

March 24, 1942.

G. JAEGER ET AL

2,277,518

DOOR STRUCTURE FOR MIXERS

Filed Aug. 2, 1940

3 Sheets-Sheet 1

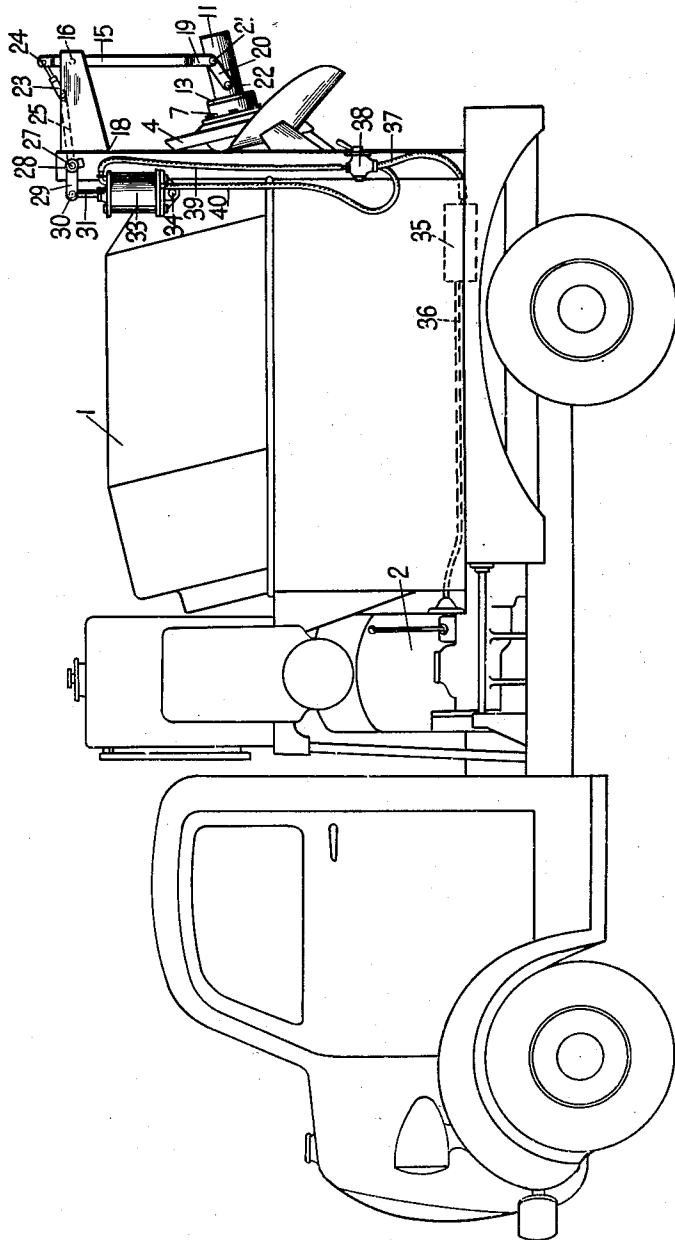


Fig. 1

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3 Sheets-Sheet 2

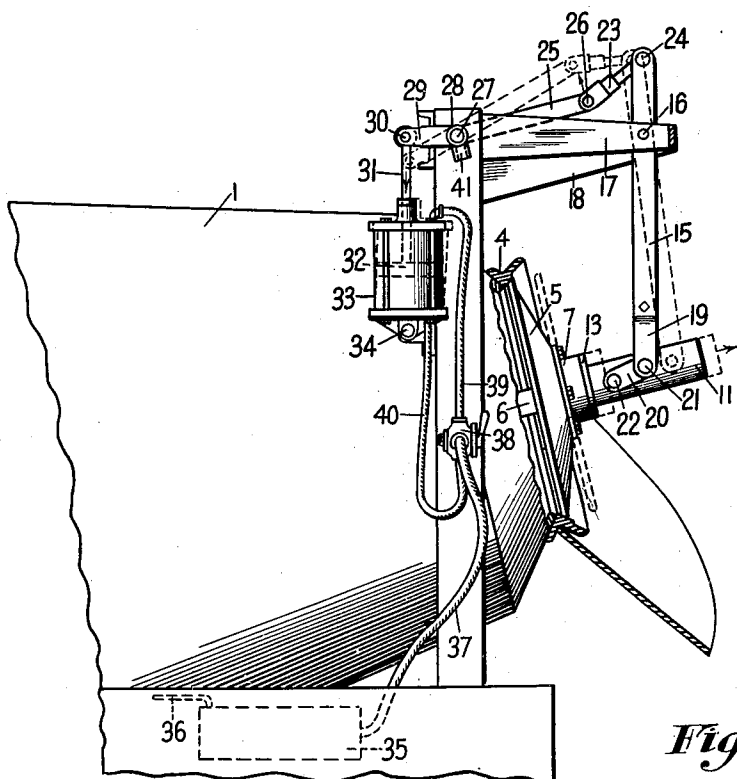


Fig. 2

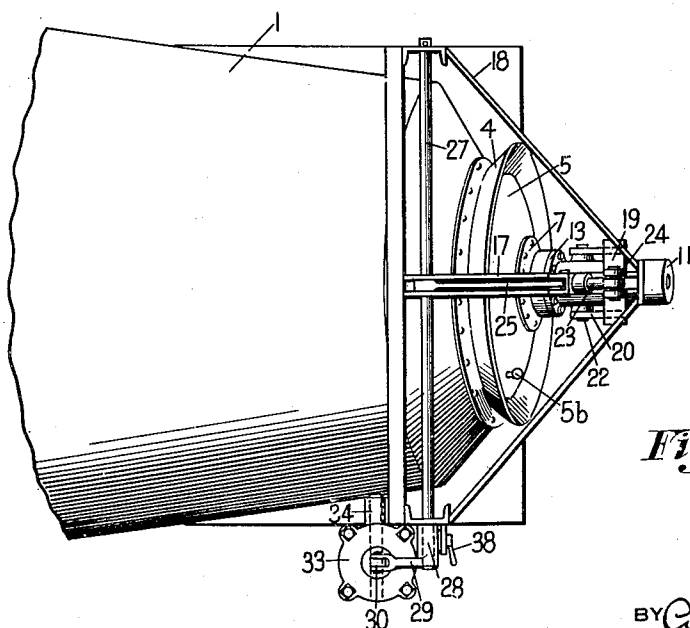


Fig. 3

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3 Sheets-Sheet 3

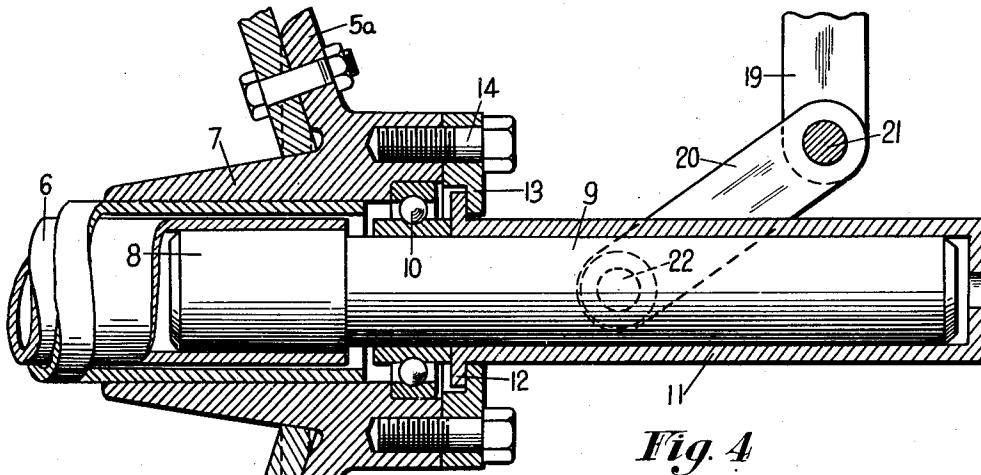


Fig. 4

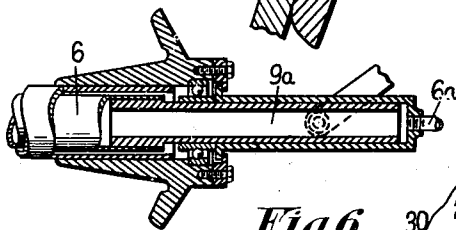


Fig. 6

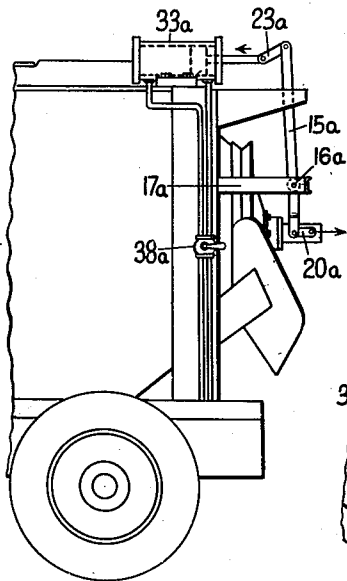


Fig. 7

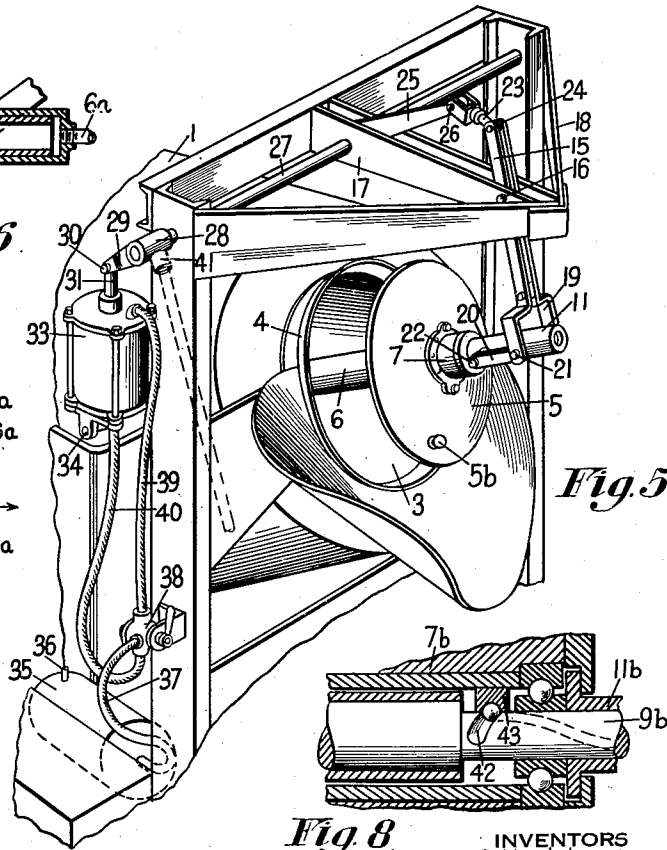


Fig. 5

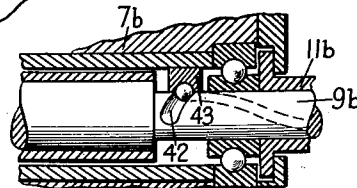


Fig. 8

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UNITED STATES PATENT OFFICE

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DOOR STRUCTURE FOR MIXERS

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Application August 2, 1940, Serial No. 349,556

2 Claims. (Cl. 259-176)

Our invention relates to a door structure for mixers. It has to do, more particularly, with the discharge door structure of a concrete mixer of the truck mixer type although it is not necessarily limited thereto.

One of the objects of our invention is to provide a door structure for a truck mixer which is of such a nature that the door may be easily and quickly opened or closed with little effort.

