

Filed Jan. 5, 1950

2,563,770

3 Sheets-Sheet 1

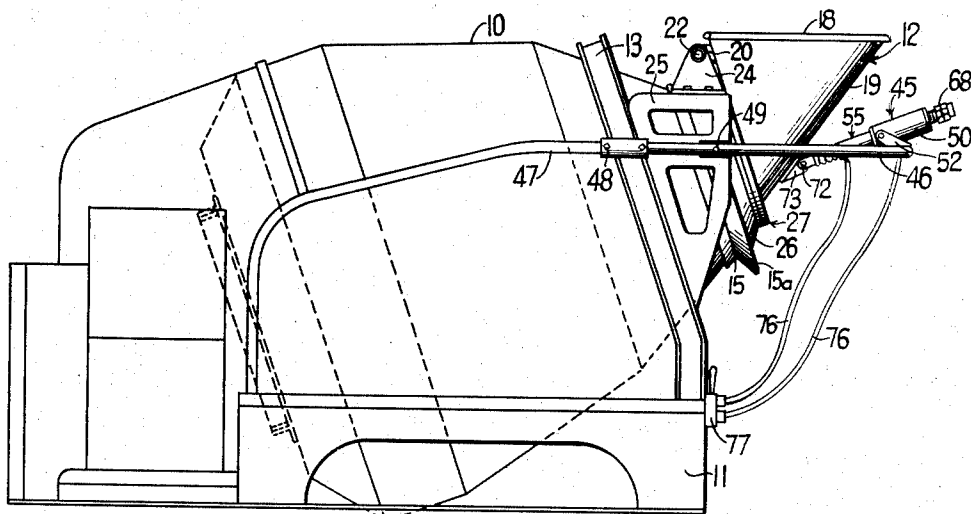


Fig. 1

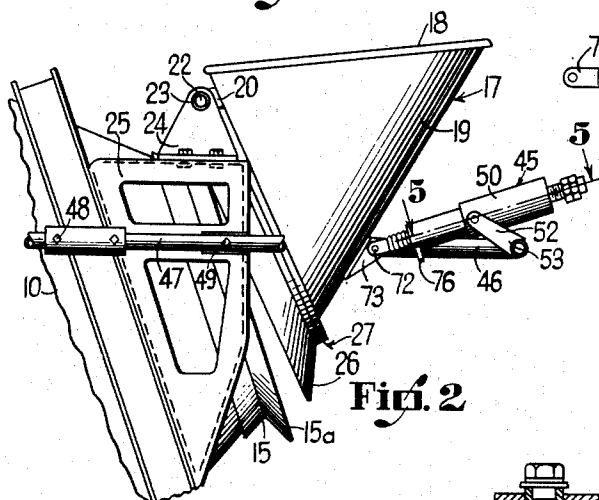


Fig. 2

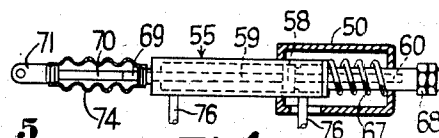


Fig. 3

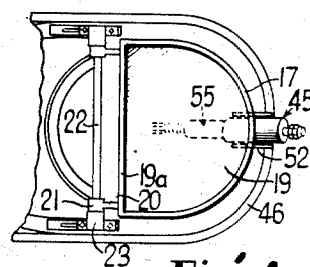


Fig. 4

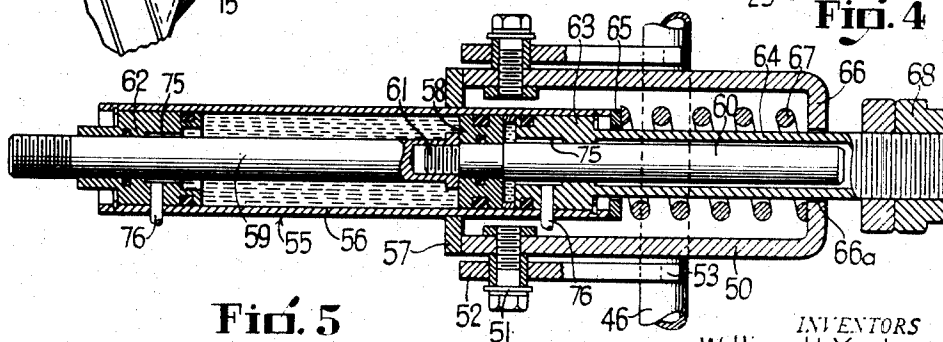


Fig. 5

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Aug. 7, 1951

W. H. YANTES ET AL
CHARGING AND DISCHARGING MEANS FOR
