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DISCHARGE MECHANISM FOR CONCRETE MIXERS AND ANALOGOUS APPARATUS

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Fig. 1.

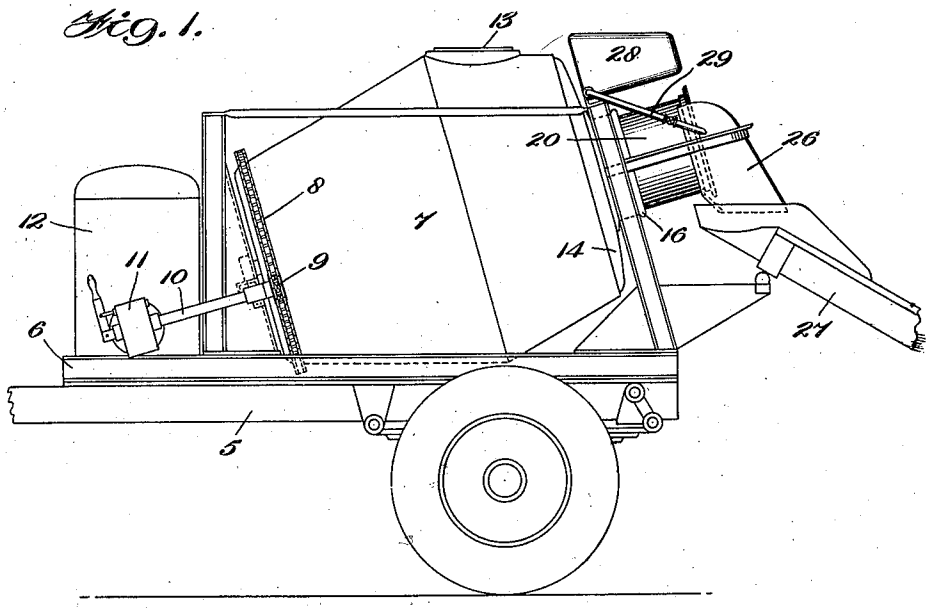
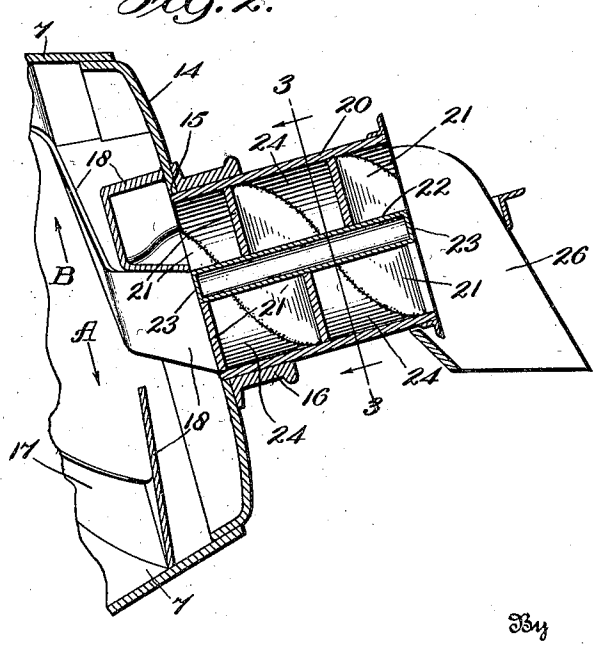


Fig. 2.



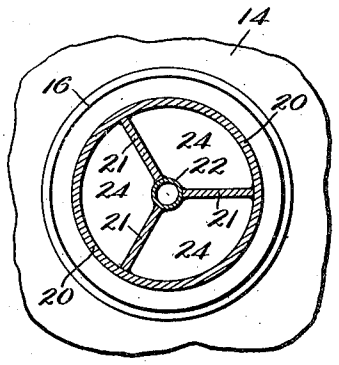


Fig. 3.

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DISCHARGE MECHANISM FOR CONCRETE MIXERS AND ANALOGOUS APPARATUS

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10 Claims. (Cl. 83—73)

This invention relates to discharge mechanism for concrete mixers and analogous apparatus and has for one of its objects to provide a mechanism of this character which will be simple in construction, comparatively inexpensive to manufacture and more efficient in use than those which have been heretofore proposed.

A futher object of the invention is to provide discharge mechanism which is particularly, although not solely adapted for use with concrete mixers of the truck or transit type and which will permit of dispensing with the usual removable closures for the discharge openings of such mixers, while at the same time effectively preventing discharge or leakage of the contents of the mixing receptacle except when such discharge is desired.

