M. J. HEWLETT & H. L. DEMMLER.

MOLDING APPARATUS.

APPLICATION FILED OCT. 5, 1908.

1,086,824.

Patented Feb. 10, 1914

5 SHEETS—SHEET 1.

Fig. 1.

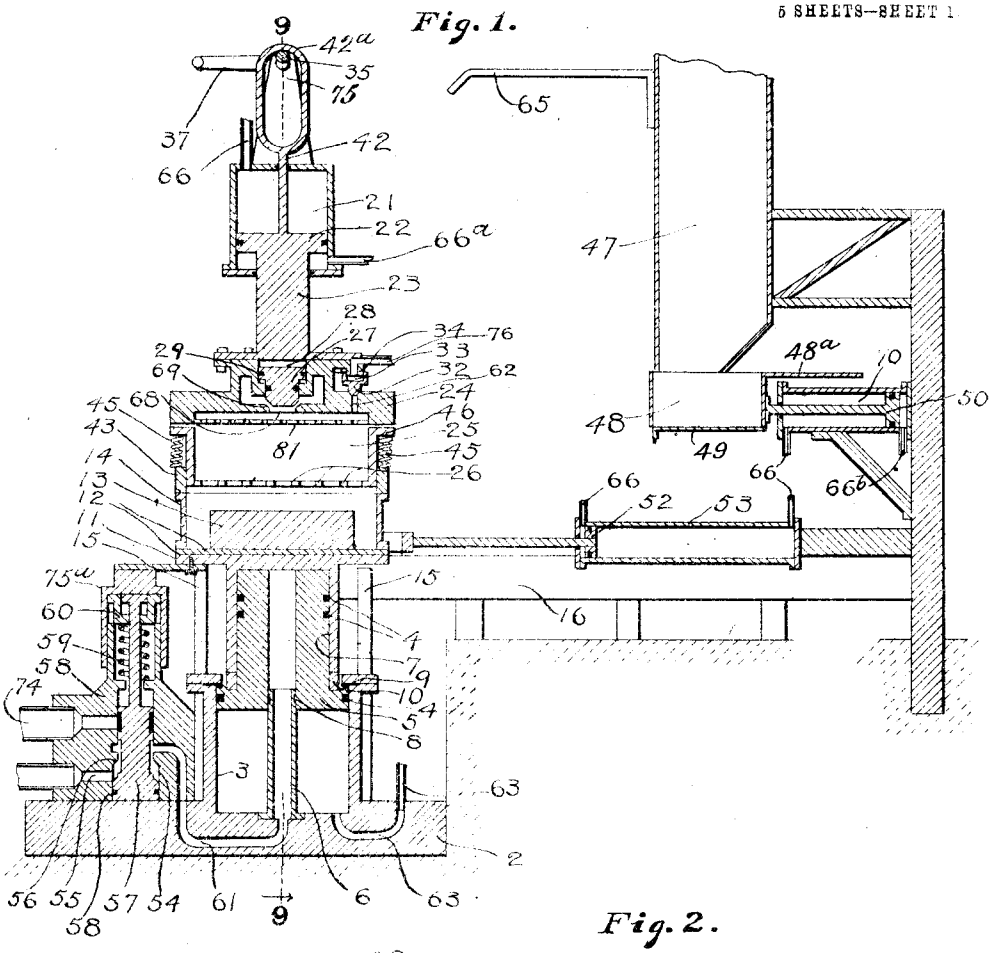
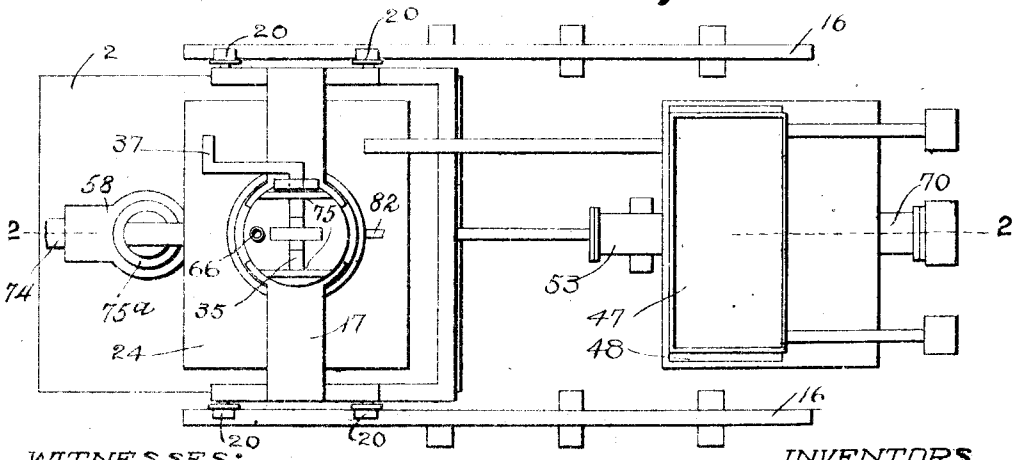


Fig. 2.



