E. KILLING.

JARRING MACHINE.

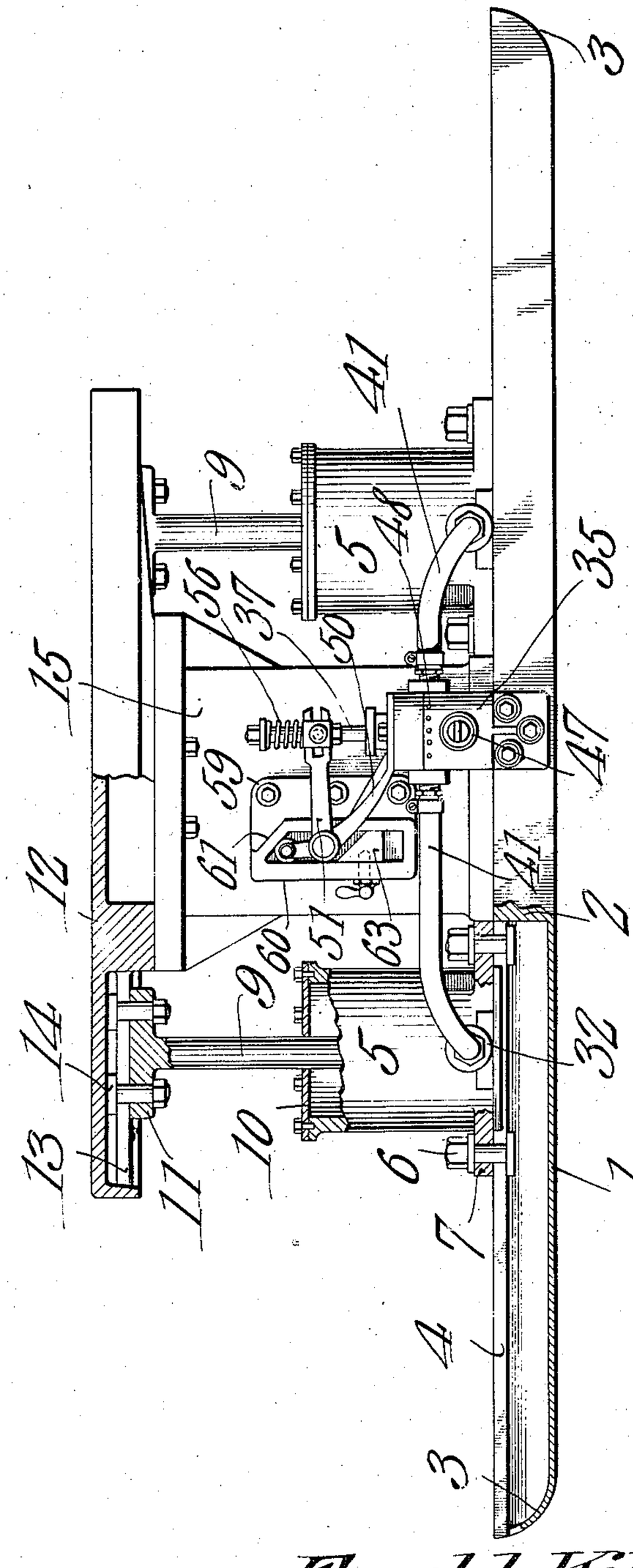
APPLICATION FILED FEB. 23, 1910.

966,691.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

E. L. Stewart

F. T. Chapman

Inventor

Ewald Killing.

By Chapman & Co.

Attorneys

966,691.

E. KILLING.

JARRING MACHINE.

APPLICATION FILED FEB. 23, 1910.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 2.

Fig. 3.

