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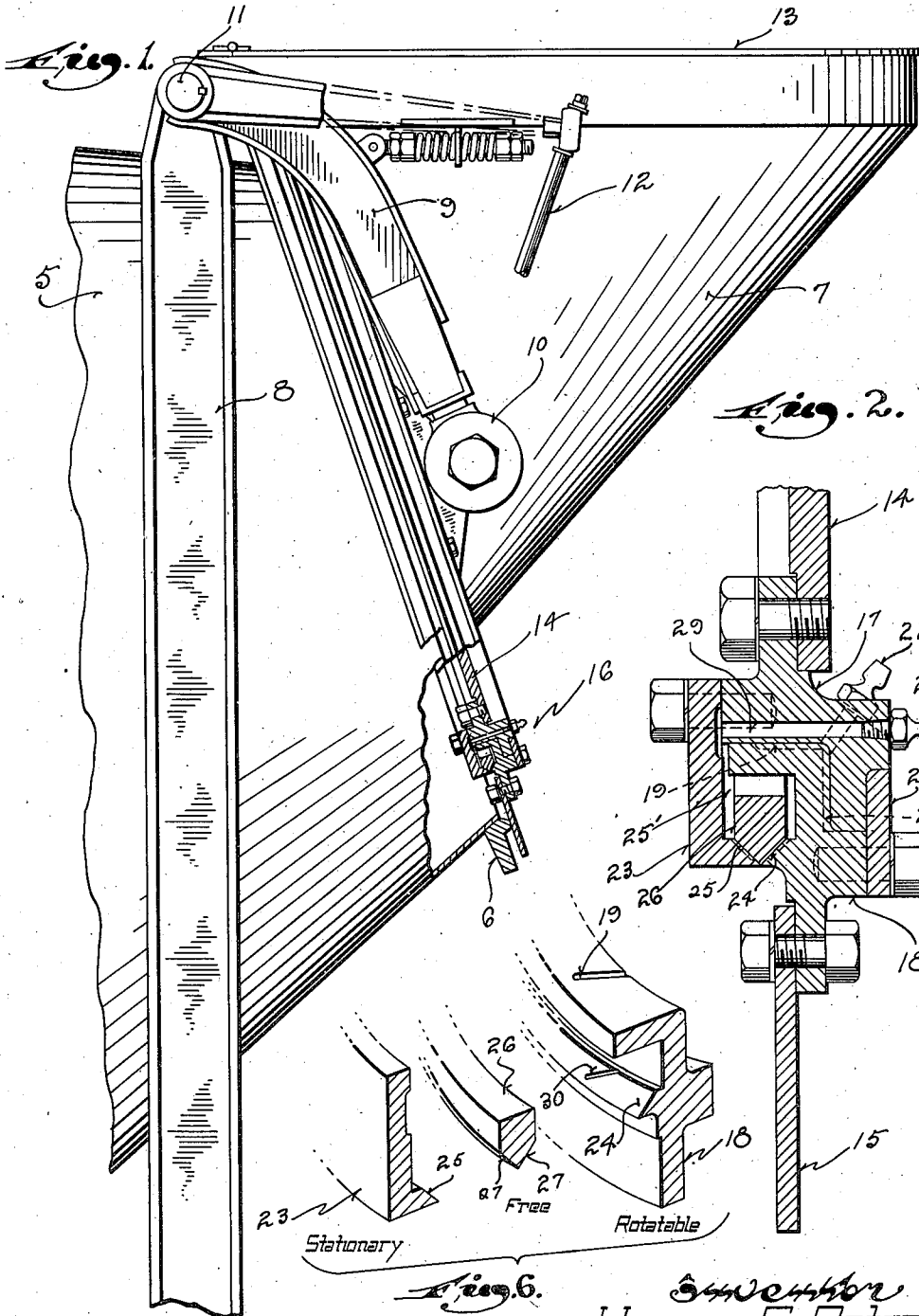
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2,454,940