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6 SHEETS—SHEET 2.

Fig. 3.

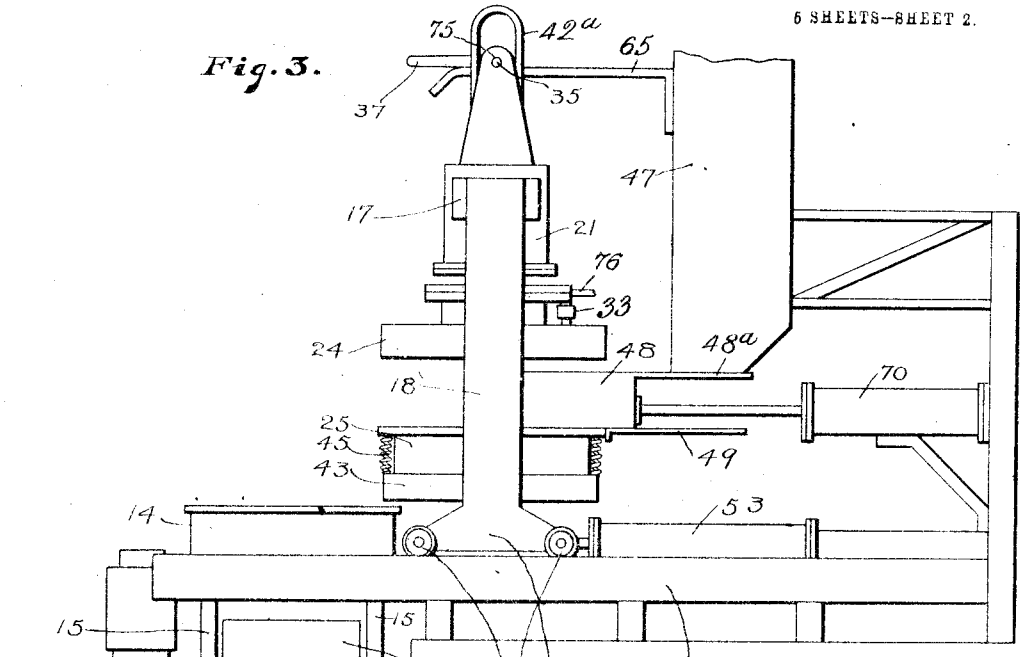


Fig. 11.

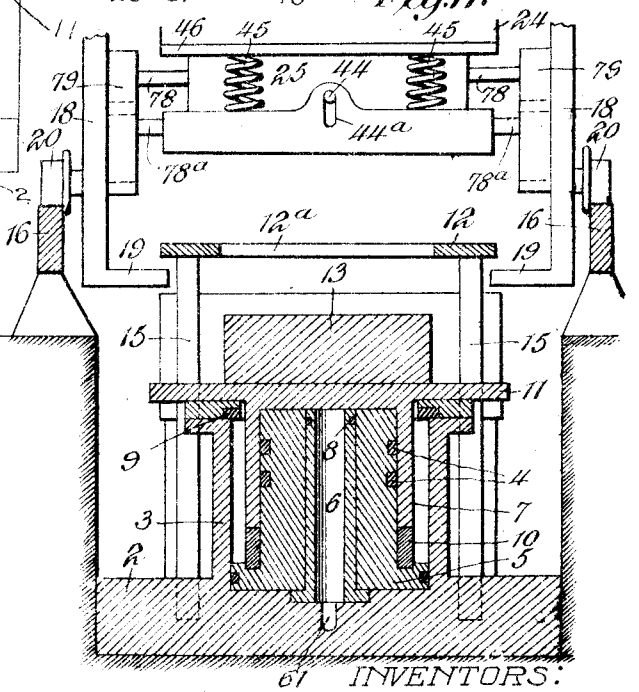


Fig 4

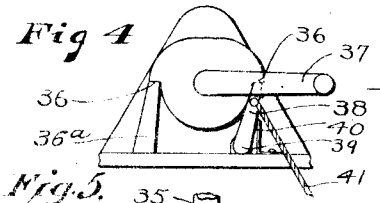
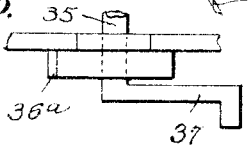


Fig. 5.



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6 SHEETS—SHEET 3.

Fig. 6.