Another object of our invention is to provide a door structure for truck mixers which is of such a nature that it may be controlled from a point remote from the door which may be in a convenient location for the operator.

Another object of our invention is to provide a door structure for truck mixers which is of such a nature that when it is closed it will be effectively locked.

Another object of our invention is to provide a door structure which is very effective but which is of a simple structure so that it can be manufactured at a low cost.

Another object of our invention is to provide a door structure of the type indicated which has means associated therewith for cleaning the door seat as the door approaches closed position so that it will effectively seal the door opening.

In its preferred form, our invention contemplates the provision of a door structure associated with the discharge opening of a truck mixer. This door structure is mounted in association with the opening for movement between closed and open positions. We provide vacuum operated means for controlling movement of the door between these two positions. The control for this vacuum operated means may be located at any suitable point convenient to the operator.

The preferred embodiment of our invention is illustrated in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a side elevation of a truck mixer showing our door structure applied thereto.

Figure 2 is a side elevation of the rear portion of the truck mixer showing in detail the door structure.

Figure 3 is a plan view of the structure shown in Figure 2.

Figure 4 is a detail of a portion of the door structure being mainly in section.

Figure 5 is a perspective view of the rear end of the truck mixer showing the door in open position.

Figure 6 is a modification of the structure shown in Figure 4.

Figure 7 illustrates a modified form of our door structure.

Figure 8 illustrates means for rotating the door as it nears closed position to clean the door seat.

With reference to the drawings we have illustrated in Figure 1 a truck mixer which includes a rotatable mixing drum 1 of the usual type driven by means of a power unit 2 in the usual manner. The rear end of the mixing drum has a discharge opening 3 (Figure 5) with which our door structure is adapted to be associated. Surrounding the opening 3 is an inclined annular flange 4 which is adapted to serve as a seat for the disk-like door 5. Supported centrally within the drum 1 is a water supply pipe 6. The rear end of this water supply 6 is adapted to support the disk door 5.

