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MEANS FOR INCREASING THE CAPACITY
OF TRUCK MIXER DRUMS

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2 Sheets-Sheet 2

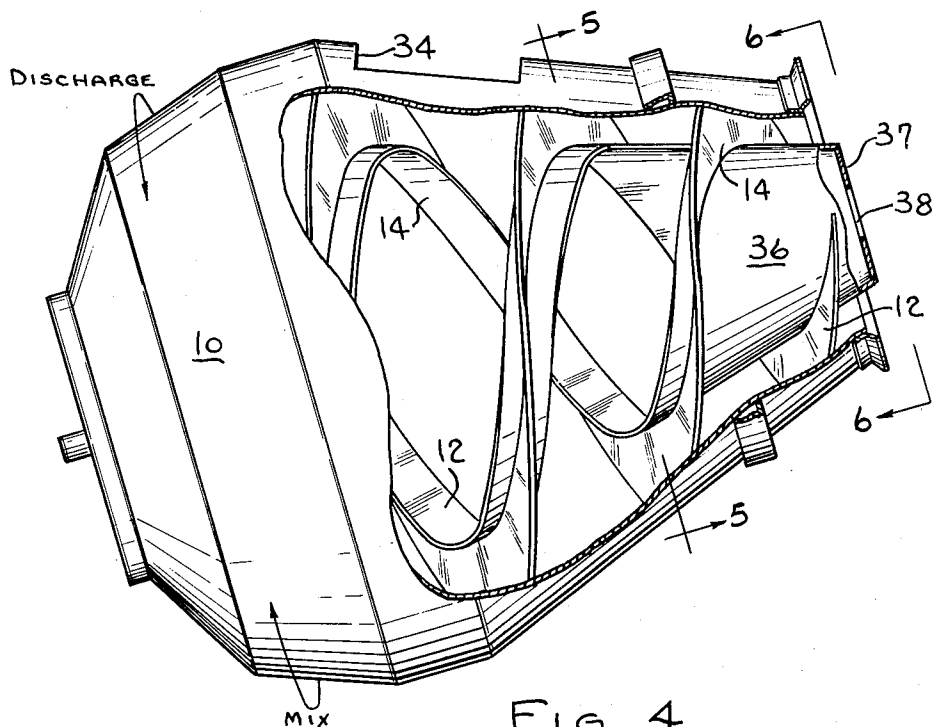


FIG. 4

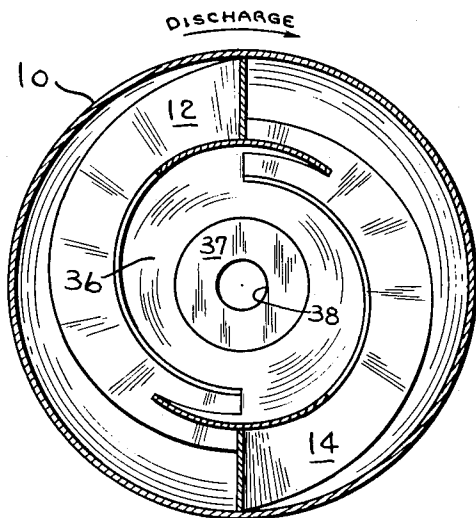


FIG. 5

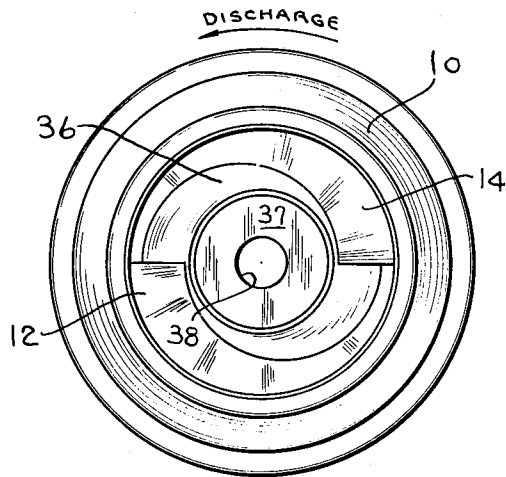


FIG. 6

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MEANS FOR INCREASING THE CAPACITY OF TRUCK MIXER DRUMS

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3 Claims. (Cl. 259—161)

This invention relates to truck type concrete mixers and agitators and particularly to increasing the capacity of a given size mixer or agitator drum. In increasing the capacity it is necessary to reduce the weight of the unit in order to remain within the highway weight restrictions obtaining in the several states. Therefore, this invention also relates to reducing the weight of the mixer unit.

Mixers and agitators have been customarily provided with a sealing door at the rear end of the drum to prevent leakage. These doors may be associated with a charging hopper or the hopper may be omitted in cases where hatch loading is employed. The present invention relates to eliminating the sealing door while preventing leakage past the blades. When the present invention is practiced the level in the drum is limited only by the size of the opening, if any, centrally of the blades. Thus, if the charging hopper is retained the level may be raised to the bottom of the opening in the rear of the drum centrally of the blades (with some allowance for surge, of course). Reduction of the size of the central opening allows the level to be raised and if the drum is plugged centrally of the blades the level may be raised almost to the extent of filling the drum.