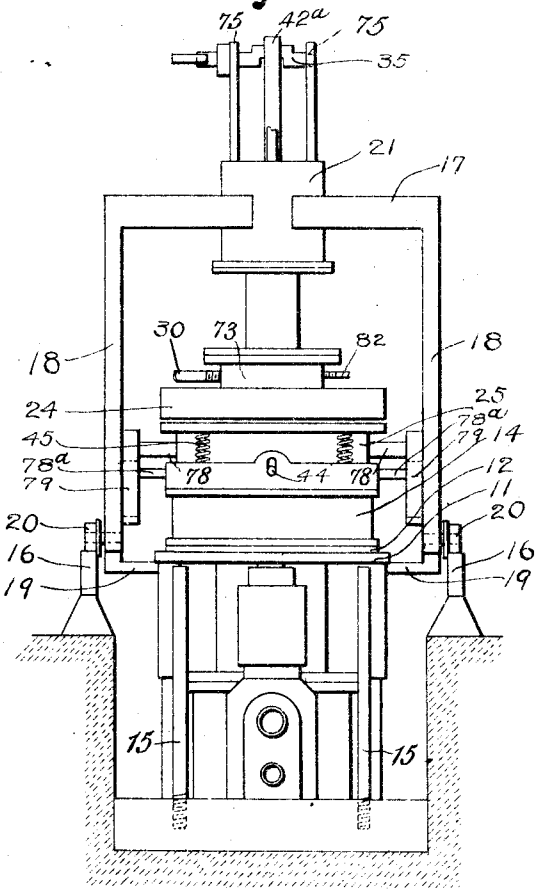


Fig. 7.

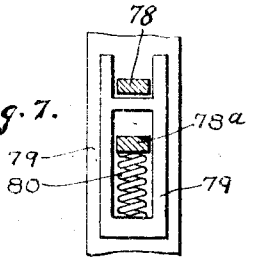
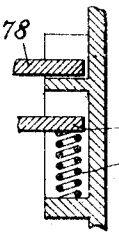


Fig. 8.



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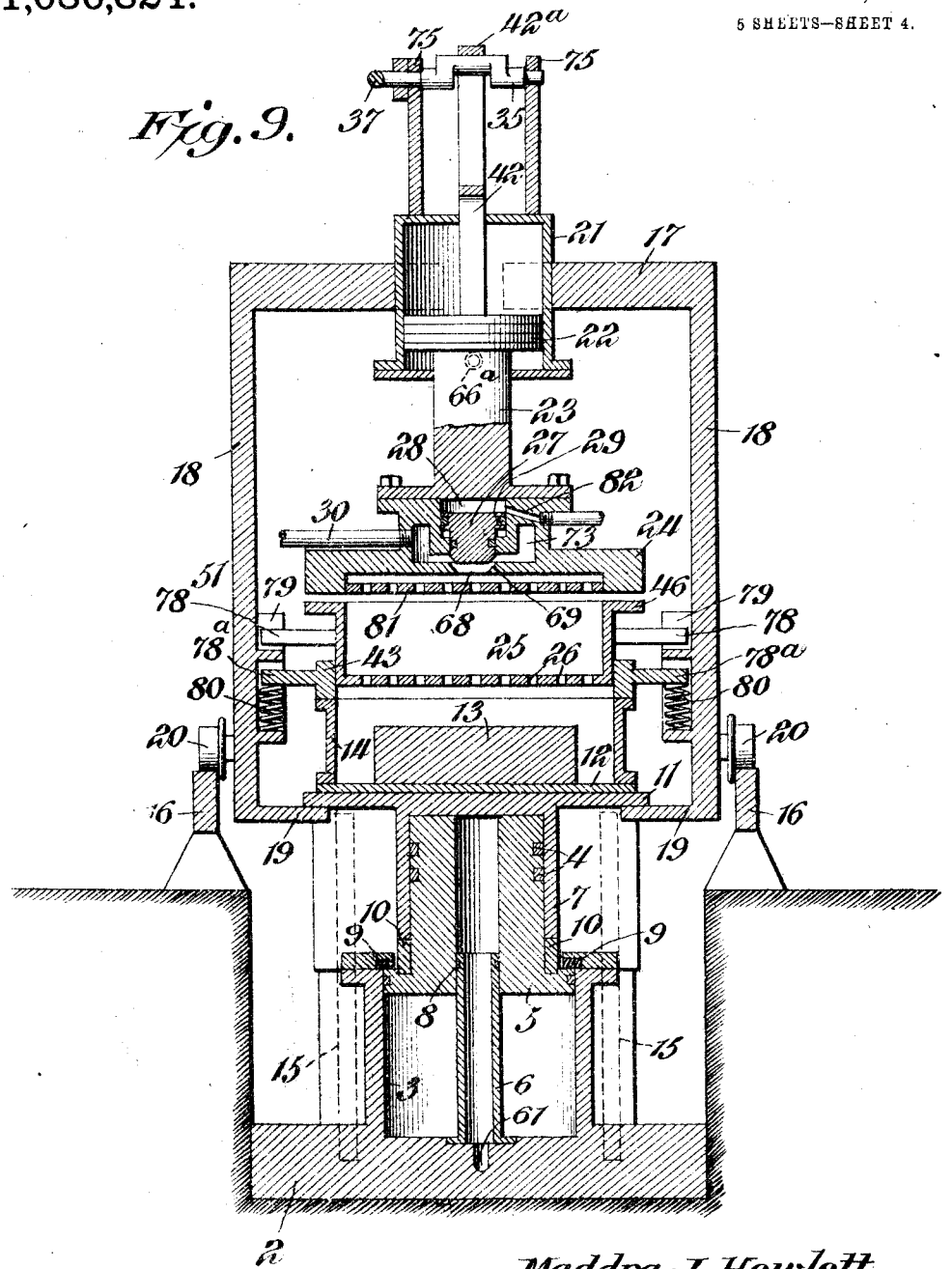
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5 SHEETS—SHEET 4.

