

[72]	Inventor	Evan S. Prichard Newport Beach, Calif.
[21]	Appl. No.	820,748
[22]	Filed	May 1, 1969
[45]	Patented	Jan. 11, 1972
[73]	Assignee	Challenge-Cook Bros., Incorporated Industry, Calif.

3,334,872	8/1967	Hansen et al.	259/172
3,367,636	2/1968	Duecy	259/169
FOREIGN PATENTS			
839,054	10/1957	Great Britain.....	259/172

Primary Examiner—Marvin A. Champion
Assistant Examiner—Lawrence J. Staab
Attorney—Lyon & Lyon

- | | | | |
|-----------|--|------------------|--|
| [54] | CONCRETE TRANSIT MIXER WITH FORWARD DISCHARGE MECHANISM | | |
| | 7 Claims, 14 Drawing Figs. | | |
| [52] | U.S. Cl..... | | 259/172,
259/176, 214/522 |
| [51] | Int. Cl..... | | B28c 7/16,
B60p 1/36 |
| [50] | Field of Search..... | | 259/30,
161, 162, 164, 165, 169, 170, 172; 198/88, 92;
214/522 |
| [56] | References Cited | | |
| | UNITED STATES PATENTS | | |
| 3,151,732 | 10/1964 | Oury et al. | 198/92 |
| 3,185,450 | 5/1965 | Duecy | 259/172 |
| 1,231,449 | 6/1917 | Stuart | 198/88 X |
| 3,191,963 | 6/1965 | Prichard..... | 280/81 |

ABSTRACT: A concrete transit mixer vehicle with an inclined rotatable drum-type mixer pointing forward with the charging and discharging open end of the drum positioned rearwardly of the truck cab. A concrete placement arrangement is mounted on the vehicle and comprises a first conveyor section and a discharge section extending from the conveyor section with an articulated connection therebetween and the conveyor section is mounted beneath the drum discharge and pivotable for swinging and elevating movement whereby concrete may be placed throughout the entire area forwardly and to the side of the truck through the articulated movement of both sections. The truck has a half-cab construction with the concrete placement mechanism stowed for on-highway operation by extending the conveyor section forwardly over the cab to the opposite side as the operator and folding the second section to extend rearwardly along the truck on such opposite side.

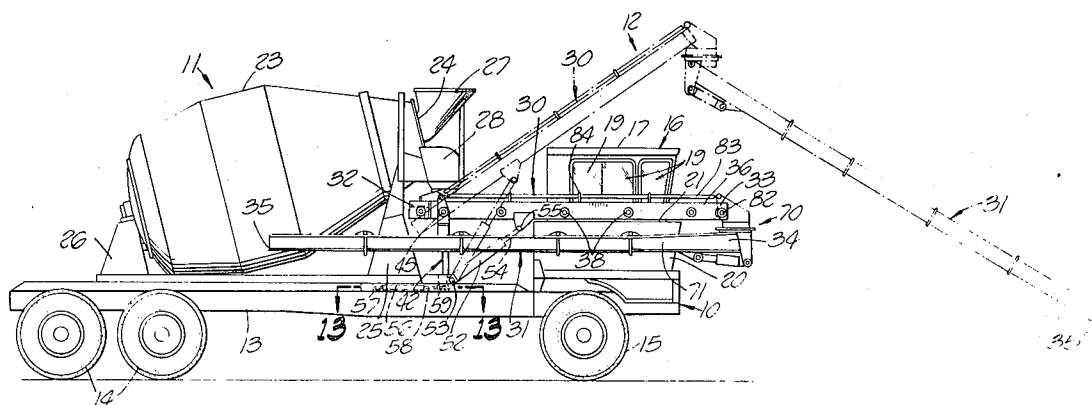


FIG. 1.

