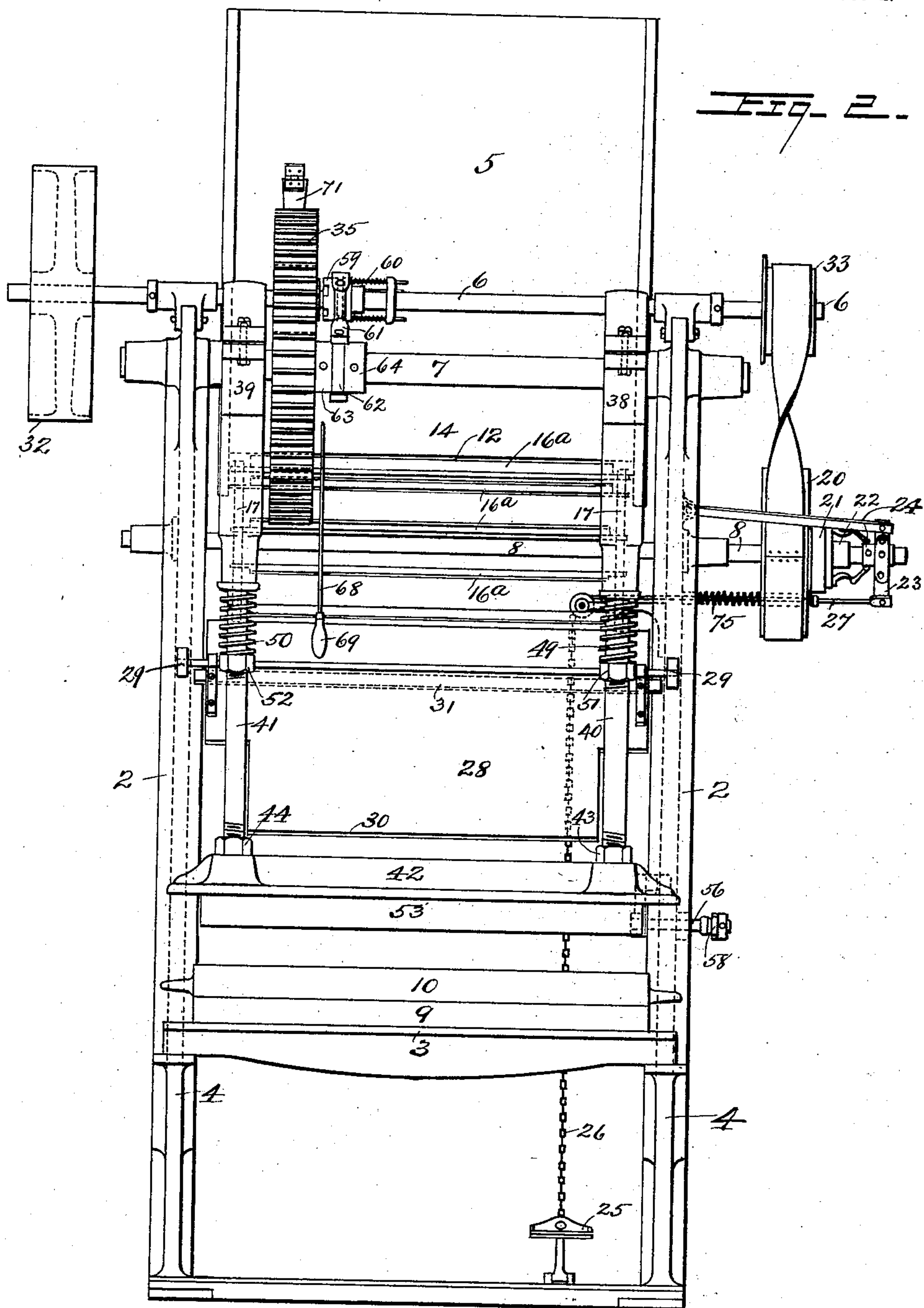
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3 Sheets—Sheet 2.



