

C. E. SIMPSON.
MOLD FORMING MACHINE.
APPLICATION FILED OCT. 20, 1910.

1,008,207.

Patented Nov. 7, 1911.

4 SHEETS—SHEET 1.

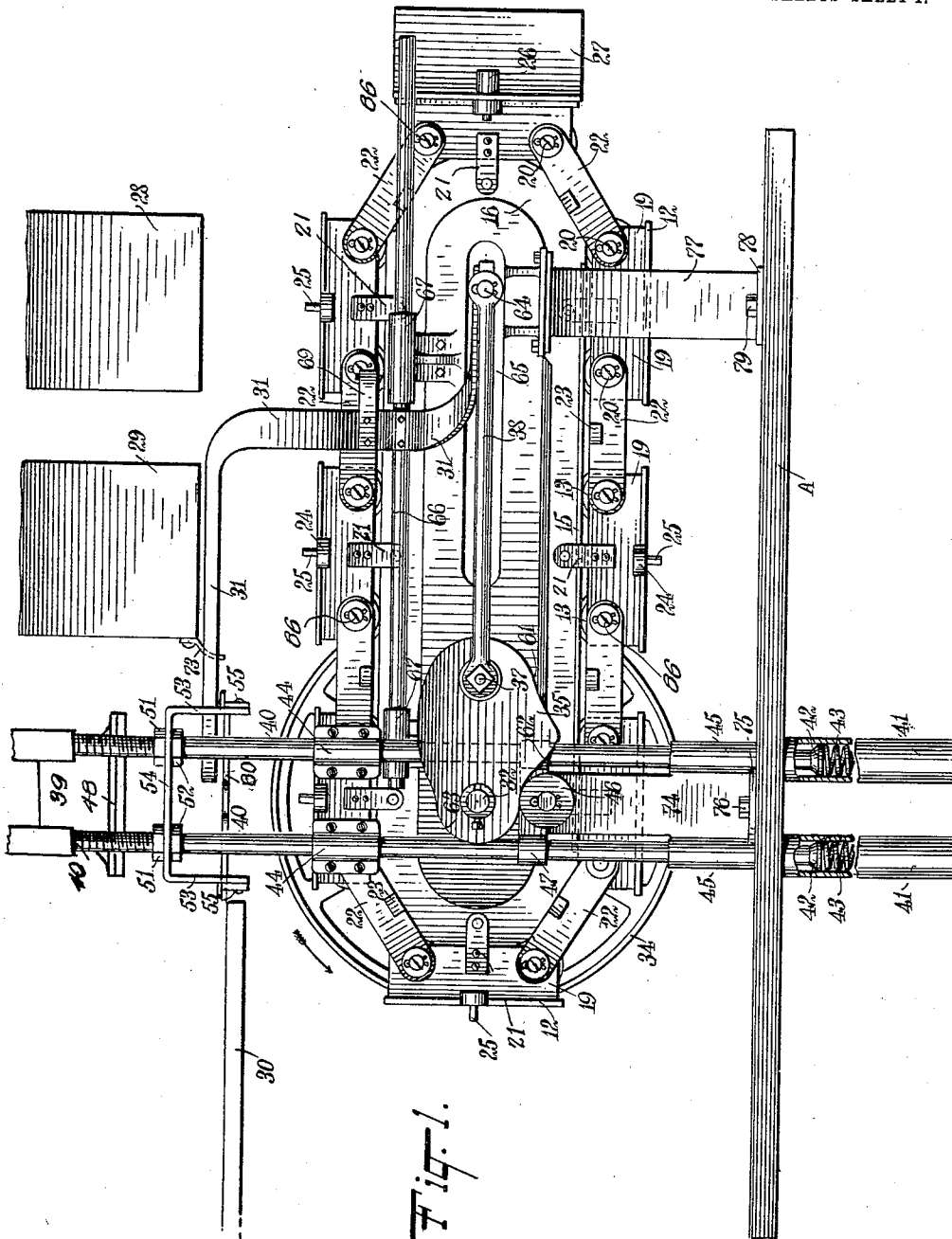


Fig. 1.