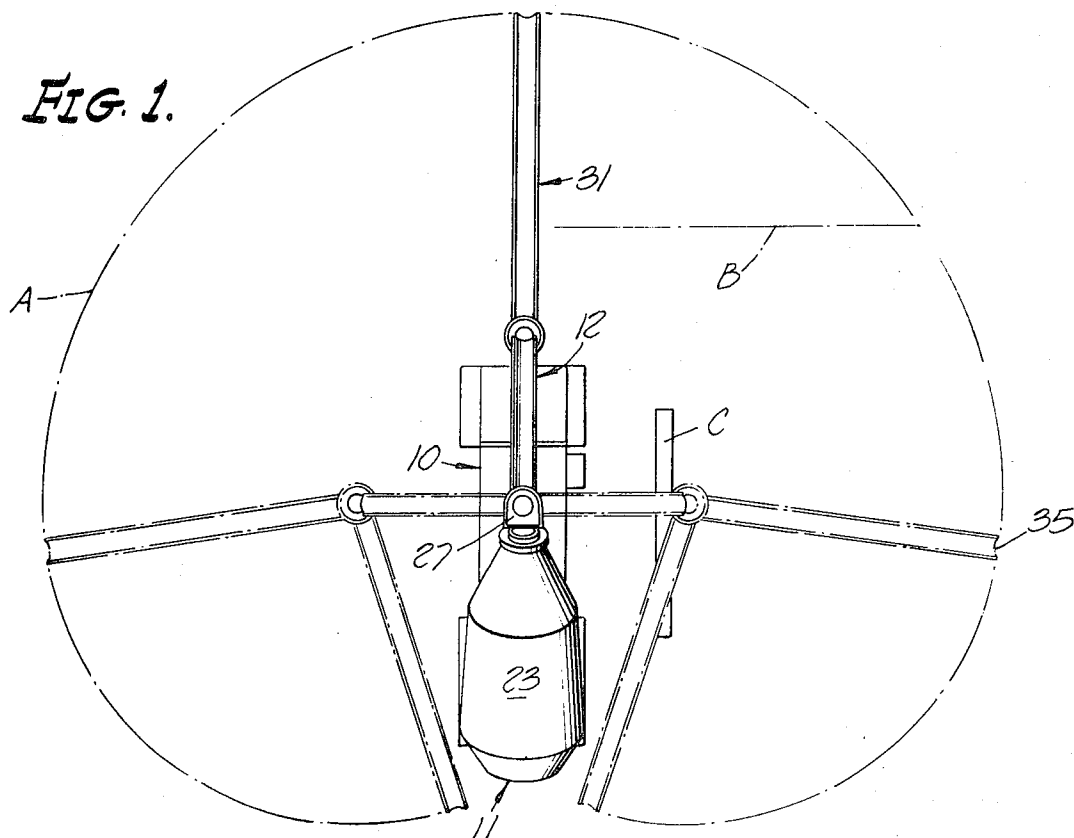
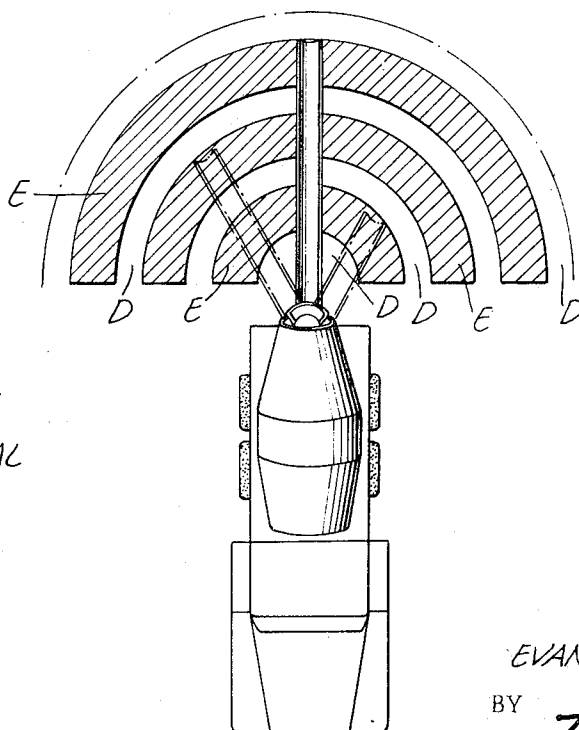
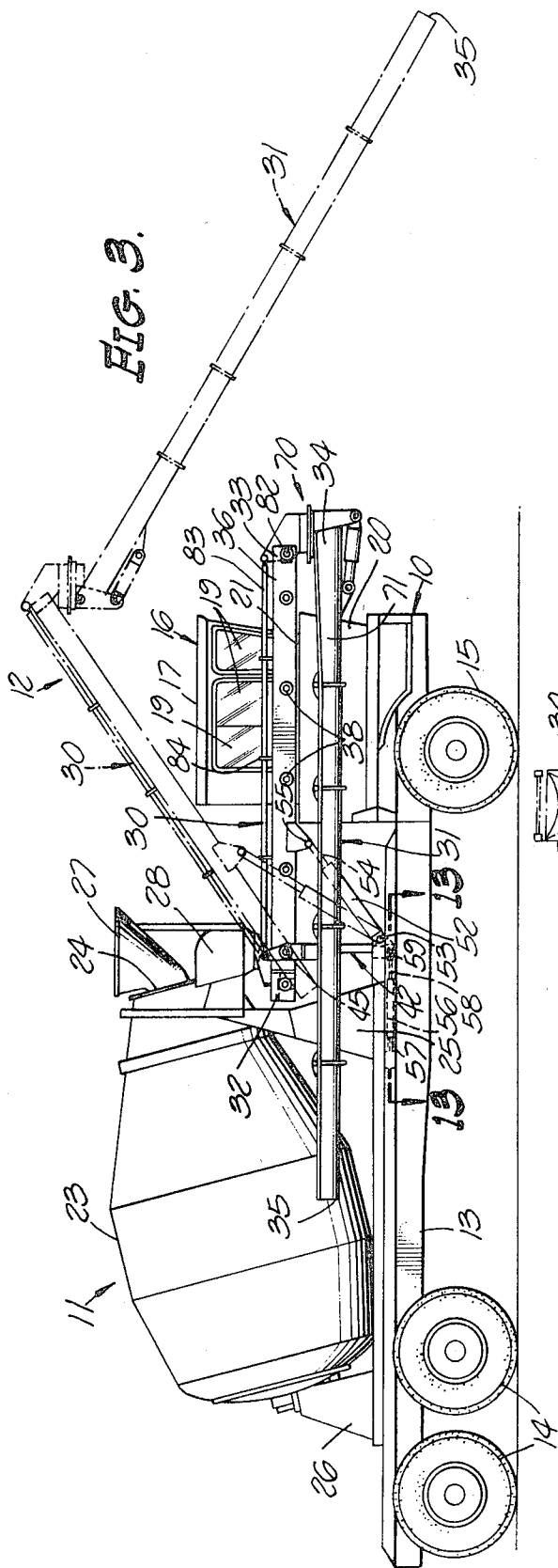
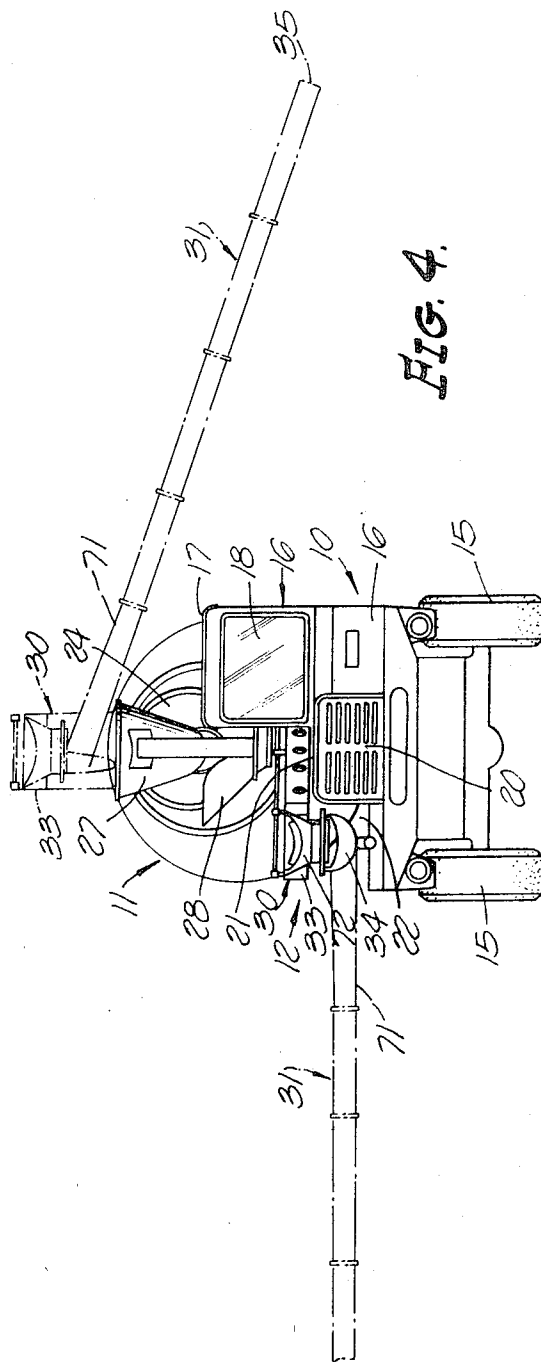


FIG. 2.

PRIOR ART
CONVENTIONAL
PLACEMENT

INVENTOR
EVAN S. PRICHARD
BY *Lyon & Lyon*
ATTORNEYS



INVENTOR
EVAN S. PRICHARD
BY *Lyon & Lyon*
ATTORNEYS

FIG. 5.