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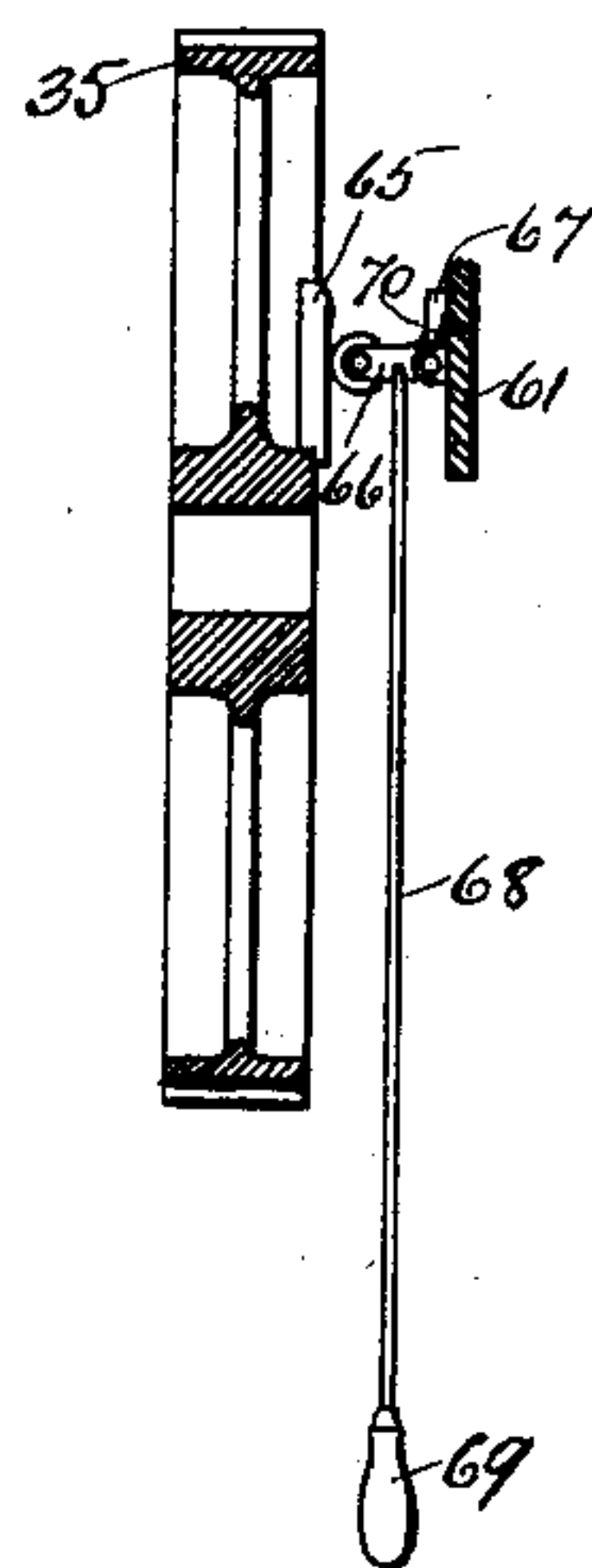
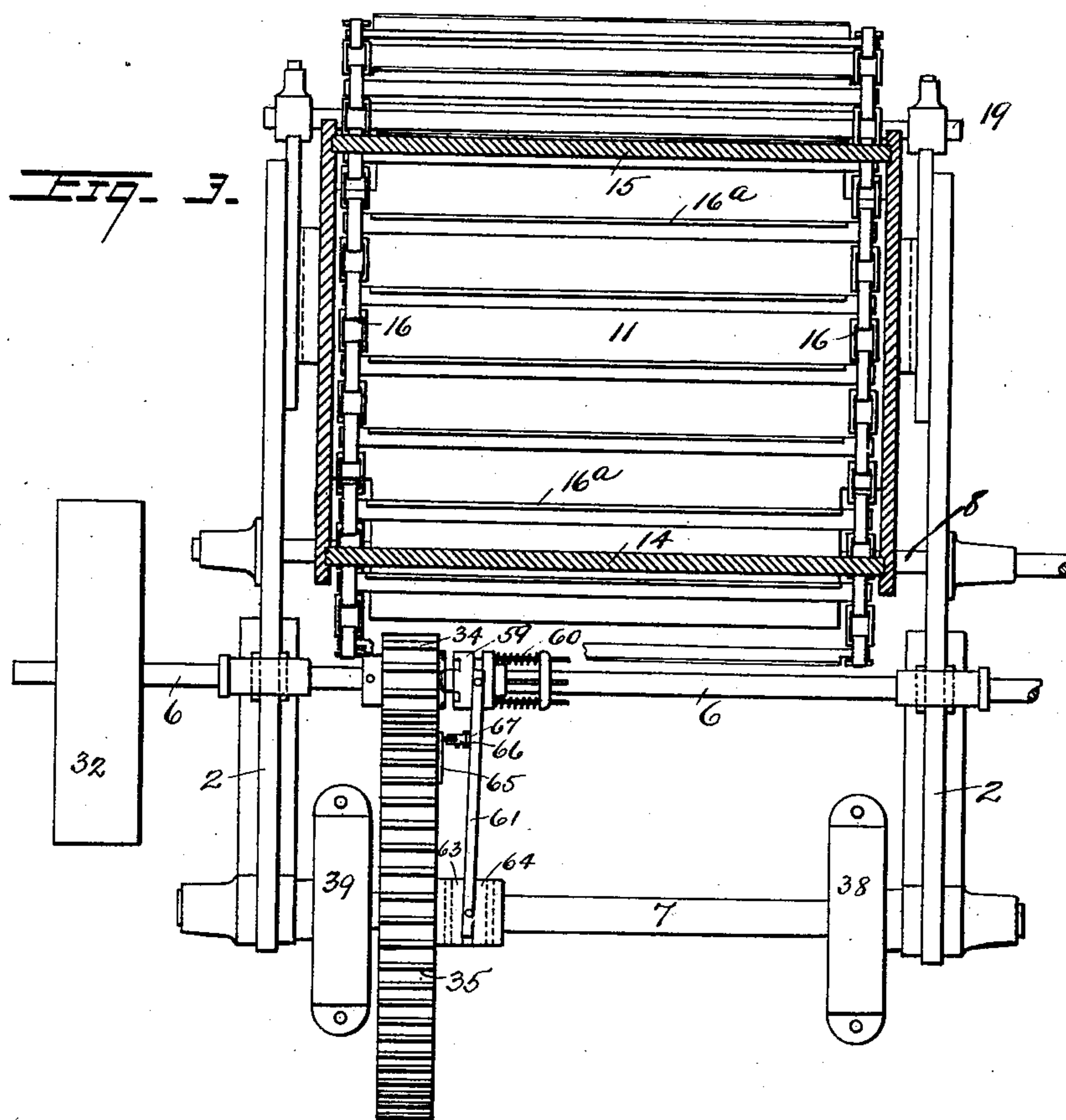
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(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