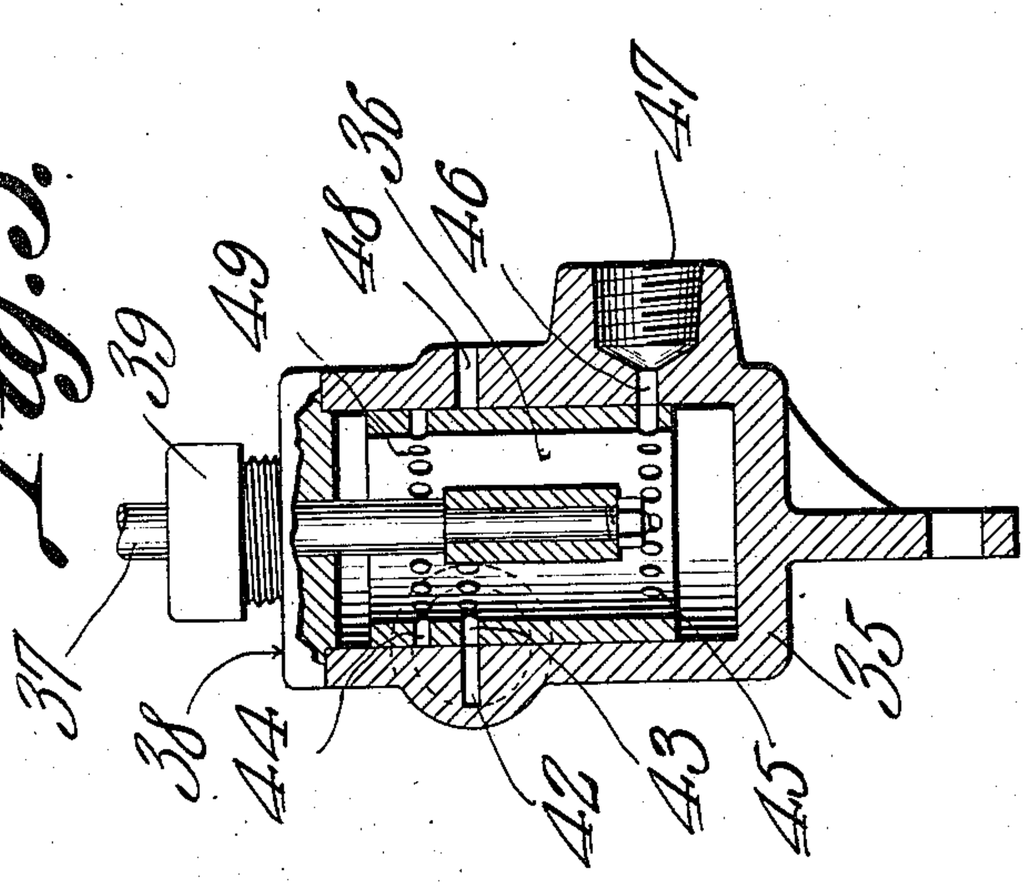