END-LOADING TRANSIT MIXERS

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3 Sheets-Sheet 2

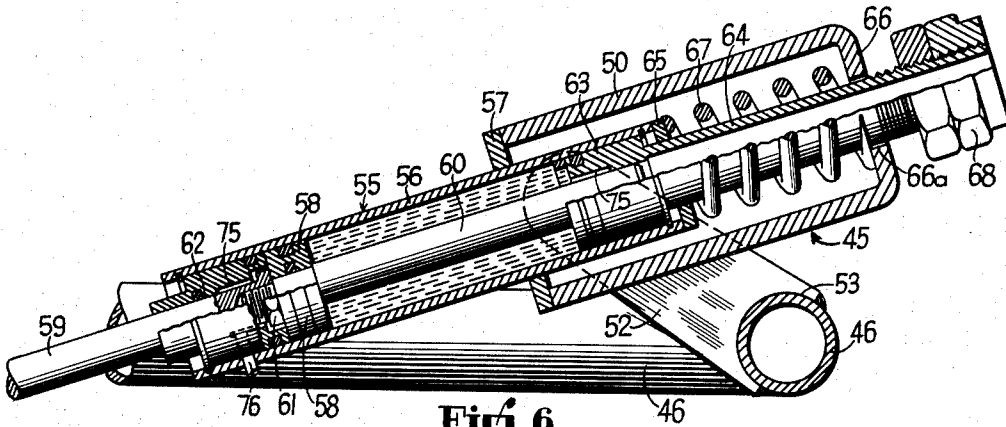


Fig. 6

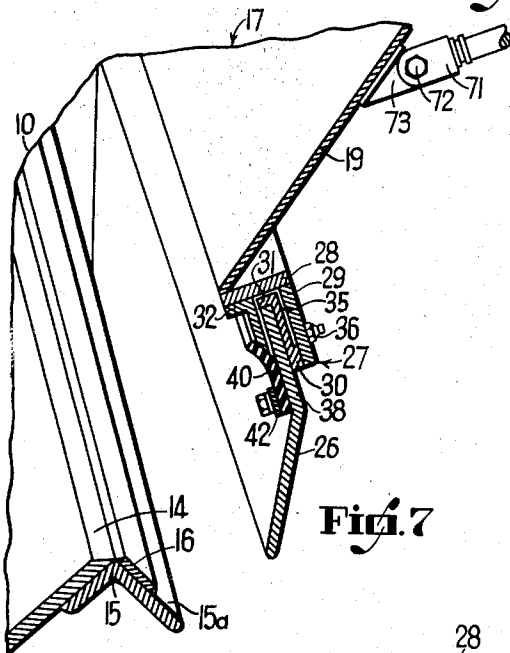


Fig. 7

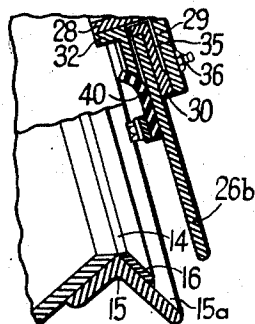


Fig. 9

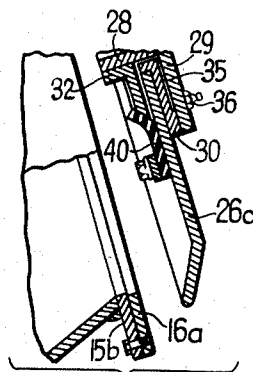


Fig. 10

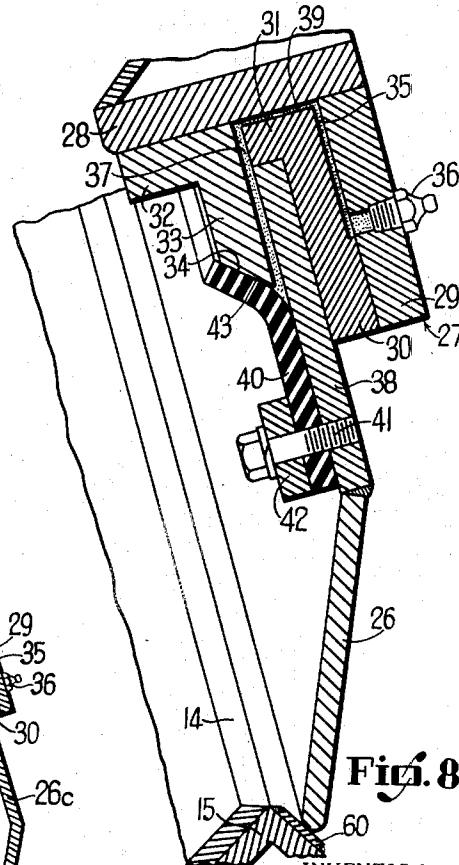


Fig. 8

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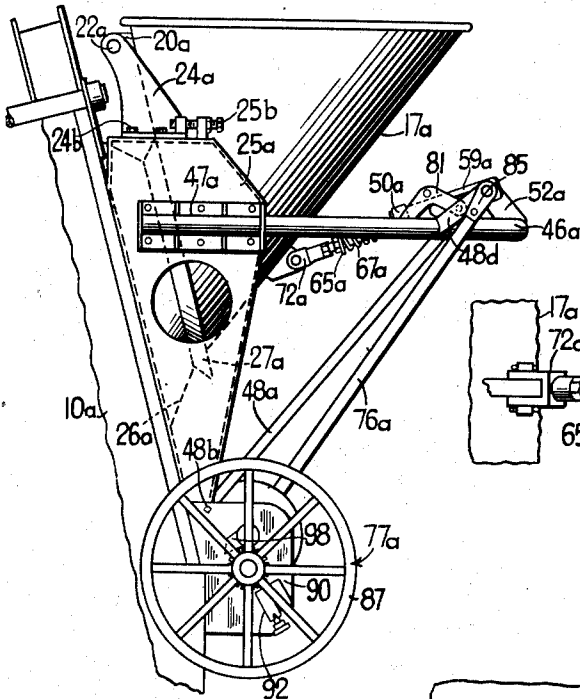


