

July 17, 1934.

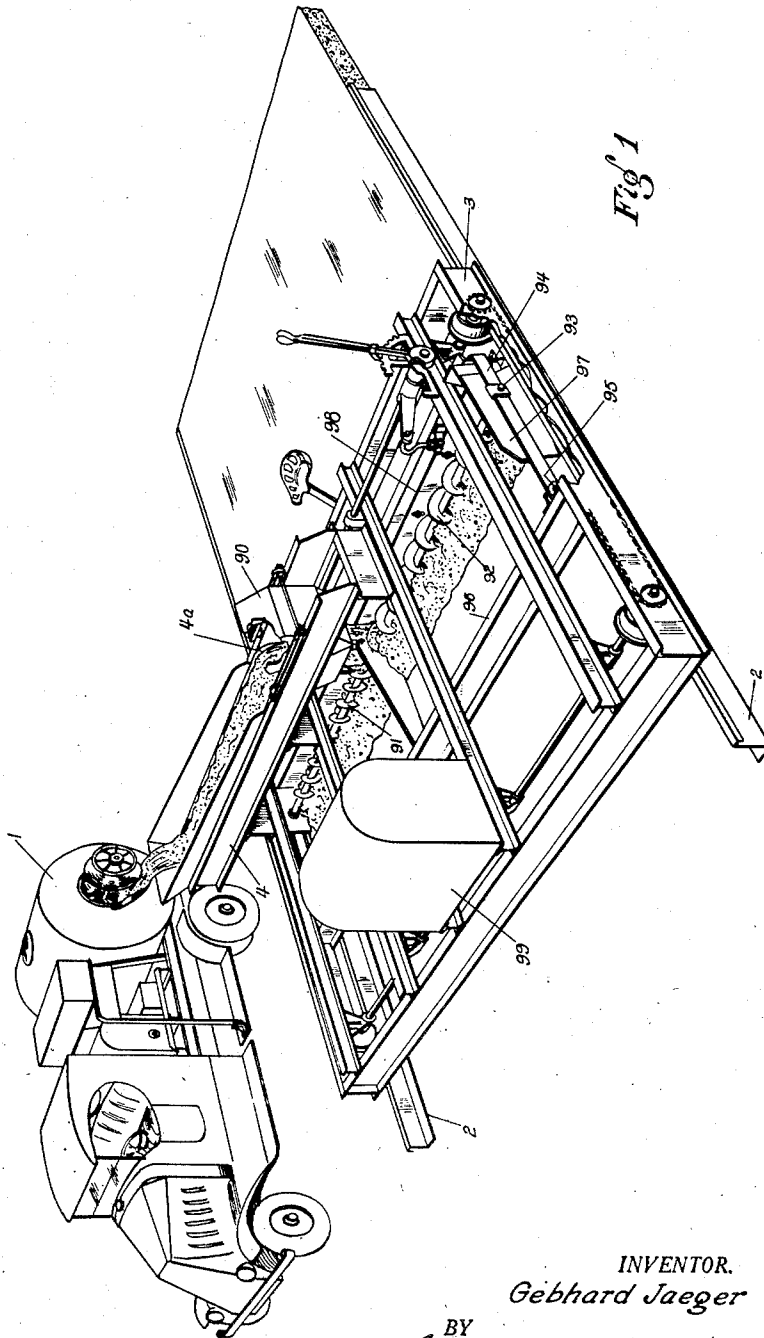
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1,967,178

METHOD AND APPARATUS FOR BUILDING ROADS

Filed March 29, 1932

4 Sheets-Sheet 1



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METHOD AND APPARATUS FOR BUILDING ROADS

