H. J. THOMPSON.

MOLDING APPARATUS.

APPLICATION FILED OCT. 20, 1915. RENEWED APR. 12, 1917.

1,234,419. Patented July 24, 1917.

3 SHEETS—SHEET 1.

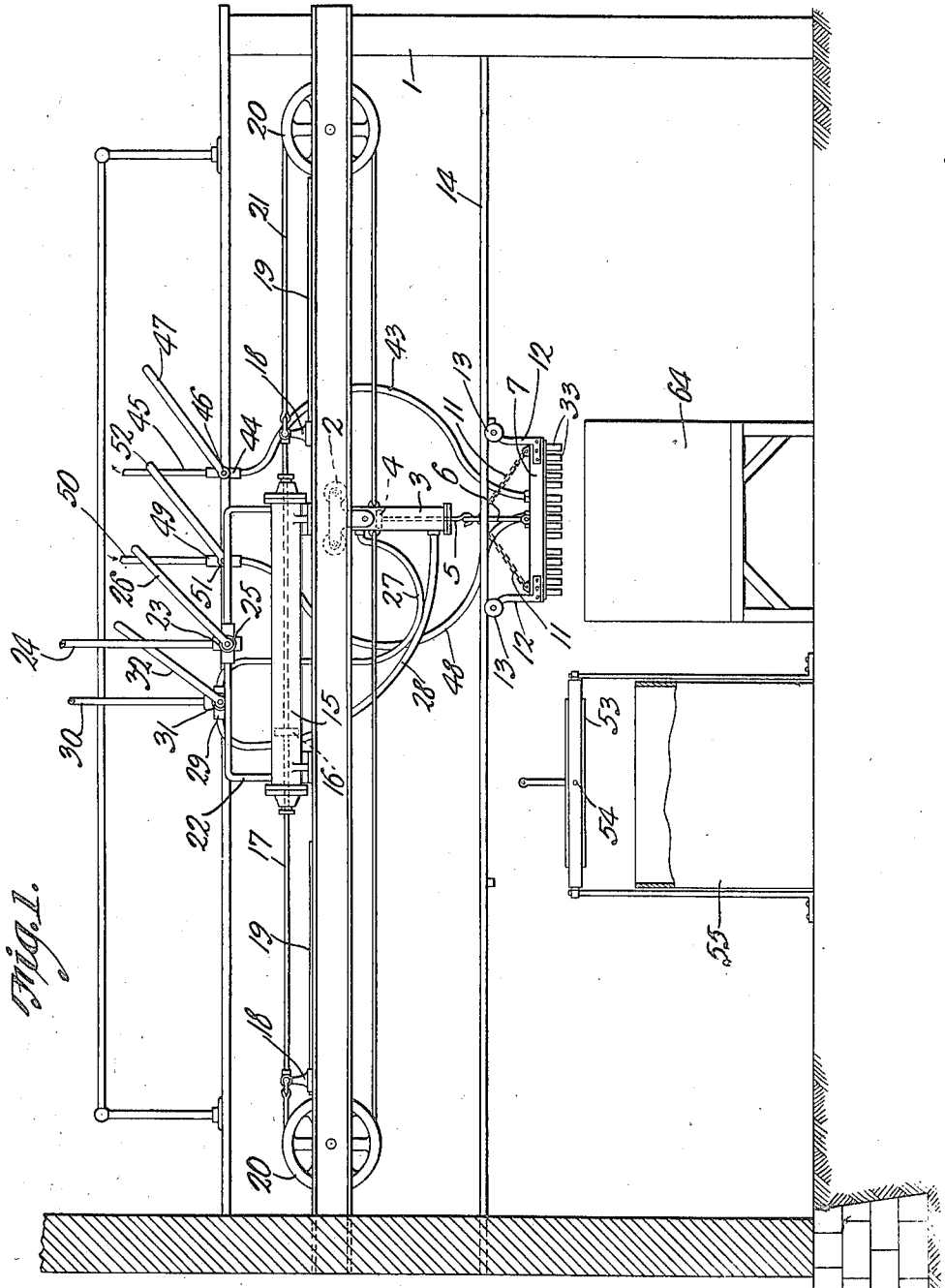


Fig. 1.

