To all whom it may concern:

Be it known that I, William P. Krause, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Jolters for Molds; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

A considerable loss of time is occasioned in foundries in the making of molds, owing to the time required on the part of the workmen to properly tamp or ram the sand around the pattern in the flask. Oftentimes the sand is improperly rammed, sometimes being packed too closely at one point and perhaps too loosely at another, so that a defective mold results.

My invention relates to a machine adapted to receive a flask thereon with sand thereon to jolt the same, so that the loose sand shoveled into the flask and surrounding the pattern is caused to pack evenly around the pattern at the proper pressure to secure the best results in the forming of the mold.

This invention has for its object the construction of a jolting machine for forming molds wherein means are provided for regulating the shock imparted to the mold being formed thereon.

It is also an important object of this invention to construct a machine wherein a movable table is mounted in a standard to receive a mold to be formed thereon and with fluid operated mechanism for elevating and lowering said table, imparting a shock thereon, the force of which is regulable and under the control of an operator.

It is also an object of this invention to construct a mold forming machine wherein the driving and compressing means operate continuously, but in which the jolting mechanism may be caused to remain at rest independently thereof by manipulation of certain valve connections.

It is also an object of this invention to provide a machine wherein a jolting table is elevated by fluid pressure and lowered by gravity, and with regulable cushioning means to control the force of impact of the return or lowering movement of the table.

It is also an object of this invention to construct a fluid operated jolting machine for forming molds wherein an elevating table is moved by only one or the conjoint action of more than one compounded compressor cylinders.

It is a further object of this invention to construct a device embodying one or more compressor cylinders for elevating a jolting table and with valved connections for governing the degree of compression.

It is finally an object of this invention to construct a jolting machine capable of adjustment to operate on molds of different sizes and weights, and wherein the shock imparted to the molds is under the control of an operator.

The invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

In the drawings:

Figure 1 is a side elevation of a device embodying the principles of my invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is a section taken on line 3—3 of Fig. 2.

Fig. 4 is a section taken on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary sectional detail taken on line 5—5 of Fig. 4.

Fig. 6 is a view similar to Fig. 3, of a single acting machine.

As shown in the drawings:

The device consists of a heavy casting 1, formed integral within which with its walls projecting therefrom, is a cylinder 2, and separated therefrom by a partition wall 3, but in axial alignment therewith, is another smaller cylinder 4. Communicating with said cylinder 4, and disposed substantially at right angles therewith, is another cylinder 5. Said communication takes place through a passage formed in the casting between said cylinders 4 and 5, as shown in Fig. 3. A small passage 6, communicates between adjacent ends of said cylinder 2, and said cylinder 4, and threaded.
through the end of said passage leading into the cylinder 4, is a cage 7, which affords a seat for a ball valve closure 8, which, when seated, serves to close communication between said respective cylinders 2 and 4. A piston 9, is mounted within said cylinder 2, on a piston rod 10, which extends through said partition wall 3, and through a suitable packing gland 11, and at its end within said cylinder 4, said piston rod 10, is rigidly connected to a trunk piston 12.

A connecting rod 13, is connected in said trunk piston 12, with its other end pivoted to a large gear 14, adapted to be driven by a pinion 15, on the shaft of a motor 16. A plunger piston 17, is mounted within said vertical cylinder 5, and is provided with a piston ring 18, to prevent leakage or loss of compression therearound. The lower end of said plunger piston 17, is provided with a cylindrical recess 19, with a small by-pass 20, communicating therein at the upper end thereof, and leading outwardly through the side of the plunger piston. A solid cylindrical member 21, is threaded into an extension of the casting 1, in the lower end of said cylinder 5, so that as said plunger lowers to its extreme position the recess 19, in the plunger fits over said solid cylinder 21, trapping a small volume of air or other suitable actuating medium therein to form a cushion, and also forcing a small volume of the air or actuating medium caught below the lower end of the plunger, back through the passage between said cylinders 4 and 5, into the cylinder 4, for re-use.