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4 Sheets-Sheet 2

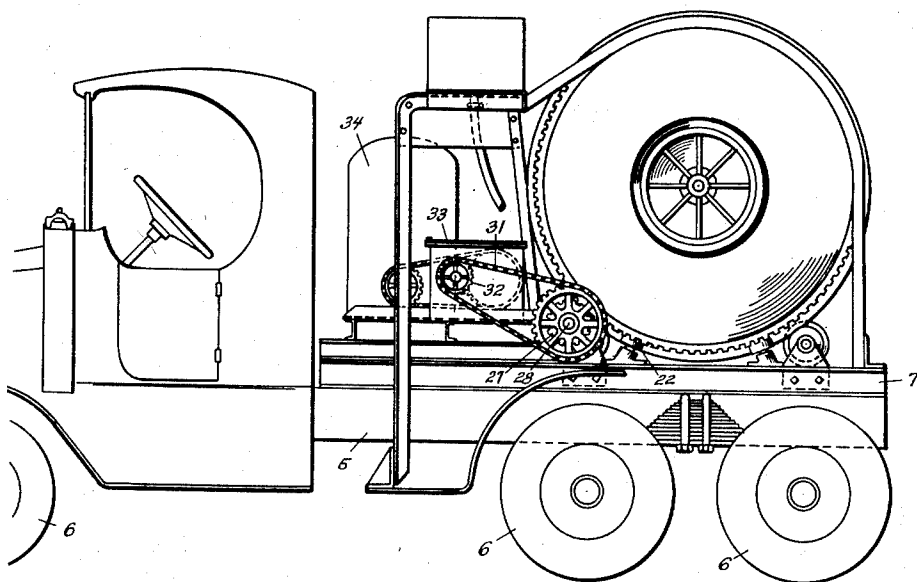


Fig. 2

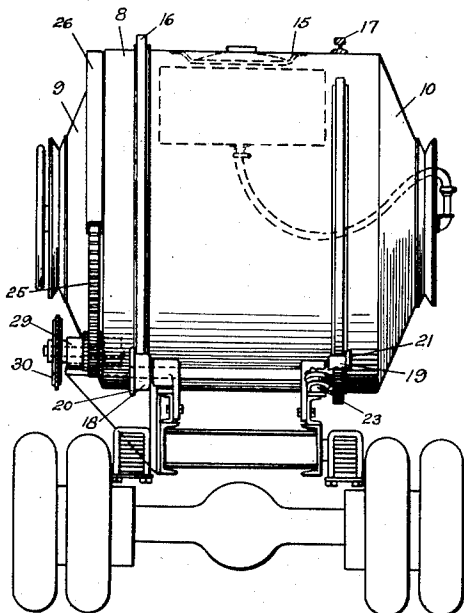


Fig. 3

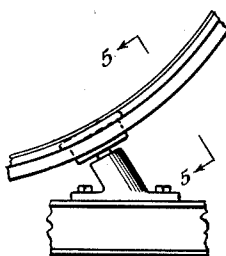


Fig. 4

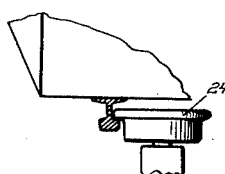


Fig. 5

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METHOD AND APPARATUS FOR BUILDING ROADS