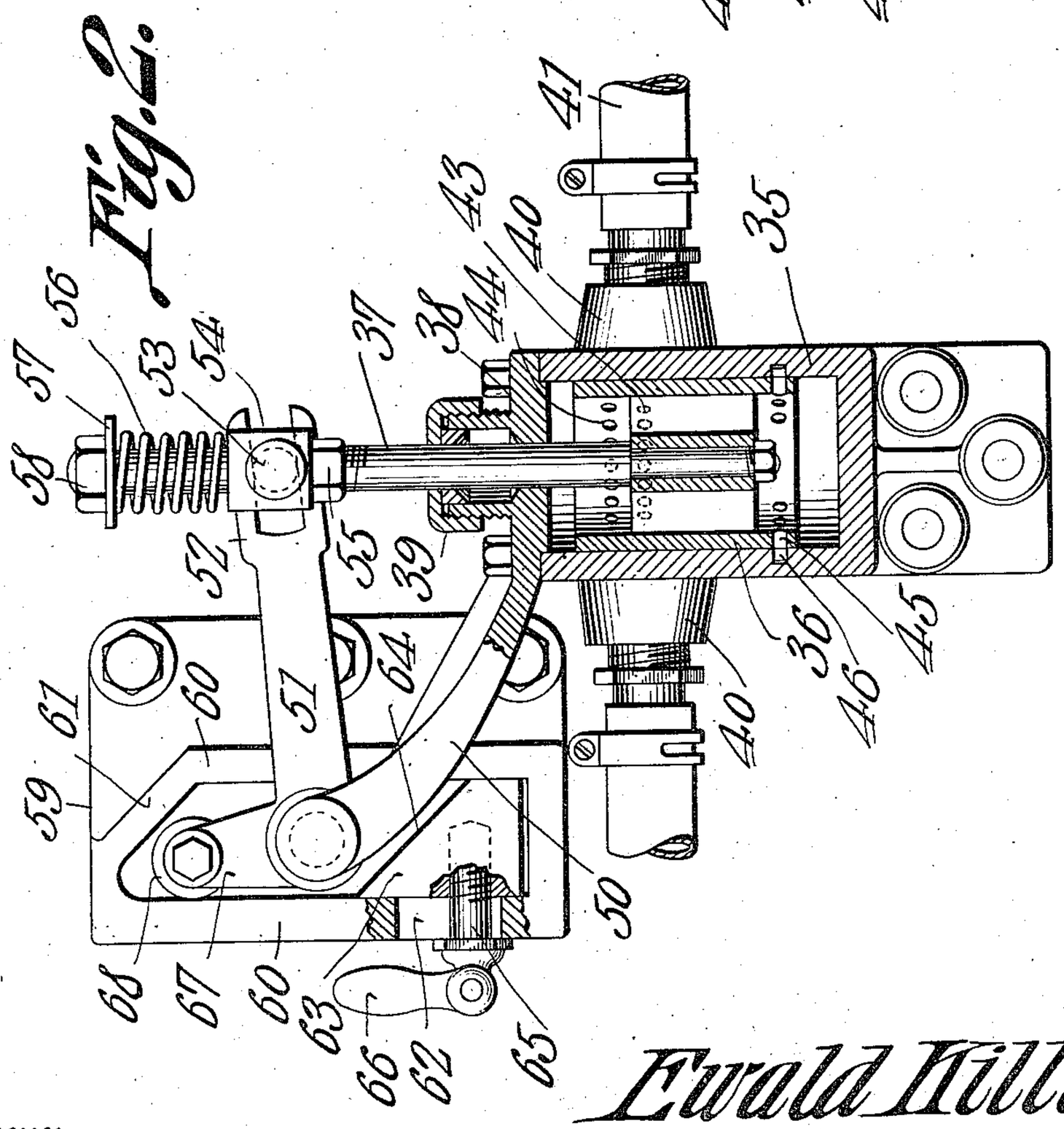