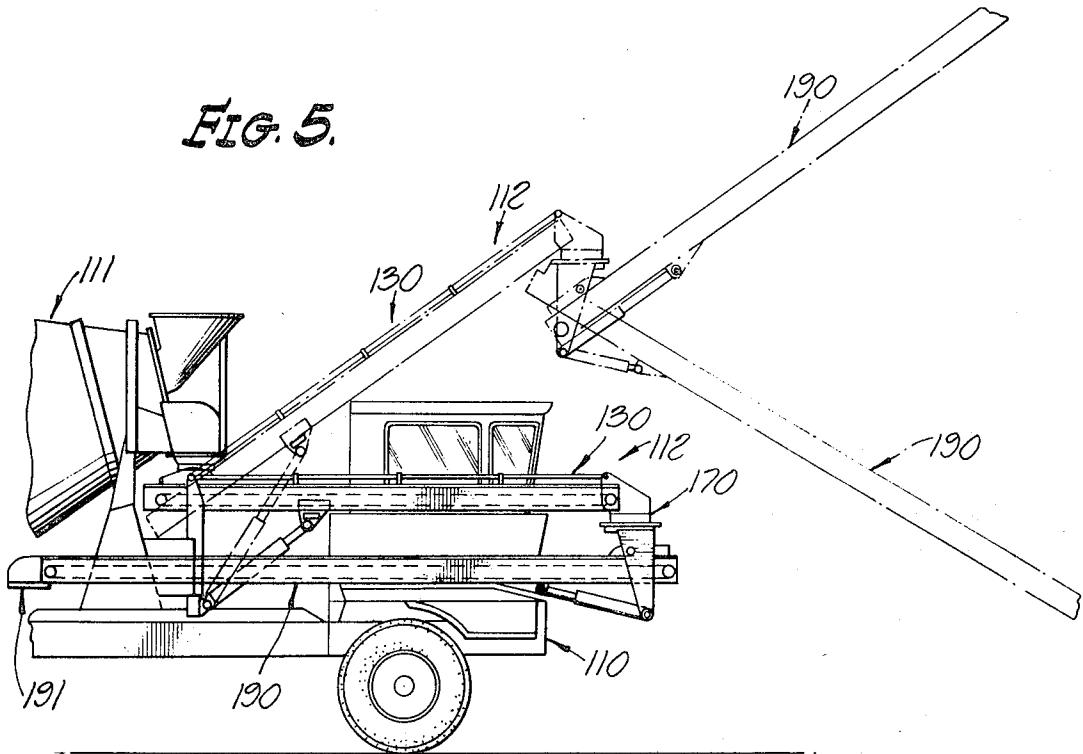
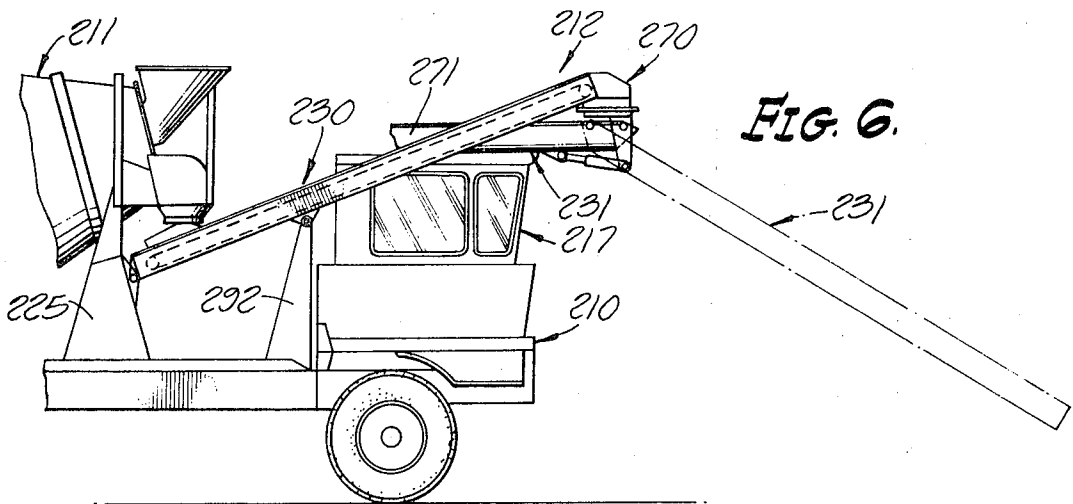
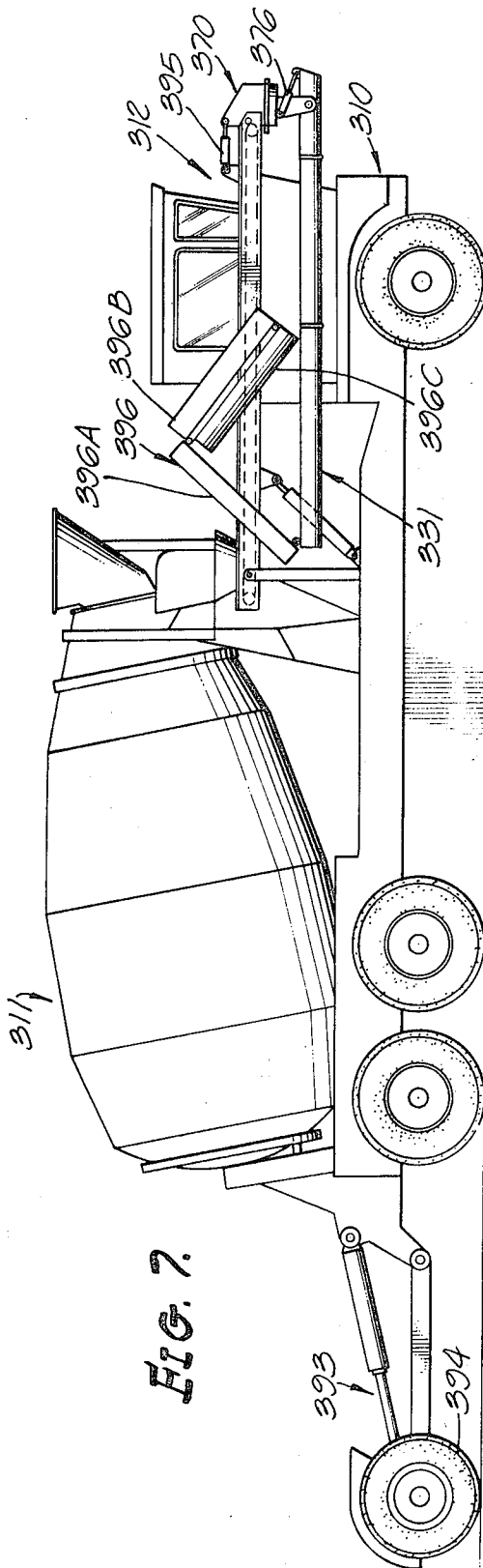
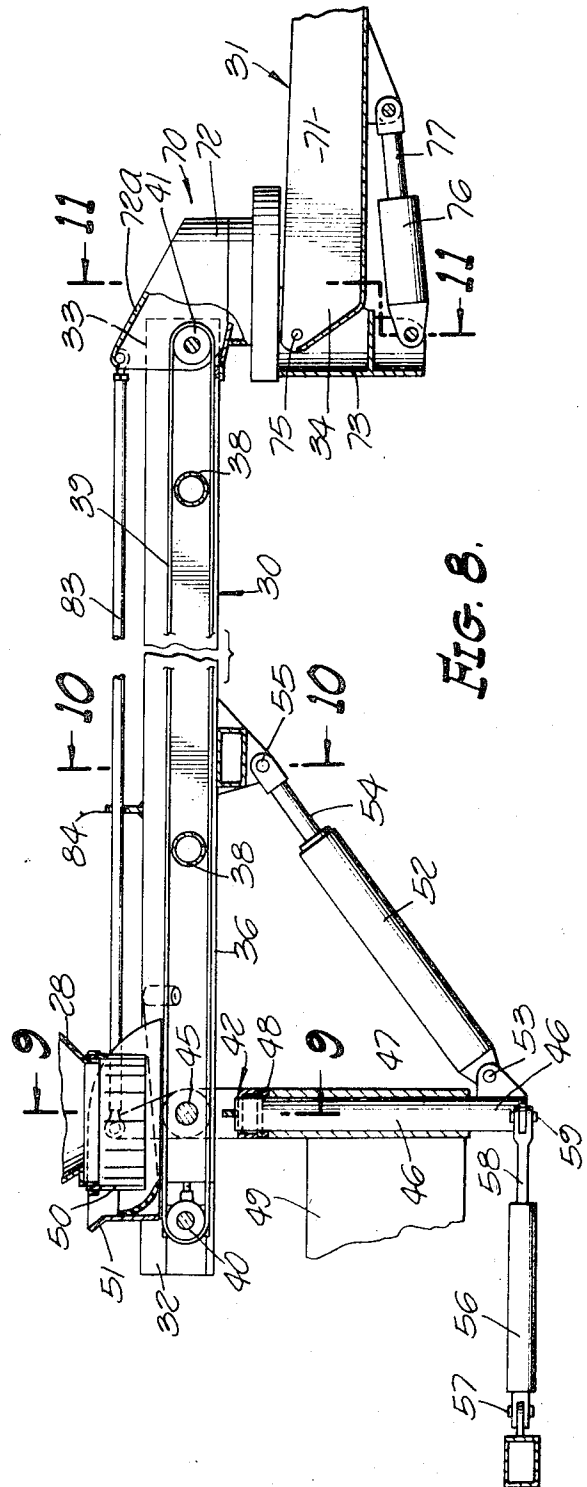


FIG. 6.