DANIEL L. ADAMS, OF READING, PENNSYLVANIA.

SAND-MOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 697,593, dated April 15, 1902.

Application filed June 27, 1901. Serial No. 66,212. (No model.)

To all whom it may concern:

Be it known that I, DANIEL L. ADAMS, a citizen of the United States of America, and a resident of Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Sand-Molding Machines, of which the following is a specification.

My invention relates to machines for making foundry sand molds, and has for its object the production of an improved machine for this purpose comprising, in connection with other novel features, a positive feed of sand from a hopper to the flask and an adjustably mounted rammer mechanism, with automatic operating means therefor, all of which are particularly described in connection with the accompanying drawings, and specifically pointed out in the claims.

Figure 1 is a side elevation, partially in section, of my improved machine, the rammer-head being shown in full lines in ramming position above the flask-bed and indicated in dotted lines as swung out of the way during the manipulation and filling of the flask. Fig. 2 is a complete front elevation of the machine. Fig. 3 is a partial plan view, the hopper being shown in section on the line *xx* of Fig. 1; and Fig. 4 is a detail view.

The frame of the machine is formed mainly by the side uprights 2 and 2, which are secured to a suitable bed and between which are mounted the main parts of the machine. These comprise the flask-table 3, which is secured to forwardly-extending brackets 4 4, the sand-hopper 5, located between the upper portions of the uprights 2 2 and rising above the same, the main driving-shaft 6, the parallel rammer-operating shaft 7, the belt-feed shafts 8 and 19, and the mechanism arranged to cooperate with these main parts, as will be fully described.

The flask-table 3, supported on the frame-brackets 4 4, as stated, is located at the front of the machine and at a convenient height from the ground or floor, so that the pattern-card 9 and the flask 10, inclosing the pattern, may be easily handled by the operator. The sand box or hopper 5, supported between the upper ends of the standards 2 2 back of the main shaft 6, is provided with a flat bottom 11, but has openings 12 and 13 in the front

and rear walls 14 and 15, respectively, of the hopper just above the bottom 11 for the passage of an endless conveyer or feed belt. This belt comprises a pair of parallel endless chains 16 16, spread apart to a width somewhat less than the interior width of the hopper-bottom and connected by a series of transverse conveyer-bars 16^a, preferably of angle-iron, arranged to practically lie upon the hopper-bottom 11 and form parallel vertical ribs above said bottom movable with the endless chains 16 16, and separated so that the bottom layer of sand in the hopper occupies the spaces between them and is positively fed forward by the chains when the latter are moved, as hereinafter described, so as to deliver the sand through the opening 12 in the front wall 14 of the hopper for the purpose of filling the flask. The endless chains 16 16 of the feed-belt are carried by a pair of sprocket-wheels 17 17, fixed to the sand-feed shaft 8 beneath the forward end of the hopper, and by similar sprocket-wheels 18 18 on a parallel shaft 19, located beneath the rear end of the hopper, and the feed-belt is driven, as shown, from the pulley 33 on the main shaft 6 through a crossed belt driving the pulley 20 on the shaft 8. This pulley 20 is loose on its shaft, but may be thrown into engagement therewith by means of a suitable clutch mechanism 21 22, which is operated by a clutch-lever 23, engaging the feathered clutch-sleeve 24 and moved by means of a conveniently located foot-lever 25, connected thereto by a chain 26 and rod 27, upon which latter is a spring 75, adapted to normally hold the clutch out of engagement with the pulley.

To provide for properly delivering the sand thus positively fed from the hopper by the feed-belt into the flask 10, I employ an inclined plate or chute 28 of somewhat greater width than the feed-belt and pivotally secured to the frames 2 2 at 29, with its upper end extending under the forwardly-projected bottom 11 of the hopper and its lowered end 30 adjusted, by means of a support 31, so as to cause the sand to fall therefrom directly into the flask beneath it.

The main shaft 6 of the machine, which is provided at one end, as shown, with the driving-pulley 32 and at the other with the pulley 33, already referred to as operating the

feed-belt pulley 20, carries a loose pinion 34 and a suitable clutch mechanism, hereinafter described, adapted to engage or disengage said pinion from the shaft 6. This pinion 34

5 is arranged in mesh with a gear-wheel 35, fixed to the rammer-operating shaft 7, so as to rotate the latter when the clutch mechanism is operated to engage the pinion with its shaft 6.