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4 Sheets-Sheet 3

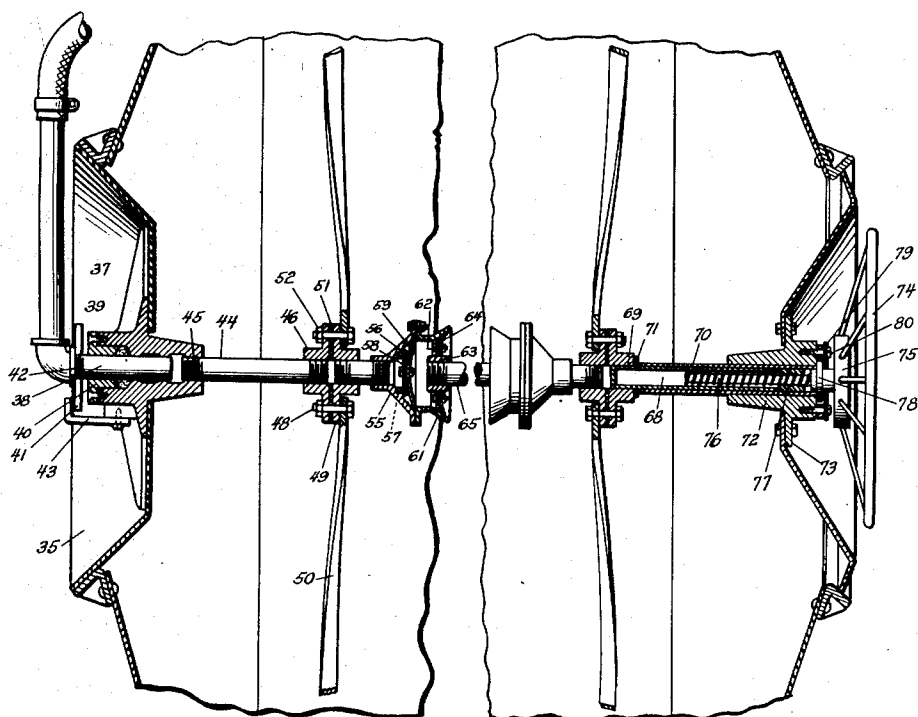


Fig. 6

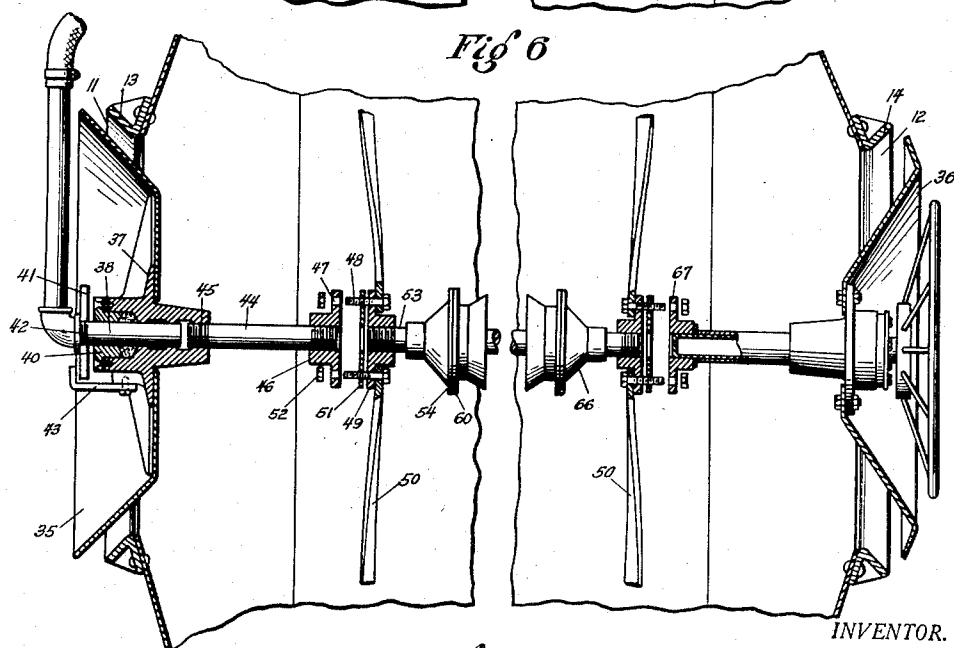


Fig. 7

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METHOD AND APPARATUS FOR BUILDING ROADS