Witnesses

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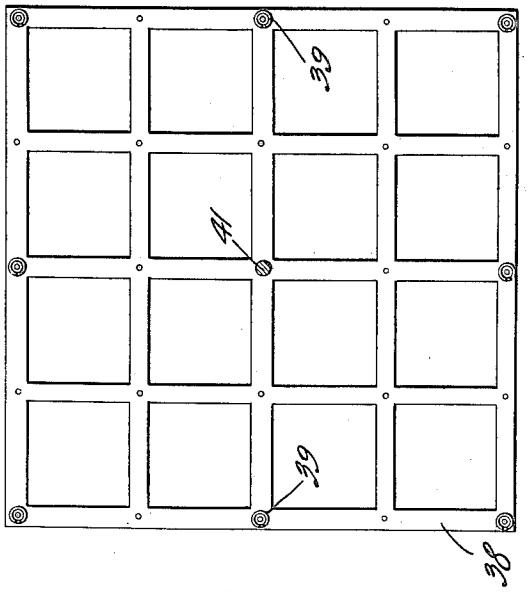


Fig. 3.

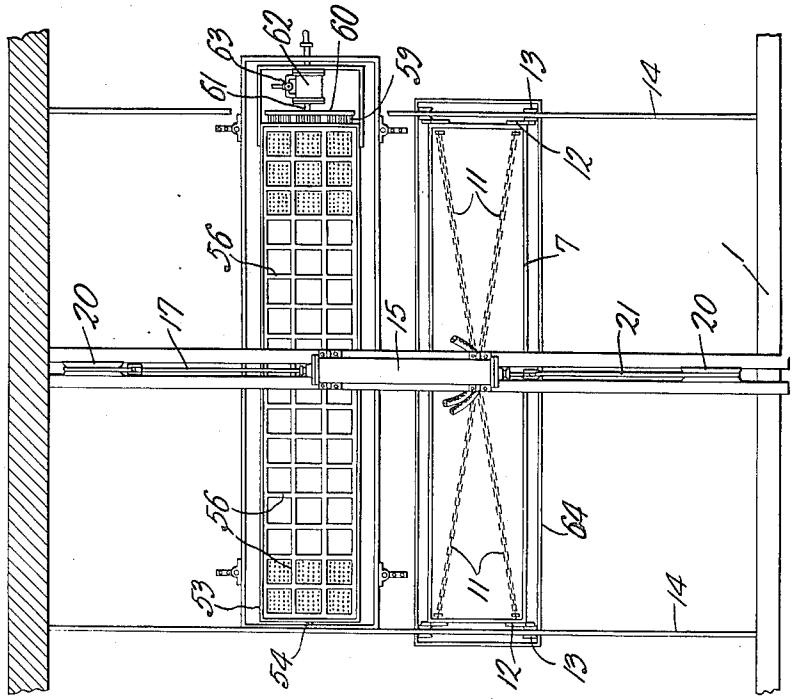


Fig. 2.

Witnesses

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3 SHEETS—SHEET 3.