10 The rammer-shaft 7, which is thus intermittently driven by the pinion 34, is provided with two fixed eccentrics 36 36, upon which are loosely mounted eccentric-straps 38 and 39, carrying rods 40 and 41, the lower ends of

15 which are shown adjustably secured to the rammer-head 42 by being screwed into the latter and rigidly held by jam-nuts 43 44. The upper ends of these rods are also screw-threaded, but pass loosely through openings therefor in the depending ends of the eccentric-

20 straps and are provided with end nuts 45 45, normally seated by the open lower portions of enlarged recesses 47 47, formed therefor in the eccentric-straps, and with compression-

25 springs 49 and 50, respectively, strung upon the rods between the lower faces of the straps and nuts 51 and 52, respectively, forming adjustable collars on the rods. The object of this method of connecting the eccentric-straps

30 to the rammer-head is to provide not only for adjusting the length of the rods to suit varying heights of flasks, but also to prevent possible breakage by excessive ramming strains, the buffer-springs 49 and 50 being readily set

35 to a sufficient tension to allow proper ramming pressure, but yielding in case the pressure becomes excessive.

The rammer-head 42 is provided, as shown, with a removably-secured block 53, which

40 may be changed, if desired, to suit the form of flask used. This rammer-head requires to be so controlled as not only to be moved positively and uniformly for the ramming operation, but also so as to be readily swung out

45 of the way during the preliminary and succeeding operations, such as placing the pattern and flasks, supplying sand to the latter, and removing the finished molds. To this end I employ in connection with the eccentric

50 suspending mechanism a swinging mechanism for the rammer-head adapted both to guide it in its ramming movement and to move and hold it out of its normal position above the flask, as desired. This latter mechanism consists, as shown, of a two-part hinged

55 lever 54 55, one end of which is pivoted to a lug 57 on the rammer-head and the other fixed to a shaft 56, mounted in the frame 2 and provided with a hand-lever 58 for rocking the

60 shaft 56 to close or open out the hinged parts of the lever, and thus swing the head inward to the position indicated in dotted lines in Fig. 1 or outward to its normal position above the flask, in the former of which positions it

65 may be readily retained, the weight of the hand-lever, as shown in connection with the

bend of the hinged lever, being adapted to serve the purpose.

The clutch mechanism, already referred to, for engaging or disengaging the pinion from 70 its shaft 6 comprises the rotating sleeve 59, slidable on the shaft and normally pressed into engagement with the pinion by springs 60, as usual, together with the lever 61 for throwing out the clutch. This lever is piv- 75 oted, as shown, to a collar 62, loosely mounted on the ramming-operating shaft 7 between fixed collars 63 and 64 thereon and is arranged to be automatically moved to disengage the clutch by a cam 65 on the adjacent side of 80 the gear-wheel 35, so as to automatically stop the rotation of the rammer-shaft after a single revolution, which is all that is required to effect the ramming of a flask. This cam 65 on the gear-wheel operates the clutch-le- 85 ver 61 indirectly through a bell-crank attachment 66, which is pivoted to a lug on the side of the lever and is provided with an antifric-tion-roller to contact with the cam. The springs 60 normally press the clutch in en- 90 gagement with the pinion-wheel; but when the gear-wheel is rotated the cam 65 thereon, coming in contact with the roller end of the bell-crank at the end of each revolution re- 95 quired to operate the rammer, presses the lever 61 outward, and so disengages the clutch, the heel portion or stop 67 of the bell-crank preventing the latter from rising above hori- 100 zontal position. The cam 65 holds the clutch out of engagement with the loose pinion 34, the pinion sliding on the turning shaft and the gear-wheel 35 being stationary. In order that the operator may throw the clutch into engagement to effect another revolution of the rammer-operating shaft, I provide a de- 105 pending rod 68, pivoted to the bell-crank and provided with a handle 69, by which the bell-crank may be forcibly pulled down, so as to permit the springs 60 to press the clutch into engagement with the pinion-wheel. As soon 110 as the gear-wheel is rotated so as to carry the cam past the bell-crank the handle 69 is released and the bell-crank is automatically raised to horizontal position by a suitable spring 70, so as to be again in the path of the 115 cam at the end of the revolution for the purpose of automatically throwing out the clutch and stopping the rammer-operating shaft. A pawl 71 is provided to engage the teeth of the gear-wheel and prevent any backward 120 movement. After one revolution of the gear-wheel 35 the cam 65 thereon throws the clutch 59 out of engagement through the lever 61 and bell-crank 66. The pinion 34 immediately runs loose on the shaft 6, and the gear- 125 wheel 35 comes to a rest with the bell-crank holding the clutch out of engagement, the springs 60 being compressed. In order to again move the gear-wheel 35, the bell-crank 66 must be pulled down from contact with 130 the cam 65 in order to give the springs 60 an opportunity to move the clutch along the