For mounting the door 5 on the pipe 6 for movement between closed and open positions, we preferably provide the structure illustrated best in Figure 4. As shown in this figure, the disk 5 has attached thereto at a central point a casting 5a which has an integral hub portion 7. The pipe 6 receives the forward end 8 of a shaft 9. The end 8 of the shaft 9 is suitably secured in position within the pipe 6 and is prevented from rotating relative to the pipe. The hub 7 fits around the rear end of the pipe 6 and is rotatable thereon. A ball bearing 10 is provided between the rear portion of the hub and the shaft 9. This ball bearing structure serves as a thrust bearing against which bears the forward end of a sleeve 11. This sleeve is mounted for longitudinal movement on the shaft 9. The forward end of the sleeve 11 has a peripheral flange 12 formed thereon. This flange is engaged by a collar 13 which is secured to the hub 7 by means of the bolts 14. The collar 13 serves to keep the forward end of the sleeve 11 in association with the bearing 10 and to connect the sleeve 11 and the door 5 together. It will be apparent that the door can be readily rotated relative to the sleeve 11. It will also be apparent that movement of the sleeve 11 axially of the shaft 9 will produce a corresponding axial movement of the door 5 relative to the shaft 9 and the pipe 6. The bearing 10 will move with the door 5. Axial movement of the door 5 will seat it on or unseat it from the seat 4 as illustrated best in Figure 2. This will close and open the discharge opening 3.

For controlling the movement of the door 5 between open and closed position, we provide vacuum actuated mechanism. This mechanism includes a vertical lever 15 which is pivoted in-

intermediate its ends as at 16 to a rearwardly extending horizontally disposed bifurcated arm 17. The arm 17 is carried on the upper end of a supporting frame 18. The lower end of the lever 15 is provided with a yoke portion 19 which straddles the outer end of the sleeve 11. Links 20 are pivotally connected to the outer ends of the legs of the yoke portion 19 as at 21 and at diametrically opposed points 22 to the sleeve 11. It will be apparent that by swinging the upper end of the lever 15, the sleeve 11 and, consequently, the door 5 will move axially.

For swinging the upper end of the lever 15, we provide a toggle joint structure. One link of the toggle is formed by an adjustable link or turnbuckle 23 which is pivoted to the upper end of the lever 15, as at 24. The other end of the link 23 is pivoted to the rear end of a lever 25 as at 26. The lever 25 has its forward end keyed to a transversely extending shaft 27 which is rotatably mounted in the supporting frame 18. One end of the shaft 27 has a sleeve 28 keyed thereon. This sleeve carries an integral arm 29. The arm 29 has its outer end pivotally connected at 30 to the upper end of a piston rod 31. This piston rod 31 has its lower end connected to a piston 32 (Figure 2) which is adapted to move within a vertically disposed vacuum cylinder 33. The cylinder 33 has its lower end pivotally connected at 34 to a bracket suitably secured to the frame 18.

Upward movement of the piston 32 in the cylinder 33 will produce a closing movement of the door 5. This will cause the arm 29 to swing upwardly, rotating shaft 27 and swinging the rear end of the lever 25 downwardly. This will push the link 23 rearwardly and will swing the upper end of the lever 15 rearwardly and its lower end forwardly. Swinging of the lower end of lever 15 forwardly will produce a forward thrust on the links 20 and, consequently will move the door 5 onto its seat 4. As previously stated, lever 25 and link 23 serve as a toggle link structure and when the pivot point 26 moves downwardly past center, the door will be locked automatically in closed position. Thus, it will not be necessary to keep the vacuum on when the door is closed in order to keep it closed. Downward movement of the piston 32 in the cylinder 33 will cause upward swinging of lever 25, as indicated by the dotted lines in Figure 2, a forward pull on link 23, forward swinging of the upper end of lever 15 and rearward swinging of the lower end thereof. This will exert a rearward pull on the links 20 and, consequently, will move the door 5 rearwardly off its seat. During movement of arm 29 the cylinder 33 will swing about its pivot 34.