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4 Sheets-Sheet 4

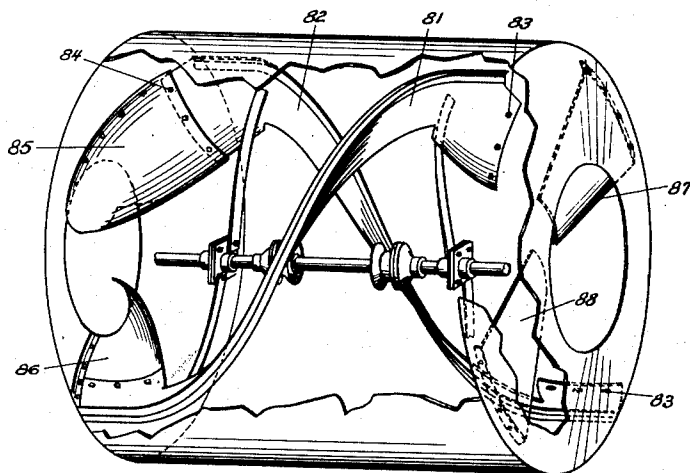


Fig. 8

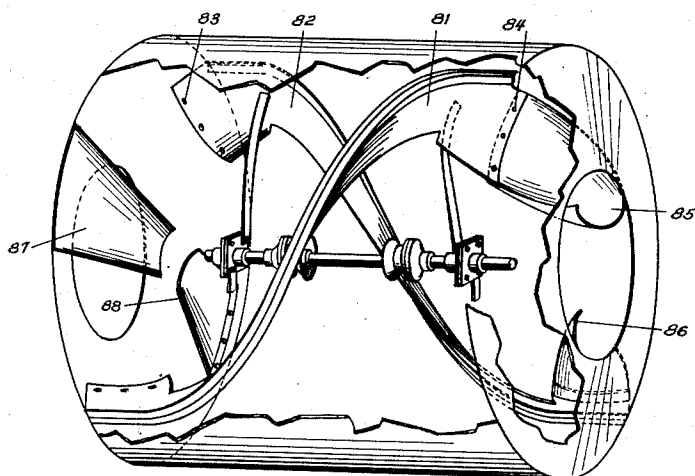


Fig. 9

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1,967,178

METHOD AND APPARATUS FOR BUILDING
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Application March 29, 1932, Serial No. 601,797

13 Claims. (Cl. 94-44)

My invention relates to method and apparatus for building roads. It has to do primarily with the building of concrete roads, although it is not necessarily limited thereto.

One of the objects of my invention is to provide a novel method and apparatus for mixing concrete and delivering it to the road surface to which it is to be applied with a minimum loss of time and with a maximum simplicity of method of application and of apparatus utilized.

Another object of my invention is to provide a truck mixer of such structure that the number of batches of material which may be delivered by a truck in a given period of time will be increased with a consequent increase in the rapidity in the road building operation and with a resultant decrease in the original cost of the motor truck equipment.

Another object of my invention is to provide a means for applying concrete to the road and spreading it thereon, which means is especially suitable in conjunction with truck mixer delivery, though capable of operation independently thereof.

One feature of my invention consists in the provision of truck mixers or trailers therefor, wherein the mixing drum is mounted transversely of the truck or trailer chassis and is so constructed that it may selectively deliver the mixed concrete from either end thereof, depending upon the direction of travel of the truck or trailer and the side of the road which may be selected for the passage of these units towards and from the point at which the concrete is to be delivered to the road. This positioning of the mixing drum transversely of the chassis of the truck or trailer renders possible the mounting of more than one mixing drum upon a truck or trailer with an obvious increase in the number of batches which may be delivered by each truck or trailer unit.

Another feature of my invention resides in the fact that, owing to the transverse disposition of the mixing drum and the delivery of the material from either end thereof, the mixed concrete may be delivered from either end of the drum and pass therefrom in a straight line to the point of application of the material to the road.

Another feature of my invention consists in the provision of a spreader unit which preferably travels under its own power on the road forms and at such a rate of speed that it will synchronize with the movement of the truck mixer or trailer, and with the discharge of the material from the mixing drum in proper amounts to pro-

duce the proper depth of the concrete applied to the road surface.

The preferred embodiment of my invention is shown in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a perspective view of a road structure wherein one form of my truck mixer is shown delivering the mixed concrete to a spreader unit mounted upon the side forms which mark the boundaries of the concrete slab being formed.

Figure 2 is a side elevation of the truck mixer shown in Figure 1.

Figure 3 is a rear elevation of the truck mixer shown in Figure 2.

Figure 4 is a detail view of a part of the means which I preferably use for holding the mixing drum upon the truck chassis.

Figure 5 is a section taken on line 5-5 of Figure 4.

Figure 6 is a detail, in section, of the drum with parts partially broken away and illustrating the means for closing the ends of the drum.

Figure 7 is a view similar to Figure 6, but illustrating the manner in which the end closures of the drum and their associated parts may be disconnected preliminary to the transposition of these end closures, respectively, to the opposite ends of the drum.

Figure 8 is a perspective view, partially broken away and showing the blades of my mixing drum in position for delivering the concrete to the left hand end of the drum.

Figure 9 is a view similar to Figure 8 but showing the manner in which the blade structure may be readjusted to effect delivery of the mixed concrete to the right hand end of the drum.

In the drawings, one form of truck mixer which I may use is shown generally in Figure 1 and is designated 1. In this figure, it is shown disposed along one side of a road-way to which a concrete slab is being applied as indicated by the side forms 2. Disposed in cooperative relation to the truck mixer is a spreader device 3 which is equipped with a conveyer 4 for receiving the concrete from the mixer and delivering it to the spreader. The structure of the spreader will be subsequently described more in detail.