Formed integral with the upper end of said plunger piston 17, though not necessarily so, is a large table 22, and threaded into the under surface thereof are guide members 23, which project through apertures provided in a horizontal extension 24, on the upper portion of and integral with the casting 1. A pad 25, of fiber composition, or any other suitable material, is fitted into the recessed upper surface of said extension 24, to receive the table thereon in its lower limit of movement, thus obviating to a great extent the secondary vibrations which would otherwise accompany the operation of the machine. An air inlet valve 26, communicates with the cylinder 2, near the outer end thereof, positioned such that the piston 9, may move therepast to its outer limit of movement. A passage 27, is formed in a lateral extension in one side of the casting 1, and communicates with said cylinder 4, and mounted to control the flow through said passage is a gate valve 28. In order to secure quick operation of opening and closing said gate valve 28, the long stem 29, thereof has pivotally connected thereto a lever 30, which is pivoted on a link 31, which is in turn pivoted on the machine. Another passage 32, communicates laterally in said cylinder 5, and mounted to govern the flow of fluid therethrough is a valve 33. Directly opposite said passage 32, another small passage 34, is caused in the casting, and a pet cock or valve 35, controls the flow therethrough and regulates the cushioning effect.

In Figs. 6 and 7 I have illustrated a single acting machine, that is to say one provided with merely one compressor cylinder instead of two or more. The construction of this type is exactly identical with that already described with the exception that it comprises a less number of parts. The compressor cylinder is denoted by the reference numeral 36, in which a trunk piston 37, is reciprocated by a power driven connecting rod 38. A plunger 39, is fitted into a vertical cylinder 40, communicating with the inner end of said cylinder 36, and as before is provided with a carrying table 41, and guides 42, together with a fiber pad 43, on which the table rests in its lower limit of movement.

A valve 44, controls the admission of fluid to the cylinder 36, and of course the valve 45, when open, releases compression to permit the plunger to remain at rest. The outlet for the compressed fluid from the plunger cylinder 40, is not shown, but the arrangement thereof and that of the cushioning mechanism control, is the same as shown in Fig. 4.

The operation is as follows:

Referring to the compound machine, when the respective pistons 9 and 12, are in head end positions in their respective cylinders, the piston 9, is disposed beyond the inlet port in the cylinder 2, controlled by the valve 26, so that air under atmospheric pressure, or other suitable actuating medium, flows into the cylinder. When the pistons commence to move, immediately after the piston 9, passes the inlet port the air trapped in the cylinder is compressed and passes through the passage 6, and ball check valve 8, into the cylinder 4, which, being of smaller diameter, and of less volume than the cylinder 2, is further compressed. Upon the return stroke of the pistons the check valve 8, closes off communication between the cylinder 4, and the cylinder 2, and the air within the cylinder 4, is compressed and forced upwardly through the passage between the cylinders 4 and 5, to cause an elevation of the plunger piston 17. When the plunger piston has moved a certain distance the lower end thereof passes by the port 30, and causes a release of the air trapped in said respective cylinders 4 and 5, of the air passing outwardly through the open valve 38. Immediately, of course, the table carrying the mold descends and of course a certain amount of air is trapped in the cylindrical recess 19.
in the lower end of said plunger piston as the same engages over said solid cylinder 21. The plunger 17, as its lower end passes downwardly beyond the port 32, also entraps a small quantity of the air or actuating medium, and forces the same back through the passage connecting the cylinders 4 and 5, into the cylinder 4, for re-use. However, immediately thereafter the passage 20, in the plunger piston comes into register with the enlarged inner end of the passage 34, and the valve 35, being open the air trapped within said recess 19, is released, allowing the table to drop into position. Of course, the respective pistons 9 and 12, are caused to reciprocate at a speed sufficient to give the table and plunger time to return to initial position, and I have found in practice that they may be operated at approximately one hundred seventy-five complete reciprocations per minute, causing, of course, a corresponding number of complete movements of the jolting table.

Of course, the quantity of air drawn into the cylinder 2, may be regulated by the amount of opening of the inlet valve 26, and of course the quantity of air admitted being thus governed, the ultimate pressures are therefore under the control of the operator.

Furthermore the adjustment of the valve 33, determines the time required for the release of the entrapped compressed air, supporting the plunger piston, so that the time which said table is held elevated, is under the control of the operator. Likewise, the extent of opening of the pet cock or valve 35, determines the cushioning effect for the table and plunger. Inasmuch as the force of the shock is a function of the time required for the plunger to come to rest, the magnitude of the shock is thus under the control of the operator.