WITNESSES:

George Bamby.
Ed. M. Mordock

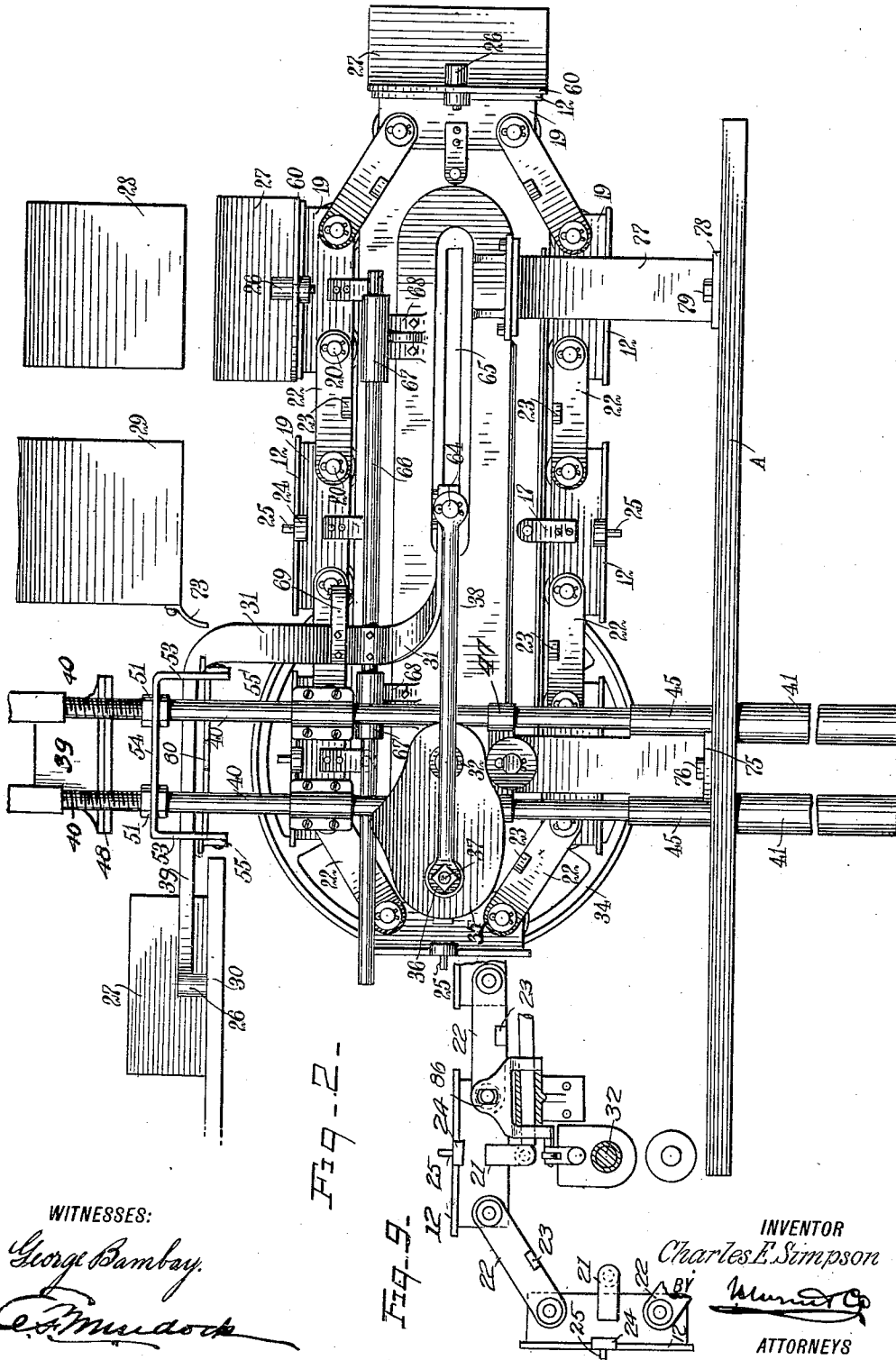