Fig. 2.



Witnesses

E. F. Klein

F. T. Chapman.

Inventor

Ewald Killing.

By Church & Co.

Attorneys

E. KILLING.

JARRING MACHINE.

APPLICATION FILED FEB. 23, 1910.

966,691.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 3.

Fig. 4.

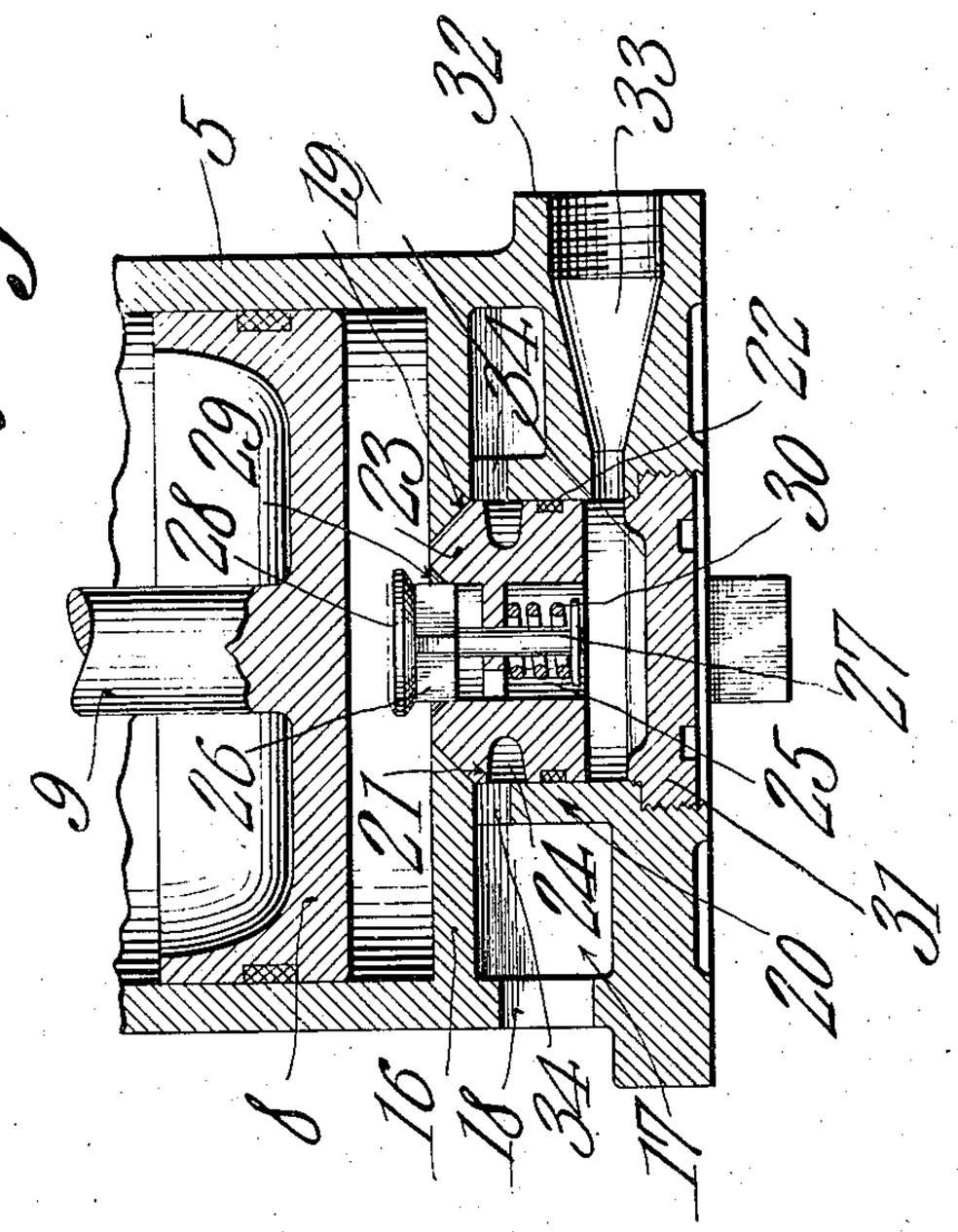
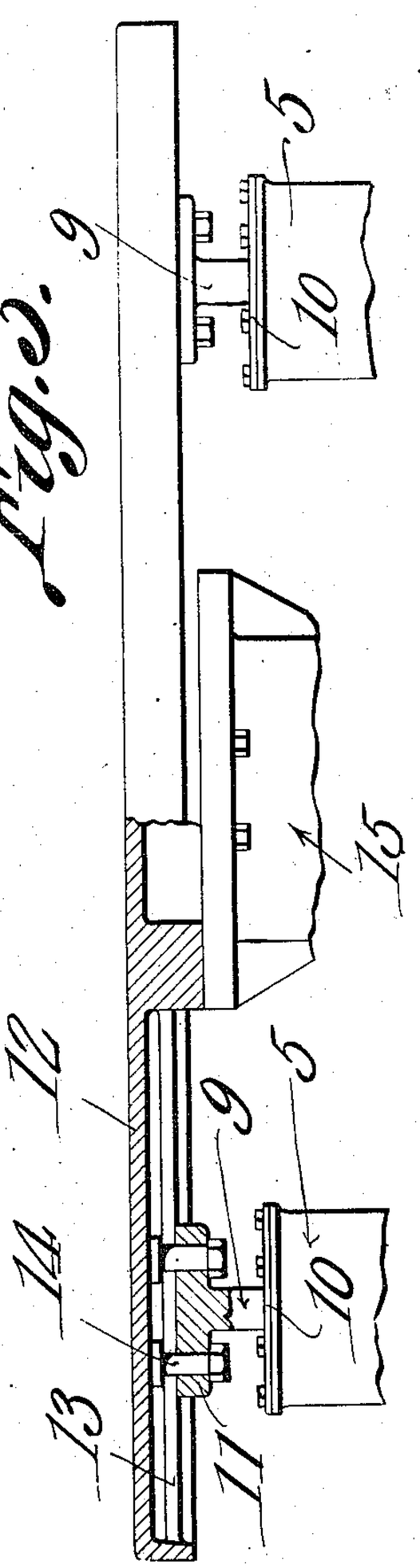