SEAL FOR CHUTES OF CONCRETE MIXERS

Filed July 27, 1946

2 Sheets-Sheet 1



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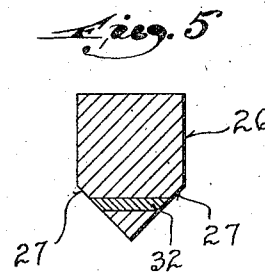
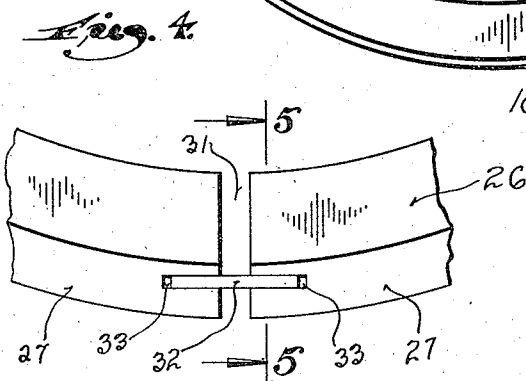
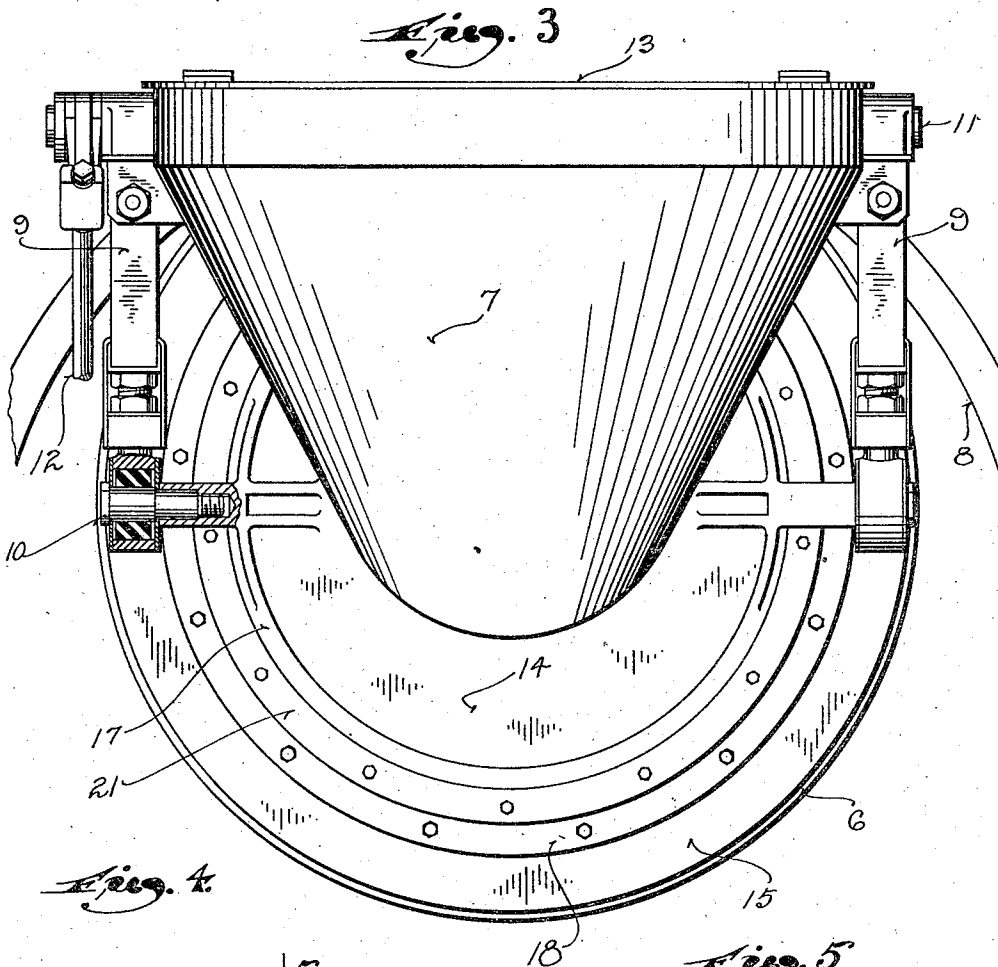
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SEAL FOR CHUTES OF CONCRETE MIXERS

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2 Sheets-Sheet 2



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SEAL FOR CHUTES OF CONCRETE MIXERS

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8 Claims. (Cl. 259-161)

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This invention relates to concrete mixers and refers particularly to a combination feed chute and closure for truck type concrete mixers.

In truck mixers especially those of the high discharge type, the drum is loaded and discharged through its elevated open end at the rear of the truck. To enable rapid charging of the drum, a substantially funnel-like feed chute is provided to direct the aggregates through the mouth of the drum provided by its open rear end. Discharging of the drum contents is effected by reversing the direction of rotation of the drum whereupon the spirally arranged mixing blades in the drum convey the concrete rearwardly to spill across the lower edge of its open end into an appropriate discharge chute.