The operation of the single acting machine illustrated in Figs. 6 and 7, is the same, the air or other fluid for compression being admitted through the valve 44, directly into the compressor cylinder 36. In both types of machines the plunger and table may be caused to remain at rest irrespective of the reciprocity of the reciprocating of the compressing piston, if the gate valve 28, in the compound type or the valve 45, in the simple type are open, thus releasing the pressure. I am aware that various details of construction may be varied through a wide range without departing from the principles of this invention. I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. In a jolting machine for molds connected compounded compressing cylinders for a fluid, a check valve mounted therebetween, another cylinder communicating with the high pressure cylinder of said compounded cylinders, a plunger movable therein, and a table connected with said plunger adapted to be oscillated by the compression and release of the fluid in the cylinders.

2. In a device of the class described low and high pressure compounded cylinders, means controlling the flow therebetween, another cylinder in communication with the high pressure cylinder, a plunger mounted in said cylinder, a table to receive molds to be formed thereon connected to said plunger and adapted to be oscillated thereby, and means controlling the inlet and outlet of fluid with respect to said cylinders.

3. In a device of the class described a plunger cylinder, a plunger therein controlling the outlet therefrom independently of valve gearing, a table thereon to receive molds, tandem pressure means for causing jolting of said table by movement of the plunger, and mechanism independent of said cylinder adapted to control said jolting.

4. In a device of the class described a table to receive molds thereon, a plunger connected to said table, pressure producing mechanisms for elevating said plunger, means to permit said plunger itself to act automatically independently of auxiliary valve gearing to cause release of the pressure to jolt said table, and means below said table for obviating secondary vibrations.

5. In a device of the class described a plunger cylinder, a plunger therein controlling the outlet therefrom independently of valve mechanism, a jolting table thereon, shock absorbing means between said cylinder and said table, fluid pressure mechanisms for elevating said table by movement of the plunger and means controlling the force of shock transmitted to the mold through said table.

6. In a device of the class described a jolting table, shock absorbing means therefor, guides for said table, mechanism for elevating said table, automatic means releasing the same independently of valve gearing, and pivoted mechanism for manually controlling the degree of shock imparted to said table and mold.

7. In a device of the class described compounded compressing cylinders, a plunger cylinder integral therewith and at an angle thereto communicating with one of said compressing cylinders, a plunger therein controlling the outlet therefrom, a jolting table connected thereto, mechanism for elevating said table by movement of said plunger and means permitting said device to be operated under one stage of compression.

8. In a device of the class described pressure producing means, movable jolting mechanism disposed at an angle thereto and operated thereby, means for preventing transmission of jolts to said pressure pro...
ducing means, each pressure charge causing a certain movement of said jolting mechanism, and means associated with and controlled by said jolting mechanism to permit automatic release of the pressure charge and regulate the cushioning effect of said jolting mechanism.

9. In a device of the class described a fluid compressing means, a plunger cylinder connected thereto, a plunger wherein and having a recess in the lower end thereof, a solid cylindrical member mounted in the bottom of said cylinder adapted to engage with said plunger recess when said plunger is lowered to trap air therein to form a cushion, a plurality of valves connected to said plunger cylinder, a by-pass leading from said recess adapted to register with said passage in the cylinder permitting the trapped air to escape through said controlling means and a jolting table mounted on said plunger and movable therewith.

10. In a device of the class described fluid compressing cylinders in axial alinement with one another, a passage leading from one of said cylinders to the other, a check-valve mounted in said passage, a plunger cylinder formed integral with said compressing cylinders and disposed at an angle thereto and communicating with one of said cylinders, a plunger therein, and a jolting table rigidly connected to said plunger and movable therewith.

11. In a device of the class described a fluid, a plunger cylinder integrally connected therewith at an angle thereto and communicating with the high pressure cylinder thereof, a plunger movable therein, a table rigidly connected to said plunger and movable therewith, and guiding means for said table.

12. In a device of the class described low and high pressure aligned compounded cylinders, a passage leading from one of said cylinders to the other, a plunger cylinder mounted at right angles to said compounded cylinders and communicating with the high pressure cylinder of said compounded cylinders, and a jolting table mounted on the top of said plunger and movable therewith.

13. In a device of the class described compressing cylinders, a plunger cylinder cast integral therewith at an angle thereto and communicating with one of said compressing cylinders, a plunger movable therein, a horizontal extension integral with said plunger cylinder, a table connected to said plunger adapted to be oscillated by the plunger due to the compression and release of the fluid in the cylinders, and guide members secured to said table extending through apertures in said extension.

14. In a device of the class described a plunger having a pressure communicating at a certain movement of a said jolting mechanism, and means associated with and controlled by said jolting mechanism to permit automatic release of the pressure charge and regulate the cushioning effect of said jolting mechanism.
means operating independently of the fluid within the cylinder to trap fluid and to afford a cushion for the table and plunger.

