May 5, 1942. C. F. BALL 2,281,820

TRUCK MIXER HOPPER

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FIG. 1.

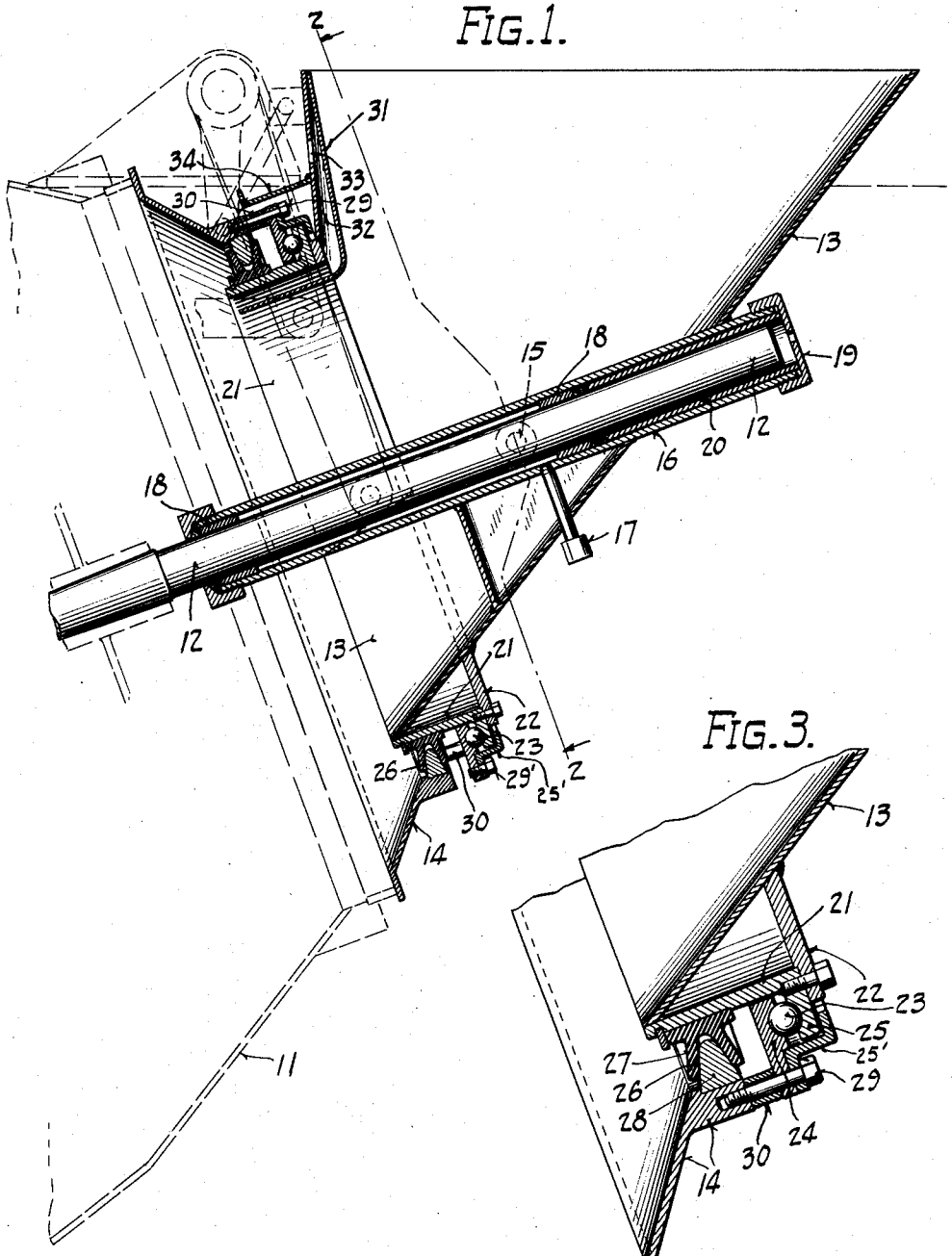


FIG. 3.