Fig. 9.



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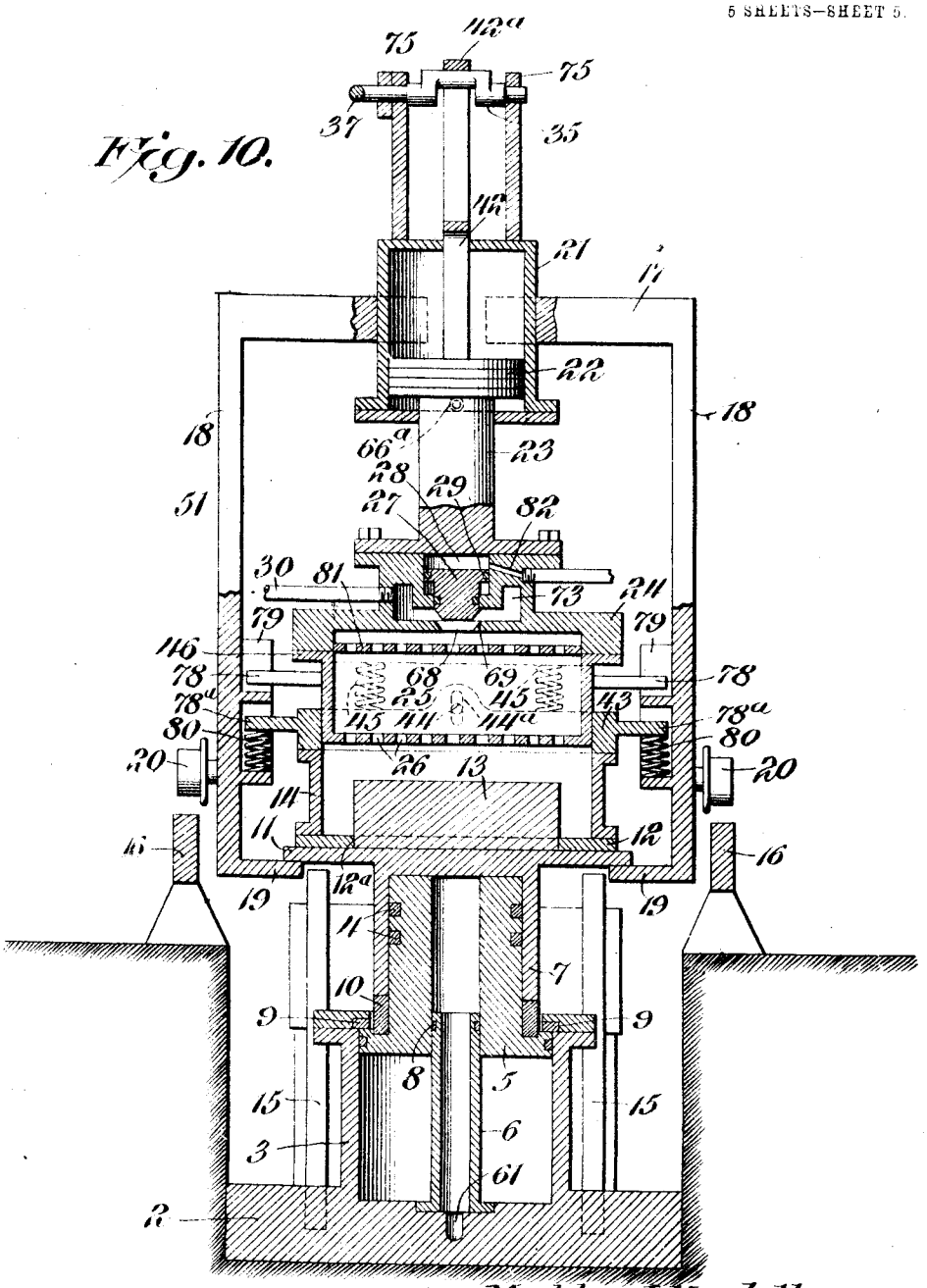
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1,086,824.

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5 SHEETS—SHEET 5.

Fig. 10.



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UNITED STATES PATENT OFFICE.