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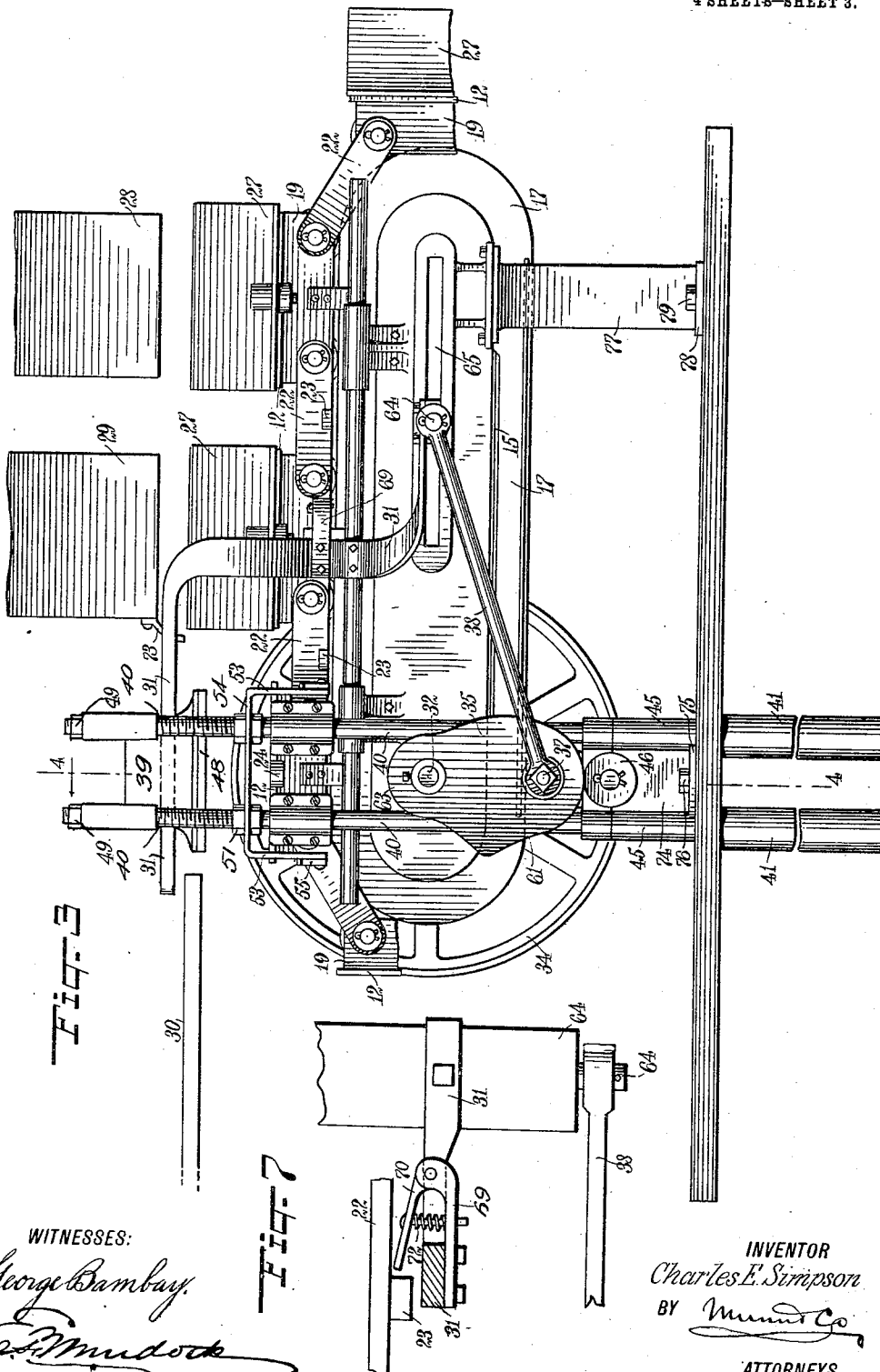