Fig. 11

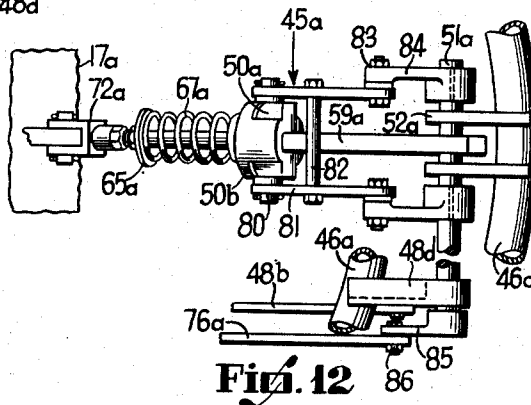


Fig. 12

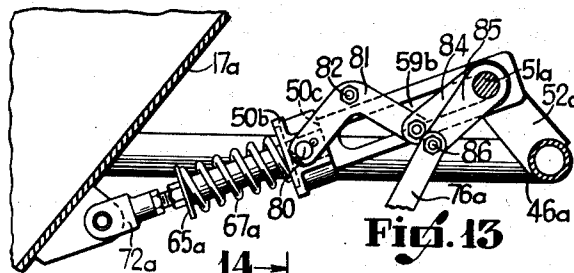


Fig. 13

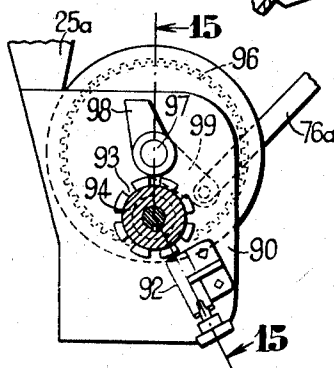


Fig. 14

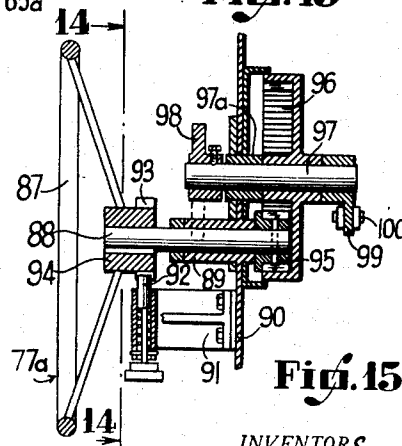


Fig. 15

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2,563,770

CHARGING AND DISCHARGING MEANS FOR
END-LOADING TRANSIT MIXERS

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Application January 5, 1950, Serial No. 136,858

17 Claims. (Cl. 259—161)

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Our invention relates to charging and discharging means for an end-loading transit mixer. It has to do, more particularly, with a charging and discharging device which is mounted at the open upper end of the inclined drum of a transit mixer of the high-dump type.

Many arrangements of charging and discharging devices for transit mixers of the high-dump type have been provided in the prior art. One type of device comprises a loading hopper mounted for movement between a charging position, where it is associated with the end opening, and a discharging position, where it is spaced from the opening. In this type of device, an annulus or door has been provided between the inner or lower open end of the hopper and the drum opening. This annulus is connected to the lower end of the hopper by sealing means, which permits relative rotation, so that pressure can be applied to the hopper to move it into charging position where the annulus will seat around the drum opening and will be pressed so firmly thereagainst that it will rotate with the drum. The hopper is usually carried or guided by a centrally disposed shaft which extends through the drum opening, the annulus, and the hopper, and this interferes with proper feeding of material through the hopper and annulus and through the opening. Usually the closing force for the door or annulus is applied at angularly spaced points at its circumferential edge, requiring complicated actuating means and not always applying even pressure around the door and permitting it to seat properly. Another difficulty with prior art devices of this general type, is the provision of an effective seal between the outer or upper end of the relatively rotatable annulus and the inner or lower end of the hopper. This is especially difficult, due to the fact that the pressure required for seating the lower or inner end of the door or annulus around the drum opening is usually applied through the seal between the hopper and the annulus. If the seal is the usual compressible gasket type between two relatively rotatable surfaces, the abrasive fine material, of the material to be mixed and the mixed material, will work between such surfaces and in a very short period destroy the seal.

One of the objects of our invention is to provide a charging and discharging device mounted at the drum opening of a high-dump mixer, the device including a hopper mounted for movement between charging and discharging positions relative to the drum opening, an annulus or door being provided between the inner open end of the hopper and the drum opening, novel means being associated with the hopper for easily and quickly moving it between charging and discharging positions relative to the drum opening.

Another object of our invention is to provide means for mounting the hopper and associated annulus or door for movement between charging and discharging positions which is of such structure that the mixer drum opening, the annulus, and the hopper will be completely unobstructed so as to facilitate movement of material there-through.

Another object of our invention is to provide a device of the type indicated wherein the means for moving the hopper between its charging and discharging positions is so designed that a minimum amount of effort will be required by the operator of the mixer to move it between its two positions.

Still another object of our invention is to provide means in association with the moving means for ensuring that resilient pressure will be applied on the annulus through the hopper, when the annulus is seated around the drum opening, to ensure that an effective resilient seal will be provided at this point.

Another object of our invention is to provide a device of the type indicated wherein the means for moving the hopper and the door between charging and discharging positions applies its pressure at a single point substantially at the center of the hopper to ensure that uniform pressure is supplied at all points around the annular door which also is inherently resilient, thereby ensuring proper seating of the door around the opening.