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MOLDING APPARATUS.

1,086,824. Specification of Letters Patent. Patented Feb. 10, 1914.

Application filed October 5, 1908. Serial No. 456,320.

To all whom it may concern:

Be it known that we, MADDRA J. HEWLETT and HENRY L. DEMMLER, citizens of the United States, and residents of Kewanee, in the county of Henry and State of Illinois, have invented certain new and useful Improvements in Molding Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

Our invention relates to the molding of sand or analogous material, either in the form of cores or in making molds, and the present application has to do particularly with apparatus for so molding sand or analogous material.

The invention relates to a machine in which sand or analogous material is forced into a flask and packed around or into a pattern by compressed air or other fluid, and in which further packing of the sand or analogous material is effected by jarring the flask by intermittently raising the flask and contents and allowing the same to drop and solidify by gravity coupled with the shock it receives on being arrested.

A further object of the invention is to provide an apparatus of this character, equipped with filling devices adapted to be brought into and out of charging relation with the flask, and capable of enabling the latter to be filled and conveniently removed after filling, thereby making a place for its successor and enabling the machine to be conveniently operated.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is a vertical longitudinal sectional view on the line 2—2 of Fig. 2, showing a molding apparatus, constructed in accordance with this invention. Fig. 2 is a plan view of the apparatus. Fig. 3 is a side elevation of the same. Fig. 4 is a side elevation of the eccentric locking mechanism. Fig. 5 is a plan view of the same. Fig. 6 is a front elevation of the molding apparatus. Figs. 7 and 8 are detail views, illustrating the construction of the guiding means for the sand frame. Fig. 9 is a central vertical sectional view on the line 9—9 of Fig. 1, illustrating the arrangement of the parts prior to clamping the sand reservoir on the flask. Fig. 10 is a vertical sectional view similar to Fig. 9, but showing the flask clamped and ready for filling. Fig. 11 is a vertical sectional view, the stripping plate being supported by the adjustable post, the main cylinder being lowered and the carriage being moved back to permit the reservoir to be filled with sand.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

In the accompanying drawings illustrating the preferred embodiment of the invention, 2 designates a base plate, forming a support for a hollow cushioning cylinder 3, which also constitutes means for drawing a pattern by lowering a vertically movable piston 5. The vertically movable piston 5 is provided with packing rings 4, and it receives a fixed vertical tube 6, forming a port, which leads to a main cylinder 7. The tube 6 is provided adjacent to its upper end with packing rings 8 to make a fluid tight joint for the sliding piston 5. A soft packing 9 is provided to cushion the re-action of the sliding piston 5, and blocks 10 of wood, or other soft material are employed to avoid abrasure from contact. The main cylinder 7 is equipped at its upper end with a platen, preferably formed integral with the cylinder and adapted to receive a pattern 13, or a set of patterns, which pattern 13 is carried upward in a vertical direction through a stripping plate 12. The stripping plate 12, which is designed to be provided with the usual opening 12^a or openings for the passage of the patterns, is adapted to receive a flask 14 and is supported by adjustable posts 15, as clearly illustrated in Fig. 11 of the accompanying drawings. The stripping plate is supported by the posts 15 before the pattern 13 is carried upward by the main cylinder, which raises the stripping plate and supports the same above the posts 15, and when the cylinder is moved downward to draw the pattern, the stripping plate is lowered to the posts 15 and is supported by the latter.

17 designates a horizontal pressure head provided at opposite sides of the apparatus with depending arms 18, preferably formed

integral with the pressure head 17 and provided with inwardly extending horizontal projections 19 to engage the platen 11. The depending arms of the pressure head are also equipped with rollers or wheels 20, located at the outer face of the said arms 18 and arranged to run on horizontal tracks 16 to facilitate the horizontal movement of the pressure head 17, which carries a vertical cylinder 21, suitably attached to the pressure head 17. The arms 18 have enlarged portions to which the said rollers or wheels 20 are secured, and a car 51 is thereby formed for carrying the reservoir 25 to and from the sand supplying means. Operating within the cylinder 21 is a piston head 22, having a piston rod 23 connected at its upper end with the piston head and at its lower end with a cross head 24. The reservoir 25 is open at the top and has perforations 26 in its bottom. Admission of compressed air to the reservoir 25 through a supply port 30 is controlled by a piston valve 27, mounted in a valve chamber 28 in the cross head 24 and provided with packing rings 29. The supply port 30 may be connected with any suitable source of supply, and the pressure within the reservoir is exhausted by means of a valve 32, held closed by fluid pressure in a cylinder 33, acting against a piston 34, which is attached to the cross head 24. This valve is for the purpose of exhausting fluid pressure from the sand reservoir 25 after the mold has been completed and the valve 27 has been closed.