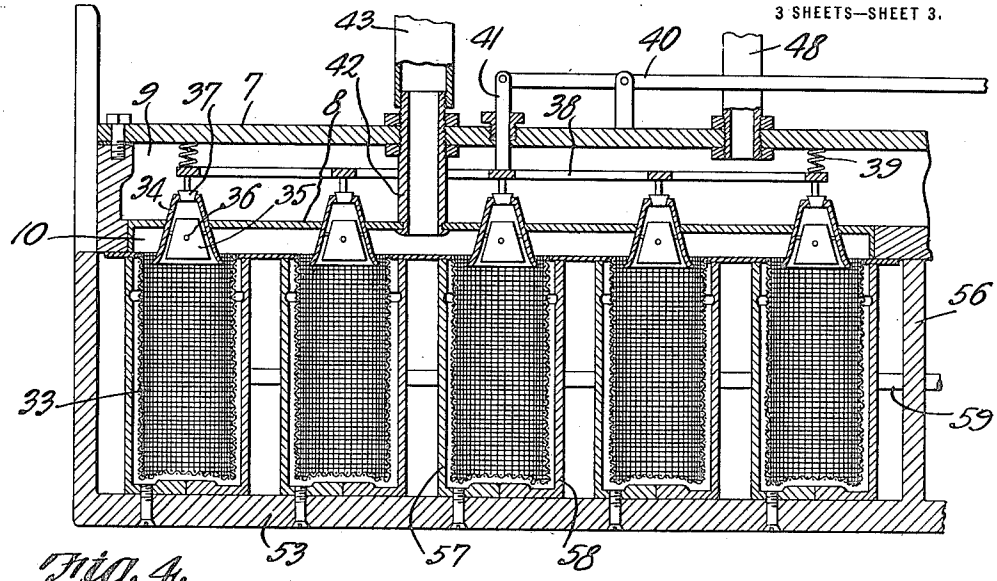


Fig. 4.

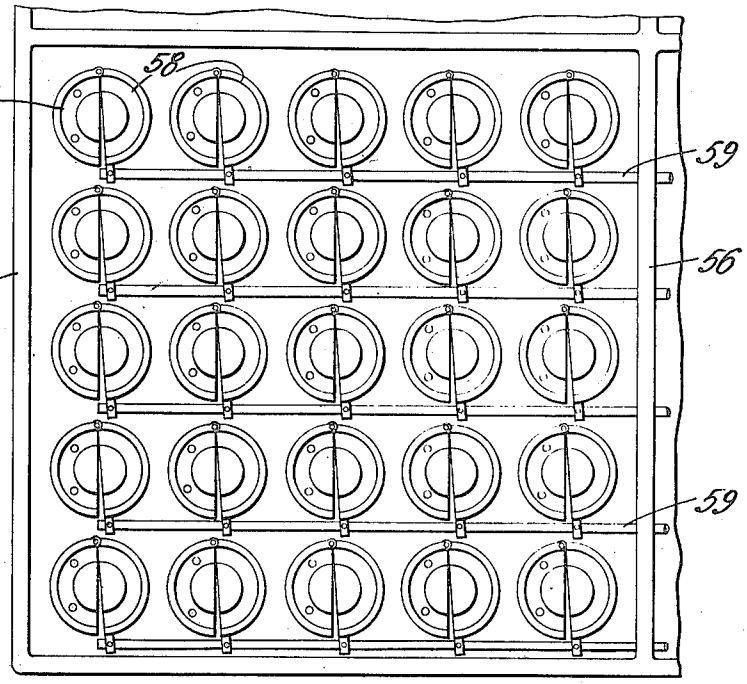


Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

HARRY J. THOMPSON, OF NEW YORK, N. Y.

MOLDING APPARATUS.

1,234,419. Specification of Letters Patent. Patented July 24, 1917.

Application filed October 20, 1915, Serial No. 56,961. Renewed April 12, 1917. Serial No. 161,675.

To all whom it may concern:

Be it known that I, HARRY J. THOMPSON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Molding Apparatus, of which the following is a specification.

This invention relates to apparatus especially designed for molding bottles and other containers out of paper pulp and the like.

One of the objects of the present invention is to provide apparatus whereby cylindrical containers can be readily molded, air being utilized as a means for holding the pulp upon one member of the mold while being conveyed and inserted into the other member of the mold, and being also utilized for the purpose of disengaging the pulp from the mold to which it has been adhering, thus to permit the ready separation of the mold members without injury to the molded object therebetween.

A further object is to provide improved means for controlling the action of the air and to provide additional means whereby air is utilized for opening the receiving molds and releasing the molded objects, thus to permit their quick discharge into a receiver provided therefor.