A further object of our invention is to provide novel sealing means between the relatively rotatable annulus and hopper which is so designed that there will be little danger of abrasive materials working between the relatively rotatable sealing surfaces and which is so designed that even though the thrust force, for seating the annulus or door around the drum opening, is applied through the sealing means, there will be no compression on the flexible sealing member associated with the sealing means which will eliminate the necessity of frequent removal and replacement of such flexible member.

Various other objects will be apparent.

According to our invention, the hopper is pivoted to an extension of the mixer frame adjacent the drum opening for swinging movement in a vertical plane. The hopper carries the annulus or door on its lower open end and is swingable from a charging position, where the inner or lower edge of the annulus is seated around the drum opening, to a discharging position, where the said edge of the annulus is spaced from the opening. No central support or guide is necessary for the hopper and, consequently, the hopper, door and drum opening are unobstructed. The annulus is rotatably mounted on the hopper

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by means of a novel sealing joint provided between the upper or outer edge of the annulus and the lower or inner edge of the hopper. For swinging the hopper between its two positions, an actuating unit is connected to an extension of the mixer frame and to the rear side of the hopper for supplying actuating pressure to the hopper substantially at its center. This unit can be controlled to quickly move the hopper and the annulus carried thereby between its two positions. When the annulus is moved into sealing position around the drum opening, the actuating unit applies thrusting pressure through the hopper and onto the annulus to properly seat it. Obviously, this pressure or thrust is also applied through the sealing joint between the hopper and the annulus but this joint is so designed that this pressure will not produce excessive wear on the sealing joint and will not interfere with relative rotation of the annulus and the hopper. The actuating unit has resilient means associated therewith which will ensure that resilient pressure will always be applied on the annulus when it is seated around the opening. Therefore, although an actuating unit is provided for positively moving the hopper and annulus into charging position, the unit will yield as the annulus is forced on its seat and this will compensate for any build-up of material on such seat.

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 elevational view illustrating our device applied to a transit mixer of the high-dump type.

Figure 2 is an enlarged view showing how the device is supported at the end of the mixer and showing it in discharging position.

Figure 3 is a detail, partly in elevation and partly in longitudinal section, illustrating a hydraulic actuating unit which may be provided on our device.

Figure 4 is a plan view of the structure shown in Figure 2.

Figure 5 is a horizontal sectional view taken substantially along line 5—5 of Figure 2, showing details of the hydraulic unit, such unit being in condition to move the hopper into discharging position.

Figure 6 is a vertical sectional view through the hydraulic unit and showing it in condition to move the hopper into charging position.

Figure 7 is an enlarged detail mainly in vertical section and illustrating mainly the sealing joint between the annulus or door and the hopper and the seat around the drum opening for the annulus.

Figure 8 is an enlarged vertical sectional view through the sealing joint between the annulus and the hopper.

Figure 9 is a view similar to Figure 7 but showing a flat surface rather than the tapering one of Figure 7.

Figure 10 is a view similar to Figure 7 but showing another modification of the sealing joint between the annulus or door and the hopper and the seat around the drum opening for the annulus.

Figure 11 is a side elevational view of our device with a mechanical actuating unit rather than a hydraulic actuating unit associated therewith.

Figure 12 is an enlarged detail in plan of part of the actuating unit of Figure 11.

Figure 13 is an enlarged detail partly in side

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elevation and partly in section of the mechanical actuating unit of our device.

Figure 14 is a sectional view taken substantially along line 14—14 of Figure 15 through the handwheel control mechanism for the actuating unit of Figure 13.

Figure 15 is a sectional view taken substantially along the line 15—15 of Figure 14.

With reference to the drawings, in Figures 1, 2 and 4 we have illustrated the general arrangement of the charging and discharging device which we provide in association with the mixer. The mixer includes the rotatable mixer drum 10 which is disposed in rearwardly and upwardly inclined position on a frame indicated generally by the numeral 11. The charging and discharging device of our invention is illustrated generally by the numeral 12 and is carried at the rear or upper end of the drum 10 by means of an upstanding extension 13 of the frame 11. The mixer drum 10, as shown best in Figure 7, is provided with the opening 14 at its rear or upper end through which material may pass. A ring 15 is disposed in surrounding relationship to this opening 14 and is provided with an inclined outwardly extending flange 15a which supports a finished ring door seat 16 for the opening 14. The seat 16 is welded to the flange 15a.

Our device 12 includes a hopper 17, the upper end 18 of which may be open or may be provided with a suitable closure. The rear wall 19 of the hopper is inclined downwardly and forwardly so that material deposited in the upper end thereof will flow downwardly therethrough by gravity. The hopper is pivoted at its forward and upper edge to the extension 13 of the mixer frame. It will be noted from Figures 1, 2 and 4 that the forward wall 19a of the hopper is provided with forwardly extending pivot arms 20 at its opposite sides. These arms carry bearings 21 at their forward ends which are rotatably disposed on a transverse rod 22. This rod is carried in sleeves 23 which are supported on the upper ends of upstanding brackets 24. The brackets 24 rest upon and are secured to the upper ends of large triangular shape supporting member 25 which may be welded or otherwise secured to the forwardly leaning extension 13 of the mixer frame. Thus, it will be apparent that the hopper 17 can be swung about the axis of the pivot rod 22.