Fig. 5.



Witnesses

E. F. Schmidt

F. J. Chapman

Inventor

Ewald Killing.

By Crowell & Co.

Attorneys

UNITED STATES PATENT OFFICE

EWALD KILLING, OF DAVENPORT, IOWA.

JARRING-MACHINE.

966,691. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed February 23, 1910. Serial No. 545,432.

To all whom it may concern:

Be it known that I, EWALD KILLING, (who has declared his intention of becoming a citizen of the United States,) residing at Davenport, in the county of Scott and State of Iowa, have invented a new and useful Jarring-Machine, of which the following is a specification.

This invention has reference to improvements in that type of molding machines known as "jarring" machines, designed for the thorough packing of the sand in the flasks and the object of the present invention is to generally improve machines of this class, the present invention comprising means whereby a plurality of lifting elements is provided with a result that there is an elimination of wear in the machine and quicker action is obtained with less expenditure of air, compressed air being the usual power element, although of course the invention may utilize any compressed fluid for power purposes.

Furthermore the invention comprises means whereby the same machine may be used with a wide range of different sizes of flasks with a minimum of change in the machine.

The invention will be best understood and the advantages of the invention made apparent, from a consideration of the following detail description taken in connection with the accompanying drawings forming a part of this specification, in which drawings,

Figure 1 is an elevation of the machine with the parts shown in section. Fig. 2 is a detail sectional elevation of a valve structure and actuating means therefor used in connection with the present invention. Fig. 3 is a section through the valve structure of Fig. 2 in a plane at right angles to the section of the same structure in Fig. 2. Fig. 4 is a diametric section of one of the power cylinders. Fig. 5 is a view partly in section showing the manner of arranging the structure for large flasks.

Referring to the drawings, there is shown a base 1 sufficiently extensive to give stability to the machine and provided at the middle portion with a block-like part 2, which, as will hereinafter appear, constitutes an anvil for receiving the impact of other parts of the machine. The opposite ends of the base may be rounded upward as indicated at 3 to facilitate transportation of the machine from place to place since the machine of the present invention is quite portable. The portions of the base 1 beyond the central block 2 may be cast hollow for lightness.

On diametrically opposite points of the central block 2, the upper portion of the base is provided with slots 4 extending from the central block toward the ends of the base. But one of these slots is shown in Fig. 1 but it will be understood that a suitable number of slots is provided on each side of the block 2 for a purpose which will presently appear.

There are provided cylinders 5, two such cylinders being shown in the drawings and these cylinders are disposed on the base on opposite sides of the central block 2, the cylinders being adjustably secured to the base by means of posts 6 extending through ears 7 on the cylinders and entering the slots 4 thus providing means whereby the cylinders may be readily loosened and moved along the base to any position desired where they may be again secured by tightening the bolts 6.

In each cylinder is a piston 8 on one end of a piston rod 9 extending through a head or cap 10 at the upper end of the cylinder and terminating at the outer end in a tee head 11 designed to receive and support the appropriate end of a table 12 which latter may be provided with longitudinal ribs 13 behind which the heads of bolts 14 may be lodged and these bolts may extend through the head 11 of the piston rod 9 to secure the latter and the table together. This structure permits the positioning of the cylinders 5 with reference to the table 12 as may be found most convenient.