20. In a jolting machine for molds an upper right cylinder, a plunger therein controlling the outlet therefrom independently of auxiliary valve gearing, an enlarged recessed extension formed integral with the upper portion of said cylinder, a rigidly mounted table on said plunger and a pad fitted into the recessed extension to receive the table thereon in its lower limit of movement.

21. In a jolting machine for molds, a plunger cylinder, a plunger movable therein, a recessed portion integral with the upper part of the plunger cylinder and having apertures therein, a table connected to said plunger and movable therewith by fluid under pressure, a pad positioned in the recessed portion to receive the table thereon in its lower limit of movement, guides secured to the table and extending through the apertures in the recessed portion, and independently operative compounded compressing mechanism disposed at an angle to said plunger cylinder and communicating therewith for regulating the shock imparted to said table.

22. In a jolting machine for molds compressing cylinders, another cylinder formed integral therewith and at an angle thereto, communicating with one of said compressing cylinders, means movable therein and controlling the outlet therefrom independently of valve gearing, horizontal recessed supporting means integral with the upper portion of said latter cylinder, a table secured to said plunger and movable therewith by the compression and release of the fluid in the cylinders, and a pad in said recessed means to receive the table thereon when lowered.

23. A jolting machine for molds comprising compressing cylinders, a plunger cylinder connected at an angle thereto and communicating with one of the compressing cylinders, a plunger therein, a table integral with said plunger and movable therewith, guiding means for said table, valves connected to said plunger cylinder to control the inlet and outlet of fluid, and mechanism for manually controlling the shock imparted to said table and mold independently of the inlet and outlet of said cylinder.

24. In a jolting machine for molds a cylinder, a plunger therein controlling the outlet therefrom independently of valve gearing, means adapted when said plunger is lowered to cooperate therewith to trap air within the plunger affording a cushion for the plunger, and a jolting table connected to said plunger and movable therewith.

25. In a device of the class described a plunger cylinder, a plunger acting independently of valve gearing to control the release of fluid from said cylinder, and means cooperating with said plunger acting to afford a cushion for the plunger independently of the fluid trapped in the plunger cylinder.

26. In a device of the class described a plunger cylinder, a plunger therein controlling the outlet therefrom independently of valve gearing and means acting to cushion the plunger independently of the fluid in the cylinder.

27. In a device of the class described horizontal tandem pressure producing means, jolting mechanism connected therewith, whereby said jolting mechanism is moved in one direction by fluid under pressure, said jolting mechanism acting independently of valve gearing to cause release of the fluid under pressure and permitting movement of the jolting mechanism to take place in an opposite direction by gravity, and apertured means for receiving said mechanism when lowered.

28. In a device of the class described tandem pressure producing means, a jolting mechanism operated thereby, and means interfitting and cooperating therewith to form an air cushion therefor, said jolting mechanism so constructed as to release said air cushion.

29. In a device of the class described horizontal tandem pressure producing means, vertical jolting mechanism operated thereby, and apertured stationary means interfitting with a part of said jolting mechanism to resiliently support the same.

30. In a device of the class described horizontally acting tandem pressure producing means, vertically acting jolting means actuated thereby, and interfitting cushion producing means.

31. In a device of the class described horizontal pressure producing means, vertically acting jolting means associated therewith and actuated thereby, and means communicating therebetwixt to permit air from said pressure producing means to be alternately forced into the jolting means and returned for reuse.

32. In a device of the class described horizontal pressure producing means, vertically acting jolting means associated therewith and actuated thereby, shock absorbing means attached to said jolting means, and means connecting said pressure producing means and said jolting means permitting the reuse of the actuating medium.

33. In a device of the class described, pressure producing means, a horizontal ex- tension thereabove, jolting mechanisms associated with said horizontal extension and with said pressure producing means, shock absorbing means mounted on said horizontal extension, and means connecting said
pressure producing means and said jolting mechanisms to permit reuse of the actuating medium.

34. In a device of the class described, in tandem pressure producing means, movable jolting mechanism operated thereby and cushioned thereon, and means associated with and controlled by said jolting mechanism to permit automatic release of the pressure charge and regulate the cushioning effect of said jolting mechanism.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

WILLIAM P. KRAUSE.

Witnesses:
CHARLES W. HILLS, JR.,
FRANK K. HUDSON.

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