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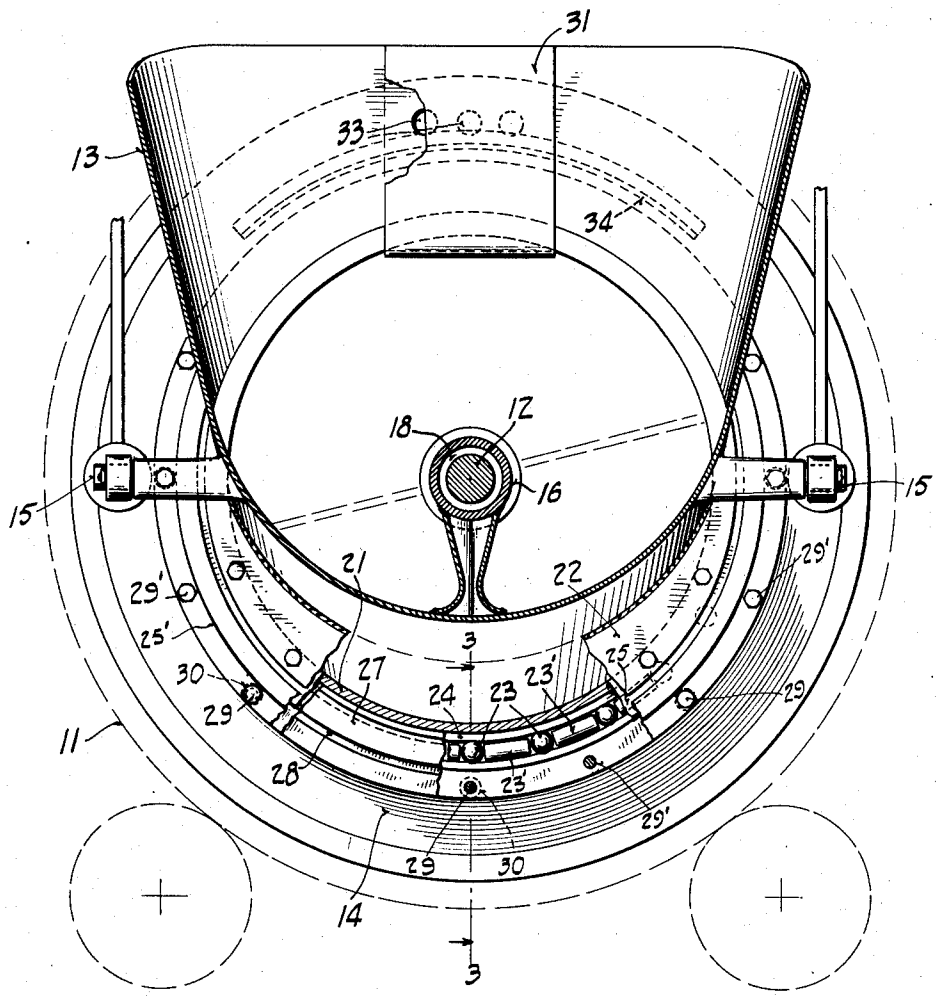
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FIG. 2.



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2,281,820

TRUCK MIXER HOPPER

Charles F. Ball, Wauwatosa, Wis., assignor to Chain Belt Company, Milwaukee, Wis., a corporation of Wisconsin

Application August 28, 1940, Serial No. 354,521

4 Claims. (Cl. 259—161)

This invention relates to apparatus for use in end-charging concrete mixers, especially such mixers as are rotatably mounted on motor trucks to mix or agitate concrete during the haul between the batching or charging plant and the job site. In this method of handling concrete and concrete-forming materials, it is customary to have a central mixing or batching plant, out of which the trucks operate, and it is also customary to provide bins or charging chutes under which the trucks may run to receive their loads.

Some central plants have wet mixing facilities, and discharge concrete which is already mixed into the truck-mixer bodies for hauling. In such plants, i. e. those equipped with wet batch facilities, the transporting means is termed an agitator, inasmuch as it is only necessary to agitate the concrete sufficiently to keep it from setting. In plants equipped with dry batch facilities, properly proportioned dry batches are charged into the mixer body but water may not be added until after the body is charged, which is generally while the truck is in motion or after it has reached the place where the concrete is to be poured. In this type of operation, the body is really a mixer because the concrete is not formed prior to charging. Naturally to produce concrete, more severe agitation and mixing is required than with those types of bodies commonly called agitators.