Secured to the under side of the table 12 is a pedestal 15 designed to engage the anvil 2 when the table is in the lowermost position.

When a suitable fluid under pressure, compressed air being the most commonly used motive fluid, is admitted to the cylinders 5, the pistons are caused to rise and through the piston rods 9 the table 12 is elevated and when the compressed air is permitted to exhaust from the cylinders then the table 12 will lower rapidly until the lower end of the pedestal 15 comes in contact with the anvil 2 causing a sudden stoppage or jar of the table which is utilized to cause the packing of sand in the flasks lodged on the table 12,

this being a common method of causing the packing of the sand in the flasks. The present invention, however, presents decided advantages in providing two cylinders acting at divergent points upon the table thus permitting the pedestal to be located midway of the table and small cylinders to be used without in any manner affecting the efficiency of the machine. It is found in practice that by using a plurality of power units in separated relation with the pedestal intermediate thereof the device may be made light and compact and portable, and by providing an extended base and means whereby the power cylinders may be located at any desired points along the base the machine is made capable of handling various sized flasks from the smallest to the largest, the only change necessary or desirable being the change of the table 12 since a small table may be used for the smaller size flasks and a large table for the larger flasks. The remainder of the structure need not be changed at all except that the cylinders 5 are adjusted farther from the pedestal 15 for a large size table than they are for a small table.

In Fig. 5 a large table is shown and the adjustability of the cylinders for the large table is indicated.

Each cylinder 5 is provided with a false bottom 16 between which and the bottom of the cylinder there is formed a chamber 17 which may be opened through a port 18 to the atmosphere.

In the false bottom or web 16 there is formed a valve seat 19 concentric with the walls of the cylinder 5 and connecting the false bottom 16 and the main bottom of the cylinder is a short cylinder 20 communicating with the valve seat 19. The cylinder 20 contains a valve 21 adapted to the seat 19 and of a height to be capable of limited movement within the cylinder 20, the valve 21 being provided at one end with a packing ring 22, and at the other end with a valve head 23 while at an intermediate point there is formed a circumferential groove 24 in the outer wall of the valve 21, this groove 24 serving to reduce friction. It may however under some circumstances be omitted. Extending axially through the valve 21 is a passage 25 in which slides a guiding spider 26 for a valve stem 27 carrying a valve 28 adapted to a valve seat 29 formed at the end of the passage 25 coincident with the head 23 of the valve 21. A spring 30 surrounding the valve stem 27 tends to maintain the valve 28 in the closed position in the valve 21. The lower end of the cylinder 5 is provided with a passage to the interior of the cylinder 20 and this passage is normally closed by a suitable screw plug 31, which may be removed when it is desired to have access to the valve 21 for renewal or repair. At one side of the cylinder 5 is a nipple 32 communicating by a passage 33 with the interior of the cylinder 20.

When normal atmospheric pressure exists in the passage 33 and in the cylinders 5 beneath the piston 8 the valve block 21 rests on the plug 31 with the valve head 23 away from the valve seat 19 and the spring 30 holds the valve 28 to its seat 29. Under these conditions the interior of the cylinder 5 beneath the piston 8 is in free communication with the atmosphere through the valve seat 19 and through passages 34 formed in the cylinder 20 with the chamber 17 and from the latter to the port 18. If now super-atmospheric pressure be established in the passage 33 the valve block 21 immediately rises until the valve end 23 is lodged in the seat 19 thus cutting off communication between the interior of the cylinder 5 and the atmosphere by way of the passages 34, chamber 17 and port 18. As soon as the superior pressure within the passage 33 and interior of the cylinder 20 is sufficiently high the spring 30 will yield and the valve 28 will open thus allowing an establishment of the super-atmospheric pressure within the cylinder 5 underneath the piston 8 and when this pressure becomes sufficient the piston 8 will move upward and through the piston rod 9 elevate the table 12. If now the pressure within the passage 33 be reduced suddenly to atmospheric pressure the spring 30 will at once close the valve 28 and now the superior pressure on the valve end of the block 21 will cause the latter to move rapidly to the lower end of the cylinder 20, the cylinder 5 being considered as upright, and the interior of the cylinder 5 is at once opened to the atmosphere, and, the passages to the atmosphere being of large capacity, the pressure within the cylinder is very rapidly reduced. The result of this is that when the interiors of the two cylinders 5 are opened to the atmosphere the table 12 rapidly falls under the action of gravity until its movement is suddenly arrested by the engagement of the pedestal 15 with the anvil 2 and this sudden stoppage imparts a jar to the contents of the flask assumed to be present on the table 12, this resulting in a packing of the sand about the patterns in the flask.