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4 SHEETS—SHEET 4.

Fig. 5.

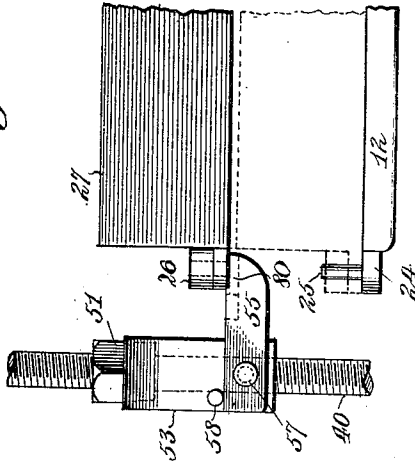


Fig. 6.

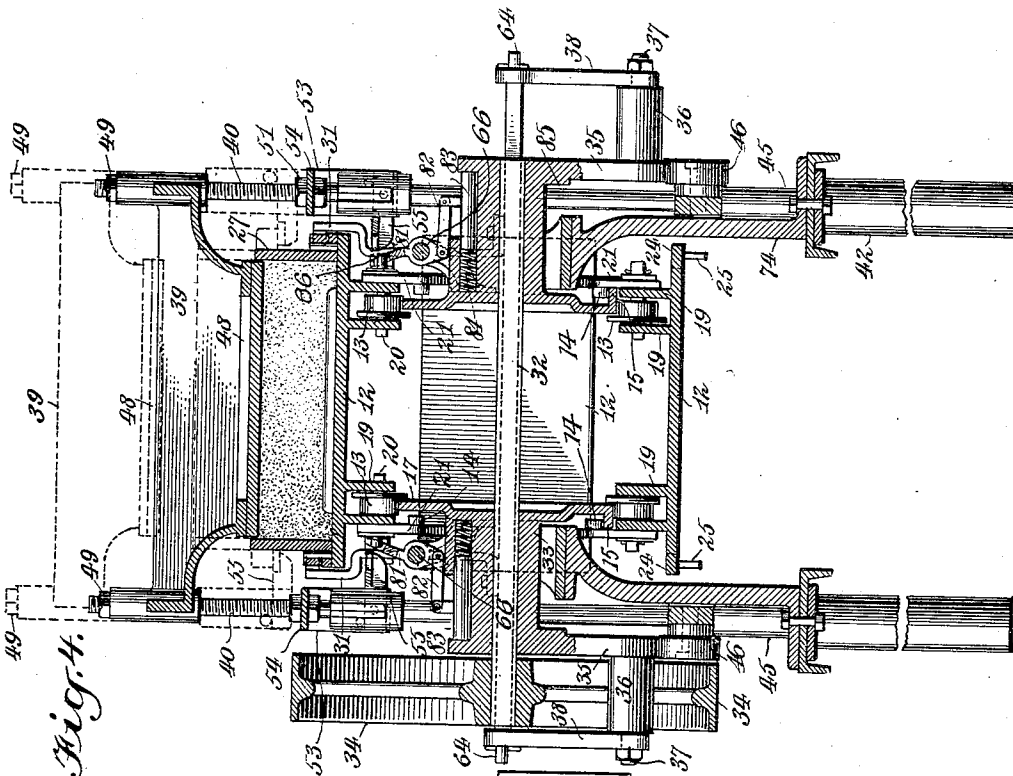
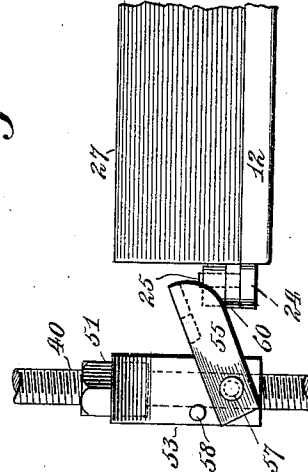
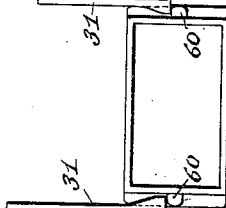


Fig. 4.

Fig. 8.



WITNESSES

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CHARLES E. SIMPSON, OF PORTSMOUTH, OHIO.

MOLD-FORMING MACHINE.

1,008,207.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES E. SIMPSON, a citizen of the United States, and a resident of Portsmouth, in the county of Scioto and State of Ohio, have invented a new and Improved Mold-Forming Machine, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide a continuously acting machine, the patterns whereof are disposed and connected in successive arrangement; to provide a machine of the character mentioned employing an endless chain of carriers provided with pattern plates adapted to receive and deliver molding frames for the formation of drag and cope molds; to provide a machine having a series of successively connected pattern plates and an intermittent feed mechanism arranged to advance each of said plates to and from stations where the facing sand and the ramming sand are delivered to the mold and to a station where the said sands are rammed; and to provide a machine of the character described which is automatic in its action.