shaft to engage the pinion 34. Without the bell-crank the springs 60 would be compressed after one revolution of the gear-wheel 35 and remain so. With the bell-crank the rammer-head may be operated when desired by merely pulling on the handle 69 to throw the lever 61 out of engagement with the cam 65 and allow the springs 60 to operate to engage the pinion 34 fixedly to the shaft 6 and turn the gear-wheel 35 in mesh therewith. The turning of the wheel 35 carries the cam 65 past the bell-crank, which resumes its normal position by the action of spring 70 and again engages said cam at the end of one revolution.

The operation of the machine will be readily understood from the preceding description. The rammer-head is swung back to its dotted position, Fig. 1, by means of lever 54-54 during the manipulation of the pattern and flasks, the suspending eccentric-rods 40 and 41 passing the projecting apron 28 on either side. The foot-lever 25 is then operated to engage the pulley 20 with its shaft 8, thus starting the feed-belt 16, the conveyer-bars of which push forward the sand resting upon the hopper-bottom through the front opening 12 in the hopper-wall and drop it into the chute-plate 28, where it is spread out and delivered over the properly-located edge 30, so as to drop directly into the flask beneath, until the movement of the feed-belt is stopped at the will of the operator by releasing the foot-lever. When ready for ramming, the lever 54 55 is moved to swing the rammer into position over the flask, and the clutch-handle 69 is then pulled down to throw in the clutch and cause rotation of the pinion 34 and rammer-shaft 7, with the resulting downward movement of the rammer-head. It will be noticed that this movement is not exactly vertical, but that the combined result of the eccentric swing of the strap ends of the rods 40 41 and of the swing of the head in a vertical arc about the pivotal center 56 of the lever 54 55 is to give a slight fore-and-aft rocking movement to the rammer when in its lowest position, which assists in properly packing the sand in its flask. As the rammer rises the clutch is automatically operated to release the pinion and prevent repetition of the ramming action until desired.

It is evident that the details of the mechanism above set forth may be considerably varied without departing from the spirit of my invention, and I do not, therefore, desire to limit myself to the exact construction shown and described; but,

What I claim is—

1. A ramming mechanism for sand-molding machines, embracing a rammer-carrying rod having means by which it is raised and lowered, combined with a guiding device therefor, embracing an arm pivoted at one end to the rammer and having its other end pivoted at a fixed point, said arm having a plurality of members pivoted together at their con-

fronting ends, and means actuated to turn said arms on the latter pivot and thereby swing said rammer laterally.

2. A ramming mechanism for sand-molding machines, embracing a rammer-carrying rod having means by which it is raised and lowered, combined with a guiding device therefor, embracing an arm pivoted at one end to the rammer and having its other end secured to a pivotal shaft, said arm having a plurality of members pivoted together at their confronting ends, and means for turning said shaft to thereby swing said rammer laterally.

