

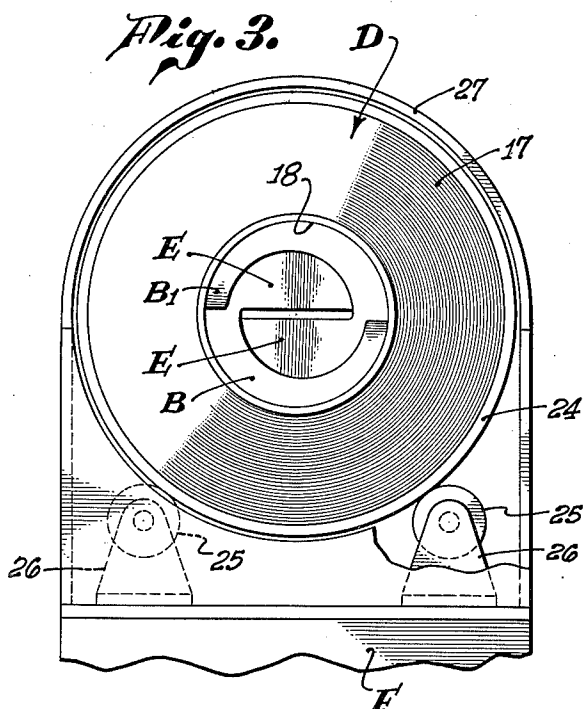
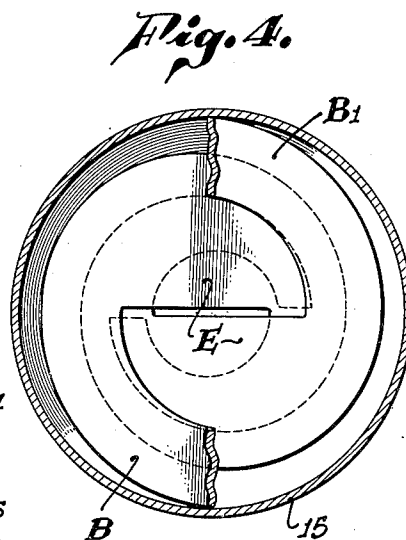
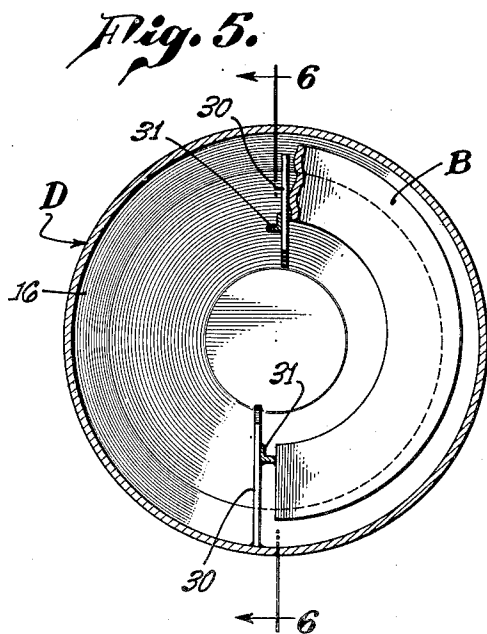
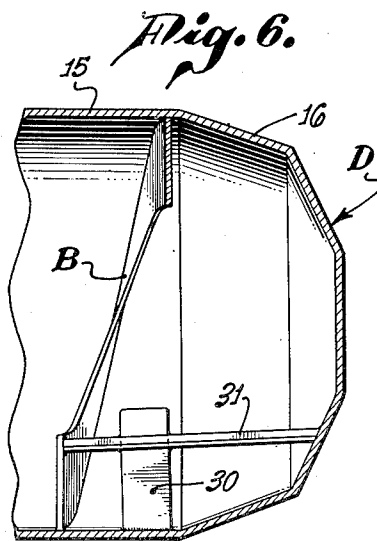
Nov. 18, 1952

J. R. CASTENDYCK
TRANSIT CONCRETE MIXER

2,618,472

Filed May 1, 1950

3 Sheets-Sheet 2



INVENTOR.
JESSE R. CASTENDYCK,
BY
Carroll J. Jones
ATTORNEY.

Nov. 18, 1952

J. R. CASTENDYCK
TRANSIT CONCRETE MIXER

2,618,472

Filed May 1, 1950

3 Sheets-Sheet 3

Fig. 7.