Secured to the base 1 is a slide valve casing 35 in which is mounted a hollow slide valve 36 secured to one end of a valve rod 37 which in turn passes through the head 38 of the casing 35 and through a packing gland 39 carried by said head.

On opposite sides of the casing 35 are threaded bosses 40 each receiving one end of a flexible pipe 41, the other end of this pipe being connected to the nipple or threaded boss 32 of the respective cylinder 5. These pipes or conduits 41 may be made of air pressure hose or where conditions

warrant, these pipes may be even made of metal. By making the pipes flexible and of sufficient length provision is made for adjustment of the cylinders 5 toward and from the pedestal 15 without the necessity of changing the pipes for this purpose.

Formed in the wall of the casing 35 is a conduit 42 communicating with both bosses 40 and formed in the walls of the slide valve 36 is a series of through passages 43, these passages being preferred to an elongated slot for the same purpose.

When the valve 36 is in one position the passages or perforations 43 match the conduit 42 and when the valve 36 is at the other limit of its travel, then another series of perforations 44 is brought into coincidence with the conduit 42 so that in either case the conduit 42 is put into communication with the interior of the hollow valve 36. At another point in the valve 36, preferably near the other end thereof is a series of perforations 45, which, when the valve is in position to cause coincidence of the perforations 43 with the conduit 42 are in communication with a conduit or passage 46 formed in the wall of the casing 36 and in constant communication with a threaded boss 47 to which an air supply pipe may be coupled.

Formed through the walls of the casing 35 is a series of perforations 48 and formed through the walls of the valve 36 is a matching series of perforations 49. The perforations 48 and 49 are so relatively located that they are brought into matching relation only when the slide valve 36 is in position to bring the perforations 44 in communication with the conduit 42 and the perforations 48 and 49 are out of communication when the perforations 43 communicate with the conduit 42 and the perforations 45 communicate with the conduit 46.

Formed on the head 38 of the casing 35 is a bracket arm 50 extending to one side of the casing and pivotally supported at the free end of the bracket 50 is a bell crank lever 51 having the free end 52 of its longer arm bifurcated and straddling a pin 53 projecting from a block 54 mounted on the rod 37 to slide longitudinally thereon. The block 54 rests normally against a nut 55 on the rod 37 and the other side of the block 54 is engaged by a spring 56 surrounding the rod 37 beyond the block and this spring is held in place by the washer 57 and a nut 58 applied to the free end of the rod 37.

Secured to the pedestal 15 is a plate 59 on which are formed parallel ribs 60 joined at one end by an inclined rib 61, the several ribs being preferably cast on the plate 59. One of the ribs 60 is provided with an elongated slot 62 and between the ribs is lodged a block 63 with a beveled end 64. The block 63 is held in adjusted positions between the flanges 60 by means of a thread screw 65 extending through the slot 62 and provided with a manipulating handle 66.

The lever 51 at the end of the shorter arm 67 carries a roller 68 adapted to engage the inner face of the inclined rib 61 or the beveled or inclined face 64 of the block 63, under conditions to be described.