A further object is to provide improved means for setting up a suction, thus to cause the pulp to adhere to one of the mold members while being conveyed to the other mold member and for forcing the pulp out of engagement with the mold member to which it normally adheres.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:—

Figure 1 is a view partly in section and partly in elevation of the complete apparatus, the male member of the mold being shown suspended above a pulp holding vat and at one side of the female member of the mold and a container therebelow.

Fig. 2 is a plan view of the apparatus shown in Fig. 1, parts being removed.

Fig. 3 is a plan view of one group of female mold members, the same being shown open to release the molded objects therein.

Fig. 4 is an enlarged vertical section through certain of the interfitting mold members in the positions assumed thereby immediately prior to the direction of air under pressure into the mold.

Fig. 5 is a top plan view of one of the valve carrying frames movable with the male mold members.

Referring to the figures by characters of reference 1 designates a supporting structure on which is mounted a carriage 2 having a cylinder 3 depending therefrom and forming a part thereof. This cylinder contains a piston 4 to the rod 5 of which is connected a rod 6 fastened to a casing 7 which is hollow and has a partition 8 dividing it into separate upper and lower compartments 9 and 10 respectively. Chains 11 may be connected to the corner portions of the casing 7 and to the upper portion of the rod 6 so as to hold the casing steady. Furthermore, arms 12 may be arranged at the ends of the casing and provided with wheels 13 adapted to travel along guide rails 14.

Mounted upon the structure 1 is a cylinder 15 having a piston 16 therein. This piston is secured to the middle portion of a rod 17 mounted to reciprocate within the cylinder and provided with supporting blocks 18 at the ends thereof and which travel along rails 19. Sheaves 20 are mounted in the structure 1 near the ends thereof and constitute guides for cables 21, chains or other flexible members. These flexible members are secured to the respective ends of the rod 17, extend partly around the respective sheaves 20 and are secured to opposite portions of the cylinder 3. Thus when the piston 16 is propelled in one direction, the connections between rod 17 and cylinder 3 will move said cylinder and the carriage 2 in the opposite direction.

Opening into the respective end portions of cylinder 15 are air supply pipes 22 ex-

tending from a valve casing 23 into which opens an air supply pipe 24. A valve 25 is employed for controlling the direction of flow of air from pipe 24, this valve being actuated by a lever 26 or in any other manner desired. By shifting the valve to one position, air will be directed from pipe 24 to one of the pipes 22 and thence into one end of cylinder 15 so as to drive piston 16 in one direction. When the valve is shifted to its other position, piston 16 will be moved in the opposite direction. Thus the carriage 2 and the parts carried thereby can be moved quickly to either of two positions.

Opening into opposed ends of the cylinder 3 are flexible pipes 27 and 28 respectively extending from a valve casing 29 in communication with an air supply pipe 30. A valve 31 is arranged in the casing and is controlled by a lever 32 or in any other suitable manner. Thus by shifting the valve to one position, air under pressure can be directed into the upper end of the cylinder 3, thus to force the piston 4 and the casing 7 downwardly, and, by directing air into the other pipe, 28, the piston 4 can be forced upwardly, thus to elevate the casing 7.

Depending from the bottom of the casing 7 are male mold members 33 preferably arranged in groups, each of these mold members being shaped to conform with the internal contour of the container to be produced and being preferably made up of a fine mesh metal fabric. The upper ends of the mold members 33 open into the compartment 10 in the casing 7 while the lower ends are closed and shaped to conform with the interior of the bottom of the article to be molded. Secured within partition 8 directly above each of the mold members 33 is a substantially conical nozzle 34 having its lower or large end flared. Suspended within each nozzle so as to be concentric therewith and spaced slightly therefrom is a spreading block 35, the block being held to the nozzle by radial pins 36 or in any other suitable manner. The upper end of each nozzle is normally closed by a valve 37 and all of the valves of each group of mold members 33 are connected to a frame 38 having suitably arranged springs 39 for holding all of the valves of the group yieldingly upon their seats. Any suitable means may be employed for lifting the valves off of their seats. For example a hand operated lever 40 may be mounted on the casing 7 and connected by a link 41 to the middle of frame 38. Thus by shifting lever 40 in one direction all of the valves 37 will be raised simultaneously against the action of their springs and, when the lever is released, the springs will return all of the valves to their seats.