My invention relates, therefore, to the prevention of leakage past the blades, without sealing the end of the drum to allow the capacity to be raised to limits imposed only by leakage elsewhere. Not only does this invention permit the capacity to be raised to almost any desired level in the drum but the invention permits elimination of the sealing door and the attendant maintenance and weight problems. The charging hopper may also be eliminated, if desired, to effect further weight savings which may be utilized in increased capacity. This invention is not, therefore, restricted to any particular construction for preventing leakage centrally of the blades but relates to preventing leakage past the blades to permit the drum to be loaded to almost any desired level.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the embodiments shown in the drawings, in which:

Fig. 1 is a side elevation with parts broken away and partly in section to show the present invention as applied to a mixing drum provided with a charging hopper;

Fig. 2 is a section taken as indicated by line 2—2 on Fig. 1;

Fig. 3 is a view taken as indicated by line 3—3 on Fig. 1;

Fig. 4 is a view similar to Fig. 1 but shows a hatch-loaded drum in which the central opening at the rear of the drum has been reduced and the capacity of the drum has been increased over that of the modification shown in Fig. 1;

Fig. 5 is a section of Fig. 4 taken as indicated by line 5—5; and

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Fig. 6 is a view taken as indicated by line 6—6 on Fig. 4.

Considering the construction shown through Figs. 1, 2, and 3, first, the drum 10 is of the conventional exterior design and is shown upwardly and rearwardly inclined at the angle it would occupy when mounted on a mixer or agitator of the high discharge type. Two spiral blades 12, 14 are fixed on the interior of the drum and originate adjacent the open rear end of the drum and terminate adjacent the forward end of the drum. These blades have a T-shaped cross section over a major portion of the drum length since this type of blade greatly facilitates the charging and discharging action of the drum. The so-called charging cone 16 mounted centrally of the blade adjacent the open rear end of the drum is a modification of the type well known in this art. These charging cones have been employed in the past to facilitate rapid charging of the drum. Thus the material was introduced through a hopper similar to hopper 18 shown in the drawing pivotally mounted on pin 20 which is fixed on the stationary channel frame member 22. Suitable hanger arms or the like may be provided for moving the hopper out of the charging position in which it is shown in the drawing or the hopper may be fixed in position if desired. In the prior art the hopper assembly was generally provided with a sealing door which rested against the rim of the drum to seal the contents of the drum during the mixing or agitating portion of the operation. The present hopper assembly does not employ the sealing door found in the prior art but prevents leakage between the charging cone and the interior of the drum by means about to be described.

In the prior art the charging cone or frusto-conical member 16 was so proportioned that its forward edge 24 projected into the drum only to the extent that the cone spanned the space between the terminal edge of a blade and a point on the other blade forwardly of the terminal edge of the blade and lying in a plane common to the terminal edge, the junction point, and the longitudinal axis of the drum. Thus the rear edge 24 of cone 16 meets blade 14 at point 26 which lies in a plane common to the point 26, the terminal edge of blade 12 at the rear end of the drum, and the longitudinal axis of the drum. Put another way, the cone contacted each of the two blades for 180° or $360^\circ/N$ where N is the number of blades. If the cone 16 in Fig. 1 was not modified and was rotated in the mixing direction the contents would spill over at point 26 and run out the rear end of the drum past the terminal edge of blade 12.

In the construction shown in Figs. 1, 2, and 3 I insert a triangular piece 28 in the form of an axial extension on the rearward edge 24 of the cone 16 and T blade 14 to, in effect, create a short spiral tunnel between blades 12 and 14. This tunnel starts at point 26 and the terminal edge of blade 12 and extends around to the edge 30 of the insert piece 28. This insert is welded to the blade and to the cone and thus becomes an integral part of the cone structure. A similar insert 32 is fitted between edge 24 and T blade 12 to make a similar tunnel. Thus the cone is made to contact more than 180° of each blade (or more than $360^\circ/N$) which creates two tunnels. By proper selection of the size of the insert the tunnel may be made to extend around the drum axis a sufficient number of degrees to prevent leakage past the blades so that the only limiting factor on the capacity of the drum is leakage centrally of the blades. Theoretically, the trailing edge 30 of insert 28 or the leading edge of blade 12 should be above a horizontal plane passing through the lowest point of the opening centrally of the drum in all rotational positions of the drum to prevent leakage of the drum contents past the blades. When this has been ac-

compleished the drum contents tending to spill over the trailing edge of the insert 28 are prevented from running down the drum wall and out through the opening between the cone and the drum since the opening is blocked by blade 12. If the above prescribed requirements are met the drum may be filled to the level of the lowest point of the opening in the cone without leakage taking place in any rotational position of the drum.