Attached to the head of the cylinder 21 are bearings 75 in which is journaled an eccentric shaft 35, provided with opposite shoulders 36 and equipped with a crank 37, attached to one end of the shaft. One of the shoulders 36 coöperates with a fixed stop 36^a, located at one side of the shaft 35 in the path of the coöperating shoulder 36, as clearly shown in Fig. 4 of the drawings, and the other shoulder is engaged by a pivoted pawl 38, mounted on a pin 39 and pressed into engagement with the said shoulder 36 by a spring 40, and adapted to be withdrawn from such engagement by a cord 41, attached to the pawl 38 and adapted to disengage the same from the co-acting shoulder to permit the shaft 35 to rotate. The shoulder 36, stop 36^a and pawl 38 hold the eccentric shaft in a given position during the initial filling of the flask, and the rotary movement of the shaft allows the reservoir 25 to descend during the jarring operation, as hereinafter fully explained. The piston rod 23 is provided with an extension 42, having an elliptical loop 42^a, which receives a crank bend of the eccentric shaft 35. The crank bend is adapted to support the piston rod 23 and the parts carried thereby, and when the eccentric shaft 35 is partially rotated, the crank bend swings downward and permits the said downward movement of the reservoir 25.

The reservoir 25 is surrounded by a band 43 having a relatively slidable movement on the outside of the reservoir, and connected with the same by means of pins 44, projecting from the reservoir and extending through vertical slots 44^a in the band. The band is normally held in its lowermost position with the pins at the upper ends of the vertical slots by means of springs 45, interposed between the upper edge of the band 43 and projecting flange 46 extending horizontally from the reservoir 25.

Supported in an elevated position is a supply hopper 47, adapted to contain sand or analogous material, which is delivered to the reservoir 25 by a slidable bottomless drawer 48, adapted to be pushed forward on guides 49 by a fluid pressure controlled piston 50 of a cylinder 70 to deliver a charge of sand, or other material into the reservoir 25. The car 51 travels on the tracks 16 and is actuated by a fluid controlled piston 52 of a cylinder 53. The base 2 also supports a valve casing 54 having a supply port 55, and provided with a valve seat 56 and receiving a valve 57, provided with suitable packing rings 58. The supply port 55 is adapted to furnish fluid pressure from any suitable source of supply, and the valve 57 is lifted by a compression spring 59, seated upon the valve casing and interposed between the same and a washer 60, which is connected with the stem of the valve 57. The casing of the valve 57 is connected by a port 61 with the main cylinder 7. The port 61 consists of a passage extending through the valve casing 54 and through the base at a point beneath the lower end of the vertical tube 6. The base 2 is provided with a supply port 63, consisting of a passage communicating with the cushioning cylinder 3.

The sand hopper is equipped with a projection 65, consisting of an arm extending from the sand hopper and arranged in the path of and adapted to engage the crank 37 of the eccentric shaft 35. Compressed air or other aeriform fluid is supplied to the cylinders 53, 21 and 70 by supply pipes 66, 66^a and 66^b, and the cross head 24, which has a port 68, is provided with a valve seat 69 to co-act with the piston valve 27. The reservoir 25, from which compressed air is exhausted through the port 62, is guided by projections 78, extending from the reservoir 25 and operating in guides 79 on the arms 18. The projections 78^a of the sand band 43 are supported by compression springs 80, which raise the band 43 and the reservoir to clear the flask. A fluid pressure chest 73 in the cross head 24 is supplied from any suitable source of fluid pressure by a pipe or port 30.

The air is exhausted from the main cylinder through an exhaust port 74 of the valve casing 54, and a supply pipe 76 furnishes fluid pressure to the cylinder 33. The several pipe connections may be connected to a hose leading to any suitable operating valves so as to furnish fluid pressure from a common source of supply. The cross head 24 is provided at the bottom with a perforated plate 81 for the purpose of distributing the fluid pressure. The cylinder 28 is provided with a port 32, through which the pressure is supplied and exhausted.