An air conducting tube 42 extends into the casing 7 and through compartment 9 and partition 8 so as to open into the lower compartment 10. A flexible tube 43 connects tube 42 to a valve casing 44 and an air suction pipe 45 extends from this casing 44. A valve 46 is arranged in the casing 44 and may be controlled by a lever 47 or in any other manner preferred. By means of this valve air can be drawn from the tubes 42 and 43 or the suction can be cut off. Another flexible tube 48 opens into the compartment 9 and extends from a valve casing 49 in communication with an air supply pipe 50. A valve 51 is arranged in casing 49 and is controlled by a lever 52 or in any other suitable manner. Thus by shifting valve 51 to one position communication between pipe 50 and tube 48 can be cut off while by shifting the valve to its other position the pipes will be placed in communication, thus directing air under pressure through the tube 48 into the compartment 9.

The female mold members are arranged in groups within a frame 53 tiltably mounted about a pivot 54 supported above a receiver 55. Frame 53 is divided into separate sections by intersecting partitions 56 and each section receives one of the groups of the female mold members. As shown in Fig. 3, each of the female mold members comprises a fixed semi-cylir lrical section 57 to which is hingedly connected a movable semi-cylindrical section 58. The mold members of each group are disposed in parallel series and the movable sections 58 of each series are pivotally connected to an actuating rod 59 extending longitudinally of the frame 53. The several rods 59 are connected to a cross head 60 secured to a piston rod 61 extending into a cylinder 62, shown particularly in Fig. 2.

Air under pressure is adapted to be directed into one end of cylinder 62 so as to force the cross head 60 in one direction, thereby to move all of the sections 58 simultaneously against the sections 57, thus to close all of the mold members in the frame 53. When air under pressure is admitted to the other end of cylinder 62, all of the movable sections of the mold members are shifted away from the sections 57, as shown in Fig. 3. The admission of air to the respective ends of cylinder 62 can be controlled in any suitable manner, as by means of a manually actuated valve 63.

In using the apparatus, air is admitted under pressure to one end of cylinder 15 thus to shift piston 16 and position the casing 7 above a vat 64 in which is arranged a quantity of paper pulp or other material of which the containers are to be formed. Air is then admitted to the upper end of cylinder 3 as hereinbefore pointed out, with the result that casing 7 will be moved downwardly to submerge all of the male members 33 of the mold within the vat 64. Valve

46 is then shifted to place tubes 42 and 43 in communication with pipe 45 so that a suction will be set up which will result in portions of the contents of the vat adhering to the bottom and walls of the various members 33. While the suction is thus maintained air is shifted to the lower end of the cylinder 3, thus to raise casing 7 and lift the mold members 33 out of the vat 64. While the casing is thus elevated, air is admitted to the other end of cylinder 15 and the carriage 2 is thus shifted to its other position and with the casing 7 directly above the frame 53. Air is then shifted to the upper end of cylinder 3 and casing 7 will be moved downwardly to bring the mold members 33 within the respective mold members 57—58. The mold sections 58 are at this time closed against the mold sections 57. The suction through the tube 43 is then cut off and air under pressure is directed through tube 48 into the compartment 9. Lever 40 is then shifted to simultaneously raise all of the valves 37 off of their seats. Consequently, streams of air under pressure will flow through the nozzles 34 and will be directed by the blocks 35 against the uppermost portions of the walls of the mold members 33. Thus the material adhering to the walls of the mold members 33 will be blown outwardly therefrom, this stripping action beginning at the tops of the mold members 33 and continuing downwardly until said mold members have been entirely freed of the material and said material is pressed by air under pressure against the molds 57—58. Immediately subsequent to this operation, the mold sections 58 are swung to open positions, as shown in Fig. 3, casing 7 is elevated by directing air into the lower portion of cylinder 3, and said casing 7 is then shifted back to position above the vat 64. The foregoing operation can then be repeated. As soon as the mold members 33 have been removed from the mold members 57—58, frame 53 can be tilted and the molded objects can be dropped therefrom into the receiver 55. It is to be understood of course that the valves 37 are to be closed before the mold members 33 are reinserted into the vat 64. If desired, air may be maintained under pressure within the compartment 9 without requiring the manipulation of valve 51.