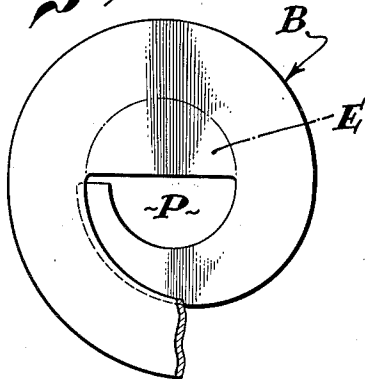


Fig. 8.

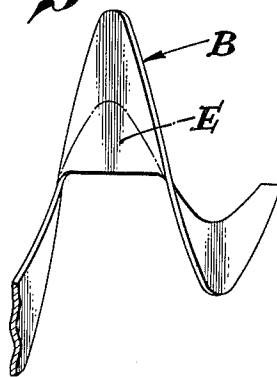


Fig. 11.

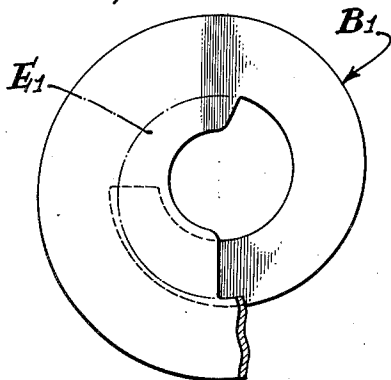
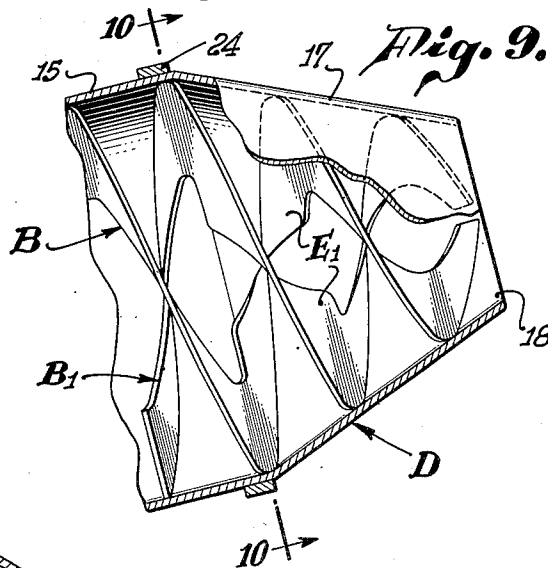
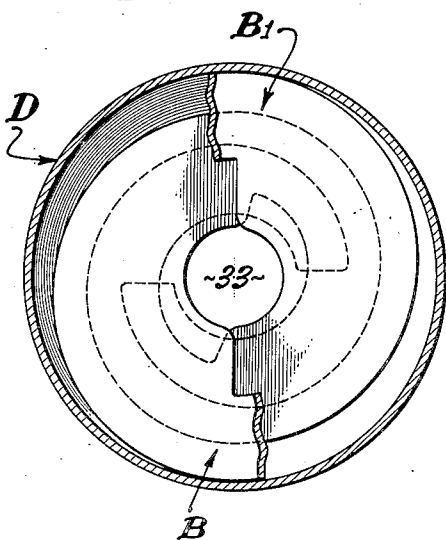


Fig. 10.

INVENTOR.
JESSE R. CASTENDYCK,
BY

Edwin D. Jones
ATTORNEY.

UNITED STATES PATENT OFFICE

2,618,472

TRANSIT CONCRETE MIXER

Jesse R. Castendyck, Downey, Calif.

Application May 1, 1950, Serial No. 159,316

6 Claims. (Cl. 259-161)

1

My invention relates to concrete mixing apparatus and more particularly to transit mixers in which a mixing drum is mounted on a motor vehicle to receive a load of aggregates, cement and water, at a supply source and mix the batch while the vehicle is enroute so that upon arrival at the job the concrete is ready for use.

Specifically, although not necessarily, my invention has reference to that type of transit mixer in which the drum as rotatably mounted on the vehicle is inclined upwardly toward the rear end of the vehicle, and its high end is open so that both feeding and discharging of the concrete may be effected at that end of the drum. Fixed in the drum are blades which, under rotation of the drum in one direction, operate to mix and feed the aggregates toward the closed forward end of the drum. This operation of the blades takes place during transit of the vehicle to the job. Upon arrival at the job the drum is rotated in the other direction, resulting in the blades operating to discharge the concrete from the rear open end of the drum.