Inasmuch as it is preferable to have the drum closed as completely as possible during transit, a cover is generally provided for the top of the funnel-like feed chute and the space between its discharge end and the edge of the drum is closed by an annular wall carried by the feed chute and engaging the edge of the drum.

This annular wall consists of a central non-rotatable part fixed to the feed chute and an outer rotatable part adapted to turn with the drum. A free running bearing is, therefore, provided between the central non-rotatable and outer rotatable parts of the annular wall. The provision of such a bearing is a relatively simple matter, but considerable difficulty has been experienced in the past in keeping it free from dirt and grout.

Many different types of seals have been proposed in the past to preclude the entry of grout and foreign matter into the bearing from inside the drum, but for one reason or another all past expedients directed to this purpose have been inadequate.

It is, therefore, the chief object of this invention to provide a free running seal between the central non-rotatable and the outer rotatable parts of the drum closure in a truck type concrete mixer which will remain effective to preclude the passage of grout and foreign matter into the bearing between the central non-rotatable and the outer annular part, notwithstanding the excessive wear to which equipment of this type is subjected.

Another object of this invention is to provide a seal for the purpose described, which is simple in construction and so designed and constructed that the effectiveness of the seal is not dependent upon the degree of pressure of the rotating elements against the drum opening.

Another object of this invention is to provide a seal of the character described which will remain effective for the life of the equipment by virtue of the fact that wear which takes place therein merely improves the fit of the parts.

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With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view in side elevation with parts broken away and in section illustrating the rear end portion of a truck type concrete mixer embodying this invention;

Figure 2 is a detail sectional view through the seal and bearing between the rotatable and non-rotatable parts of the closure;

Figure 3 is a rear view of the complete structure shown in Figure 1;

Figure 4 is a fragmentary detail view illustrating a portion of one of the elements of the seal between the rotatable and non-rotatable closure parts;

Figure 5 is a cross sectional view through Figure 4 on the plane of the line 5-5; and

Figure 6 is an exploded perspective cross sectional view through the elements which coact to form the free running seal.

Referring now more particularly to the accompanying drawings in which like numerals indicate like parts, the numeral 5 designates the rotatable mixing drum of a truck type concrete mixer which as is customary in the high discharge mixers now in general use, revolves about an inclined axis. The elevated rear end of the drum is open and serves as a common charging and discharging mouth for the drum. A drip ring 6 fixed thereto provides a solid finish-machined edge for the mouth of the drum.

Inasmuch as the invention is not concerned with the manner in which the drum is mounted and driven these features are not illustrated. It is common knowledge to those skilled in this art that the contents of the drum are discharged by the action of the mixing blades (not shown) upon reverse rotation of the drum, whereby the concrete contained therein is advanced to and spilled out of the mouth of the drum.

Charging of the drum is effected through a funnel-like hopper or feed chute 7 pivotally mounted from the frame 8 of the supporting structure by means of arms 9. The outer ends of the arms 9 are pivotally connected to the feed chute as at 10 and their upper inner ends are connected to a cross shaft 11 which is adapted to be rocked to swing the feed chute between its

charging position, shown in Figure 1, and an elevated discharging position by means of mechanism (not shown) acting through a connecting rod 12. The manner in which the feed chute is mounted and swung to and from its charging position is more particularly described in the patent to R. J. Barnes, No. 2,374,912.

The open top of the feed chute is adapted to be closed by a hinged cover 13 so that when the feed chute is in its charging position and the cover 13 is down, it serves to close the central portion of the mouth of the drum. The annular space between the discharge end of the feed chute and the edge of the drum is closed by an annular wall structure consisting of a non-rotatable annular plate 14 fixed to the feed chute and a rotatable annular plate or ring 15 mounted to revolve about the non-rotatable plate by means of a free running bearing structure indicated generally by the numeral 16. Thus when the feed chute is in its closed charging position, the rotatable annular ring-like part 15 bears against the drip ring 6 to turn with the drum.

The bearing structure 16 by which the non-rotatable and rotatable parts 14 and 15 are connected for free relative rotation comprises a ring member 17 bolted to the peripheral portion of the non-rotatable part 14 and a ring member 18 bolted to the inner peripheral portion of the rotatable part 15. The rings 17 and 18 have complementary flanges formed with mutually engaging right angularly disposed surfaces 19 and 20. The latter cooperates with a retaining ring or flange 21 fixed to the rotatable ring 18 to embrace a flange of the non-rotatable ring 17 and thus hold said ring members together. Lubricant is fed to the bearing surfaces 19 and/or 20 through one or more grease fittings 22 and appropriate passages.