INVENTOR
EVAN S. PRICHARD

BY

Lyon & Lyon
ATTORNEYS



INVENTOR
EVAN S. PRICHARD

BY

Lyon & Lyon

ATTORNEYS

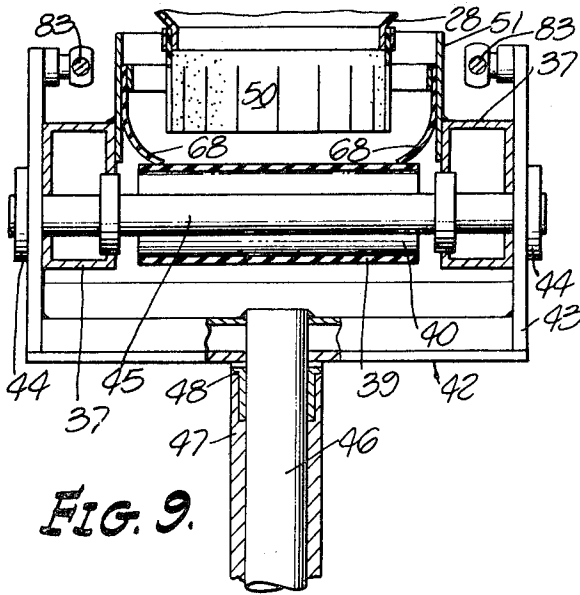


FIG. 9.

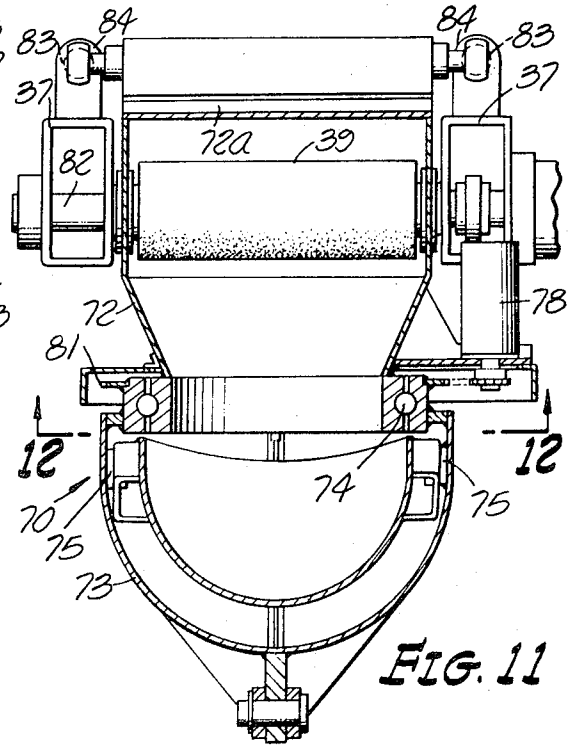


FIG. 11

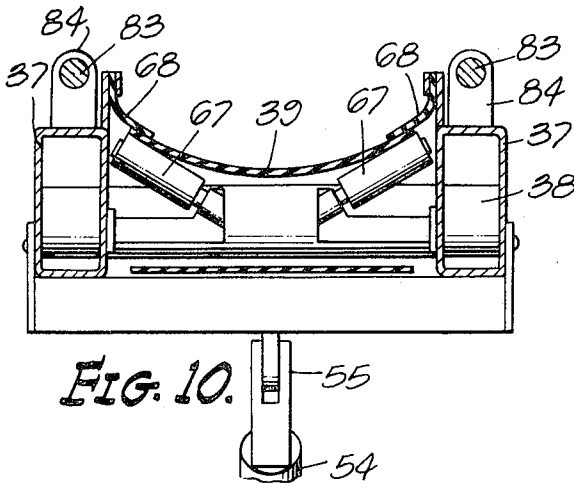


FIG. 10.

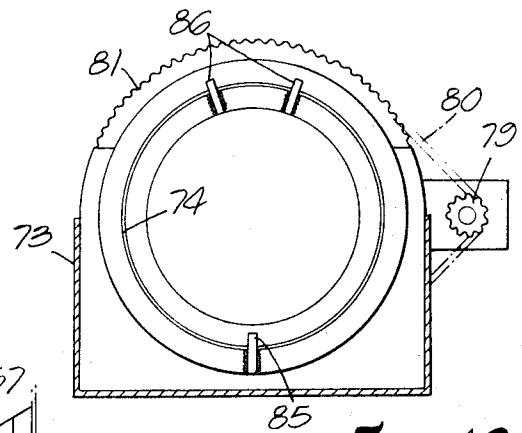


FIG. 12.

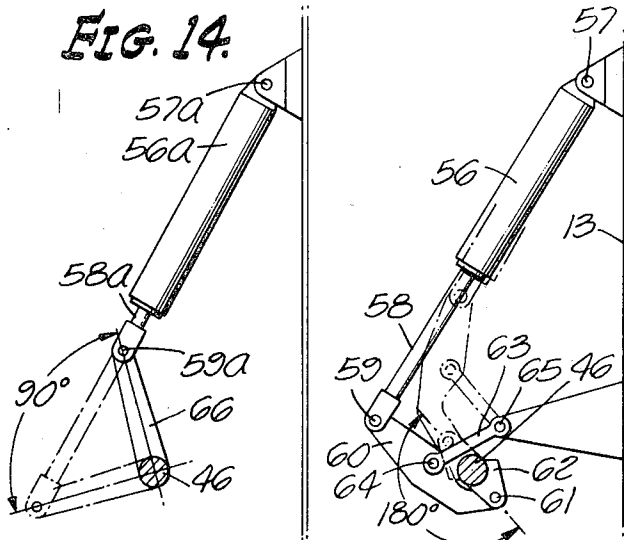


FIG. 14.

FIG. 13.

INVENTOR
EVAN S. PRICHARD
BY *Lyon & Lyon*
ATTORNEYS

CONCRETE TRANSIT MIXER WITH FORWARD DISCHARGE MECHANISM

This invention relates to concrete transit mixer vehicles and in particular is directed to such a truck mixer having a forward-pointing mixer and a concrete conveyor placement mechanism for versatile and convenient placement of the concrete anywhere to the front and side of the truck.

