Oct. 20, 1942. C. F. SCHNUCK ET AL 2,299,502

INTERNAL MIXER

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Fig. 1.

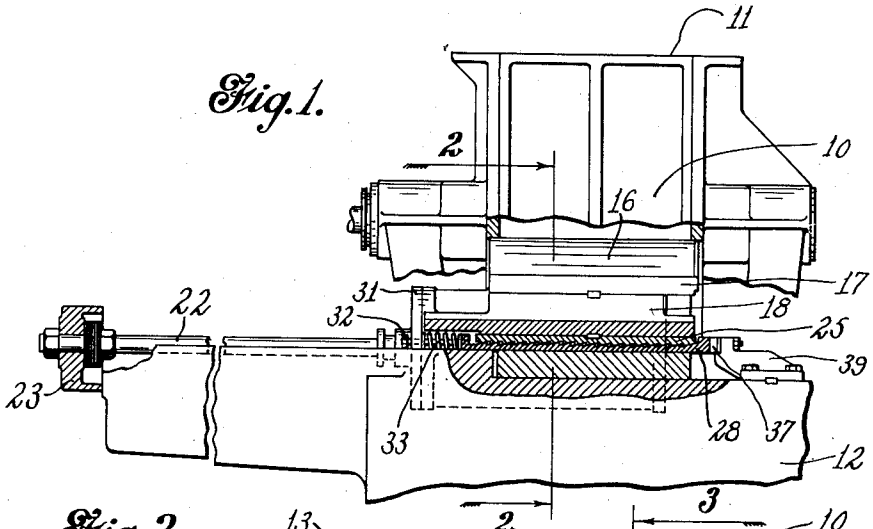
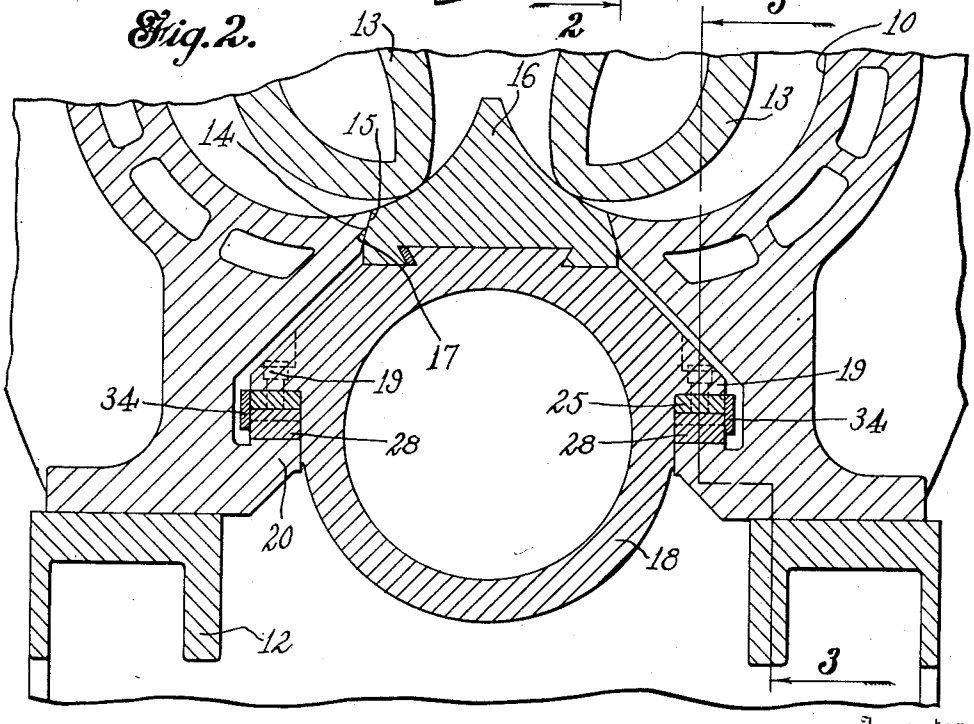


Fig. 2.