The truck mixer is shown best in Figures 2 to 9, inclusive. It comprises a chassis 5 carried upon wheels 6 and in turn carrying a rectangular framework 7 for the support of a mixing drum and the operating parts therefor.

The mixing drum, designated 8, is mainly of cylindrical form but may be provided with con-

cal ends 9 and 10. Each conical end of the mixing drum is provided, as shown in Figures 6 and 7, with a circular aperture and these are, respectively, designated 11 and 12. Each circular aperture 6 is provided on the exterior thereof with a ring member, 13 and 14, these ring members being provided with machined drip surfaces, so that either aperture may be used, with equal facility, as a delivery aperture.

10 It will be noted that the mixing drum 8 is mounted transversely of the chassis of the truck and further description of my apparatus will show that the mixing drum may be caused to deliver the mixed concrete from either end of the drum, 15 depending upon which side of the slab is being traversed by the truck mixer and the direction of travel thereof.

The mixing drum is further provided on its side with a charging door 15 so that the drum 20 may be charged from the top. This charging door preferably fits into a machined surface on the drum. It is preferably of circular form and provided with a machined surface so that it will be self-cleaning, water-tight, and otherwise tight, 25 without dependence upon gaskets of any kind.

The mixing drum is preferably supported and held upon the rectangular framework 7 through the medium of annular rail members 16 and 17 which are disposed in spaced relation upon the 30 cylindrical portion of the drum and which are secured thereto in any suitable manner. To effect this supporting and holding action, supporting rollers or wheels 18 and 19 are so disposed upon the rectangular framework 7 that they form 35 cradles for the tracks 16 and 17 while the flanges 20 and 21 of the rollers 18 and 19 hold the mixing drum against lateral displacement.

In further cooperation with the track members 16 and 17, I have provided rollers 22 and 23 which 40 are disposed between the tracks 16 and 17 and which bear against the inner side thereof. As shown in Figure 5, each of the rollers 22 and 23 is provided with a flange 24 which hooks beneath the head of the rail with which it cooperates to 45 preclude upward displacement of the mixing drum.

The mixing drum is rotatable in either direction by means of a circular rack member 25 which is secured to the drum adjacent one end thereof 50 and which is preferably covered by a guard member 26. This circular rack member is adapted to be driven by a gear 27 carried upon a shaft 28 which is journaled in bearings 29 and which carries a sprocket 30. The sprocket 30 is preferably 55 driven by a sprocket chain 31 which is in turn driven by a sprocket 32. The means for varying the speed or direction of rotation of the sprocket 32 is preferably inclosed in a housing 33 and may vary as to form. Any suitable motor unit may be utilized and such a motor unit is diagrammatically indicated at 34.

The closures for the mixing drum, illustrated best in Figures 6 and 7, are respectively designated 35 and 36. The closure 35 is preferably of 65 such a form that it will remain in position throughout the mixing and discharge operations. The closure 36 is designed to be maintained in closing relation to its aperture during mixing but is adjustable to open position when it is desired to effect discharge of the material which 70 has been mixed.

The closure 35 is preferably of frustro-conical form and is provided at its center with a bearing member 37 through which passes a water 75 pipe 38. Packing 39 is normally held in the

counter bore of this bearing by means of a gland 40.

It will be understood that the mixing drum rotates about the pipe 38 during the operations of mixing and discharge. This pipe 38 is provided 80 with a circular disk 41 which is threaded thereon as at 42, while a hook-like finger 43, secured to the bearing 37, extends outwardly into such cooperative relation to the disk 41 that outward axial movement of the pipe 38 will be precluded. 85

The inner end of the pipe 38 communicates with a pipe section 44 which is threaded as at 45 into the inner end of the bearing 37, so that the pipes 38 and 44 are in co-axial relation with each other. The inner end of the pipe 44 carries a flanged collar 46 with bolt holes 47 90 provided in the flange thereof. These bolt holes 47 are adapted to receive retaining bolts 48 which are carried by a collar 49 and radially extending supports 50 which carry the piping, bells, closures, et cetera. A washer 51 is interposed between the collars 46 and 49. 95

It will be apparent by reference to Figure 7 that the pipe 44, and the collar 46 are detachable by removal of the nuts 52. Because of this construction, it is possible to readily detach these 100 members and to remove the frustro-conical closure 35 together with the pipe 38. Furthermore, it will subsequently appear that these parts are readily transferable to the opposite side of the 105 mixing drum for closing the opening 12 on such opposite side, while the closure 36 may be transferred from the opening 12 to the opening 11.