To operate the molding apparatus, fluid pressure is applied through the pipe 63 to the cushioning cylinder 3, lifting the sliding piston 5 from its lowermost position at the lower end of the cylinder 3 and raising the pattern 13 to the starting position. A flask is then placed on the stripping plate and the hopper 47 is filled with sand or analogous material. By moving the car to the right to a position adjacent to the hopper 47, the drawer 48 is beneath the hopper and the shelf 49 forms a temporary bottom for the said drawer, which at this time, is filled with sand from the hopper. The drawer is then moved to the left, so that its bottom will register with the opening at the top of the reservoir 25, an extension 48^a of the drawer meanwhile closing the bottom of the hopper. The drawer is then moved to the right to return it to its initial position beneath the hopper, and the car is moved to the left to position it over the main cylinder 7. Fluid pressure is supplied to the back of the piston 50 of the cylinder 70, pushing the bottomless drawer or reservoir 48 over the reservoir 25. Fluid pressure is then applied to the back of the piston 52 of the cylinder 53, causing the car 51 to move over the flask 14. By applying fluid pressure to the top of the cylinder 21, the cross head 24 forms a cover for the reservoir 25 and rests thereon and causes the depending arms 18 to rise, lifting the car 51 and causing the projections 19 of the arms 18 to engage the platen, and thus clamp the reservoir 25 over the flask forming a closed receptacle for the introduction of sand, or other filling material. The arms and the inwardly extending projections 19 thereof constitute fluid controlled means for locking the flask or core box to the said reservoir 25 and the means for introducing sand under fluid pressure into the said flask or core box. The piston 22 is arrested in its downward travel by the eccentric shaft 35, the eccentric or crank portion of which is supported in its uppermost position by the pawl 38. When the flask is thus clamped and ready for filling, the stripping plate with the flask thereon is supported by the main cylinder 7; the band 43 rests upon the upper edge of the flask, and the sand reservoir is supported by the said band 43 through the pin and slot connection and the said springs 45. This will permit the lifting of the carriage 51 and the clamping of the flask in the manner before explained. Fluid pressure is then exhausted from the top of the valve 27, which rises from its seat 69 admitting fluid pressure from the supply pipe 30 through the port 68 into the reservoir 25, forcing the sand or other analogous material through the perforations in the bottom of the reservoir 25 and filling the flask 14. The sand band 43 acts as an extension of the flask to admit further packing of the sand by vibration. The pawl 38 is withdrawn, allowing the crank or eccentric 35 to rotate and move downwardly from the upper end of the loop 42^a to permit the sand reservoir to descend in the further packing of the sand through the jarring of the flask. Fluid pressure is supplied through the port 55 of the valve casing 54 and through the port 61 to the main cylinder 7, thereby causing the platen to rise. As the platen moves upward, the spring 59 seats the valve 57 cutting off the fluid to the port 61 and connecting the said port 61 to the exhaust port 74, exhausting the pressure within the main cylinder and causing the platen to fall. The main cylinder is arrested in its downward movement by the piston 5 and the platen in falling engages the cap 75^a over the valve 57, unseating said valve and reëstablishing communication between the supply port 55 and the port 61. By this construction the main cylinder is automatically raised and dropped, thereby producing a jarring of the flask and the contents thereof, and the main cylinder 7 will be continuously reciprocated or vibrated in this manner as long as fluid pressure is supplied to the port 55. The valve 57 reciprocates automatically and the platen is continuously operated until the mold is completed. By applying fluid pressure over the valve 27 and seating the same and exhausting fluid pressure from the cylinder 33, exhaust valve 32 is unseated and the fluid pressure is exhausted from the reservoir 25. By exhausting fluid pressure from the top of the cylinder 21, the cross head 24 is raised and the car 51 is permitted to return to the track 16. Fluid pressure is then applied to the forward end of the cylinder 53 and the car is drawn back. Fluid pressure is then exhausted from the cylinder 3 and the platen is allowed to drop, leaving the stripping plate 12 supported on the posts 15, and permitting the patterns to be drawn. The sand band 43 is only employed in cases where an extremely hard mold is required. Ordinarily molds can be made of sufficient strength by vibrating the flask while fluid pressure is acting upon the contents of the reservoir 25, thus dispensing with the necessity of locking the reservoir 25 above the flask. In such cases the reservoir will be

supported directly by the flask, and fluid pressure applied to the contents of the reservoir and also to the vibrating mechanism to keep the flask full and to compensate for the settling of the sand, resulting from the jarring or vibration of the flask. The mold may be finished level in this manner, and it will be unnecessary to strike off the surplus material as is necessary with the ordinary molding device. The finished mold may now be removed and another flask placed on the pattern.

The molding apparatus may be employed for forming cores or molds for any purpose for which they may be required.

Having thus fully described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a molding machine, the combination of a flask or core box, means for introducing sand under fluid pressure into said flask or core box, and fluid controlled means for locking said flask or core box into controlled relation to said means for introducing sand under fluid pressure into said flask or core box.

2. In a molding machine, the combination of a flask or core box, means for introducing sand under fluid pressure into said flask or core box, fluid controlled means for locking said flask or core box into controlled relation to said means for introducing sand under fluid pressure into said flask or core box, and means for withdrawing a pattern or core from said flask or core box.

3. In a molding machine, the combination of a mold box, means for introducing sand under fluid pressure into said mold box, fluid controlled means for locking said mold box in controlled relation to said means for introducing sand under fluid pressure, and means for changing the relative positions of said mold box and said means for introducing sand under fluid pressure, for the purpose described.

4. In a molding machine, the combination of a mold box, means for introducing sand under fluid pressure into said mold box, fluid controlled means for locking said mold box into controlled relation to said means for introducing sand into said mold box, fluid controlled means for withdrawing a pattern or core from said mold box, and means for changing the relative positions of said mold box and said means for introducing sand into said mold box, for the purpose described.