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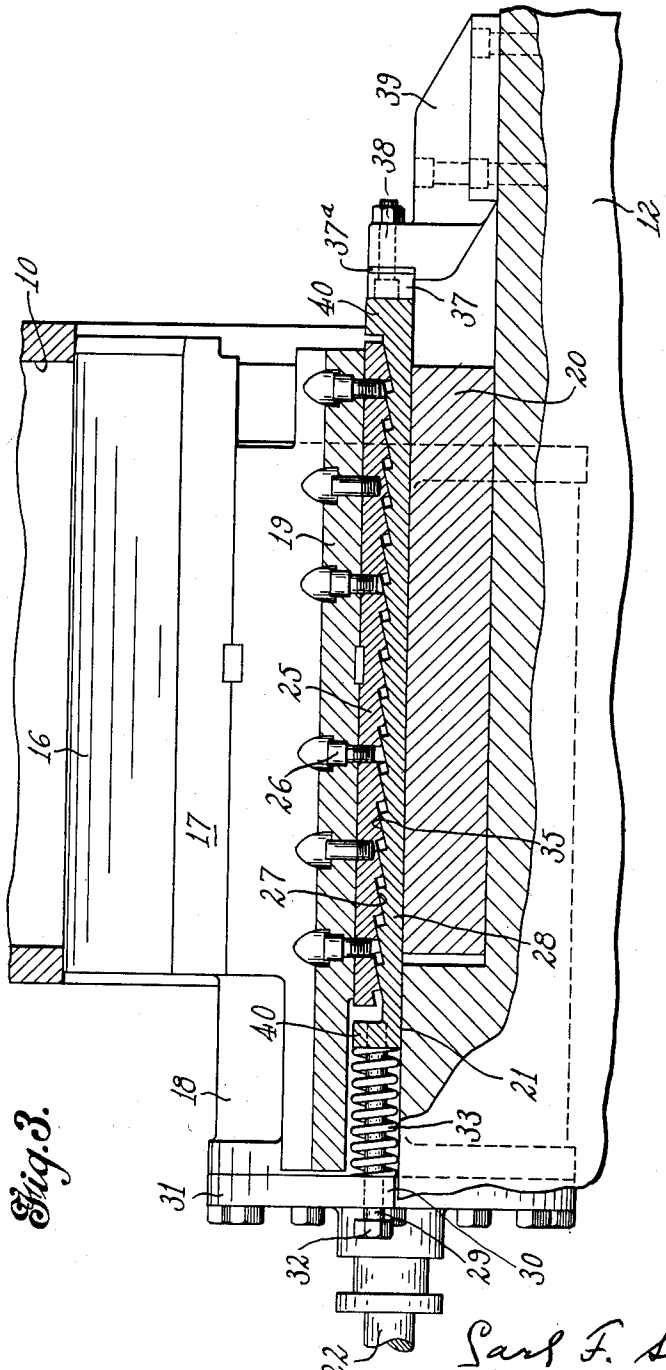


Fig. 3.