The present invention is intended for use with machines which are either mixers or agitators, as those terms are known in the trade, and in such use must be designed to serve satisfactorily either purpose. Where there are dry batch facilities, the materials fed through the hopper are sand, coarse aggregate and cement, and the water may also be fed through the hopper to wash down the dry materials, whereas in wet batch operations, mixed concrete is fed through the hopper into the mixer drum.

In copending applications, Serial No. 307,784, filed December 6, 1939, entitled Charging device for truck mixers, and Serial No. 313,323, filed January 11, 1940 entitled Apparatus for charging concrete mixers, I have disclosed mechanism for charging machines of this character, in which the materials are fed into the end of the drum in a highly improved manner. Experimentation with machines of the type there disclosed has led to still further improvements, modifications and refinements, the nature of which will be subsequently described.

Keeping in mind the nature of the material being handled, one object of the present invention is to increase the speed with which material may be charged into the drum. Another object is to improve the arrangement of seals and bearings to promote better wearing qualities and increase efficiency.

In carrying out objects expressed in the aforesaid applications, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined in the appended claims.

In the accompanying drawings, illustrating a preferred embodiment of the invention,

Figure 1 is a central, vertical section through the charging hopper;

Figure 2 is a transverse section of the hopper taken on the line 2—2 of Figure 1; and

Figure 3 is a detail view of the seal and bearing taken on line 3—3 of Figure 2.

The mixing drum 11 shown in dotted lines on the drawings is of the type which is used on truck mixers, in that it rotates on a fixed axis, which is either horizontal or inclined, preferably inclined, as shown herein, and is provided with an end opening which is used both for charging or discharging purposes. During charging operations blades within the drum work material toward the forward or closed end of the drum, and during discharge by reversing the direction of rotation the same blades move material toward the rear or open end of the drum.

Extending axially of the drum through the rear opening is a shaft or tube 12, which is rigidly mounted on and rotates with the drum 11. By journalling hopper 13 on this shaft, and by providing an intermediate pressure plate 14 between the hopper and the drum which moves with the former, but rotates with the drum when in pressural contact therewith, I am carrying out concepts disclosed in my earlier filed application, Serial Number 307,784. By supporting plate 14 directly on hopper 13, rather than through some intermediate arrangement such as the spider described in the aforesaid application, features are incorporated which are disclosed in my later application, Serial No. 313,323.

Hopper 13 may be slid back on shaft 12 so as to provide a space for the discharge of concrete from the end of the mixer, a suitable, and in my estimation, a very desirable arrangement being that described in my copending applications, in which actuating linkage is attached to trunnions 15 extending horizontally from either side of the hopper. Such linkage, shown in dotted lines in Figure 1, not only slides the hopper back for dis-

charge of the drum's contents but also transmits pressure to positively seat the plate against the drum during charging and mixing operations. Translation of the hopper in either direction effects a sliding of sleeve 16 to which the hopper is attached. Grease may be fed into the space between sleeve 16 and shaft 12 by means of a grease fitting 17, and spaced bearing bushings 18 may be arranged between the sleeve and shaft 12. The end of sleeve 16 which extends beyond the rear wall of the hopper is threaded for a vented cap nut 19 which confines a tube 20 for retaining the rear bushing 18. To prevent the bushings from working toward each other, sleeve 16 may be shouldered at suitable positions. In this manner grease may be forced into the bearings from a constantly maintained reservoir between the tubes.

The bottom of the hopper 13 is trough-shaped and slopes downwardly toward the rear opening of the drum, the lower end being arranged annularly of the drum axis. Mounted on the lower end of the hopper is a cylindrical member 21, within which the lower portion of the hopper extends, the trough-shaped bottom portion of the hopper or duct 13 closing off the inner edge of member 21. The upper half of cylindrical member 21 forms an extension for the hopper, the latter being cut back along the line where the two surfaces come in contact.

Abutting against the edge of member 21 is a skirt plate or flange 22 welded to the outside of the hopper and depending on the lower side thereof. Flange 22 may be bolted to member 21, thus rendering the hopper portion 13 readily detachable from the rest of the structure and permitting replacement of only one of these parts in case such replacement should become necessary. Member 21 is L shaped in cross section (as shown in Figure 1) having an outwardly turned flange 25 which serves as part of a bearing. In this manner the bearing remains assembled even when the hopper or duct 13 is disconnected.