3. A ramming mechanism for sand-molding machines, embracing, in combination, an operating-shaft, a rammer, rammer-rods attached to opposite ends of said rammer, connections between said rods and shaft for actuating the rods to thereby raise and lower said rammer, a rock-shaft, and guide-arms, each pivoted at one end to said rammer and having its other end secured to said rock-shaft and each comprising two members pivoted together at their contiguous ends, and means actuated to turn said rock-shaft and thereby swing said rammer.

4. In a sand-molding machine, the combination with a frame, a flask-table, a hopper, and means for feeding sand from said hopper to the flask, of a shaft, means for actuating the same, eccentrics on said shaft, eccentric-straps engaging said eccentrics, rods carried by said straps, rammers secured to said rods, and arms each pivotally connected at one end to the rammer and at its other end to a fixed point on the machine-frame, each of said arms being formed of two parts hinged together at their contiguous ends, and means for folding or opening the hinged parts to swing the suspended rammer.

5. In a sand-molding machine, the combination with a rammer-actuating shaft, and an eccentric thereon, of an eccentric-strap engaging said eccentric, a rammer, a rod to the lower end of which said rammer is secured, said rod being suspended directly from said strap and supported to have longitudinal movement relative thereto and a buffer-spring for said rod and rammer.

6. In a sand-molding machine, the combination with a rammer-actuating shaft, and an eccentric thereon, of an eccentric-strap engaging said eccentric and having an opening in one end, a rod having one of its ends projecting into said opening and movable longitudinally therein, a rammer secured to the other end of said rod, means on said rod by which it is supported directly from said strap, and a buffer-spring for absorbing excessive pressure imposed on said rammer.

7. In a sand-molding machine, the combination with a rammer-actuating shaft, and an eccentric thereon, of an eccentric-strap engaging said eccentric, a rod supported directly by said strap and having a rammer at its lower end, said rod having means by which the length of its projection from said strap is ad-

justably determined and having movement relative to said strap, and a buffer-spring for absorbing excessive pressure imposed on the rammer.

5 8. In a sand-molding machine, the combination with a rod, and means for supporting and for raising and lowering the same, of a rammer carried by said rod and partaking of the movements thereof, said rammer having
10 movement relative to the means for supporting and raising and lowering said rod, a buffer-spring for absorbing excessive pressure imposed on the rammer, and a guiding means for said rod independent of its said raising
15 and lowering and supporting means.

9. In a sand-molding machine, the combination with the machine-frame, a rammer-actuating shaft, and an eccentric thereon, of an eccentric-strap engaging said eccentric, a rod
20 supported directly from said strap and having movement relative thereto, a rammer secured to said rod and partaking of the movements thereof, a buffer-spring for said rammer and rod, and a guiding means for said
25 rod and rammer, said guiding means being pivoted to said rod and the machine-frame at its respective ends.

10. In a sand-molding machine, the combination with a rammer-actuating shaft, an eccentric thereon, an eccentric-strap engaging
30 said eccentric, a rammer, a rod to which said rammer is secured, and a nut threaded upon the upper end of said rod and serving to suspend said rod directly from said strap and
35 to adjustably determine the length of the projection of said rod from said strap.

11. In a sand-molding machine, the combination with a rammer-actuating shaft, and an eccentric thereon, of an eccentric-strap engaging
40 said eccentric, a rod having longitudinal movement relative to said strap, a nut threaded upon the upper end of said rod and engaging said strap, said nut serving to suspend said rod directly from said strap and
45 adjustably to determine the length of the projection of the rod from the strap, a rammer secured to said rod, and a buffer-spring for said rod and rammer.

12. In a sand-molding machine, the combination with a rammer-actuating shaft, and an eccentric thereon, of an eccentric-strap engaging
50 said eccentric and having an opening through one end and an open portion with which said opening communicates, a rod projecting through said opening into said open
55 portion, said rod being movable relative to said strap, a nut threaded upon said rod and located in said open portion of the eccentric-strap, a rammer secured to said rod, and a
60 buffer-spring for said rod and rammer.