During transit of this type of mixer to a job, spillage and consequent loss of concrete occurs from the rear open end of the drum. This is due to the sudden forward motions to which the drum is subjected resultant of quick starting and acceleration of the truck, as well as to upward tilting of the drum as when the truck is ascending a steep grade and its speed is suddenly increased. To prevent such spillage the open end of the drum of present mixers is provided with a closure which is mounted independently of the drum to open or close the drum opening. Not only does this closure and the actuating means therefor add materially to the cost of the mixer, but it requires frequent repair since, when in closed position, although in contact with the drum, it cannot rotate with the drum and thus is subjected to constant wear which makes it difficult to prevent leakage of the liquid content of the concrete from the drum and thereby maintain the original quality of the concrete.

Of course, in the helical bladed mixers without closures, spillage of concrete invariably occurs during transit in spite of the inward feeding action of the blades, since the spacing of the blades from each other provides an unobstructed passage generally axially coincident with the drum opening, through which the concrete is free to be thrown when the drum is subjected to sudden forward movement or when ascending a steep inclination, or both.

To minimize spillage, users of such mixers reduce the yardage of aggregates supplied to a mixer considerably below the maximum capacity of that mixer. Naturally this greatly reduces the pay load of the mixer.

It is the purpose of my invention to provide a transit concrete mixer of the type described, which eliminates the need of a closure and yet completely prevents spillage of the concrete therefrom during transit, regardless of the in-

2

tensity of the sudden forward motions of the mixer, the steepness of any inclination ascended thereby, or any combination of the two. In achieving this result one is enabled to increase the concrete carrying capacity of a mixer to its maximum without spillage.

In the attainment of this non-spillage function in a mixer having helical mixing blades, the blades, preferably at points adjacent the open end of the drum, are provided with elements which co-act to form a dam in the passage between the blades that prevents the aggregates from being thrown rearwardly within and outwardly of the drum, while at the same time not interfering with the normal feeding of the aggregates by the blades when charging the drum.

When discharging concrete from the drum under reverse rotation of the blades, these damming elements serve to prevent the concrete from spilling off of the blades, and thus tend to pack it adjacent the drum opening, resulting in a positive and rapid discharge of the concrete from the drum, and thereby lessening the time normally required to empty the drum.

I will describe only two forms of mixers, each embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings:

Fig. 1 is a view showing, in side elevation, a truck having mounted thereon one form of concrete mixer embodying my invention.

Fig. 2 is an enlarged vertical longitudinal sectional view of the mixing drum and adjacent parts of the mixer shown in Fig. 1.

Fig. 3 is an end elevational view taken on the line 3-3 of Fig. 2.

Fig. 4 is a vertical sectional view taken on the line 4-4 of Fig. 2.

Fig. 5 is a vertical sectional view taken on the line 5-5 of Fig. 2.

Fig. 6 is a vertical sectional view taken on the line 6-6 of Fig. 5.

Fig. 7 is a fragmentary end elevational view of one of the blades shown in Fig. 2 and illustrating one form of damming element embodying my invention.

Fig. 8 is a fragmentary side elevational view of the blade shown in Fig. 7 and the accompanying damming element.

Fig. 9 is a fragmentary vertical sectional view similar to Fig. 2 and showing another form of damming element embodying my invention.

Fig. 10 is a vertical sectional view taken on the line 10-10 of Fig. 9.

Fig. 11 is a view similar to Fig. 7 and illustrating one of the damming elements shown in Fig. 10.

Referring specifically to the drawings, T designates a motor truck, on the frame F of which a mixing drum D is mounted for rotation in either direction about an axis which is inclined upwardly to the rear end of the truck as is conventional to give a high point of discharge and thus facilitate distribution of the concrete at the job over a greater area.

3

The drum D has an intermediate cylindrical portion 15, a front end conical portion 16, and a rear end conical portion 17 which, at its rear end, is formed with an opening 18 through which the drum may be charged with aggregates through a hopper 19 fixed on the frame F by a superstructure S and extending into the opening.

For mounting the drum D to rotate about an axis inclined upwardly to its rear end, I preferably employ a shaft 20 journaled in a support 21 on the frame F. The upper end of this shaft is fixed to the adjacent drum end, and it carries a sprocket 22 about which an endless chain 23 is trained and adapted to be driven by any suitable means (not shown) for selectively rotating the drum in either direction.

The drum D at the rear end of the cylindrical portion 15 has fixed thereto a bearing rim 24, and rollers 25 engage the rim for rotatably supporting the drum at this point. The rollers are mounted in suitable brackets 26 (see Fig. 3) and the drum is confined on the rollers by a yoke 27 fixed to the frame F and extending over the drum.

Fixed to the inner wall of the drum D in any suitable manner, such as by welding, is a main helical blade B which extends preferably from a point adjacent the closed end of the drum (see Fig. 2) to and through the cylindrical and rear conical portions 15 and 17. The greatest width of the blade is in the drum portion 15, and it is uniform, while in the drum portions 16 and 17 it is reduced in width to correspond to the reduction in internal diameter of these portions.