In the position of the slide valve 36 shown in Figs. 2 and 3 compressed air entering through the boss 47 will find its way through the perforations 46 and perforations 45, then through the interior of the valve 36 thence by way of the perforations 43 to the conduit 42, these perforations under these circumstances being in communication with the conduit 42. The compressed air now flows by way of the pipes 41 to the passages 33 of each cylinder 5 and thence in a manner already described to the under side of the pistons 8 causing the pistons to rise. The rising of the pistons 8 causes a like elevation of the table 12 and pedestal 15 and the plate 59 with the ribs 60 and 61 and the block 63 participate in this movement. Ultimately the beveled edge 64 of the block 63 engages the roller 68, the said roller being assumed to be at the left hand end of its travel as viewed in Fig. 2 and this roller is forced toward the right causing the bell crank lever 51 to rock in a direction to move the end 52 downward and this causes a like movement of the rod 37 thus moving the valve 36 to the lower position where the perforations 43 are out of coincidence with the conduit 42 and the perforations 45 are out of coincidence with the perforations 46. At this point the pressure in the pipes 41, passage 33, and cylinder 5 beneath piston 8 becomes equalized allowing spring 30 to close valve 28. Then the perforations 44 are brought into communication with the conduit 42 and the perforations 49 into communication with the perforations 48, the latter leading to the atmosphere, which reduces pressure in pipes 41, passage 33 and beneath exhaust valve and then the superior pressure above the valve 21 in each cylinder 5 causes the valve to move to a position opening the interior of each cylinder 5 to the atmosphere as before described. The table 12 and pedestal 15 now drop rapidly and the plate 59 and ribs 60 and 61 participate in this movement, but before the downward movement of the table 12 is arrested by the engagement of the pedestal 15 with the anvil 2, the inclined rib 61 has engaged the roller 68 and causes a rocking of the bell crank lever 51 in a direction to move the valve 36 upwardly as viewed in the drawings, thus again coupling up the compressed air supply with the interior of the cylinders 5 to cause the lifting of the table 12 in the manner described. By this means the downward movement of the table is not resisted

by air pockets which would tend to cushion the downward movement but such downward movement is rapid and the arrest of the movement is sharp and sudden thus imparting the most efficient jar to the contents of the flask or flasks on the table 12.

By using two cylinders instead of one the height of the cylinders may be materially reduced and the machine may be built very low thus making it easy to shovel sand into the flask. Furthermore the construction of the present machine contributes to its stability and eliminates vibration without the necessity of a heavy fixed base, thus rendering the machine readily portable.

What is claimed is:—

1. In a jarring machine, a table or support for flasks, separated actuating means for the table, an intermediate pedestal for the table, and an anvil co-acting with said pedestal.

2. In a jarring machine, a table or support for the flasks having an intermediate pedestal, an anvil in operative relation to the pedestal, compressed fluid engines connected to the table on opposite sides of the pedestal, and means connected to the table for operation thereby for causing the introduction of compressed fluid into the engines simultaneously and the simultaneous exhaust thereof from said engines.

3. A jarring machine provided with an extended base and with a plurality of actuating means for the jarring side of the machine adjustable along the base to or from an intermediate point of said base.

4. A jarring machine provided with an extended base carrying an intermediately located anvil, a plurality of compressed fluid engines adjustable along the base toward or from the anvil, and a table removably connected to the engines and provided with an intermediate member for engaging the anvil at one limit of travel of the table with relation to the base.

5. In a jarring machine, an elongated base provided with an intermediate anvil, cylinders connected to the base on opposite sides of the anvil and adjustable toward and from said anvil, pistons in said cylinders, piston rods on said pistons, a table carried by the piston rods in removable relation thereto, a pedestal on the table adapted to engage the anvil at one limit of travel of the table, means for admitting compressed fluid to the cylinders and for putting the cylinders into communication with the atmosphere, and connections between the pedestal and the fluid controlling means for causing the operation of the latter in timed relation to the movements of the table.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EWALD KILLING.

Witnesses:

CHAS. S. SIMPSON,

CORNELIUS H. MURPHY.