At present the most conventional form of concrete truck mixer employs a rotatable mixing drum with its axis inclined rearwardly and the open end located at the rear of the truck. The concrete is discharged from the open end into the chute which is pivotable from side to side to distribute the concrete. Sections may be added and subtracted from the discharge chute to vary the distance that the concrete is placed from the rear of the truck. Under most circumstances this type of conventional truck mixer must be backed into the job site since the concrete is discharged from the rear of the truck. This is often inconvenient in that the truck operator lacks complete visibility to the rear of the truck. Moreover, the distance of placement of the concrete from the rear of the truck is limited by a combination of the angle of inclination that must be maintained on the discharge chute and the limited height of the discharge opening of the drum.

Another significant disadvantage of the aforescribed conventional rear-discharge-type truck mixer is in the fact that the discharge chute is extended or shortened by adding or removing sections of 3-foot to 4-foot lengths and therefore concrete cannot be discharged directly to the ground area between the end of one chute section and the end of the next chute section but rather the concrete must be manually spread therebetween. Moreover since the conventional discharge chute is rigid and pivoted about a single vertical axis, the concrete can only be discharged in an arcuate path. To overcome either of these deficiencies of conventional truck mixers it sometimes becomes necessary for the operator to move the truck while discharging the concrete thereby requiring an assistant to guide the discharge chute or for the operator to move back and forth between the cab and the rear of the truck.

While there have been attempts to provide mixers with forwardly pointing discharges to overcome some of the deficiencies of the more conventional rear-discharge truck mixers, these attempts have introduced still other deficiencies and problems such as requiring unusual mixer drum shapes or special truck cabs or vehicle construction thereby rendering the resultant truck mixer excessively expensive. Still other mixer units have been constructed with relatively versatile concrete discharge and placement means but these have been limited to off-highway operation and are not readily adaptable for on-highway operation due to the many restrictions and requirements for highway operation. For example conveyor discharges have been used on off-highway vehicles but the stowage of such conveyors for on-highway operation has heretofore presented an insurmountable obstacle to adaption for on-highway operation.

In summary, it is a principal object of this invention to provide a concrete transit mixer vehicle adapted for on-highway operation wherein a conventional inclined mixer drum points forwardly and an articulated conveyor and discharge means allows versatile and ready placement of concrete to the front and side of the vehicle.

Another object of this invention is to provide a novel form of transit mixer truck having a forward-pointing mixer, a half-cab construction of the operator and motor compartments, and a forwardly extending conveyor and discharge arrangement adapted to extend over the half-cab on the side opposite the operator for stowage during on-highway operation.

A further object of this invention is to provide a novel form of transit mixer vehicle with a discharge conveyor and chute arrangement having two sections with an articulated connection therebetween and an articulated mounting of the first section on the vehicle whereby the ultimate discharge end of such arrangement may be moved in any desired path rather than

merely an arcuate path. A still further object of this invention is to provide such an arrangement wherein the first section is a conveyor that may serve to elevate the concrete whereby the second section may be a passive chute of a substantial length otherwise impossible due to the required downward incline for the flow of concrete. Yet another object of this invention is to provide such an arrangement with the first section being a conveyor whereby the concrete may be discharged to elevations and over obstructions not otherwise possible.

A further object of this invention is to provide a novel form of concrete transit mixer having a conventional half-cab truck chassis and a conventional mixer drum pointing forwardly with a conveyor discharge arrangement adapted for power operation and controlled by the operator from the truck cab to allow controlled placement of concrete throughout the area to the front and at least one side of the truck.

Still other objects and advantages of the transit mixer of this invention will appear from the following description and the accompanying drawings, wherein:

FIG. 1 is a diagrammatic plan view of the transit mixer truck of this invention and illustrating the concrete discharge conveyor and chute arrangement in a number of positions to show the entire area accessible for concrete placement.

FIG. 2 is a plan view of a conventional rear-discharge-type transit mixer truck for purposes of illustrating the limitations on the area of concrete placement with such truck.

FIG. 3 is an elevation view of the preferred form of concrete transit mixer vehicle of this invention with the discharge and placement mechanism positioned for on-highway travel and illustrated in phantom lines in an unfolded, operating position.

FIG. 4 is a front elevation of the preferred concrete transit mixer vehicle of this invention and illustrating in phantom lines a couple of the unfolded operating positions of the concrete discharge and placement mechanism.

FIG. 5 is a fragmentary side elevation view of a modified form of the concrete transit mixer vehicle of this invention employing a concrete discharge and placement mechanism having two conveyor sections.

FIG. 6 is a fragmentary side elevation of still another modified form of the concrete transit mixer vehicle of this invention employing a concrete discharge and placement mechanism wherein the first section is a fixedly mounted conveyor extending forwardly.

FIG. 7 is a side elevation of a still further modified form of the concrete transit mixer vehicle of this invention with the concrete discharge and placement mechanism employing a folding chute arrangement and with a load-supporting trailing axle for permitting greater vehicle loads.

FIG. 8 is a fragmentary side view in both section and elevation of the preferred form of concrete discharge and placement mechanism.

FIG. 9 is a sectional elevation of a portion of the discharge and placement mechanism taken substantially on the line 9—9 in FIG. 8.

FIG. 10 is a sectional elevation view of the conveyor taken substantially on the line 10—10 in FIG. 8.

FIG. 11 is a sectional elevation view of the mounting support between the two sections of the concrete discharge and placement mechanism taken substantially on the line 11—11 in FIG. 8.

FIG. 12 is a sectional bottom view taken substantially on the line 12—12 in FIG. 11.

FIG. 13 is a sectional plan view of the conveyor pivoting mechanism taken substantially on the line 13—13 in FIG. 3.

FIG. 14 is a sectional plan view similar to FIG. 13 and illustrating a modified form of the conveyor pivoting mechanism applicable when only 90° pivoting is desired.

Referring now more particularly to FIGS. 3 and 4 the concrete transit mixer vehicle of this invention includes a truck chassis, generally designated 10, a concrete-mixing drum apparatus, generally designated 11, and a concrete discharge and placement mechanism, generally designated 12. The truck chassis 10 is of substantially conventional construc-

tion and includes a frame 13 supported on ground-engaging wheels comprising tandem rear wheels 14 and front wheels 15 adapted for steering the vehicle. The vehicle cab 13 is of the somewhat conventional type sometimes known as a "half-cab" wherein the operator's compartment 17 is limited in width to less than one-half of the total width of the vehicle cab on the normal driver's side of the vehicle, i.e., on the left side in the United States. The operator's cab or compartment 17 has a windshield 18 and side windows 19 for complete visibility. The motor compartment 20 of the truck cab 16 is centered with the top 21 of the compartment positioned below the side windows 19 of the operator's compartment. Laterally adjacent the motor compartment 20, opposite the side of the operator's compartment 17, is an open space 22 which is best shown in FIG. 4. The truck chassis also includes all of the usual equipment and components for operation of the vehicle on the highway.

The concrete-mixing drum apparatus 11 is of the conventional form having a mixing drum 23 with an open end 24 and supported for rotation on an inclined axis by support structures 25 and 26 mounted on the truck frame 13. As shown, the open end 24 of the mixing drum 23 points forwardly and is positioned rearwardly of the truck cab 16 at a point relatively near the midlength of the vehicle. Appropriate conventional mechanism (not shown) is provided for rotating the drum 23 in both directions for either mixing the concrete or discharging the concrete out the opened end 24 in the usual manner. A hopper 27 is provided for introducing the bulk concrete ingredients into the mixing drum. A discharge accumulator 28 is provided for collecting and downwardly directing the mixed concrete as it is discharged from a drum 23. Thus in all material respects the concrete mixing drum apparatus 11 is identical to that which is commonly employed on a rear discharge truck mixer with the exception that the inclined axis and open end of the apparatus point forwardly.