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INTERNAL MIXER

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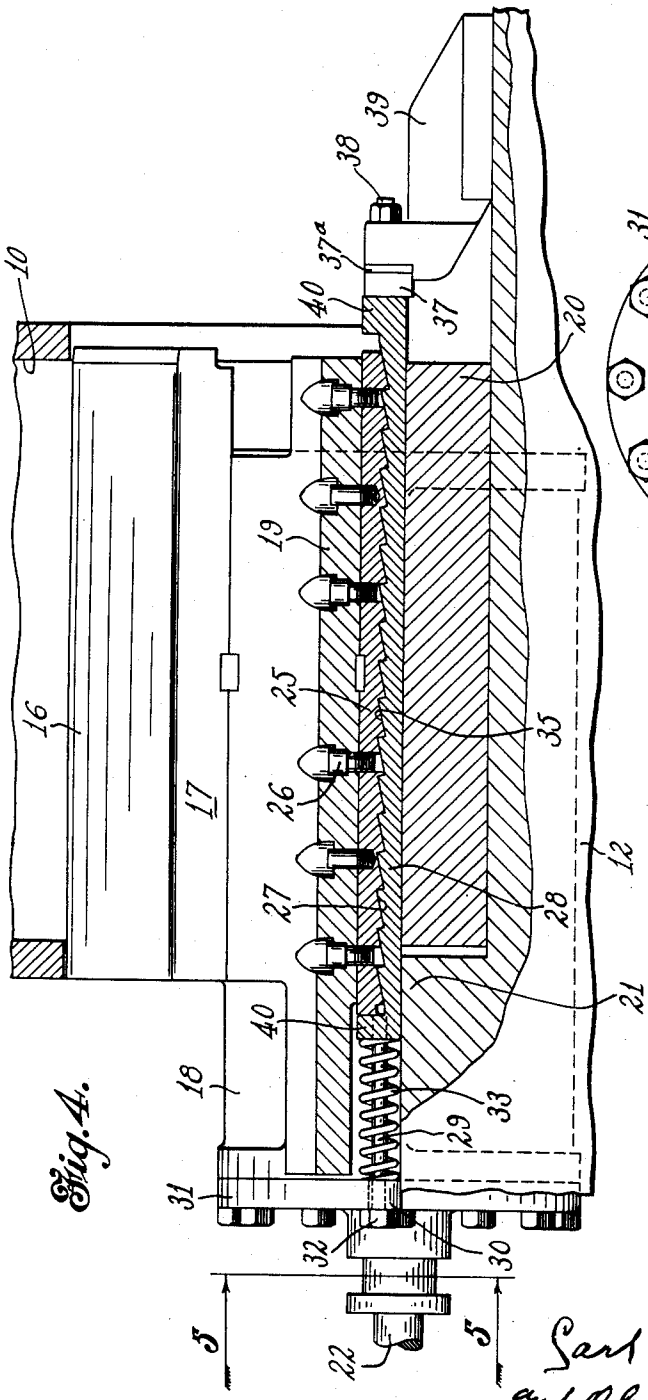


Fig. 4.

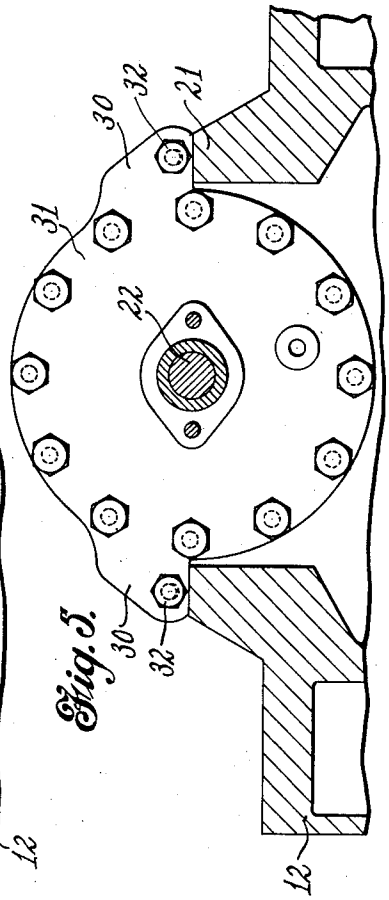


Fig. 5.

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Patented Oct. 20, 1942 2,299,502

UNITED STATES PATENT OFFICE

2,299,502

INTERNAL MIXER

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Application January 29, 1942, Serial No. 428,712

17 Claims. (Cl. 18—2)

This invention relates to mixers or converters, and more particularly to a device of this character for use in converting into a plastic mass a material which contains or consists of powders or like substances.