One embodiment of the present invention is disclosed in the structure illustrated in the accompanying drawings, in which like characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a side elevation of a machine constructed and arranged in accordance with the present invention, the feeding mechanism being disposed in its retracted feeding position; Fig. 2 is a similar view of the machine, showing the mechanism in its extended feeding position; Fig. 3 is a similar view showing the mechanism in its intermediate feeding position; Fig. 4 is a vertical cross section taken on the line 4—4 in Fig. 3; Fig. 5 is a detail view on an enlarged scale, showing one of the elevator dogs employed for elevating the flask from the pattern plates and disposed above a lower flask to show the relation of the said flasks with the said dog; Fig. 6 is a similar view, showing the elevator dog in yielding position to pass the lower of the said flasks; Fig. 7 is a detail view, on an enlarged scale, of the engaging device for connecting the feeding mechanism and pattern carriers. Fig. 8 is a detail plan view showing a mold platform in position to be advanced by the thrust arms to the delivery table; and Fig. 9 is a detail

view showing the arrangement and construction of the rocking levers for holding the carriers while the frames are being lifted therefrom and while the ram is packing the same.

The machine is primarily designed to operate for the manufacture of stock molds, the patterns being formed on match plates which are fixedly secured upon carriers 12, 12. The carriers 12, 12 are provided with carrying wheels 13, 13 and rollers 14, the latter being extended from the side of the car to extend above a flange 15 on the tracks 16, 16 to support the various carriers when the same pass below the track frame formed by the tracks 16, 16. The tracks 16, 16 are provided with circular ends, substantially as shown in the drawings, particularly in Fig. 3 thereof, and are provided with an upper flange 17 and a lower flange 15, as above stated. The wheels 13, 13 roll on the upper edge of the flange 17 to support the carriers 12, 12 when the sand is being delivered there-to and subsequently rammed. The pattern plates 18 are bolted or otherwise rigidly secured to the carriers 12, as shown best in Fig. 4 of the drawings. The carriers 12 are provided with side bars 19, 19 extended from the under side of the platforms of the said carriers to form bearings for the axles 20, 20 of the wheels 13, 13. It is to the side bars 19 that the extended brackets 21 are secured. It is upon a bracket 21 that the rollers 14 are mounted to support the carriers 12 on the flanges 15 when said carriers are inverted. The carriers thus constructed are connected in series to form an endless chain by means of links 22, 22. The links 22, 22 are pivotally connected to the axles 20, 20, and are provided with lateral extensions 23, 23.

The platforms of the carriers 12 are provided with extensions 24, 24, upon which extensions are mounted centering pins 25, 25. The pins 25, 25 are provided to extend within perforations formed in side turrets 26, 26 formed on the sides of frames 27, 27. The frames 27, 27 are auxiliary to and separate from the machine here described. In the operation of the machine the said frames are placed in position as shown in Fig. 1 of the drawings, when the platforms of the carriers 12 are each disposed in a vertical edgewise position at the receiving end of the machine. The adjustment of the frames to the platforms at this point is a manual

operation, the attendant on the machine placing the various frames in position thereon.

In the operation of the machine the chain of carriers thus constructed is moved from step to step, each step presenting a new carrier, and a frame supported thereon, below the first of the two sand hoppers 28 and 29. The hoppers 28 and 29 are disposed apart a distance equal to the movement of the chain of carriers for one operation. The hopper 28 is provided to contain facing sand, the proper quantity of which is delivered within each of the frames 27 upon the pattern plate and platform of the carrier 12. Suitable means for distributing the sand in the frame are provided. In the hopper 29 is contained a coarser ramming sand used for forming the body of the mold.

As shown in the drawings, in Figs. 1, 2 and 3, the first frame is adjusted during the stationary period of the chain of carriers, upon the vertically disposed platform of the carrier at the receiving end of the machine.

In the first operation of the intermittent feeding mechanism the chain of carriers is advanced so that the platform having the frame 27 thus applied is carried to the first of the horizontal positions on top of the track formed by the flanges 17. The position thus assumed is best shown in Fig. 2 of the drawings. In the said Fig. 2 of the drawings, is shown the second of the frames 27, which the operator immediately placed

by inserting the pins 25 on the carrier 12 properly disposed within the perforations in the turrets 26 of the last frame which he has lifted into position. While in this position the facing sand is delivered from the hopper 28 into the first of the frames 27, facing the pattern therein contained. In the second operation the first of the said frames is advanced and brought to rest under the hopper 29, where it receives a charge of the ramming or body sand contained in the said hopper. During the same period the second of the said frames is receiving a facing coat of the facing sand contained in the hopper 28. During the operations of delivering the sands to the first and second frames the third frame is placed in position by the operator, as seen best in Fig. 3 of the drawings.