A still further object of the invention is to provide a discharge mechanism which is especially adapted for use in connection with high discharge concrete mixers of the truck type and which secures an increase in the elevation of discharge over that heretofore attained, thereby securing a further increase in the chuting or spouting range.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel details of construction and combinations of parts more fully hereinafter described and particularly pointed out in the appended claims.

Referring to the accompanying drawing forming a part of this specification in which like reference characters designate like parts in all the views:—

Figure 1 is a side elevational view of the rear portion of a truck or transit concrete mixer of the rotating drum type, illustrating discharge mechanism constructed in accordance with the present invention applied thereto;

Figure 2 is an enlarged vertical sectional view through the rear portion of the mixing receptacle and discharge mechanism shown in Figure 1; and

Figure 3 is a transverse sectional view taken approximately on the plane indicated by the line 3—3 of Figure 2, looking in the direction of the arrows.

It is the usual practice in the operation of truck or transit mixers of the rotating drum type which are provided with discharge openings in the rear wall of the mixing receptacle to charge the cement and aggregates into the receptacle to a much greater extent than is common in mixers of the stationary and paving types wherein the charging and discharging openings of the mixing drum are normally open. That is to say, in truck mixer practice the drums are in practically every instance filled with concrete-making materials to above their rotative axis, and in most cases they are substantially two-thirds full. As a result of this practice of more fully charging the mixing receptacle it is necessary in truck mixers to provide closure means for the discharge opening in order that during the mixing or agitating operation the mixture will not leak out or be prematurely discharged through such opening. Such closures have usually taken the form of disks or plates fitting into the discharge opening and secured during the mixing cycle in various ways, and in many instances these closures have been mounted upon swinging arms and provided with suitable operating mechanism whereby they may be swung outwardly for discharge purposes.

In as much as the forward end of these drums is usually sealed and since the charging and discharge openings are likewise closed during mixing it has been found that excessive pressures have been built up within these receptacles as a result of gases formed through chemical action between the water and the cement during mixing and it has been necessary to provide means for venting the receptacles to the external atmosphere to prevent the violent blowing out of the discharge closure when it is unlocked for purposes of discharging.

The present invention through provision of suitable means for preventing discharge through the discharge opening during mixing while at the same time eliminating the usual tightly sealed discharge closure maintains the interior of the mixing receptacle in communication with the external atmosphere so that any gases which may be formed during the mixing may readily find their way to said atmosphere and the provision of special vents is therefore rendered unnecessary. It also permits of the introduction of the water necessary for the mix through the said discharge opening, eliminating the necessity for stuffing-boxes or glands, as well as for valves or protectors for the discharge end of the water pipes; and since the interior of the receptacle is always open to the atmosphere, the time required to get the water into the receptacle is greatly reduced. Furthermore, through elimination of the closure for the discharge opening and its supporting and operating mechanisms, considerable saving in the cost of construction may be effected.

Referring more particularly to the said drawing 5 indicates the chassis of a motor vehicle on which is mounted a mixing and agitating unit 6 of a well known construction which includes a rotatable mixing receptacle or drum 7 driven by means of a chain 8 passing about sprocket 9 carried by a shaft 10 extending from a suitable transmission and reversing mechanism 11 associated with an internal combustion engine or other source of power enclosed within a housing 12. Although the drum is here shown as being driven by an independent motor, it is of course obvious that if desired power for such drive may be derived from a power take-off from the truck motor or from the truck transmission.

The drum 7 may be provided with a charging opening normally closed during mixing and discharge by a hatch cover 13 and the rear wall 14 of the said drum has the usual axial discharge opening 15 surrounded by a bearing ring 16 constituting the rear journal for the drum. The interior of the drum 7 may also be provided with the usual mixing or agitating blades 17 which develop adjacent the discharge opening 15 into pick-up bucket formations 18 which are or may be of the type described and claimed in the co-pending application of Charles F. Ball, filed June 24, 1931, Ser. No. 546,591, now Patent No. 2,006,728, granted July 2, 1935. As is customary in this type of apparatus the blades 17 are helically disposed within the receptacle so that during rotation of the drum in one direction they not only agitate the contents but also move it toward the forward end, while upon rotation in the opposite direction they reverse the end-wise movement and force the mixture toward the rear where it is picked up by the bucket formations 18 and carried to the discharge opening 15.