13. In a sand-molding machine, the combination with the frame, flask-table, a hopper, and means for feeding sand from said hopper
65 to the flask, of a shaft, means for actuating the same, an eccentric on said shaft, an eccentric-strap engaging said eccentric, a rod suspended from said strap, a rammer secured

to said rod, said rod being movable relatively to said strap, a buffer-spring connected with
70 said rod and strap, an arm pivotally connected at its opposite ends to the rammer and machine-frame, said arm being composed of two members hinged together at their contiguous ends, and means for folding or opening the
75 same, for the purpose specified.

14. A ramming mechanism for sand-molding machines, embracing a main driving-shaft, a loose pinion and a clutch device thereon, a
80 rammer-operating shaft, a rammer connected therewith, a fixed gear-wheel on the latter shaft geared with said pinion, a clutch-lever and means controlled by said gear-wheel for
85 actuating said lever.

15. A ramming mechanism for sand-molding machines, embracing, a main driving-shaft, a loose pinion thereon, a spring-pressed
90 sleeve on said shaft, a rammer-operating shaft, a collar loosely mounted thereon and confined against movement longitudinally thereof, a pivoted lever connected with said sleeve and
95 collar, a fixed gear-wheel on said rammer-operating shaft geared with said pinion, a cam carried by said gear-wheel, and a bell-crank connected with said lever and projecting into
100 the path of said cam.

16. A ramming mechanism for sand-molding machines, embracing a main driving-shaft, a loose pinion thereon, a spring-pressed sleeve
105 on said shaft, a rammer-operating shaft, a collar loosely mounted thereon and confined against movement longitudinally thereof, a pivoted lever connected with said sleeve and collar, a fixed gear-wheel on said rammer-operating shaft geared with said pinion, a cam
110 carried by said gear-wheel, a spring-pressed bell-crank having a heel portion or stop, said bell-crank being connected with said lever and arranged to be actuated automatically by
115 said cam, and a means connected with said bell-crank by which the same may be actuated manually, substantially as described and
120 for the purposes set forth.

17. In a sand-molding machine the combination with the frame, the flask-table, the sand-hopper, and the sand-feed mechanism,
125 of the main driving-shaft with loose pinion and clutch device thereon, the rammer-operating shaft having a fixed gear-wheel in mesh with said pinion, the clutch-lever arranged to be automatically operated by said gear-wheel, and the rammer connected with said rammer-
130 operating shaft substantially as set forth.

18. In a sand-molding machine the combination with the frame, the flask-table, the sand-hopper, and the sand-feed mechanism,
135 of the main driving-shaft with loose pinion and clutch device thereon, the rammer-operating shaft having a fixed gear-wheel in mesh with said pinion, the clutch-lever arranged to be automatically operated by said gear-wheel, the rammer connected with said rammer-
140 operating shaft, and means for operating said clutch independently of the said gear-wheel, substantially as set forth.

19. In a sand-molding machine, the combination with a flask-support, of a sand-feed mechanism therefor comprising a hopper having a closed bottom and provided with openings in its sides, and an endless feed-belt traveling across the lower portion of said hopper and through said openings and having projections which travel therewith and are caused thereby to positively discharge the sand from the hopper through one of said openings, substantially as described.

20. In a sand-molding machine, the combination with a flask-support, of a sand-feed mechanism therefor mounted above and at one side of said support, said hopper having a horizontal closed lower end and provided

with openings in its opposite sides, an endless feed-belt traveling across the lower portion of said hopper above said bottom and through said openings and having projections which travel therewith and are caused thereby to positively discharge the sand from the hopper through one of said openings, and a conducting means for the sand, arranged between the latter opening and the flask, substantially as described.

Signed at Reading, Pennsylvania, this 19th day of June, 1901.

DANIEL L. ADAMS.

Witnesses:

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