The third operation of the feeding mechanism advances the first of the said frames under the ramming press, where the sand is rammed firmly to holding texture. At the same time the second of the said frames is advanced to a receiving position under the hopper 29, and the third of the said frames is advanced to receiving position under the hopper 28. Between the third and fourth operations, by means of a mechanism hereinafter described, the first of the above mentioned frames is lifted from the platform of the carrier 12, and the pattern plate carried

thereby, to a delivery position above the level of the receiving table 30, and in this position it is held as the feeding mechanism performs the fourth operation. The fourth operation of the feeding mechanism advances the second of the said frames under the ramming press, the third of the said frames under the hopper 29, and the next frame which has been placed in position by the operator, under the hopper 28. At the same time, by means of thrust bars 31, 31, the first of the said frames is thrust forward over the surface of the said table 30, or upon a conveyer belt, if such be employed.

The feeding mechanism employed for advancing the chain of carriers in the manner above described embodies a driving shaft 32. Suitable bearings 33, 33 are formed in the frame and extended from between the upper flanges 17, 17. Fixedly mounted upon the said shaft is a driven wheel or pulley 34. The shaft 32 is provided also with cams 35, 35, from the sides whereof are extended studs 36, 36. The studs 36, 36 are provided with pivot pins 37, 37 to form pivotal bearings for the ends of pitman rods 38, 38. On the side of the machine on which is mounted the wheel 34 the stud 36 is extended between the spokes thereof, as seen best in Fig. 4 of the drawings.

The cams 35, 35 are provided to depress a cross head 39 which is carried upon plungers 40, 40. The plungers 40, 40 are reciprocated in cylinders 41, 41, and are provided with feet 42, 42 adapted to rest upon spiral springs 43, 43. The springs 43, 43 are sufficiently strong to uphold the plungers 40, 40 and cross head 39 when not depressed by the cams 35, 35.

The plungers 40, 40 are guided in the operation by boxes 44, 44 and 45, 45. The plungers are thus reciprocated by the cams 35, 35 impinging upon and thrusting downward the wheels 46, 46. The wheels 46, 46 are supported on the plungers 40, 40 by cross bars 47, 47, which are rigidly connected to the said plungers.

The cross head 39 is provided with a ram face 48. The cross head 39 is adjusted vertically on the plungers 40, 40 by means of nuts 49, 49 and 50, 50. The nuts are engaged with the screw threaded sections formed at the upper ends of the said plungers. Disposed between each pair of plungers 40, 40, and adjustably mounted thereon by means of nuts 51, 51 and 52, 52, are arms 53, 53 depended as shown in the drawings from a cross head 54. At the lower ends of the arms 53, 53 are pivotally mounted the dogs 55, 55. Each of the said dogs is held in horizontally extended position by means of a stop pin 58. The stop pins 58 are arranged substantially as shown in said figure of the drawings, to permit the dogs to assume a substantially vertical position when

impinging upon any stationary object from above, and to be held rigid in horizontal extension when impinging upon any object from below.

5 The dogs 55, 55 are provided to lift the frames 27 and the rammed mold contained therein from the platforms of the carriers 12, and the pattern plates secured thereon. It is to receive the said dogs that the frames
10 27, 27 are provided with flanges 60, 60 extended beyond the platforms of the carriers 12 into the path of the said dogs.

The cams 35, 35 are shaped to a peripheral curvature substantially as shown in the
15 drawings, the action of the cams on the wheels 46, 46 and the plungers 40, 40 connected therewith being such as to depress the cross head and ram face carried thereby upon the frame 27 disposed in line there-
20 with rapidly and with force. From the peak of the cam the immediate following section 61 is curved substantially as shown, to permit the plungers 40, 40 and cross head 49 connected therewith, to rise slowly as the
25 pressure of the cams is gradually removed. In this manner there is provided for a gentle lift of the mold and a more perfect parting of the pattern plate and the mold than would be obtained if the action were
30 sudden. Immediately succeeding the section 61 is a section 62, which rapidly falls to the lowest level section 63. From the forward end of the section 63 to the peak the periphery of the cam is curved to a substan-
35 tially even path.