The concrete discharge and placement apparatus 12 is comprised generally of two concrete-carrying sections which in the preferred form are a conveyor section, generally designated 30, and a discharge chute section, generally designated 31, although it will hereinafter appear that these sections may be of different constructions, some of which are described as modified forms of this invention. The conveyor section 30 has a receiving end 32 positioned beneath the discharge accumulator 28 and an extending discharge end 33. In turn the discharge chute section 31 has a receiving end 34, which is connected to the discharge end 33 of conveyor section 30 in a manner hereinafter described, and a discharge end 35 from which the concrete is discharged for the desired placement.

Referring more particularly to FIGS. 8-13, the concrete discharge and placement apparatus 12 illustrated in FIGS. 3 and 4 is shown in greater detail. The conveyor section 30 includes an elongated frame 36 which may be comprised of a pair of wide rails 37, here shown as rectangular tubing, joined by a plurality of struts 38, here shown as round tubing. A conveyor belt 39 is mounted on the frame 36 and extends from a driving roller 40 at the receiving end 32 to a return roller 41 at the discharge end 33 of the conveyor section. The drive roller 40 is driven by any convenient means such as a hydraulic motor (not shown) and the belt 39 serves to convey the concrete from the receiving end 32 to the discharge end 33 in a manner hereinafter described more fully.

Means are provided for supporting the conveyor section 30 of the concrete discharge and placement apparatus 12 in a manner for allowing horizontal swinging and vertical movement of the discharge end 33 and, as shown in FIG. 9 of the drawings, these means may include a trunnion support frame, generally designated 42. Frame 42 includes a U-shaped structure 43 with bearings 44 supporting a horizontal shaft 45 which is in turn connected to the conveyor frame 36. Preferably the shaft 45 passes through the side rails 37 of the frame and between the upper and lower flights of the conveyor belt 39. The trunnion frame 42 includes a downwardly

extending post or stub shaft 46 rotatably mounted in the tubular housing 47 with appropriate bearings 48. The tubular housing 47 and stub shaft 46 have a substantially vertical axis and the housing is fixedly mounted on the frame 13 of the truck chassis, either directly or by means of the members 49 extending forwardly of the mixing drum support 25. As shown in FIGS. 8 and 9, the axis of stub shaft 46 is aligned with the center of discharge accumulator 28 and passes through the axis of shaft 45. By this arrangement, the receiving end 32 of the conveyor section 30 is pivotally supported for rotation of the conveyor section about both the vertical axis and the lateral horizontal axis and such movement will not displace the conveyor from beneath the discharge accumulator 28. A flexible annular boot 50 may be provided on discharge accumulator 28 for directing the concrete downwardly and inhibiting splashing. A splash guard 51 may be mounted on the conveyor frame 36.

Movement of the conveyor section 30 about the horizontal axis of shaft 45 to elevate and lower the extending end of the conveyor section is accomplished by means of a hydraulic cylinder 52 pivotally connected at 53 to the lower extending end of stub shaft 46 and having the piston rod 54 pivotally connected at 55 to the underside of conveyor frame 36. Extension of the piston rod 54 from the hydraulic cylinder 52 causes pivotal elevating movement of the conveyor section 30 as shown in phantom lines in FIG. 3. Retraction of the piston rod 54 may be used to cause the conveyor section 32 to extend downwardly such as when concrete is to be placed at an extremely low level to the side of the vehicle.

Means are provided for causing powered pivoting of the conveyor section 30 from side to side about the axis of stub shaft 46 and, as shown more particularly in FIGS. 8 and 13, these means may include a hydraulic cylinder 56 pivotally mounted at 57 to the vehicle frame 13 and extending in a generally horizontal direction. The piston rod 58 has its end pivotally connected at 59 to an operating link 60 which is in turn pivotally connected at 61 to a bell crank 62 fixedly mounted on the stub shaft 46. A support link 63 is pivotally connected at 64 to a point on the link 60 intermediately between the pivotal connections 59 and 61 and the other end of link 63 is pivotally supported at 65 by the frame of the vehicle. Thus it may be seen that by this relatively common three-link mechanism the power stroke of the hydraulic cylinder 56 may be translated into approximately 180° rotation of stub shaft 46. Thus in turn the conveyor section 30 may be pivoted approximately 180° from one side of the vehicle around the front to the other side of the vehicle as illustrated in FIG. 1.

In the modified form of the conveyor swinging mechanism shown in FIG. 14 the hydraulic cylinder 56a is again pivotally mounted to the vehicle frame at 57a but only a single link 66 is connected from the stub shaft 46 to the piston rod 58a. The link 66 is fixedly connected to the stub shaft 46 and pivotally connected at 59a to the piston rod 58a. In this manner the rotation of stub shaft 46 is limited to approximately 90° and in turn the swinging movement of the conveyor section 30 would be limited to approximately 90°. However for many applications this would provide adequate versatility of movement of the conveyor and in fact it may be desirable to limit such 90° movement between a position extending straight forward and the position extending straight laterally on the opposite side of the vehicle driver whereby the conveyor section 30 could not be inadvertently swung into the operator's cab 17.

The conveyor belt 39 may be of any convenient form for carrying the concrete and as shown in the typical section view of FIG. 10 the belt may be supported on inclined rollers 67 to give the belt a concave shape for containing the concrete. Flexible skirts 58 extend the length of the conveyor section 30 on either side of the conveyor belt and overlie the edges of the conveyor belt to inhibit concrete spillage.

Means are provided for joining the two sections 30 and 31 of the concrete discharge and placement apparatus 12 to support the second section 31 from and for universal movement relative to the conveyor section 30 and, as shown in the

drawings, these means may comprise the articulated connection assembly generally designated 70. In this embodiment the second or discharge section 31 comprises a semicircular chute which may be a single rigid unit or, as shown, may include a plurality of removable sections supported from the base section 71. The assembly 70 includes a generally cylindrical housing 72 enclosed at its upper end by a deflector plate 73 for directing the concrete downwardly from the belt 39. A support frame 73 depends from housing 72 and is supported for rotation relative to the housing in any convenient manner such as the annular bearing 74. The base section 71 of the chute is pivotally supported on the frame 73 by stub shafts 75 for rotation about a horizontal axis perpendicular to the length of the chute. A hydraulic cylinder 76 is pivotally mounted at the bottom support frame 73 and has its piston rod 77 pivotally connected to the underside of base section 71 for powered, remote control of the angle of inclination of the discharge chute section 31. The hydraulic motor 78 is mounted on housing 72 and has a sprocket 81 mounted on the support frame 73 whereby the frame 73 can be rotated relative to the housing 72 about a vertical axis to accomplish the side-to-side swinging of the discharge chute section 31. Means may be provided for prohibiting full rotation of the support frame 73 relative to the housing 72 which might otherwise cause tangling of the hydraulic hoses and similar problems and such means may include a stop lug 85 mounted on the frame 73 and a pair of lugs 86 mounted on the housing 72 as shown in FIG. 12.