The discharge mechanism constituting the present invention as here shown comprises a tube or conduit 20, one end of which may pass through the bearing ring 16, and into the discharge opening 15, as clearly shown in Figure 2, which tube or conduit may project rearwardly from the rear wall 14 any suitable distance, say from 2 to 5 feet or more. This conduit 20 is preferably rotatable with the drum 7 and there is provided within the said conduit one or more helically disposed baffles or vanes 21 which may be welded or otherwise suitably secured to the inner surface of the tube 20. The said baffles 21 extend substantially radially inwardly from the inner surface of the tube and their inner edges are preferably secured to an axial core or tube 22, the ends of which are or may be closed as at 23. While not absolutely essential it is preferred to provide as many helical baffles or vanes 21 as there are mixing blades 17 within the drum and to arrange them as substantial continuations of said blades, and for the purposes of illustration three such baffles and blades have been herein indicated, although obviously a greater or less number may be employed as occasion may demand. The helical baffles 21 together with the core member 22 completely close the conduit 20 against direct longitudinal movement of the material therethrough at all times, whether the receptacle 7 be stationary or rotating in either direction. On the other hand the elements 21 and 22 provide tortuous channels 24 within the conduit 20 through which the concrete mixture may find its way during discharge, as for example when the drum is rotated in the direction of the arrow B of Figure 2 at which time the mixing blades 17 and pick up buckets 18 will move the mixture toward the right as viewed in Figures 1 and 2 and discharge it into the said tortuous channels 24 whereupon it will be picked up by the helical blades or baffles 21 and its movement toward the right further continued until it is discharged at the outer end of the conduit 20. When the drum is being rotated in the reverse direction indicated by the arrow A in Figure 2 for mixing purposes the said vanes or baffles 21 will tend to move any material which may find its way to the discharge opening toward the left as viewed in said figure and will thereby effectively prevent leakage or undesired discharge of the mixer notwithstanding the fact that no tight removable closure is employed. At the same time the channels 24 provide adequate vents to the external atmosphere through which any gases formed through the hydration of the cement may find their way, as will be readily understood.

At the outer or discharge end of the tube or conduit 20 there is provided a chute or hopper 26 for guiding and directing the mixture into a suitable trough or other conveyor 27 by means of which it may be conveyed to the point of use.

In as much as the discharge opening of the drum is at all times open to the atmosphere it is possible to introduce the water necessary for the mix through said opening, thereby eliminating the necessity for the use of stuffing-boxes at the forward end of the drum, as has heretofore been the case where the water pipe was introduced through the front journal. For this purpose there is provided a water-receiving tank or receptacle 28 positioned adjacent the rear of the apparatus and above the conduit 20, see Figure 1, from which receptacle a valved water pipe 29 may lead, the discharge end of which pipe may extend through the wall of the chute 26 so as to discharge water into the interior of the conduit 20. If desired this pipe may be extended through the central tubular member 22 and into the interior of the drum 7, or in some instances, said member 22 may be employed as a portion of the water conduit by merely causing the end of pipe 29 to enter the outer end of the member 22 as will be readily understood. Of course in this case the inner end 23 and/or side walls of member 22 may be perforated to permit the water to enter the drum. However, it is preferred to position the discharge end of the water pipe 29 at or adjacent the outer end of conduit 20 in as much as the latter provides a ready means for introducing the water into the drum, and the spraying of the water into the outer end thereof effectively washes its surfaces as well as those of the vanes 21 and core 22, preventing hardening and building-up of concrete deposits thereon. Furthermore, if the water supply pipe is not extended into the drum the danger of clogging thereof through the hardening of the concrete mixture is eliminated, and it is also unnecessary in such case to provide any special valve or protector at the end of the water pipe for preventing entry of the concrete mixture into the pipe, as has been heretofore necessary where the pipe extended a considerable distance into the mixing receptacle from the forward end.

While the present mechanism is adapted for use in connection with mixers of the rotating drum type in which the drum is mounted with its axis substantially horizontal it is of special importance in connection with the high dis-

charge mixers, whether they be of the normally horizontal drum type in which the high discharge is accomplished through elevation of the rear end of the mixing unit as described and claimed in the copending application of Charles F. Ball, filed May 16, 1931, Serial No. 537,926, now Patent No. 1,998,749, granted April 23, 1935, or whether they be of the fixed, inclined axis type disclosed in the co-pending application of Charles F. Ball filed March 9, 1932, Serial No. 597,829, now Patent No. 2,018,112, granted October 22, 1935. For purposes of illustration the present invention has been shown as applied to the conoidal drum type having a fixed inclined axis such as that shown in the last mentioned application and as will be readily apparent from Figures 1 and 2, the elevation of discharge may be materially increased through the employment of the tube or conduit 20. The extent of this elevation will of course depend upon the length of the said tube, which may be varied within considerable limits as will be readily understood.

It is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure except as may be required by the claims.