The pitmen 38, 38 are connected to a cross head 64. The cross head 64 is mounted in a guide slot 65 formed in the side frames of the machine. To the cross rod 64 is con-
40 nected the curved thrust bars 31. The thrust bars 31 are rigidly connected with parallel guide bars 66, 66, which are slidably mounted in bearings formed in the heads 67, 67 of brackets 68, 68. The con-
45 struction and arrangement for supporting and guiding the thrust bars 31 as described insures the accuracy of the path of reciprocation of the said bars. As above described, the bars 31 at the upper horizontal
50 extensions, are provided to thrust the frames 27, 27 on to the table 30 or a suitable conveyor. The said bars 31 are likewise provided to advance the chain formed by the carriers and links. For this purpose a
55 bracket arm 69 is rigidly mounted on the vertical extension of the said bars, and is provided at the rear thereof with a spring extended pawl 70. The pawl 70 is constructed substantially as shown in Fig. 7
60 of the drawings, having a spring 72 for actuating the same. The pawl 70 is so disposed that as the pitmen 38 are extended to the limit of the throw, as shown in Fig. 1 of the drawings, the bracket arm 69 passes
65 behind the extensions 23 set out from the

links 22, 22, engaging the said extensions. When the cam 35 is moved to the upper half of its movement the pitmen 38, 38 are drawn to the ends of the slot 65 adjacent to the driving shaft 32. The cross rods 64
70 being moved with the pitmen 38 carry the thrust bars 31 to the position shown in Fig. 2 of the drawings. The engagement of the thrust rods 31 with the extensions 23 of the links 22 advances the chain of carriers, plac-
75 ing one of the said carriers in direct line with the cross head 39 between the plungers 40, 40. When the cam 35 swings through the lower half circle of its movement, the pitmen 38, 38, cross rod 64 and thrust bars
80 31 are carried to the opposite end of the slot 65 to the position shown in Fig. 1 of the drawings, in which position the bracket arm 69 again passes to the rear of and into en-
85 gagement with the extension 23 of the next of the following links 22, 22. In this manner the endless chain of carriers is advanced intermittently to receive the charges of fac-
ing sand, ramming sand, and to be rammed. The ramming sand delivered from the hop-
90 per 29 is designed to more than fill the frame 27. To insure the proper quantity of sand in the frame 27 the hopper 29 is provided with a scraper blade 73, rigidly se-
95 cured to the side of the said hopper and depended therefrom. In the operation of advancing the frame after the same is filled from the hopper 29 the scraper blade 73 re-
moves the surplus sand from that delivered from the said hopper within the frame. 100

The frame of the machine herein described is reinforced and constructed in any suitable manner. I have shown in the drawings a standard 74 disposed at the for-
105 ward end of the machine, having a foot plate 75 by which the machine is bolted to the fixed structure A by means of a lag screw 76. The foot plate 75 is integrally
110 formed with the boxes 45, 45 for guiding the plungers 40, 40. At the opposite end of the machine is formed a standard 77, having a foot plate 78 for securement to the said fixed structure A by means of a lag screw 79.

While I have herein described the em-
115 ployment in the machine of hoppers for containing the molding material and from which the said molding material is delivered, it will be understood that such con-
120 struction is not essential as I may by operating the machine at a slower rate, feed the molds 27, 27 manually. Also, if desired, the molds may be run in a path juxtaposed to the piled molding material from which
125 the material may be extracted as in making snap molds. I find, however, great convenience in the handling of the molding material as set forth, permitting, as it does, of an increased speed rate in the operation
130 of the machine.