The collar 49 also carries a pipe section 53 which is normally co-axial with the pipe section 110 44 and which leads into a bell-like member 54. As shown in Figure 6, the bell-like member 54 contains a flared chamber 55 having a series of bosses 56 disposed about a central point for the reception of bolts 57 which secure a metal washer 115 58 thereto. This metal washer 58 in turn carries a flexible washer 59 of somewhat greater diameter than the metal washer. The water delivered through the pipes 38, 44 and 53 passes around the outer edge of the metal washer 58 and passed 120 the flexible washer 59, which operates as a check valve which permits the flow of water or other fluid in one direction but precludes the entrance of extraneous matter into the pipe 53.

The bell-like member 54 is further provided 125 with a supplemental bell structure 60 which is flared as at 61 but which is also provided with a metal washer 62 integrally formed upon a collar 63 and likewise carrying a flexible washer member 64. The collar 63 is internally threaded for 130 the reception of a pipe section 65.

The other half of the pipe structure is substantially identical with the structure just described, as far as the bell structure 66 and the 135 separable collar structure 67 are concerned. The collar member 67, however, is designed to receive a closing plug member 68 which is threaded thereinto as at 69. This plug member 68 fits closely within a cylindrical sleeve 70 whose inner 140 end abuts firmly against a washer 71.

The outer end of the sleeve 70 fits closely within the bearing 72 which is rotatable thereon. This bearing 72 is provided with a circular flange 73 to which is bolted the body portion 36 145 of the closure member.

The means for opening the closure in order to permit discharge of the mixed concrete preferably comprises a hand wheel 74 having a collar 75 and a screw 76. The screw 76 extends into the 150

hollow interior of the plug 68 and cooperates with a non-rotatable nut 77 which is disposed within the said hollow plug. The collar 75 is provided with a radial flange 78 integrally formed thereon and this flange 78 is normally embraced by a washer 79 secured by bolts 80 to the bearing 72.

The operation of this means for adjusting the closure will be readily understood. Rotation of the hand wheel 74, due to co-action of the screw 76 with the internally threaded nut 77, will cause the collar 75 to move outwardly away from the outer end of the sleeve 70. Contact of the flange 78 with the washer 79 will cause the bearing 72 to slide outwardly along the sleeve 70 and the body portion 36 of the closure will move therewith.

The blade structure for effecting mixing or delivery of the concrete depending upon the direction of rotation of the mixing drum, is illustrated best in Figures 8 and 9. In these figures, it will be seen that two main blade elements 81 and 82 are preferably provided. It will be understood that the number of blade elements may be varied as desired. Each main blade element is provided at both its ends with series of bolt holes 83. These main blade elements constitute the principal means which I utilize for the mixing of the concrete. In a general way, they may be said to be of helical form and they act to subject the material of the batch to a continuous lifting and folding action, so as to effect thorough mixing without aerating the material being mixed. Furthermore, their curvature is such that they will tend to feed the material being mixed towards one end of the mixing drum, depending upon the direction of rotation.

Each of the mixing blades 81 and 82 is preferably provided with a delivery section 85 and 86 which is removably secured thereto by means of bolts 84 which may be fitted in bolt holes 83. It will be apparent that these delivery sections may be applied to either end of the blade members 81 and 82, depending upon which end of the mixing drum has been selected as the delivery end.

At that end of the mixing drum which is opposite to the delivery end, I have provided a pair of blades 87 and 88 which may be termed "throw-back" blades. These blades are removably bolted to the end wall of the mixing drum and may be transferred from one end thereof to the other.