When such materials are worked under a certain amount of pressure, there is a tendency for the powder to escape from the chamber, if there is any opportunity for such escape. Machines of this character are often provided with a lower discharge door which slides horizontally into place below the mixing chamber to close the discharge opening. While the devices have been manufactured with as little clearance as possible between the discharge door and the adjacent parts of the mixing chamber, in some instances there has been a tendency for the contents of the chamber, and particularly powdered material, to escape between the adjacent parts of the door and the chamber.

One object of the present invention is to provide a mixer having a bottom discharge door so arranged that the discharge door when closed will be forced against the adjacent parts of the chamber so as to tightly close the discharge opening and prevent the escape of any materials from the chamber.

A still further object of the invention is to provide a mixer having a bottom discharge opening with a sliding closure member to control this opening, and means to effect a compound movement of the closure member, one part of the movement comprising a sliding movement to closed position below the chamber, and the other part of the movement comprising a movement upward or in a direction transverse to the sliding movement to effect tight contact between the edges of the closure member and the edges of the chamber opening.

A still further object of the invention is to provide a mixer or converter having a bottom discharge opening with a closure member slidable to position below such opening, the discharge opening and abutting parts of the closure member being slightly beveled whereby the closure member can, near the end of its closing movement, be raised against the beveled surfaces of the discharge opening and make tight engagement with said surfaces to prevent the escape of materials from the mixing chamber.

A still further object of the invention is to provide a mixer or converter of the class described such that the upward or transverse movement of the closure member will automatically take place during the latter part of the longitudinal closing movement of this member, and upon an opening movement of the latter the closure member will be permitted to drop slightly away from the chamber during the initial portion of the opening movement.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings:

Fig. 1 is a side elevational view of a portion of a mixer or converter embodying our invention, certain of the parts being shown in section;

Fig. 2 is a sectional view on line 2—2 of Fig. 1;

Fig. 3 is a partial sectional view on line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 3, but showing the parts in another position; and

Fig. 5 is a sectional view on line 5—5 of Fig. 4.

To illustrate a preferred embodiment of our invention, we have shown in the accompanying drawings a mixer or converter comprising a mixing chamber 10 having a charging stack 11 at the upper portion thereof, and a base 12 at the lower portion upon which the chamber rests. As illustrated in the drawings, the mixer is of the double-cylinder type and is provided with rotors 13 designed to be rotated within the chamber in the usual manner to perform the mixing operation. The present invention is equally adaptable in purpose and construction to machines of this category having a single rotor in a substantially concentric working chamber, the surface of the door when closed forming a portion of the mixing chamber.

As shown more especially in Fig. 2, the chamber is provided with a bottom discharge opening 14, the edges of this opening being slightly beveled so as to taper outwardly and downwardly, as shown at 15. This opening is adapted to be controlled by a sliding door or closure member 16, this member having slightly beveled side edges 17 complemental to the edges 15 of the opening 14. It will be apparent, therefore, that if the member 16 is moved horizontally into position below the opening 14, it may thereafter be raised slightly so as to effect tight engagement between the beveled edges 15 and 17, and tightly close the discharge opening against escape of the contents of the chamber, particularly when certain of the materials in the chamber are in powdered form.

The closure member 16 is keyed or otherwise rigidly secured to a door cylinder 18, the cylinder being provided with wings 19 adapted to extend laterally over ways 20 and 21 provided on the chamber and base, respectively. The door is adapted to be moved to open and closed positions by means of fluid pressure introduced in opposite ends of the cylinder, which fluid pressure works against a piston (not shown) secured upon a piston rod 22, the outer end of which is rigidly held at 23 in the base of the mixer. As the piston is fixed against longitudinal movement, it will be understood that the cylinder and door or closure member will be moved to open and closed posi-

tions, as illustrated, for example, in the United States patent to Banbury No. 1,523,387.