The operation of the machine is as follows: Power having been applied to the wheel 34, the shaft 32 is rotated, rotating the cams 35 and reciprocating the cross rod 64. The cross rod 64, by means of the thrust bars 31 and the pawl 70 connected therewith, engages the extensions 23 on each of the links 22 to advance the carriers 12 in the manner described. The swing of the pitman rods 38 equals the distance from center to center of the carriers 12 and thus serves to advance one of the frames 27 from operating station to operating station successively, first introducing said frame in receiving position below the hopper 28, then below the hopper 29, and then below the ram face 48. The cams 35 depress the plungers 40, 40 by engaging the wheels 46, 46 to force the ram face 48 into the mold frame 27. It will be noted that the wheels 34 and the cams 35 rotate in the direction as shown by the arrow in Fig. 1. The depression of the wheels 46 and the plunger rods 44 occurs on the return stroke of the arms 64 and 31. The arms 31 in their upper extensions are provided with hooked ends as bset seen in Figs. 2 and 4 which are adapted to engage the turrets 26 when the frames 27 are lifted on the dogs 55 and the cross bar 80 extended between the said dogs to form rails for supporting the frame 27, as seen in Fig. 1 to the position as shown in dotted lines in Fig. 4 of the drawings and in full lines in Fig. 5 of the drawings. To hold the carriers 12 in position, I have provided the rocking levers 81, 81 which levers are mounted on the guide bar 66 and are connected by means of links 82, 82 with plunger rods 83, 83. The rods 83 are held in extended position by means of springs 84 and force against a cam face 85 formed on the inside of the cams 35 as shown best in Fig. 4 of the drawings. When the cams 35 are in the lower extension, and depressing the plungers 40, 40, the cam surface 85 permits the extension of the plunger rods 83 to rock the levers 81 into holding engagement with the axles 20 of the carriers 12, a slot 86 being provided therefor. When the cams 35 are swung into the horizontal position shown in Fig. 1, the cam surface 85 compresses the plunger rods 83 to remove the levers 81 from engagement with the said axles, freeing the carriers to be moved in the manner above stated. With each movement of the carriers, the bars 64 and 31 force the frames 27 and the contents thereof upon the table 30.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A mold forming machine, comprising a plurality of carrier frames pivotally connected to form an endless chain; a guide frame forming a track for said carrier frames; a plurality of molding frames

adapted to be attached to said carrier frames; a plurality of hoppers disposed above said guide frame to deliver molding material to said molding frames; an intermittent mechanism for advancing said carrier frames at regular intervals; a press arranged in series with said hoppers and having a plunger above said carrier frames adapted to compress the molding material in said molding frames; a plurality of lifting arms operatively connected with said plunger and adapted to extend below the said molding frames in lifting position; and a driving mechanism for said press.

2. A mold forming machine, comprising a plurality of carrier frames pivotally connected to form an endless chain, said frames having fixedly secured thereto pattern plates; a guide frame forming a track for said carrier frames; a plurality of molding frames adapted to be attached to said carrier frames, said molding frames each having a lifting flange extended beyond said carrier frames; a plurality of hoppers disposed above said guide frame to deliver molding material to said molding frames; a press arranged in series with said hoppers and having a plunger above said carrier frames adapted to compress the molding material in said molding frames; an intermittent mechanism for advancing said carrier frames at regular intervals; a plurality of elevating members adapted to extend under the flange of said molding frames to lift the same; and a driving mechanism adapted to reciprocate the said plunger.

3. A mold forming machine, comprising a plurality of carrier frames pivotally connected to form an endless chain, said frames having fixedly secured thereto pattern plates; a guide frame forming a track for said carrier frames; a plurality of molding frames adapted to be attached to said carrier frames, said molding frames each having a flange extended beyond said carrier frames; a plurality of hoppers disposed above said guide frame to deliver molding material to said molding frames; a press arranged in series with said hoppers and having a plunger above said carrier frames adapted to compress the molding material in said molding frames; and a reciprocating mechanism for advancing said endless chain of carrier frames, said mechanism embodying a rotary driving crank shaft, a horizontally guided cross head, a pitman connecting said crank shaft and said cross head, and a pawl member for engaging said endless chain to move the same in one direction only.

4. A mold forming machine, comprising a plurality of carrier frames pivotally connected to form an endless chain, said frames having fixedly secured thereto pattern plates; a guide frame forming a track for

said carrier frames; a plurality of molding frames adapted to be attached to said carrier frames, said molding frames each having a lifting flange extended beyond said carrier frames; a plurality of hoppers disposed above said guide frame to deliver molding material to said molding frames; a press arranged in series with said hoppers and having a plunger above said carrier frames adapted to compress the molding material in said molding frames; a reciprocating mechanism for advancing said endless chain of carrier frames embodying a cross head guided in said guide frame; an engaging pawl mounted on said cross head for engagement with said endless chain to

move the same in one direction only; a plurality of elevating members adapted to extend under the flange of said molding frames to lift the same, said members being connected with said reciprocating mechanism; and a thrust member connected with said reciprocating mechanism to advance each of said molding frames when lifted by said elevating members.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES E. SIMPSON.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