Apparatus such as herein described is especially designed for making cylindrical containers for use as milk bottles and the like, and the particular means for stripping the molded objects from the male mold members 33 and of releasing the molded objects from the female mold members, is deemed of considerable importance inasmuch as it results in the positive release of the molded objects without injury thereto. The particular means for simultaneously lifting the valves 37 off of their seats to admit air under pressure to the mold members 33, is also deemed of importance.

What is claimed is:—

1. In molding apparatus, the combination with a casing having separate air compartments therein, means for directing air under pressure into one of the compartments, and means for creating a suction through the other compartment, of foraminous mold members depending from the casing and communicating with the suction compartment, nozzles discharging into the respective mold members, valves for closing communication between the nozzles and the pressure chamber, and means for simultaneously opening all of the valves.

2. In molding apparatus, a casing having separate pressure and suction compartments, means for directing air into the pressure compartment, means for directing air from the suction compartment, foraminous mold members extending from and communicating with the suction compartment, nozzles for the respective mold members, valves normally closing the nozzles, a structure to which all of the valves are connected, means for shifting said structure to simultaneously open all of the valves and establish communication between the interiors of the mold members and the pressure chamber.

3. Molding apparatus including a casing having a pressure compartment and a suction compartment, a foraminous mold member extending from and in communication with the suction compartment, a nozzle opening into one end portion of the mold member, a spreading block fixedly mounted in the nozzle and extending close to the wall and end thereof, a valve normally closing one end of the nozzle, and means for unseating the valve to establish communication between the nozzle and the pressure compartment.

4. In molding apparatus, a plurality of female mold members each comprising opposed fixed and movable sections, said mold members being arranged in series, a connection between the movable sections of the mold members of each series, means for actuating said connection to simultaneously shift the movable sections toward or from the fixed sections, a plurality of male mold members of foraminous material, means for moving said mold members to positions between the sections of the female mold members, nozzles opening into the foraminous mold members, a spreading block in each nozzle and extending close to the wall thereof, a valve closing one end of each nozzle, and means for simultaneously opening the valves to direct air under pressure into the nozzles.

5. Molding apparatus including a plurality of series of female mold members each

member including a fixed section and an opposed hinged section, a connection between the hinged sections of each series, means for simultaneously shifting all of the connections to open or close said mold members, foraminous mold members insertible between the sections of the first mentioned members, a casing movable therewith and having a pressure compartment and suction compartment, said suction compartment being in constant communication with the interiors of the foraminous mold members, nozzles opening into the respective foraminous mold members, valves closing the nozzles at one end, and means for simultaneously opening the valves to establish communication between the nozzles and the pressure compartment.

6. In molding apparatus, the combination with a foraminous mold member open at one end, of means for stripping the molded object therefrom, said means including a nozzle having a flared outlet within the mold member adjacent the open end thereof, a spreading block concentrically arranged within the nozzle and spaced from the wall thereof, a valve normally closing the other end of the nozzle, means for opening the valve, and means for directing air under pressure into the nozzle when the valve is opened.

7. In molding apparatus, the combination with a foraminous mold member open at one end, of means for stripping a molded object from said member, said means including a nozzle having a flared open end within the open end portion of the mold member and extending close to the wall of said member, a spreading block concentrically arranged within the nozzle and spaced from the wall thereof, and means for directing air under pressure into the nozzle, the flared end of the nozzle and the block coöperating to direct a sheet of air against the wall of the mold member close to the open end thereof.

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

HARRY J. THOMPSON.

Witnesses:
E. R. SPENCER,
C. E. LANE.