For maintaining the assembly 70 in the same attitude during elevating movement of the conveyor section 30, the housing 72 is pivotally supported on the end 33 of the conveyor section 30 by the horizontal shaft 82. A pair of the rods 83 extend the length of the conveyor section 30 and are pivotally connected to the housing 72 and the trunnion frame 42 on each side of the conveyor frame whereby the housing 72 is continually maintained in the same attitude during elevating and lowering of the conveyor section 30. In other words the vertical axis of the rotation of the annular bearing 74 is automatically maintained thereby facilitating the side-to-side swinging of the discharge section 31 by the motor 78 since such swinging will not involve raising or lowering the section 31. The tie rods 83 are parallel to the frame 36 of the conveyor section 30 and are supported at spaced locations along the conveyor frame by guides 84.

For on-highway operation of the truck mixer of this invention shown in FIGS. 3 and 4, the conveyor section 30 of the concrete discharge and placement apparatus 12 is positioned to extend forwardly over motor compartment 21 at a relatively horizontal attitude and at a slight angle away from the operator's compartment 17. The length of conveyor section 30 is such as to extend a short distance beyond the front of the truck chassis 10 as shown in FIG. 3 but only an amount which is legally acceptable, as for example in some jurisdictions a front overhang of 3 feet is permissible. The lateral angle of extension of conveyor section 30 results in positioning the articulated connection assembly 70 directly in front of the open space 22 of the truck cab as shown in FIG. 4 whereby the discharge chute section 31 may extend directly rearwardly along the length of the truck without laterally overhanging the truck. Appropriate hooks or latches (not shown) may be provided for anchoring the apparatus 12 in this position for on-highway operation. By positioning the apparatus 12 in this manner the operator's visibility is relatively unimpaired and yet a maximum length of conveyor section 30 and discharge section 31 and may be employed.

The operation of the concrete discharge and placement apparatus 12 may be controlled entirely from within the vehicle operator's compartment 17 or separate controls may be positioned elsewhere on the vehicle if desired. The controls will include means for selectively and separately operating the hydraulic cylinders 52, 56 and 76 and the hydraulic motor 78 whereby four different movements of the apparatus 12 may be attained. The conveyor section 30 is selectively elevated and lowered by cylinder 52 and swung from side to side by

cylinder 56 while the discharge section 31 may be elevated and lowered by cylinder 76 and swung from side to side by motor 78. Thus it may be seen that every portion of the entire area within the line A illustrated in FIG. 1 may be reached by the discharge end 35 of the apparatus 12 for placing concrete. The path of movement of discharge end 35 is limitless in that it is controlled by all four powered operators 52, 56, 76 and 78. Thus for example a straight line path, such as B, may be followed to fill a concrete form by simultaneously actuating cylinder 56 to rotate the conveyor section 30 while actuating motor 78 to rotate the discharge section 31 so that discharge end 35 moves in the desired straight line rather than merely an arcuate path. Similarly by coordinating the operation of the elevating hydraulic cylinders 52 and 76 the distance of the discharge end 35 from the vehicle may be infinitely varied without changing the height of the discharge end 35 or even manipulating the hydraulic operators 56 and 78, all without moving the vehicle. In addition it may be seen that the versatility of the concrete discharge and placement apparatus 12 also allows the operator to reach over a wall C or the like to discharge concrete on the other side which would not be possible with a conventional discharge arrangement if such wall were as high or higher than the conventional discharge chute. In contrast the conventional arrangement shown in FIG. 2 only allows direct placement of the concrete in limited arcuate-shaped areas D and is incapable of directly reaching the shaded areas E without moving the vehicle. Moreover the multiple areas D can only be reached by reason of adding or subtracting sections of the discharge chute which is a rather laborious task.

In the modified form of the invention illustrated in FIG. 5, the truck chassis 110 and mixing drum apparatus 111 remain essentially the same as chassis 10 and mixing drum apparatus 11 heretofore described. The concrete discharge and placement apparatus generally designated 112 has a conveyor section 130 that may be the same as conveyor section 30. The pivotable support for conveyor section 130 may also be substantially identical to that heretofore described whereby the section may be elevated and lowered as well as swung from side to side. The second section of the apparatus 112 is illustrated in this embodiment as a powered conveyor section, generally designated 190, suspended from an articulated connection assembly 170 substantially similar to the aforescribed assembly 70 and capable of elevating and lowering as well as swinging the second section. The discharge end 191 of the second powered conveyor section 190 may have a covered housing for directing the concrete downwardly from the end of the conveyor. If desired another discharge chute may be suspended from the diverter housing 191. The apparatus 112 is folded in the same manner as apparatus 12 for on-highway operation of the vehicle with the second powered section 190 extending rearwardly along the right side of the vehicle. With the second powered conveyor section of this embodiment of FIG. 5 the concrete can be elevated to an even higher level and discharged an even greater distance than the previously described embodiment in that no downward angle of inclination need be provided on the conveyor section 190 for conducting the concrete.

The embodiment of this invention illustrated in FIG. 6 is a somewhat simplified arrangement which may employ the same truck chassis 210 and mixing drum 211 as heretofore described but the concrete discharge and placement apparatus 212 is comprised of a fixedly mounted conveyor 230 with the discharge chute section 231. The conveyor section 230 extends forwardly at a convenient angle of inclination and is supported on the column 292 and the support structure 225. In this manner the complex trunnion frame 42, power cylinders 52 and 56, the tie rod 83 arrangement and other elements of the aforescribed conveyor section 30 are eliminated thereby greatly simplifying the conveyor. The articulated connection assembly 270 between the conveyor section 230 and the discharge chute section 231 is fixedly connected to the conveyor section but otherwise may be substantially the same

as the aforescribed assembly 70 whereby the discharge chute section 231 may be elevated and lowered as well as swung from side to side. For on-highway operation of the vehicle the base chute section 271 may be positioned above the operator's compartment 217 and the remaining chute sections removed and conveniently stored elsewhere on the vehicle. By this simplified arrangement a forward-point discharge for the concrete is accomplished and since the point of discharge is substantially higher than otherwise possible directly from the mixing drum, the range of placement of the concrete is substantially increased.

FIG. 7 illustrates the manner in which the capacity of the truck mixer may be increased as well as a manner in which the range of concrete placement may be conveniently extended. The truck chassis 310 may be substantially similar to that which has been heretofore described although normally of a greater length. The concrete-mixing drum apparatus 311 is illustrated as a substantially larger capacity drum which in turn will increase the gross weight of the vehicle during use. To accommodate this increased weight a load-distributing trailing axle assembly 393 is provided and may be of the type described in my U.S. Pat. No. 3,191,963 entitled Retractable Axle for Vehicle Load Distribution. This trailing axle permits the proper distribution of the weight on each of the axles and by providing an additional set of road-contacting wheels 394 the total load that may be carried is increased. The concrete discharge and placement apparatus 312 is substantially similar to the aforescribed apparatus 12 with certain variations. The apparatus 312 is illustrated as including a hydraulic cylinder 395 for causing tilting of the articulated connection assembly 370 rather than the aforescribed arrangement employing the tie rods 83. In addition the hydraulic cylinder 376 for lowering and elevating the discharge chute section 331 is connected above the pivotal support of the discharge chute section and would operate in the reverse manner. The discharge chute section 331 is provided with a folding chute extension assembly, generally designated 396 similar to that described in my copending application Ser. No. 629,454, now U.S. Pat. No. 3,456,769, entitled "Transit Mixer Discharge Chute." The chute sections 396A, 396B and 396C are serially connected to each other and the remainder of chute section 331. Sections 396A, B and C are folded for convenient storage during transit as well as for convenience in shortening and lengthening the discharge chute section 331. Biasing means or power-operated means may be provided at each of the hinged connections between the chute sections of assembly 396 for assisting in the folding and unfolding.