The forward or lower end of the hopper is open and carries a rotatable annulus or door 26 in association therewith which is disposed between the drum 10 and hopper 12. The annulus 26 is mounted on the hopper, in such a manner that relative rotation therebetween is permitted by means of a special type of sealing joint indicated generally by the numeral 27. This joint is illustrated best in Figures 7 and 8.

The lower open end of the hopper is provided with a ring 28 which may be welded thereto around the opening thereof. This ring 28 is provided with an outwardly extending flange 29 at its rear edge which may be formed as a part thereof or welded thereto. Ahead of the flange 29 and in contact therewith is a thrust ring 30 which is secured to the flange 29, preferably removably, for rotation therewith. The inner edge of this thrust ring has a forwardly extending lip 31. Just ahead of the forward edge of the lip 31, an axially extending ring 32 is disposed around the ring 28 and may be secured thereto, for example, by welding. This ring 32 is provided with an outwardly directed flange 33 which has a beveled outer edge 34. The parts of the sealing

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joint 27 so far described are non-rotatably carried by the hopper. It will be noted from Figure 8 that the rear surface of the ring 30 and the inner edge thereof are machined to provide a lubricant-receiving space 35 to which lubricant can be fed by pressure fittings 36. It will also be noted that a substantial space 37 is provided between the ring 30 and flange 33.

The annulus 26 is provided at one edge with an inwardly extending flange 38 which is disposed at a suitable angle so that it will be parallel to the flange 29 on the hopper. The flange 38 is so positioned that it extends into the space 37 and its inner edge 39 tightly contacts the outer side of lip 31. Secured to the forward side of the flange 38 is a flexible sealing ring 40 which is preferably made of rubber. This ring is secured in face contact with the flange 38 by means of the removable screw bolts 41 which carry collars 42 that press against sealing ring 40. The inner edge 43 of the flexible ring 40 will bear against the beveled surface 34 on flange 33. As indicated, when the ring 40 is drawn tight against flange 38, the outer edge 43 of the flexible ring will bend and will resiliently contact beveled surface 34. The other edge of annulus 26 is adapted to seat on the seat 16 provided around the drum opening and when moved into association therewith will be angularly disposed relative thereto as indicated to ensure proper sealing contact. When the annulus 26 is pressed against the seat 16, it will rotate with the drum, relative rotation between it and the hopper being permitted by the sealing joint 27. The flange 38 on member 26 will merely rotate in the space 37 between flanges 30 and 33 and at the same time the edge 43 of the flexible sealing ring 40 will rub against the beveled surface 34 and will maintain sealing contact therewith. The lubricant will also pass between flange 33 and flange 38, as indicated in Figure 8, and will build up pressure therein which will tend to prevent fines from entering between flexible edge 43 and beveled surface 34 and reaching the relatively rotatable metal sealing surfaces on members 30 and 38.

For moving the hopper 17 about the pivot axis 22, we provide the unit illustrated generally by the numeral 45 in Figures 1, 2 and 4. This unit is supported by means of a yoke 46 which extends around the rear side of the hopper and is spaced rearwardly therefrom. The arms 47 of this yoke may extend forwardly along each side of the drum 10 to the forward end of the drum where they may be suitably anchored to the frame 11. The arms 47 are rigidly bolted at 48 to the frame extension 13 and at 49 to the triangular members 25.

The unit 45 is shown in detail in Figures 5 and 6 and comprises a supporting sleeve 50 which has trunnion bolts 51 carried at its forward and lower end which are rotatably disposed in openings formed in the forward and upper ends of arms 52. These arms 52 have their rear ends welded as at 53 to the transversely extending part of the yoke 46 and extend upwardly and forwardly therefrom. Thus, the sleeve 50 is free to pivot about an axis passing through the trunnions 51.

Supported by the sleeve 50 for limited axial movement relative thereto is a hydraulic cylinder and piston unit 55. This unit comprises the cylinder 56 which is slidably mounted in an opening provided in a bearing plate 57 which is secured to the forward end of sleeve 50. Disposed within the cylinder 56 is a piston 58. This piston

58 is mounted on a piston rod which includes the forwardly extending section 59 and the rearwardly extending section 60 which are coupled together at 61. The section 59 is mounted for axial sliding movement in a bearing 62 disposed at the forward end of cylinder 56 while the section 60 is similarly mounted in a bearing 63 provided at the rear end of cylinder 56. This bearing 63 is provided with a tubular extension 64 which extends rearwardly through an opening provided in a bearing plate 65 secured to the rear end of cylinder 56 and in which it can move axially. Surrounding the extension 64 and disposed between the plate 65, on the rear end of cylinder 56, and an inwardly turned flange 66, on the rear end of sleeve 50, is a compression spring 67. It will be noted that the bearing extension 64 extends through the opening 66a within flange 66 and is axially movable therein and that it carries on its outer end lock nuts 68 which are threaded thereon. Nuts 68 serve as a stop for cooperating with the flanged end 66 of sleeve 50 to limit forward movement of cylinder 56. The forward end of the section 59 of the piston rod is coupled at 69 to the rear end of a connecting pin 70 which carries a clevis 71 at its forward end that, in turn, is pivoted at 72 to a lug 73 on the back wall 19 of the hopper. A flexible sleeve 74 preferably encloses the coupling 69.

It will be noted that each bearing 62 and 63 is provided with a chamber 75 surrounding, the associated section of the piston rod for receiving the hydraulic fluid. Associated with each of these chambers and leading thereto is a line 76. Exhaust of fluid from one end of the cylinder and supply of fluid to the other end is controlled by means of the usual reversible valve 77 which is connected to the lines 76 and to a suitable source of hydraulic fluid under pressure. The valve 77, of course, is preferably located at the rear side of the mixer.