Pressure plate 14 is supported for rotation on the hopper by means of a bearing located a distance back from the lower end of the hopper and outside the cylindrical member 21. Preferably the bearing is of the non-friction type with balls 23 and dowels 23' alternately arranged within a bearing race formed by annular members 24 and 25, the former 24 mounted on plate 14, and the latter being the outwardly turned flange of member 21. The bearing is retained by an annular member 25', which is Z shaped in cross section.

To prevent concrete from entering the bearing, either during charging or during mixing, while the hopper is pressed tightly against the drum, a seal 26 is arranged at the lower end of the hopper between member 21 and rotatable plate 14. This seal is preferably of the spreading type comprising a U shaped, resilient member 27 disposed to straddle a tapering flange 28 mounted on the rotatable plate.

The bearing cage and sealing means are arranged so that they are a distance apart measured axially along shaft 12 and a gap is provided for the escape of any material which may work through the seal. This is accomplished by means of the bearing mounting, which comprises angularly spaced bolts 29 surrounded by spacer sleeves 30, said bolts being threaded into plate 14, positioning and retaining bearing members 24 and 25. Alternate studs 29' may be tapped into member 24 rather than extend therethrough in order to retain the bearing when the latter is disconnected from the plate 14. Sleeves 30, which rotate about the hopper with plate 14, afford the only obstruction to the escape of material which might work through the seal.

Consequently material is prevented from packing into the bearing and excessive wear or premature failure is avoided.

At the top of the hopper on the forward side, a shield 31 is attached which hangs down inside the hopper and is curved under the cylindrical member 21. The space 32 thus provided is tapered outwardly from the top of the hopper and communicates with one or more openings 33 in the forward side, which serve as vents to permit the escape of air during charging of the drum. This arrangement has decided advantages as the hopper may be entirely filled with material during charging and there is no other place for the escape of air in the drum during the displacement of such air by the materials charged. To prevent the dust and other materials which may escape with the air through the vent, from entering the bearing a guard or shield 34 is provided on the hopper over the bearing and beneath the vents 33.

The operation of the device is substantially in accordance with that more fully described in the before-mentioned, copending applications. The present invention provides, among other features, an improved bearing disposed in such a manner with respect to the hopper that it cannot be affected by the abrasive type of material being handled. The importance of this improvement will be appreciated best by realizing that successful operation of the machine depends upon effectively sealing the end of the drum by an annular pressure plate which may rotate, through bearings, about a stationary charging device.

The invention having been described, what I claim as new and seek to protect by Letters Patent is:

1. A hopper for concrete mixers having an open top portion for receiving materials to be charged, a cylindrical member attached to the lower portion of said hopper, said hopper having a curved and sloping bottom merging with the inside of said cylindrical member, a bearing disposed on the outside of said cylindrical member, an annular rotatable pressure plate mounted on said cylindrical member for rotation with respect to said hopper, and angularly spaced members retaining said bearing in spaced relation between said plate and said cylindrical member.

2. A hopper for concrete mixers having a sloping rear and bottom wall for charging materials, an apertured forward wall, and a shield spaced from said forward wall inwardly of said hopper providing a channel communicating with said apertures to permit escape of air from the mixer during charging operations.

3. In a hopper for truck mixers, the combination of a charging duct, an annular closure plate rotatably mounted on said duct and arranged to space said duct from the charging opening of the truck mixer, a bearing between said duct and said plate including bearing members associated with said duct and said plate respectively and means affording readily detachable securement between the bearing member associated with the duct and said duct while said bearing

members are retained in assembled bearing relationship.

4. In combination with a charging hopper for rotatable mixing drums, an annular member mounted for rotation adjacent the lower end of the hopper, a rotary seal and a bearing disposed between said hopper and said annular member, said bearing being spaced outside of said hopper and remote from said seal, and bearing retaining means associated with said annular member having one or more open spaces to enable material which may work through said seal to escape without entering said bearing.

CHARLES F. BALL.