In the operation of this complete structure, the batch is introduced through the side wall of the drum, preferably when the charging opening is uppermost, and the water will be delivered axially of the drum as indicated in Figures 6 and 7. During the mixing action, the rotation of the mixing drum in the proper direction, with both ends of the drum closed, will cause the blades to slide and plow through the material so as to give it a fast kneading and folding over action. Simultaneously, the material being mixed will be fed towards that end of the drum which carries the throw-back blades. These throw-back blades will reverse the flow of the material and this mixing and end to end feeding action will effect a thorough mixing without that lifting and pouring action which ordinarily aerates the concrete. When the material is fully mixed, it is merely necessary to reverse the direction of rotation of the drum and adjust the hand wheel on one end thereof to move the closure at that end to that position most suitable for discharge of the material. During this discharge, the sup-

plemental sections 85 and 86 will receive the mixed material from the main blade sections 81 and 82 and deliver it by positive screw feeding action through the open end of the drum, whether this open end of the drum be at horizontal or above horizontal.

From the structure described, it will be seen that the closures 35 and 36 may be interchanged merely by disconnecting the collars 47 and 67. In this way, delivery from either end of the mixing drum may be rendered possible. In order to effectuate this delivery, however, it is desirable to transpose the supplemental blade sections 85 and 86 and the throw-back blade sections 87 and 88. These adjustments merely vary the main direction of mixing movement during the mixing operation or the direction of delivery movement during the delivery operation.

The spreading means which I utilize may take various forms. As already described, it preferably comprises a conveyer 4 whose receiving end is located for the ready reception of the mixed material to be delivered from the mixing drum. This conveyer 4 preferably delivers into a hopper 90 whose lower end delivers to the inner ends of right and left hand screw conveyers 91 and 92. It is desired that the hopper 90 be adjustably mounted so that its delivery end may be adjusted with relation to the adjacent ends of the screw conveyers 91 and 92, to vary the proportion of the mixed material delivered to each screw conveyer.

In the structure which I preferably use, I contemplate the mounting of screw conveyers in axial alignment through the medium of trunnions, such as 93, carried by arms 94 whose forward ends are pivoted as at 95 to a cross beam 96. These arms carry side retaining plates 97. The rear extremities of the arms 94 preferably carry an adjustable strike-off member 98 which is disposed in the rear of the right and left hand screw conveyers. Any suitable means may be provided for vertically adjusting the arms 94 about their pivots 95 to simultaneously raise or lower the screw conveyers and the strike-off blade.

A motor, such as diagrammatically indicated at 99, is preferably mounted upon the spreader member. This motor is provided with means for causing translatory movement of the spreader member along the forms 2, means for driving the screw conveyers 91 and 92 and means for driving the endless belt 4a of the conveyer 4, suitable clutches being provided for control of these mechanisms.

It will be seen from this description that I have provided a superior method and apparatus for use in road building. For one thing, the material which is mixed by the truck mixer is delivered therefrom with a straight-line delivery into a spreading mechanism which applies it immediately to the road. Furthermore, the truck mixer and the spreader may move simultaneously along the road during the delivery of the material from the truck mixer to the spreader and during the delivery by the spreader to the road, though the independent driving means for the mixer and the spreader permit a certain amount of variation in the speed of action of the spreader to insure the delivery of the proper amount of the mixed material to the road.

It will further be seen that I have provided a method for increasing the facility with which the mixed material is delivered to the spreader and for delivering and applying this mixed mate-

rial in a practically continuous way. Thus, where it has hitherto been difficult to maintain the spreading mechanism in continuous operation, my method makes possible the practically continuous supply of properly mixed material to the spreading mechanism so that the spreading of the material upon the road surface can proceed without interruption. Furthermore, the cross-wise mounting of the mixing drums upon the truck chassis or upon a trailer chassis, makes possible the use of more than one drum upon the chassis to increase the number of batches of mixed material that may be delivered in any given period of time. Likewise, the cross-wise positioning of the mixing drum, with the straight-line delivery of the mixed material which is rendered possible thereby brings the delivery opening of the mixer closer to the receiving member of the spreader and facilitates the passage of the mixed material to the point of application.

In addition, the novel form of mixing drum which I utilize, being provided with a top charging opening and with terminal discharge openings at either end, subject to selection at will, increases the flexibility of my method and apparatus, so that it may readily be caused to meet practically any condition which may arise in road building. In other words, the truck mixers may be caused to traverse and deliver from either side of the road and to travel in either direction thereon.

Wherever the term "truck mixer" appears in the claims of this specification, it is intended to also cover a trailer with a mixing drum carried thereon.

Having thus described my invention, what I claim is:

1. The method of building roads which comprises delivering a flow of aggregate to a spreader from a source of supply which is moving along adjacent the side of the surface upon which it is to be spread, and spreading the aggregate across the road surface.