Also fixed within the drum, as by welding, is a second and subsidiary blade B1 which starts at a point within the cylindrical portion 15 and ends at or adjacent the opening 18. That part of the blade B1 within the portion 15 is preferably of the same width as that part of the blade B in the same drum portion, and in the drum portion 17 its width is decreased to the same degree as the corresponding part of the blade B.

Resultant of the afore-described arrangement of blades B and B1 there is naturally provided between them a passage P which is coincident with the axis of the opening 18. Such a passage is of necessity formed in all mixers having helical blades so arranged, and it is through this passage that spillage of the concrete or its aggregates occurs through the opening 18 during transit of the mixer to a job.

In Figs. 1 to 5, 7 and 8 is illustrated one means for positively preventing such spillage, particularly when the drum is loaded with aggregates having a high slump characteristic. This means comprises damming elements E which are secured to or formed integral with the blades B and B1 at opposite points on the inner edges thereof. The elements are semicircular in outline and of such area that they overlap one another at their linear marginal edges so as to form a partition extending completely across the passage and acting as a dam for the aggregates as will be more fully described hereinafter. In addition the elements E are twisted (see Fig. 8) to follow the same general helical form of the blades, thus offering no impediment to movement of the aggregates inwardly of the drum during rotation of the blades in a direction to effect feeding of the aggregates to the forward end of the drum. Also the elements E are located on the blades at a point sufficiently spaced from the opening 18 so as not to interfere with free flow of the aggregates into the drum when loading the latter through the stationary hopper 19.

4

In Figs. 2 and 6 the front drum portion 16 is shown provided with means for increasing turbulence of the aggregates received therein to effect more thorough mixing thereof, and thus producing a better quality of concrete, and also means for preventing "balling" of the aggregates (the aggregates forming into balls) and rendering the mix non-uniform and difficult of expulsion by the blades.

The means for increasing turbulence comprises a plurality of fins 30, in the present instance two, which are in the form of plates secured, as by welding, at one end to the inner wall of the front drum portion 16 so as to extend inwardly toward the axis of the drum at different angles. One fin is adjacent the flat end of the front drum portion 16, as shown in Fig. 2, while the other is located further rearwardly within the drum. Such an arrangement disposes the fins to opposite sides of the last convolution of the blades B where, under rotation of the drum, they operate to lift and drop the aggregates and thus create a great turbulence thereof.

The means for preventing balling of the aggregates comprises a plurality of bars 31, preferably angle bars, which are secured, as by welding, to the forward wall of the drum at one end and to the blade B at the other, so as to extend longitudinally in the drum and at different points circumferentially therein. Only two such bars are here employed and the shorter one thereof is shown welded to one side of the adjacent fin 30 to provide an additional support for the latter. The longer bar likewise is welded to one side of the other fin 30, and to the end of the blade B.

The afore-described arrangement of bars 31 serves under rotation of the drum, to intercept and separate the aggregates as they cascade from the wall of the drum and the blade B to prevent balling thereof and thus insure a uniform mix.

In operation of the mixer it will be understood that when charging the drum with aggregates through the hopper 19, the drum is rotated in such direction that the blades B and B1 operate to mix the aggregates and at the same time progressively move them forwardly in the drum. When the drum is rotated in the reverse direction the blades function to feed the mix rearwardly and discharge it from the opening 18.

During transit of the mixer to a job, the drum is rotated in that direction as when charging to effect constant mixing of the aggregates, since such mixing must be maintained to prevent setting of the resultant concrete. In consequence the aggregates are being constantly cascaded, that is, lifted and dropped by the inner convolutions of the blade B and the fins 30.

In travelling to a job the mixing drum is subject to sudden forward motions due to starting as well as accelerating the forward speed of the truck while under way. It is these motions, particularly when the truck is ascending an incline, that, in a mixer with conventional helical blades, cause the spillage of the aggregates, since the passage between the blades allows the concrete to be thrown rearwardly and outwardly of the drum opening 18. To reduce the possibility of such spillage, users of the conventional mixer reduce the quantity of aggregates for any given charge considerably below the real capacity of the drum. Obviously this reduces the pay load.

In a mixer wherein the blades are provided with damming elements E, as in my invention, the drum can be charged to its full capacity with-

out the possibility of spillage during transit, inasmuch as the elements completely block off the passage P against the aggregates being thrown rearwardly and out of the opening 18 due to any forward movement of the truck, and regardless of the degree of suddenness of such movement or the inclination of the drum at the time it occurs. This blocking function of the elements is effective irrespective of the slump characteristics of the mixture, and particularly if the slump characteristics are high, because the overlapped arrangement of the elements provides a complete block-off.