For supplying vacuum to the cylinder 33 we provide a vacuum tank 35. This tank may be connected by a line 36 to the manifold of the power unit 2 which is an internal combustion engine. However, if desired, the line 36 may be connected to a vacuum pump driven by the unit 2 or by the main power unit of the truck mixer. A vacuum line 37 leads from the tank 35 and is connected to a control valve 38. The control valve 38 is connected by a flexible conduit 39 to the upper end of the cylinder 33 and by a flexible conduit 40 the lower end of the cylinder. The control valve is such that when it is in one position the line 39 is connected to the line 40 so that vacuum will serve to lift the piston 32 and close the door 5. At the same time, the valve causes the line 40 to communicate with the atmosphere.

In the other position of the valve, the line 37 is caused to communicate with the line 40, producing vacuum in the lower end of the cylinder 33 and drawing the piston 32 downwardly, the valve causing the line 39 to communicate with the atmosphere at the same time.

Thus by merely operating the valve 38, the door may be closed or opened. When closed, it will be locked in closed position. The vacuum will normally hold the door closed when the unit 2 is operating. However, if the unit 2 does not operate, the door will still be locked in closed position by the toggle linkage. The sleeve 28 which carries the arm 29 is provided with an integral socket 41 for receiving a bar or lever by means of which the door may be manually operated.

If any material adheres to the seat 4, it is desirable to rotate the door 5 relative to the seat to clean the seat during the closing operation. The bearing structure 10 will permit this rotation. The door 5 is provided with a handle or knob 5b on its outer surface adjacent its periphery to facilitate this rotation. When the drum 1 rotates, the door 5 rotates therewith. The door rotates relative to the sleeve 11 and this relative rotation is facilitated by the bearing 10.

In Figure 8, we have illustrated means for automatically producing this rotation as the door nears closed position. In this instance, the shaft 9b is provided with a helical groove 42 which is engaged by a ball carried by a support 43 rigidly secured to the interior of the hub portion 7b of the door. The groove 42 is almost straight throughout the greater portion of its length but extends at a sharp angle, relative to the axis of shaft 9b, at its inner end. Consequently, as the door is moved inwardly by the thrust applied to the sleeve 11b, it will not rotate to any appreciable extent until the ball carried by member 43 reaches the inner portion of groove 42, at which time the door will be given a quick turn. At this time, the door will be substantially in contact with seat 4 and, consequently, any grout on the seat will be wiped off and there will be a better seal produced.

Ordinarily, water is supplied to the mixer from a supply tank at the forward end thereof which is connected to the pipe 6. However, because the sleeve 11 does not rotate, it is easy to connect a pipe 6a to the rear end thereof, as indicated in Figure 6 for supplying water to the mixer. In this instance, the shaft 9a will be hollow so that it will conduct the water to the pipe 6.

In Figure 7 we show a modification of our structure. In this instance, we provide a somewhat different arrangement for operating the door. A vacuum cylinder 33a is provided but is horizontally disposed at the top of the mixer. This piston rod is connected to the upper end of a lever 15a by means of a link 23a. The lever 15a is pivoted adjacent its lower end as at 16a. The lower end of the lever 15a is connected to the door structure by means of links 20a. The pivot 16a is carried on the outer end of a horizontal support 17a secured to the rear end of the mixer.

This structure will function similarly to that previously described. By operating the valve 38a, the lever 15a will be swung about its pivot 16a to move the door between closed and open positions.

It will be apparent from the preceding description, that we have provided a door structure having many advantages. It is of such a nature

that the door may be easily and quickly opened or closed with little effort. It may be controlled from a point convenient to the operator. Although the structure is very effective, it is very simple.

Various other advantages will be apparent from the preceding description, the drawings and the following claims.

Having thus described our invention, what we claim is:

1. In combination, a mixing drum mounted for rotation, said drum being provided with an opening in one end thereof, a door associated with said opening, said door being slidably mounted for axial movement on a support disposed centrally of said opening, said door being adapted to rotate with the drum, means for moving said door axially of said support to open or close said opening, said means including a movable control member mounted adjacent said door, means for connecting said control member to said door in such a manner as to permit relative rotation of said door, said door and said support being provided with cooperating portions

which engage each other to produce positive rotation of the door as it approaches closed position.

2. In combination, a mixing drum mounted for rotation, said drum being provided with an opening in one end thereof, a door associated with said opening, said door being slidably mounted for axial movement on a support disposed centrally of said opening, said door being adapted to rotate with the drum, means for moving said door axially of said support to open or close said opening, said means including a movable control member mounted adjacent said door, means for connecting said control member to said door in such a manner as to permit relative rotation of said door, said door and said support being provided with cooperating portions which engage each other to produce positive rotation of the door as it approaches closed position, and a vacuum actuated unit connected to said movable control member for moving said door.

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