5. In a molding machine, the combination of a mold box, means for introducing sand with fluid pressure into said mold box, fluid controlled means for locking said box in controlled relation with the said sand introducing means, and means for exhausting pressure from the sand supplying means.

6. In a molding machine, the combination of a mold box, means for introducing sand with fluid pressure into said mold box, fluid controlled means for locking said sand introducing means into controlled relation with said mold box, means for exhausting fluid pressure from said means for introducing sand into said mold box, and fluid controlled means for withdrawing a pattern or core from said sand box.

7. In a molding machine, the combination with a vibratory platen, means for clamping a flask to said platen, fluid controlled means for filling said flask, and fluid controlled means for changing the relative positions of said clamping means to said platen.

8. In a molding machine, the combination with a platen, means for vibrating said platen, fluid controlled means for filling a flask to form a mold, means for recharging said filling means, means for changing the relative positions of said platen and said filling means, means for supporting said platen, and fluid controlled means for supporting said platen support.

9. In a molding machine, the combination with a flask or core box, means for supporting the same in a relatively fixed position, fluid controlled means for filling the flask or core box to form a mold or core, and means carried by the filling means for engaging with the said supporting means for locking the filling means at a point above the flask or core box.

10. In a molding machine, the combination with a flask or core box, means for supporting the same in a relatively fixed position, a car provided with means for engaging the said supporting means, means carried by the car for filling the said flask or core box to form a mold or core, and means for raising and lowering the car to engage the same with the supporting means to lock the filling means at a point above the flask or core box and to release the filling means.

11. In a molding machine, the combination with a flask or core box, fluid controlled means for filling said flask or core box to form a mold, means for locking said filling means above said flask, means for releasing said locking means, and means for compressing said mold.

12. In a molding machine, the combination with a flask or core box, fluid controlled means for filling said flask or core box to form a mold, means for locking said filling means above said flask or core box, means for releasing said locking means, and means for vibrating said flask or core box to further compress said mold.

13. In a molding machine, the combination with a flask, fluid controlled means for filling said flask to form a mold, means for holding said filling means in controlled relation to said flask, and means for vibrating said mold to further compress said mold.

14. In a molding machine, the combina-

tion with a flask, fluid controlled means for filling said flask to form a mold, means for holding said filling means in controlled relation to said flask, means for vibrating said mold to further compress the sand, and means for changing the relative positions of said flask and said filling means.

15. A molding machine including a flask, adjustable fluid controlled means for filling said flask to form a mold, fluid controlled means for charging said filling means, means for changing the relative positions of said flask and said filling means, and means for drawing a pattern.

16. A molding machine including a flask, adjustable fluid controlled means for filling said flask to form a mold, fluid controlled means for charging said filling means, means for changing the relative positions of said flask and said filling means, means for drawing a pattern, and means for vibrating said flask to further compress said mold.

17. In a molding machine, the combination with a flask, fluid controlled means for filling said flask, means for vibrating said flask and the filling means, and means for cushioning said vibrating means.

18. In a molding machine, the combination with a flask, fluid controlled means for filling said flask to form a mold, means for vibrating said flask and the filling means to further compress contents of said flask, and fluid means to cushion said vibrating means.

19. In a molding machine, the combination with vibrating mechanism, of a flask carried by the same, a car movable toward and from the vibrating mechanism, a reservoir carried by the car, and a fluid pressure cylinder mounted on the car and having a piston connected with the reservoir, said cylinder and piston operating to lower the reservoir to the flask and raise the car.

20. In a molding machine, the combination with vibrating mechanism, of a flask carried by the same, a car movable toward and from the vibrating mechanism, a reservoir carried by the car, and a fluid pressure cylinder mounted on the car and having a piston connected with the reservoir, said cylinder and piston operating to lower the reservoir to the flask and raise the car, said car when raised engaging with the said vibrating means for holding the flask thereon and for retaining the reservoir in position on the flask.

21. In a molding machine, the combination with a flask, fluid controlled means for filling said flask to form a mold, means for supporting said filling means with relation to said flask and means for further compressing said mold without disturbing the relation between the flask and the filling means.

22. In a molding machine, the combination with a flask or core box, means for supporting said flask or core box, means for vibrating said supporting means and said flask or core box, and resiliently supported means for supporting said means for supporting said flask or core box.

23. In a molding machine, the combination with a flask or core box, means for supsupporting said flask or core box, means for vibrating said supporting means and said flask or core box, and fluid controlled means for supporting said means for supporting said flask or core box.

24. In a molding machine, the combination with a flask or core box, means for supporting the same in a relatively fixed position, a car provided with means for engaging the supporting means, fluid controlled means carried by the car for filling the flask or core box, and means for imparting relative vertical movement to the car and the filling means for engaging the car with the supporting means and locking the filling means at a point above the flask or core box.

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