In order, however, for the cylinder and the closure member or door connected thereto to move freely from one position to the other, and still make tight contact with the chamber walls so as to effectively close the discharge opening when the door is in closed position, we have provided means to effect an upward movement of the door near the end of its closing stroke, and for a lowering movement of the door during the initial part of the opening movement. To this end a pair of cooperating camming members or gibs are carried by the door cylinder between the lower surfaces of the wings 19 and the upper surfaces of the ways upon which the door cylinder slides. As shown in Fig. 3, for example, the upper of these gibs 25 is secured to the door cylinder by suitable means such as the bolts 26, and it will be noted that the lower surface of the gib is arranged in saw-tooth form, as shown at 27, there being a plurality of inclined wedging surfaces separated by generally vertical surfaces.

The lower gib 28 is likewise carried by the door cylinder, but is movably mounted with respect to the latter. This gib is provided with a stem 29 passing loosely through a wing 30 arranged on the side of the cylinder head 31 (Fig. 5), and is provided on its outer end with a head 32. A compression spring 33, acting between the wing 30 and the end of the gib, tends to move this gib toward the right, as shown in Fig. 3, which movement will, of course, be limited by the head 32 of the stem 29. It will be understood that a part of gibs 25 and 28 are provided at each side of the door cylinder, as shown in Fig. 2.

The lower gibs are held against lateral movement by plates 34 secured to the upper gibs 25, so that while free to move longitudinally with respect to the cylinder 18, they will always be maintained below the upper gibs 25. Also the lower gibs 28 are provided with upper saw-tooth surfaces 35 formed to complement the saw-tooth surfaces 27 of the upper gibs 25. From inspection of Figs. 2, 3 and 4 it will be apparent that when the lower gib is moved toward the right with respect to the upper gib, as shown in Fig. 4, the door or closure member 16 will be permitted to drop to a lower position, while when this gib is moved toward the left, as shown in Fig. 3, with respect to the upper gib 25, the beveled surfaces of the gibs will co-act to raise the member 16 so that its beveled edges 17 will make tight engagement with the edges 15 of the discharge opening of the chamber.

In order to move the lower gib to the left when the closure member nears the end of its closing movement, a stop 37 is secured by a bolt 38 to a bracket 39 on the bed of the machine. A spacing member 37a is placed between the stop and the bracket to properly position the forward face of the stop 37. It will be understood, of course, that these parts are duplicated at each side of the machine, so that there will be a stop for each of the lower gibs 28. The lower gib 28 is provided with shoulders 40 at each end. The movement of this gib to the right may be limited by contact of one shoulder 40 with the left-hand end of the upper gib 25, as shown in Fig. 4, or by the head 32 of the bolt or stem 29. When, however, the lower gib is moved toward the left with respect to the upper, the arrangement is such that the movement will be arrested by the contact between the closure member and the chamber to insure a tight fit.

The closure member or door 16 is shown in closed position in Fig. 3. When it is moved to open position or toward the left, as shown in this figure, the spring 33 will prevent movement of the gib 28 with the door cylinder during the initial part of the opening movement, the parts then being in the position shown in Fig. 4. In this position the beveled surfaces are in such relation that the cylinder and closure member 16 secured thereto have dropped slightly from their positions shown in Fig. 3. During the remainder of the opening movement the gibs will move together with the door and door cylinder to fully open position.

When the door is to be closed the cylinder is moved toward the right, and when the parts approach the end of the closing movement, the shoulder 40 of the lower gib will strike the stop member 37, thus arresting the movement of this gib and compressing the spring 33. A slight continued movement of the cylinder will cause the beveled surfaces oft he gib 25 to ride up along the corresponding surfaces of the gib 28, and cause the cylinder and door to be raised so that the edges 17 of the door or closure member make tight contact with the beveled edges 15 of the cylinder, and thus effectively prevent the escape of material from the mixing chamber.