With the valve 77 in one position, the piston 58 will be at the rear end of the cylinder 56, as shown in Figure 5. This pulls the piston rod rearwardly and swings the hopper rearwardly and upwardly about the pivot axis 22. In this position, as shown in Figure 7, the annulus 26 will be spaced from its seat 16 and discharge of material through the opening 14 and down through the indicated space will be permitted. At this time the various parts of the sealing joint 27 between the hopper and annulus will be in proper association but will be under no thrust. The spring 67 will be exerting no force on the end of the cylinder 56.

When it is desired to move the hopper and annulus into charging position, the valve 77 is operated to reverse the flow of hydraulic fluid, as indicated in Figure 6. This will move the piston 58 forwardly and downwardly and the cylinder 56 until the annulus 26 engages seat 16. The continued hydraulic pressure causes the cylinder 56 to move rearwardly and press against the spring 67. The spring will be sufficiently strong to resist compression to any considerable extent and the piston 58 will serve to press the annulus firmly but resiliently on its seat 16. Thus, the initial movement of the piston 58 will seat the annulus and then spring pressure is applied by the cylinder 56 being forced against the spring 67. This action continues until full forward travel of the piston in the cylinder is accomplished.

It will be thus apparent that before the piston reaches the extent of its forward travel, a resilient pressure or thrust is applied to seat the

door or annulus 26 and this makes it unnecessary to accurately determine the forward travel of the piston. Also, it ensures proper seating of the annulus or door even though material builds up on the seat 16. Although the thrust pressure for seating the annulus or door at the drum opening is applied through the sealing joint 27, this will have no deleterious effect on the seal due to the fact that the thrust is applied by ring 30 on flange 38 and has no effect on the flexible ring 40. Furthermore, relative rotation is permitted and the seal will be maintained by the flexible edge 43 of ring 40 wiping the bevel surface 34. It will be noted that the force for moving the hopper between its various positions is applied at the center of the hopper which makes it possible to provide a simplified actuating structure and also ensures that uniform seating pressure will be applied all around the door 26.

The annulus or door member 26 need not be of the particular form shown in Figure 7 but may be of other forms, for example, a flat form, as indicated in Figure 9, where the annulus is designated 26b.

Figure 10 shows still a further form of tapered annulus or door member 26c which contacts with a flat ring seat 16a. This seat 16a is bolted to the flange 15b rather than welded as shown in Figures 7, 8 and 9. The form shown in Figure 7 and the forms shown in Figures 9 and 10 are for illustrative purposes only and the door or annulus may assume other forms.

The actuating unit 45 previously described is fluid-operated, preferably hydraulically operated. However, as shown in Figures 11 to 15, inclusive, a mechanical actuating unit may be provided.

In this structure, the hopper 17a is carried on the mixer substantially as before. The pivot arms 20a on the hopper are pivoted to the brackets 24a at the horizontal pivot 22a. In this instance, the brackets 24a are adjustably carried by the upstanding supporting members 25a. The brackets 24a are normally clamped to the members 25a by clamping bolts 24b which pass through openings and slots in the cooperating members 24a and 25a. Adjustable screws 25b are connected to the brackets 24a and members 25a and may be used for adjusting the brackets forwardly or rearwardly on members 25a when the bolts 24b are released. This provides means for adjusting the pivot axis 22a of the hopper forwardly or rearwardly. If necessary, the bolts 24b can be released and shims positioned between members 24a and 25a to vary the height of the pivot 22a. Thus, the location of the pivot 22a can be adjusted accurately relative to the mixer drum 10a to accurately position door 26a relative to the drum opening and then the bolts 24b can be tightened.

The support for the unit 45a comprises a yoke 46a which extends rearwardly around the hopper and has its forward ends anchored to the plates 25a by means of brackets 47a. For bracing the rear end of the member 46a, the rearwardly and upwardly extending braces 48a are provided which have their lower ends bolted at 48b to members 25a at the lower ends thereof and their upper ends bolted to brackets 48d which extend rearwardly and upwardly from the curved part of supporting member 46a to which they are welded. Thus, the rearwardly extending member 46a will be rigidly braced.

The unit 45a is a toggle unit and is supported by the member 46a. It includes a toggle shaft

51a which extends transversely and which is supported at its ends for rotation in the brackets 48d and which is supported intermediate its ends by the forwardly and upwardly extending arms 52a which have their rear ends welded to member 46a substantially midway between the ends thereof. An actuating rod 59a is provided and this rod is pivotally connected for vertical swinging movement to the rear side of the hopper 17a, substantially at the center of the hopper, by means of a clevis 72a. The rear and upper end of this bar 59a is enlarged and is provided with a longitudinally extending guide slot 59b through which the toggle shaft 51a passes. The forward portion of the bar 59a is reduced and slidably mounted on this reduced portion of the bar is a collar 50a. In front of this collar 50a is a compression spring 67a which surrounds the reduced part of the bar 59a and which engages a fixed collar 65a mounted at the forward end of the bar. The rear end of the spring 67a fits into a cup 50b formed within member 50a at the forward side thereof. This spring normally tends to keep member 50a rearwardly in engagement with the shoulder 50c formed at the beginning of the enlarged rear portion of the bar 59a.