Thus by this invention I provide novel transit mixer capable of vastly improved distribution and placement of the concrete at the job site. This is possible with each of the forms of my invention herein disclosed but it is to be understood that additional embodiments and forms of transit mixers may come within my invention defined by the appended claims.

I claim:

1. In a concrete transit mixer apparatus comprising, a truck chassis for on highway operation, an inclined rotatable concrete-mixing drum mounted on the rear of said truck chassis, said mixing drum having an elevated open end facing forwardly and positioned near the midlength of the truck chassis, an elongated conveyor having one end mounted on said truck chassis beneath said drum open end for pivoting about both a vertical axis and a horizontal axis and having an extending end, power-operated means for causing said pivotal movement of said conveyor about both the vertical axis and the horizontal axis, an elongated discharge means pivotally mounted on the extending end of said conveyor both for elevating and lowering and for swinging from side to side said discharge means relative to said conveyor, said pivotal mounting of the discharge means on the conveyor including a housing supported for pivotal movement on said conveyor about a horizontal axis parallel to the pivotal axis for elevating and lowering the conveyor, and tie rod means extending parallel to said conveyor between said housing and the conveyor mount-

ing for mechanically maintaining the side to side pivotal axis of said discharge means substantially vertical for ease of such side to side movement.

2. A concrete transit mixer apparatus employing a truck chassis usable for on-highway operation and having a frame, ground-engaging front and rear wheels with the front wheels being steerable, and a truck cab at the front of the chassis wherein the truck cab has a center motor compartment and a narrow operator's compartment laterally offset to one side of the motor compartment with the operator's compartment extending substantially above the motor compartment for lateral visibility over the motor compartment and the cab has an open space laterally adjacent to the motor compartment on the opposite lateral side from the operator's compartment, the lateral width of the cab being within predetermined limits for on-highway operation, the improvement comprising; a concrete mixer mounted on the frame entirely rearwardly of the truck cab and having an inclined rotatable mixing drum with an elevated open end facing forwardly for discharging concrete; a concrete discharge and placement mechanism mounted on said frame and including elongated first and second concrete carrier sections of substantial length, said first section comprising an elongated rigid frame supporting a conveyor having a receiving end and a discharging end, said conveyor frame having the receiving end mounted on the chassis frame in a position beneath said drum open end for receiving concrete discharged from the drum and said mounting being pivotable for movement of said conveyor frame in both the vertical and horizontal planes, said second concrete carrier section having one end mounted on said discharge end of said conveyor frame for receiving concrete from said conveyor and having means for conducting concrete to the other end of said second section, said second section being mounted on said conveyor frame for relative movement in both the vertical and horizontal planes, and power-operated means for selectively causing said movements of said first and second section, the combined lengths of said first and second sections being of an amount to extend a substantial distance beyond the front of the truck chassis when extending forwardly for controlled discharge and placement of the concrete in front of the truck chassis; and said first and second concrete carrier sections being mounted in an in-transit stowage position with said first section extending forwardly over the motor compartment at a small lateral angle away from the operator's compartment with said discharge end of said first section being laterally beyond the motor compartment, said second section suspended below said first section discharge end to a position in said open space and extending rearwardly in a substantially longitudinal direction along said truck chassis.

3. A concrete transit mixer apparatus employing a truck chassis usable for on-highway operation and having a frame, ground-engaging front and rear wheels with the front wheels being steerable, and a truck cab at the front of the chassis wherein the truck cab has a center motor compartment and a narrow operator's compartment laterally offset to one side of the motor compartment with the operator's compartment extending substantially above the motor compartment for lateral visibility over the motor compartment and the cab has an open space laterally adjacent to the motor compartment on the opposite lateral side from the operator's compartment, the lateral width of the cab being within predetermined limits for on-highway operation, the improvement comprising; a concrete mixer mounted on the frame entirely rearwardly of the truck cab and having an inclined rotatable mixing drum with an elevated open end facing forwardly for discharging concrete; a concrete discharge and placement mechanism mounted on said frame and including elongated first and second concrete carrier sections of substantial length, said first section comprising a conveyor having one end mounted on the chassis frame in a position beneath said drum open end for receiving concrete discharged from the drum and pivotable for permitting movement of said conveyor in both the vertical and horizontal planes, and said second concrete carrier

section having one end mounted on the other end of said conveyor and pivotable for movement in both the vertical and horizontal planes; and said first and second concrete carrier sections being mounted in an in-transit stowage position with said first section extending forwardly over the motor compartment at a small lateral angle away from the operator's compartment with said other end of said first section being laterally beyond said motor compartment, said second section suspended below said first section to a position in the open space of the cab and extending rearwardly in a substantially longitudinal direction along said truck chassis.

4. The apparatus of claim 3 wherein said second section includes a plurality of hinged chute sections selectively foldable back upon each other and unfoldable for shortening and lengthening, respectively, the discharge means, and means for mechanically assisting in such folding and unfolding.

5. A concrete transit mixer apparatus usable for on-highway operation comprising: a truck chassis having a frame, ground-engaging front and rear wheels with the front wheels being steerable, a cab at the front of the chassis, and a motor and drive means; said truck cab having a center motor compartment and a narrow operator's compartment laterally offset on the truck chassis to one side of said motor compartment, said operator's compartment extending substantially above the motor compartment for lateral visibility over the motor compartment, said cab having an open space laterally adjacent to the motor compartment on the opposite lateral side from said operator's compartment and the lateral width of said cab being within predetermined limits for on-highway operation; a concrete mixer mounted on said frame spaced rearwardly of said truck cab and having an inclined rotatable mixing drum with an elevated open end for discharging concrete, said open end facing forwardly and being laterally centered on the truck chassis; a concrete discharge and placement mechanism mounted on said frame and including elongated first and second concrete carrier sections of substantial length, said

first section comprising an elongated rigid frame supporting a conveyor having a receiving end and a discharging end, said conveyor frame having the receiving end pivotally mounted on said chassis frame in a position beneath said drum open end for receiving concrete discharged from the drum and for permitting pivotal movement of said conveyor frame in both the vertical and horizontal planes, said second concrete carrier section having one end mounted on said discharge end of said conveyor frame for receiving concrete from said conveyor and having means for conducting concrete to the other end of said second section, said second section being mounted on said conveyor frame for relative movement in both the vertical and horizontal planes, and power-operated means for selectively causing said movements of said first and second section, the combined lengths of said first and second sections being of an amount to extend a substantial distance beyond the front of the truck chassis when extending forwardly for controlled discharge and placement of the concrete in front and to at least one side of the truck chassis; and said first and second concrete carrier sections being mounted in an in-transit stowage position with said first section extending forwardly over the said motor compartment at a small lateral angle away from the operator's compartment with said discharge end of said first section being laterally beyond said motor compartment, said second section suspended below said first section discharge end to a position in said open space and extending rearwardly in a substantially longitudinal direction along said truck chassis.

6. The apparatus of claim 5 wherein said pivotal mounting of said conveyor frame allows elevating and swinging of the conveyor frame over the truck cab for placing concrete on both sides of the truck chassis.

7. The apparatus of claim 5 wherein said second section is a second powered conveyor and the pivotal mounting thereof allows said power-operated means to elevate said second conveyor to extend upwardly.

* * * * *

40

45

50

55

60

65

70

75