While we have shown and described our improvements with relation to a mixer commonly used in the rubber industry, it will be understood that the invention is applicable to mixers or converters for use with materials other than rubber and to single rotor machines, and is independent of the specific means shown for operating the closure member.

While we have shown and described a preferred embodiment of our invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What we claim is:

1. In a mixing device, a chamber having an opening, a closure member slidable to position to close said opening, and means to move said member in a direction transverse to its closing movement during a part of said movement to effect a close engagement of said member with the adjacent parts of the chamber.

2. In a mixing device, a chamber having an opening, a closure member slidable to position to close said opening, and means to move said member in a direction transverse to its closing movement to effect a close engagement of said member with the adjacent parts of the chamber, said means being operative near the end of the closing movement.

3. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, means to move said member to closed position, and automatically acting means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber.

4. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means automatically operative near the completion of the closing movement to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber.

5. In a mixing device, a chamber having an opening, a closure member having a compound movement to close said opening, one portion of

said movement being in a direction transverse to that of the other portion of said movement, and means to effect said movements simultaneously.

6. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means to effect an upward movement of said member during the last portion of its closing movement and a lowering movement thereof during the beginning of its opening movement.

7. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said means comprising a pair of co-acting members at least one of which has a beveled surface, and means operative upon the closing movement of said closure member to effect relative movement of said co-acting members.

8. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said means comprising an element movably carried by said member, and relatively fixed means engaging said element to effect relative movement between it and said member to effect the raising of the latter.

9. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said means comprising a pair of co-acting elements carried by said member and adapted for relative movement, co-acting camming surfaces on said elements to effect said raising movement upon relative movement of said elements, and means to effect such relative movement as said member nears its closed position.

10. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said device being provided with a slideway upon which said member moves, and said means comprising a pair of gibs carried by said member between it and said way, one of said gibs being fixed to the member and the other being movably carried by the member.

11. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said device being provided with a slideway upon which said member moves, and said means comprising a pair of gibs carried by said member between it and said way, one of said gibs being fixed to the member and the other being movably carried by the member and normally urged in a direction to permit said closure member to assume its lower position.

12. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said device being provided with a slideway upon which said member moves, and said means comprising a pair of gibs carried by said member between it and said way, one of said gibs being fixed to the member and the other being movably carried by the member and normally urged in a direction to permit said closure member to assume its lower position, and stop means on the device to contact said movable gib near the end of the closing movement of the closure member and cause a relative movement of said gibs to raise the closure member.

13. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said device being provided with a slideway upon which said member moves, said means comprising a pair of gibs carried by said member between it and said way, one of said gibs being fixed to the member and the other being movably carried by the member, and said gibs having inclined engaging surfaces on their contiguous faces.

14. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said device being provided with a slideway upon which said member moves, said means comprising a pair of gibs carried by said member between it and said way, one of said gibs being fixed to the member and the other being movably carried by the member, and said gibs being of saw-tooth formation on their engaging surfaces.

15. In a mixing device, a chamber having an opening, a closure member slidable to position to close said opening, and means automatically operative during such sliding movement to move said member in a direction transverse to its closing movement to effect a close engagement of said member with the adjacent parts of the chamber, said closure member and the edges of said opening being complementally beveled on their abutting surfaces.

16. In a mixing device, a chamber having a bottom discharge opening, a closure member horizontally movable to close said opening, and means automatically operable near the end of said closing movement to move said member upwardly to effect close engagement of said member with the adjacent parts of the chamber, said chamber having beveled surfaces adjacent said opening, and said closure member being complementally beveled at the parts thereof engaging the beveled portions of the chamber.

17. A mixing device comprising a chamber having a bottom discharge opening, a closure member slidable to and from a position below said opening, said closure member having means to engage the chamber portions about said opening and make a close fit therewith, means to move said closure member horizontally to a position below said opening, and means actuated by said movement to thereafter raise said closure member into tight engagement with the edges of the opening.

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