While the mutually engaging bearing surfaces 19 and 20 provide an excellent bearing for the rotatable closure part 15 and assures its freedom to turn with the drum, these bearing surfaces would soon be ruined by the abrasive action of grout from inside the mixing drum unless the grout is effectually excluded from the bearing. The provision of a seal which will satisfactorily guard against the passage of grout and other foreign matter from inside the drum to the free running bearing is the chief purpose of this invention.

Thus the rotatable ring member 18 and an inner ring member or flange 23 bolted to the non-rotatable ring member 17 have adjacent conical surfaces 24 and 25 respectively. These conical surfaces have their large diameter ends in juxtaposition and hence define an annular V-shaped groove opening radially inward to an annular lubricant reservoir 25'.

The reservoir 25' is formed conjointly by the ring members 18 and 23, and is of a size to receive an expanding split spring ring 26, the outer peripheral portion of which has a cross sectional shape corresponding to that of the V-shaped groove. Thus the expanding split spring ring has conical surfaces 27 to engage the conical surface 24 and 25 with a snug surface-to-surface engagement, such engagement being maintained by the inherent resilience of the spring ring 26.

The lubricant reservoir 25' is adapted to be filled with a suitable lubricant through one or more grease fittings 28 connected with the reservoir by passages 29 so that the conical surface-to-surface engagement between the spring ring 26 and the ring members 18 and 23 can be kept lub-

ricated at all times. Grease grooves 30 in the surfaces 24 and 25 facilitate the dispersion of the lubricant over the engaging surfaces.

In operation the expanding spring ring, being free, will at times remain stationary and at other times will revolve with the ring member 18, but in any event its inherent resilience expands it into snug engagement with the walls of the V-shaped groove and thereby effectively precludes passage of grout and foreign matter past the seal. Inasmuch as the seal thus provided lies inside the free running bearing, that is, between the bearing and the inside of the drum, the passage of grout and foreign matter from inside the drum to the bearing is effectually precluded. The opening 31 between the ends of the expanding split spring ring is ordinarily so slight that there is little danger for grout to pass through it.

Positive assurance against even this slight leakage is obtained by a bridging piece 32 slidably received in slots 33 in the ends of the spring ring as shown in Figures 4 and 5. This bridging piece is, of course, shaped to have its side edges lie flush with the conical surfaces of the expanding split spring ring.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent that this invention provides a practical wholly satisfactory free running seal between the non-rotatable and rotatable parts of the closure or door for the mouth of a truck type concrete mixer and that the incorporation of the seal of this invention involves no radical change from a design found to be commercially acceptable.

What I claim as my invention is:

1. A closure for the mouth of a rotatable concrete mixing drum, including a non-rotatable part covering the central portion of the mouth of the drum, an annular rotatable part surrounding the non-rotatable part and engageable with the edge of the drum, and a bearing between said parts permitting free rotation of the rotatable part relative to the non-rotatable part, characterized by the provision of: a seal located between the bearing and the inside of the drum to prevent the passage of grout and liquid to the bearing from inside the drum, comprising adjacent annular surfaces on the rotatable and non-rotatable parts shaped to form an annular groove having diverging sides and opening radially inwardly; and an expanding spring ring in said groove maintained in contact with the diverging sides thereof by its own inherent resilience.

2. A closure for the mouth of a rotatable concrete mixing drum comprising: an inner non-rotatable and an outer rotatable part, said parts conjointly forming the closure for the mouth of the drum; means connected with the non-rotatable inner part for moving the closure to and from a closed position at which its outer rotatable part engages the edge of the drum to rotate therewith; a bearing between said parts permitting free rotation of the rotatable part relative to the non-rotatable part; adjacent annular members on said parts located between said bearing and the inside of the drum, said members having annular surfaces coacting to form an annular groove; and a spring ring seated in said groove and maintained in snug engagement with the walls thereof by the inherent resilience of the spring ring.

3. A closure for the mouth of a rotatable concrete mixing drum of the type charged and discharged through the same mouth and wherein

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charging is effected through a feed chute mounted adjacent to the mouth of the drum for swinging to and from a position projecting into the central part of the mouth so that said feed chute covers the central part of the mouth of the drum when in its charging position, and wherein the annular space between the feed chute and the edge of the drum is closed conjointly by a non-rotatable part encircling and carried by the feed chute and a rotatable part rotatably joined with and encircling said non-rotatable part and engaging the edge of the drum to turn therewith, characterized by the provision of: a seal for the joint between the non-rotatable and rotatable parts comprising, annular members on said parts disposed between said joint and the inside of the drum and having adjacent conical surfaces co-acting to form an annular groove with diverging sides, and a spring ring received in said groove and by its inherent resiliency maintaining snug engagement with the walls thereof.