What we claim is:

1. In concrete mixing and analogous apparatus having a rotatable agitation receptacle provided with a discharge opening, a perimetrically closed conduit open at both ends, secured to said receptacle in communication with and extending outwardly from said opening; and members within said conduit arranged to completely prevent direct axial discharge of the receptacle contents when said receptacle is charged with material to a level above the axis of said discharge opening.

2. In concrete mixing and analogous apparatus having a rotatable agitation receptacle provided with a discharge opening, a perimetrically closed conduit open at both ends, secured to said receptacle in communication with and extending outwardly from said opening; and means including baffles within said conduit, arranged to transversely obstruct the same to completely prevent direct axial discharge of the receptacle contents when said receptacle is charged with material to a level above the axis of said discharge opening, said baffles however providing indirect non-axial passages through which said contents may be discharged during the discharging operation.

3. In concrete mixing and analogous apparatus having a rotatable agitation receptacle provided with a discharge opening, an open-ended conduit secured to and rotatable with said receptacle, and extending from said opening; and baffle members within and rotatable with said conduit, providing tortuous passages through which the material may pass from the receptacle as the latter together with the conduit are rotated in one direction, said baffles however completely preventing direct longitudinal movement of the material through the conduit.

4. In concrete mixing and analogous apparatus having a rotatable agitation receptacle provided with an axial end discharge opening, a perimetrically closed conduit open at both ends, secured to said receptacle in communication with and extending outwardly from said opening; and means including spaced helically disposed baffles secured within said conduit, arranged to transversely obstruct the same to completely prevent direct axial discharge through said conduit of the receptacle contents when said receptacle is charged with materials to a level above the axis of said discharge opening, said baffles however providing helical passages open to the atmosphere through which said contents may pass during the discharging operation.

5. In concrete mixing and analogous apparatus having a rotatable agitation receptacle provided with an axial end discharge opening, a perimetrically closed conduit open at both ends, secured to said receptacle in communication with and extending outwardly from said opening; and means including a central core member surrounded by a plurality of helically disposed baffles, secured within said conduit and arranged to transversely obstruct the same against direct axial discharge of the receptacle contents when said receptacle is charged with materials to a level above the axis of said discharge opening, said core member and baffles however providing helical passages open to the atmosphere through which said contents may pass during the discharging operation.

6. In concrete mixing and analogous apparatus having a rotatable agitation receptacle provided with a discharge opening at one end, and agitating blades and pick-up buckets within said receptacle arranged through rotation in one direction to agitate and move the material away from said opening, and through rotation in the opposite direction to agitate and move the material to and through said opening, the combination of a tubular conduit secured to said receptacle for rotation therewith and extending outwardly from said discharge opening; and helical vanes within said conduit constituting continuations of said blades and buckets, arranged through rotation in said first direction to move any material tending to enter said conduit through said discharge opening back into said receptacle thereby preventing leakage and undesired discharge, and through rotation in said other direction to receive material from said buckets and move it outwardly through said conduit to discharge the same.

7. In a truck concrete mixer having a rotatable mixing receptacle provided with a discharge opening; an open-ended discharge conduit extending outwardly from said opening; means in said conduit arranged to prevent leakage and discharge of the receptacle contents during the mixing operation while maintaining open communication between the interior of said receptacle and the atmosphere; a water tank carried by the truck; and connections between said tank and said discharge conduit for introducing water into said conduit to flush the same, said water passing from said conduit into said mixing receptacle through said discharge opening.

8. In a high-discharge concrete mixer, agitator and the like, a rotatable agitation receptacle having an axial discharge opening in one end wall of smaller diameter than said receptacle, the rotative axis of said receptacle in its discharge position being inclined from the horizontal; a circumferentially closed conduit rotatable with said receptacle and extending axially outward from said opening, arranged to receive the mixture from said opening and conduct it to a point of discharge which is higher than discharge would be from said opening; and means in said conduit for moving the mixture therethrough.

9. In concrete mixing and analogous apparatus,

a rotatable agitation receptacle having an end discharge opening and an axially extending wall; a core member within said wall, disposed substantially parallel to but spaced therefrom; and a helical member disposed between said wall and core member, and forming therewith a perimetrically closed helical passage communicating with said discharge opening through which the mixture may be wormed upon rotation of said receptacle.

10. In concrete mixing and analogous apparatus, a rotatable agitation receptacle having an end discharge opening and a perimetral wall extending from said opening; a tubular member disposed substantially co-axially of said opening; and a helical member intermediate said tubular member and wall with its respective edges secured thereto, said helical member serving to prevent straight-line discharge of the mixture through the space between the tubular member and wall, but being arranged to worm the mixture outwardly through said space upon rotation of the receptacle in one direction.

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