Connected to the collar 50a at diametrically opposed pivots 80 are the toggle links 81 which are of substantially L-shape, as shown in Figure 13. These links are rigidly connected together by a transverse bolt 82 located behind collar 50a. The rear ends of these links are pivoted at 83 to the forward ends of toggle levers 84 which are keyed on the transverse toggle shaft 51a at opposite sides of members 52a.

The shaft 51a may be rocked in order to rock the toggle levers 84 about the axis of such shaft by means of a rocker arm 85 keyed on one end thereof. This arm is rocked by means of a bar 76a which has its upper end pivoted thereto at 86 and which has its lower end connected to a handwheel control 77a.

The unit 77a includes the handwheel 87 which is keyed to the outer end of shaft 88 that is rotatably mounted in a transverse bearing 89 mounted in a vertically supporting plate 90 at the rear of the mixer frame below one of the members 25a. The plate 90 carries a bracket 91 which extends laterally outwardly therefrom and on which is supported a plunger latch 92 that cooperates with notches 93 in the hub 94 of the handwheel 87. The plunger latch 92 can be withdrawn to permit rotation of the handwheel and, when released, will automatically lock the handwheel in fixed position.

The inner end of the shaft 88 carries a pinion 95 which is keyed therein and which meshes with an internal gear 96 that is keyed on a transverse stub shaft 97 which is parallel to shaft 88 and is rotatably mounted in a bearing 97a carried by the plate 90. The outer end of the shaft 97 has a stop arm 98 keyed thereon while the inner end has a crank arm 99 keyed thereon which is pivoted at 100 to the lower end of the bar 76a.

It will be apparent that when latch 92 is released, the handwheel 87 can be rotated and this will rotate the stub shaft 97. This will swing the arm 99 and exert a push or pull on the bar 76a. Rotation of the gear 96 in a counterclockwise direction is limited by the arm 98 contacting with the bearing 89, as shown in Figure 14 by dotted lines. Rotation in the opposite direction is limited by movement of the bar 76a rocks the rocker arm 85 which, in turn, rocks the toggle shaft 51a. The bar 76a and the rocker arm 85

will be off center, even when the door 26a is seated, as shown in Figure 11, to facilitate rocking of arm 85 when a thrust is exerted on bar 76a by counterclockwise rotation of gear 96.

Counterclockwise rotation of handwheel 87 will result in counterclockwise rotation of gear 96 and this will exert a rear and upward thrust on the bar 76a which will open the door and swing the hopper rearwardly. This results from rearward and upward swinging of rocker arm 85 which rocks the toggle shaft 51a upwardly and rearwardly. This swings the toggle levers 84 upwardly and rearwardly about the axis of shaft 51a from their below center full line position shown in Figure 13 which lifts the toggle pivots 83 and releases the forward thrust on the collar 50a and further exerts a rearward pull thereon. This will pull the bar 59a rearwardly, causing it to slide rearwardly on the shaft 51a. In other words, the bar 59a and the collar 50a carried thereby, along with the associated parts, is moved bodily rearwardly to swing the hopper rearwardly about the pivot axis 22a.

After discharge of the mixer drum contents, the door 26a is seated by rotating handwheel 87 in the opposite direction. This rotates gear 96 clockwise, causing it to exert a forward and downward pull on bar 76a. This rocks the arm 85 downwardly and forwardly and rocks the toggle levers 84 in a similar direction. This exerts a forward thrust on the links 81, moving the rod 59a and associated parts forwardly bodily and thereby swinging the hopper 17a into charging position. As soon as the door 26a seats on the seat around the mixer drum opening, the spring 67a will give to some extent, permitting slight forward movement of collar 50a on bar 59a. This will not only ensure proper seating of the door on its seat with a resilient pressure but also will permit the pivot points 83 of the toggle mechanism to move downwardly beyond center so as to lock the door in closed position with resilient pressure. Thus, the door is seated by bodily movement of bar 59a, and associated parts, and then resilient pressure is applied on the door by movement of member 50a relative to bar 59a and against the pressure of spring 67a. Furthermore, the toggle is permitted to lock by reason of the fact that spring 67a permits the pivots 83 to move downwardly beyond center.

It will be apparent that in this structure, the sealing joint 27a between door 26a and hopper 17a is the same as in the previously described structure. This will permit rotation of the member 26a with the mixer drum and relative to the hopper as the door is seated. The force to move the hopper between its charging and discharging positions is applied substantially at the center of the hopper which simplifies the structure. Furthermore, this ensures uniform pressure being applied around the door 26a when it is being forced into contact with its seat around the drum opening.

It will be apparent that the hopper is mounted for movement between charging and discharging positions without providing any obstruction to free flow of material through the hopper, the annulus or the mixer opening. Furthermore, it will be apparent that by a simple control, the hopper may be moved between its two positions.

Various other advantages will be apparent.

Having thus described our invention, what we claim is:

1. In combination with a mixer having a rotatable mixing drum with an end opening through

which the material is charged and discharged, a charging device movable between charging and discharging positions, means for moving said device between such positions and including a fluid cylinder and piston unit connected to said device and to a support carried by the mixer, means connected to said unit for controlling said unit to cause it to thrust said charging device into charging position, and resilient means engaging said unit and permitting limited yielding movement thereof in a direction opposite to the direction of said thrust when the charging device is moved into charging position so as to hold said charging device resiliently in charging position.

2. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper adapted to be moved into association with said opening or away from said opening, means for supporting said hopper on a support carried by said mixer for movement between the indicated positions, means for moving said hopper between such positions and including a fluid cylinder and piston unit which is connected to said hopper, means for supporting the cylinder and piston unit from said support, said means comprising a member carrying said cylinder for axial movement, and resilient means for resisting axial movement of said cylinder away from said hopper as said cylinder and piston unit thrusts said hopper into charging position in association with said opening.

3. A structure according to claim 2 wherein an annular door is provided between said hopper and said drum opening, and means for rotatably mounting said door on said hopper.

4. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper, means for mounting said hopper for vertical swinging movement towards and from said opening, said means including a pivot structure for connecting the hopper to a support on the mixer for vertical swinging movement, an annular door rotatably carried at the inner side of said hopper for cooperation with said opening, and means for swinging said hopper with the door carried thereby about said pivot structure to move the door into position over said opening or in spaced relationship to said opening, said means comprising a fluid-actuated cylinder and piston unit connected to the rear side of said hopper and to a fixed support provided on said mixer, the cylinder of said unit being mounted for axial movement in a sleeve carried by said support, and a compression spring carried in said sleeve and resisting movement of said cylinder away from said hopper.

5. A structure according to claim 4 wherein said sleeve is pivoted to said support for vertical movement and said cylinder and piston unit is pivotally connected to said hopper for vertical movement.

6. A structure according to claim 5 wherein a sealing joint is provided between said annular door and said hopper, said joint comprising relatively rotatable thrust members carried by said hopper and said door, and a flexible sealing member independent of said thrust members carried by the door and engaging a sealing surface carried by the hopper.

7. A structure according to claim 5 wherein a sealing joint is provided between the door member and the hopper member, said joint compris-

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ing relatively rotatable thrust surfaces provided on the hopper and the door members, and a flexible sealing member remote from said thrust surfaces carried by one of said members and engaging a sealing surface on the other of said members.

8. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper and an annular door for cooperating with said opening, means for mounting said door on said hopper so as to permit relative rotation, said means comprising a sealing joint which includes flat thrust ring members carried by said hopper and said door member in face-to-face contact, and a flexible sealing member carried by the door remote from the contacting faces of said thrust members and engaging a sealing surface carried by said hopper.

9. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper member and an annular door member for cooperating with said opening, means for mounting said door member on said hopper member so as to permit relative rotation, said means comprising a sealing joint which includes thrust rings with flat surfaces carried by said hopper member and said door member and in face-to-face contact, and a flexible sealing member remote from said thrust surfaces carried by one of said members and engaging a sealing surface on the other of said members.

10. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper member and an annular door member for cooperating with said opening, means for mounting said door member on said hopper member so as to permit relative rotation, said means including a sealing joint which comprises a flange carried by the hopper and a flange carried by the door which are in face-to-face contact and are relatively rotatable, a flexible sealing ring carried by the flange on the door, said sealing ring extending into overlapping relationship to a sealing surface provided on the edge of a flange carried by the hopper, said door flange being disposed between said last-mentioned flange and said first-mentioned flange.

11. A structure according to claim 10 including means for supplying lubricant under pressure between said sealing ring and the flange which carries it.

12. A structure according to claim 11 wherein said flexible sealing ring is anchored at one edge to the door flange and has its opposite edge free and overlapping the second-mentioned flange carried by the hopper.

13. A structure according to claim 12 wherein the free edge of the flexible sealing ring rubs against a beveled surface provided on the extreme outer edge of the second flange carried by the hopper.

14. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper, means for mounting said hopper without obstructing the interior thereof for vertical swinging movement towards and away from said opening, said means

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including a pivot structure for connecting the hopper to a support on the mixer for vertical swinging movement, an annular door rotatably carried at the inner side of said hopper for cooperation with said opening, and means for swinging said hopper with the door carried thereby about said pivot structure to move the door into position over said opening or in spaced relationship to said opening, said means comprising an actuating unit which includes a rod connected to the hopper, a toggle mechanism connected to said fixed support, a yieldable connection between said toggle mechanism and said rod which will yield when the door is seated, and resilient means opposing yielding of said connection.

15. In combination with a mixer having a rotatable mixing drum with an opening through which the material is charged and discharged, a charging device including a hopper, means for mounting said hopper without obstructing the interior thereof for vertical swinging movement towards and away from said opening, said means including a pivot structure for connecting the hopper to a support on the mixer for vertical swinging movement, an annular door rotatably carried at the inner side of said hopper for cooperation with said opening, and means for swinging said hopper with the door carried thereby about said pivot structure to move the door into position over said opening or in spaced relationship to said opening, said means comprising an actuating unit which includes a rod connected to the rear side of the hopper for vertical swinging movement, a transverse toggle shaft carried by said fixed support, a guide portion on the rear end of said bar which engages said shaft but permits longitudinal movement of said bar, toggle levers carried by said shaft for rocking therewith, means for rocking said shaft, toggle links connected to said levers, a collar mounted on said bar for movement thereon, said links being also connected to said collar, and a spring on said bar in engagement with said collar and opposing movement of the collar on the bar by said links.

16. A structure according to claim 15 wherein said means for rocking the shaft comprises a rocker arm carried thereby, a handwheel, and an actuating rod operatively connecting the handwheel to said arm.

17. A structure according to claim 16 including a strap which limits rotation of said handwheel in one direction.

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