When rotation of the drum is reversed for a discharging operation the elements E function to confine the concrete on the blades B and B1 for a time sufficient to effect packing thereof resulting in a more positive and rapid discharge of the concrete from the mixer. The net result is that the drum can be completely discharged in less time than has been heretofore possible.

In Figs. 9 and 11 I have shown the same mixer embodying a modified form of damming element E1 for preventing spillage when mixing aggregates of low slump characteristics, that is, where the solidity of the mix is such that accelerated forward movements of the truck must be extremely sudden to cause ejection of the concrete from the drum.

There are two of these elements E1 at corresponding points on the inner edges of the blades B and B1, and as will be understood, they may be separately formed and secured to the blades, or formed integral with the blades. They are located along the length of the blades at the same general point as are the elements E in the other form of my invention, and so as to be disposed within the rear drum section 17 and spaced inwardly from the opening 18.

The elements E1 are of arcuate form, helically twisted, and tapered from end to end to correspond to the taper of the blades. Additionally, they are reversely disposed lengthwise on the blades so as to coact in partly blocking or damming the passage P. This construction and arrangement of elements leaves an opening 33 (see Fig. 10) between the elements through which the shaft 20 if lengthened to an open end of the drum and mounted to support the drum at both of its ends, could be extended without altering the construction of the elements.

It has been found in practice that while the elements E1 block off the passage P only partly, it is sufficient to prevent spillage under any travelling condition when mixing batches having low slump characteristics. As with the elements E they do not interfere with charging of the drum, and they function to prevent spilling of the concrete from the blades in the same manner as the elements E and for the same purpose of packing the concrete to accelerate its discharge from the drum.

It is to be understood that various changes and modifications may be made herein both as to the shape of the mixing drum, the blades, the fins and the bars therein, and more particularly the form and arrangement of the damming elements in the drum, without departing from the spirit of my invention and the spirit and scope of the appended claims.

What I claim is:

1. A concrete mixer, including: a rotatable mixing drum having an intermediate cylindrical

portion, a front conical portion which is closed at its front end, and a rear conical portion which is open at its rear end to provide a feeding and discharge opening for aggregates; a main helical blade fixed within said drum and substantially coextensive in length therewith; a subsidiary helical blade fixed within the rear conical drum portion and extending part way into the cylindrical drum portion; and elements fixed on said blades at a point within the rear conical drum portion for blocking off the space between the blades at one point along the length thereof.

2. A concrete mixer, including: a rotatable mixing drum having a rear end portion; a pair of helical blades fixed at their outer edges to the inner wall of said portion to provide a straight passage leading to the rear end of said portion; and a pair of elements fixed on the inner edges of said blades in alignment with the respective blade and extending inwardly therefrom to substantially span said passage.

3. A concrete mixer, including: a rotatable mixing drum the rear end portion of which is of truncated conical form; a pair of helical blades fixed at their outer edges to the inner wall of said portion to provide a straight passage leading to the rear end of said portion; and a pair of elements of substantially semi-circular outline having their curved edges fixed respectively to the inner edges of said blades in alignment therewith at diametrically opposite points between the ends of said portion and their straight edges extending to opposite sides and diametrically of the axis of said passage.

4. A concrete mixer, including: a rotatable mixing drum the rear end portion of which is of truncated conical form; a pair of helical blades fixed at their outer edges to the inner wall of said portion to provide a straight passage leading to the rear end of said portion; and a pair of elements of arcuate form, helically twisted, and tapered from end to end to correspond to the contour of the blades, the outer edges of the elements being fixed respectively to the inner edges of the blades at diametrically opposed points and so that the elements are reversely disposed lengthwise on the blades with their inner edges extending into said passage whereby the elements partly block off the passage.

5. A concrete mixer, including: a rotatable drum having an open end and a closed end; a helical blade fixed within the drum and extending into the closed end of the drum; fins fixed at one end within the drum adjacent the closed end thereof and extending radially inward of the drum; and bars fixed at their ends to the closed end of the drum and to said blade so as to extend longitudinally of the drum.

6. A concrete mixer as embodied in claim 5, wherein the bars are fixed between their ends to the fins.

JESSE R. CASTENDYCK.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
861,235	Huyck	July 23, 1907
1,516,773	Lancaster	Nov. 25, 1924
2,029,126	Rybeck	Jan. 28, 1936
2,492,249	Willard et al.	Dec. 27, 1949