4. In a concrete mixer: a rotatable mixing drum having an open end providing a mouth through which the drum is charged and discharged; a combination feed chute and closure for the mouth of the drum including a funnel-like feed chute, a non-rotatable annular wall encircling and fixed to the discharge end of the feed chute, and an annular rotatable part rotatably joined with said wall and engageable with the edge of the drum to turn therewith; annular members on said rotatable part and the non-rotatable wall disposed intermediate the joint therebetween and the inside of the drum, said members having adjacent annular surfaces co-operating to define an annular groove; a spring ring seated in said groove and urged into snug engagement with the surfaces thereof to form a free running seal between said annular rotatable part and said wall; and means for moving said combined feed chute and closure to and from a closed position at which its annular rotatable part engages the drum to turn therewith.

5. In a concrete mixer having a rotatable mixing drum adapted to be charged and discharged through an open end thereof, a combination feed chute and closure for said open end of the drum, including a funnel-like feed chute, a non-rotatable annular wall encircling and fixed to the discharge end of the feed chute, and an annular rotatable part rotatably joined with said wall and engageable with the edge of the drum to turn therewith: a free running seal between said annular rotatable part and said non-rotatable wall, comprising cooperating annular members on said wall and the rotatable part having adjacent conical surfaces thereon with the large diameter ends of said surfaces in juxtaposition and radially outermost so that said conical surfaces conjointly form a radially inwardly opening V-shaped groove; and an expanding spring ring seated in said groove, said ring having its outer peripheral portion V-shaped to fit the walls of the groove with a surface-to-surface contact and be maintained in snug engagement therewith by the inherent resiliency of the spring ring.

6. In a concrete mixer having a rotatable mixing drum adapted to be charged and discharged through an open end thereof, a combination feed chute and closure for said open end of the drum, including a funnel-like feed chute, a non-rotatable annular wall encircling and fixed to the discharge end of the feed chute, and an annular rotatable part rotatably joined with said wall and

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engageable with the edge of the drum to turn therewith: a free running seal between said annular rotatable part and said non-rotatable wall, comprising, a stationary metal ring fixed to the non-rotatable annular wall, said stationary ring having a smooth finished annular surface; a rotatable metal ring fixed to the annular rotatable part, said rotatable ring having a smooth finished annular surface; said rings being coaxial and adjacent to each other and being interposed between said joint and the inside of the drum with their smooth finished annular surfaces in juxtaposition; a metal sealing ring between said smooth finished annular surfaces; and means for resiliently maintaining the sealing ring in snug engagement with said smooth finished annular surfaces, said sealing ring being free to turn with the rotatable ring or stand still with the stationary ring.

7. A closure structure of the character described comprising: a central non-rotatable part; an annular rotatable part; a joint between said parts providing for free rotation of the rotatable part relative to the non-rotatable part; means on said parts lying between said joint and the inside of the drum conjointly forming an annular substantially V-shaped groove opening radially inwardly; a metal spring ring seated in said groove, said ring having its outer circumferential portion V-shaped in cross-section corresponding to the angle between the walls defining the V-shaped groove so as to have snug surface-to-surface engagement therewith; means on the non-rotatable and rotatable parts jointly defining an annular lubricant reservoir opening to the V-shaped groove, and embracing the radially inner portion of the spring ring; and means for introducing lubricant into said reservoir.

8. A closure structure of the character described comprising: a central non-rotatable part; an annular rotatable part; a joint between said parts providing for free rotation of the rotatable part relative to the non-rotatable part; means on said parts lying between said joint and the inside of the drum conjointly forming an annular substantially V-shaped groove opening radially inwardly; an expanding metal spring ring seated in said groove, said ring having its outer circumferential portion V-shaped in cross-section corresponding to the angle between the walls defining the V-shaped groove so as to have snug surface-to-surface engagement therewith; means on the non-rotatable and rotatable parts jointly defining an annular lubricant reservoir in which the radially inner portion of the spring ring is located; means for introducing lubricant into said reservoir; said spring ring being split and its adjacent ends having aligned slots in the outer portions of their V-shaped cross-section; and a bridging piece slidably received in said slots and extending across the space between the ends of the ring.

HARRY C. PETERS.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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