2. The method of building roads which comprises delivering a flow of aggregate to a spreader from a source of supply which is moving along adjacent the side of the surface upon which it is to be spread, and spreading the aggregate across the road surface while additional aggregate is being delivered to said spreader.

3. The method of building roads which comprises delivering a flow of aggregate to a spreader from a source of supply which is moving along adjacent a side of the surface upon which it is to be spread, conducting the delivered aggregate to a point intermediate the side edges of the road surface, and spreading the aggregate in opposite directions across the road surface.

4. The method of building roads which comprises delivering a flow of aggregate to a spreader from a source of supply which is moving along adjacent a side of the surface upon which it is to be spread, conducting the delivered aggregate to a point intermediate the side edges of the road surface, and spreading the aggregate in opposite directions across the road surface while additional aggregate is being delivered to said spreader and conducted to said surface.

5. The method of building roads which comprises delivering a supply of aggregate to a spreader from a source of supply which is moving along adjacent a side of the surface upon which it is to be spread, and spreading the aggregate across the road surface while it is being received by the spreader.

6. The method of building roads which comprises delivering a flow of aggregate to a moving spreader from a source of supply which is moving along with the spreader while the flow of aggregate travels at an angle to the path of travel of the spreader and the source of supply, and spreading the aggregate across the road surface as it is being received by the spreader.

7. The method of building roads which comprises delivering a flow of aggregate to a moving spreader from a source of supply which is moving along with the spreader while the flow of aggregate travels substantially at right angles to the path of travel of the spreader and the source of supply, and spreading the aggregate across the road surface as it is being received by the spreader.

8. Apparatus for building roads or the like which comprises an aggregate containing member disposed adjacent the side of the surface upon which the aggregate is to be spread, a spreader movable along the surface upon which the aggregate is to be spread and including means for spreading the aggregate across said surface as the spreader moves therealong, said aggregate containing member being adapted to move along with said spreader and in cooperative relation therewith, and means for receiving the aggregate from said aggregate containing member and delivering it to said spreading means as said spreader and said aggregate containing member move along together.

9. Apparatus for building roads or the like comprising an aggregate containing member adapted to move along the side of the surface adapted to receive the aggregate, a spreader adapted to move along said surface with said aggregate containing member, means for delivering a substantially-continuous flow of aggregate from said aggregate containing member which flow travels at an angle to the path of travel of said spreader and said aggregate containing member, and spreading means on said spreader adapted to spread the aggregate across the road surface as it is being received by the spreader.

10. Apparatus for building roads or the like comprising an aggregate containing member adapted to move along the side of the surface adapted to receive the aggregate, a spreader adapted to move along said surface with said aggregate containing member, means for delivering a substantially continuous flow of aggregate from said aggregate containing member which flow travels substantially at right angles to the path of travel of said spreader and said aggregate containing member, and spreading means on said spreader adapted to spread the aggregate across the road surface as it is being received by the spreader.

11. Apparatus for building roads or the like comprising a spreader movable along the surface upon which the road building aggregate is to be spread and including means for spreading aggregate across said surface, an aggregate containing mixer disposed adjacent a side of the surface upon which aggregate is to be spread and movable in cooperative relation with said spreader, and means for receiving the aggregate from said mixer and delivering it to said spreading means as said spreader and said mixer move along together.

12. Apparatus for building roads or the like comprising a spreader movable along the surface upon which the road building aggregate is

to be spread and including a screw spreading member for spreading aggregate across said surface, an aggregate containing mixer disposed adjacent a side of the surface upon which aggregate is to be spread and movable in cooperative relation with said spreader, and means for receiving the aggregate from said mixer and delivering it to said screw spreading member as said spreader and said mixer move along together. 80

10 13. Apparatus for building roads or the like comprising a spreader movable along the surface upon which aggregate is to be spread and including a screw spreading member for spreading aggregate across said surface, an aggregate containing mixer having a discharge outlet at right angles to said spreader disposed adjacent a side of the surface upon which aggregate is to be spread, and movable in cooperative relation with said spreader, and means associated with said spreader for receiving the aggregate from the discharge outlet of said mixer and delivering it to said screw spreading member as said spreader and said mixer move along together. 85

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