The construction illustrated in Fig. 1 does not meet the above requirements strictly since the drum is charged while being rotated in the mixing or agitating direction and is constantly rotated in that direction until the operator is prepared to discharge the load. Since concrete does not flow readily, when the drum is rotated during loading it is only necessary to make insert 28 of sufficient size to prevent the concrete from flowing between the cone and the drum fast enough to get ahead of the leading edge of blade 12 before the blade reaches a position blocking the flow. This, of course, must take into account the rotational speed of the drum but it will be appreciated that the insert piece may be shorter than the theoretical size. In the drawing the spiral tunnel extends about the drum axis approximately thirty-five rotational degrees and this construction serves to prevent leakage while the drum rotates in the mixing direction. While it is difficult to mathematically set out the exact number of rotational degrees of necessary tunnel the existence of the tunnel is of great importance and without the tunnel leakage would most certainly occur. It is, of course, easiest to design for the optimum or theoretical conditions in which the leading edge of blade 12 or the trailing edge of insert 30 is above the horizontal plane through the bottom of the cone opening in all rotational positions of the drum.

In the modification shown in Figs. 4 through 6 the drum 10 is provided with a hatch (not shown) located in the cutout portion 34 of the drum for loading at the central plant. In this modification the cone 36 is provided with an integral plate 37 at the rear end having a central aperture 38 which may be usefully employed as a vent during the hatch loading of the drum and for inspection of the drum contents during the agitating process. Since the diameter of the opening 38 is less than the diameter of the open rear end of cone 16 in Fig. 1 the level within the drum can now be raised to the lower edge of opening 38 and thus increased over the capacity of the modification shown in Figs. 1 through 3 without experiencing spillage centrally of the cone. In order to prevent leakage or spillage past the blades the cone is now extended to span more of the space between the adjacent blades and thus define tunnels of a greater number of degrees of rotation about the drum axis. Thus, in this modification the tunnel extends around the drum axis about 90° and this extension is sufficient to prevent leakage past the blades even though the level within the drum is up to the bottom edge of opening 38 in the end of the cone.

Instead of providing plate 37 on the end of the cone to reduce the size of the opening the cone can be sharply tapered so the space between the drum wall and cone diverges rearwardly. This construction has a further advantage in assisting discharge as fully explained in my copending application Ser. No. 399,197.

Although but two embodiments of the present invention have been illustrated and described it will be apparent to those skilled in the art that various other changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. The combination with a truck mixer drum of the type having an open rear end and including a plurality of circumferentially spaced spiral blades formed on the interior of the drum and originating at the open rear end

of the drum and extending forwardly and terminating adjacent to the opposite end of the drum, of a member mounted in the rear end of said drum and having a hollow generally frusto-conical portion in contact with the blades at the point of origin thereof, and extending forward within the drum in continuous contact with each blade member spirally toward the opposite end of the drum through arcs of contact substantially equal respectively to the arcuate distance between adjacent blades whereby the termini of said arcs of contact substantially lie respectively in planes passing through the axis of the drum and through the point of origin of a next adjacent blade, and an axial extension on said frusto-conical member in the region of each said termi projecting forwardly into contact with the respectively adjacent spiral blades and extending and maintaining the continuity of the arcs of contact between said frusto-conical member and the respective blades, said axial extensions, the frusto-conical member, the inner surface of the drum and the opposing faces of adjacent spiral blade members together forming spiral tunnels, said tunnels each having an arcuate extent less than the circumferential distance between adjacent blades but sufficient to prevent leakage of material from the drum through the open end thereof when it is rotated in a direction such that each said point of origin becomes the leading end of its spiral blade.

2. The combination recited in claim 1 in which the rear end of the frusto-conical member has a central opening and the spiral tunnels are of such length that either the point of origin of a given blade or the forward terminus of the tunnel communicating with the forward face of said given blade is at all times above a horizontal plane passing through the lowest point of said central opening in the member.

3. The combination with a truck mixer drum of the type having an open rear end and including a plurality of circumferentially spaced spiral blades formed on the interior of the drum and originating at the open rear end of the drum and extending forwardly and terminating adjacent to the opposite end of the drum, of a member mounted in the rear end of said drum and having a hollow generally frusto-conical portion in contact with the blades at the point of origin thereof and extending forwardly therefrom within the drum and in substantially continuous contact with each blade through an arc of contact substantially equal to the arcuate distance between adjacent blades whereby the termini of said arcs of contact substantially lie respectively in planes passing through the axis of the drum and through the point of origin of an adjacent blade, said frusto-conical member having a central opening, said frusto-conical member in the region of each said termini being provided with an axial extension projecting forwardly into contact with the respectively adjacent spiral blades to thereby increase the arcuate extent of contact between said blades and said frusto-conical member beyond said termini, said axial extensions together with the frusto-conical member, the inner surface of the drum and the opposing faces of adjacent spiral blade members forming spiral tunnels extending circumferentially beyond said termini an amount less than the circumferential distance between adjacent blades but to an extent such that either the point of origin of a given blade or the forward terminus of an associated spiral tunnel is always above a horizontal plane passing through the lowest point of said opening in the frusto-conical member whereby to prevent leakage of material from the drum through the open end of the drum when it is rotated in a direction such that each said point of origin becomes the leading end of its spiral blade.

References Cited in the file of this patent

UNITED STATES PATENTS

2,254,639	Andrae	Sept. 2, 1941
2,338,820	Peters	Jan. 11, 1944