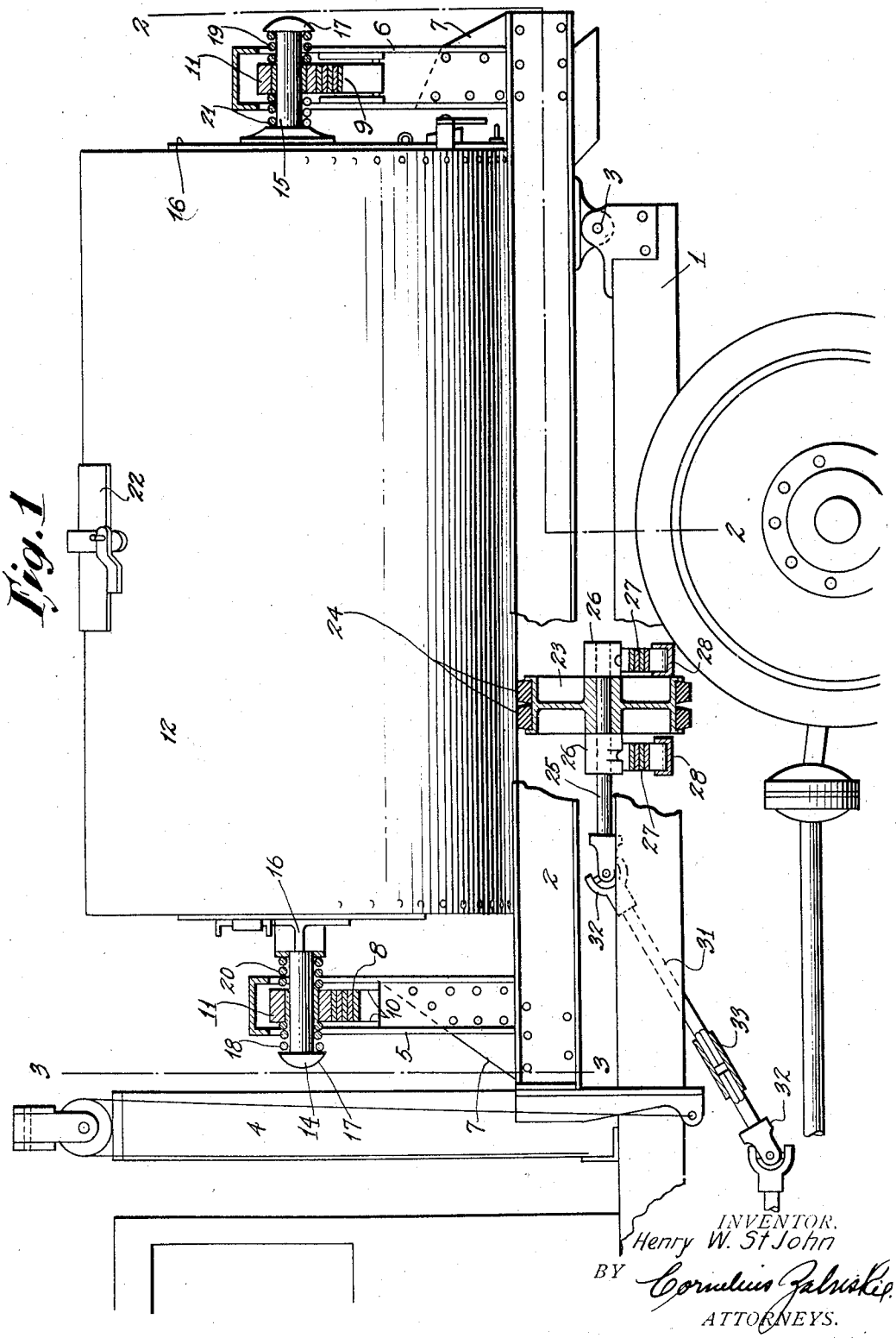
Aug. 20, 1929. H. W. ST. JOHN 1,725,682

CONCRETE TRANSPORTING APPARATUS

Filed Aug. 18, 1928 2 Sheets-Sheet 1

Fig. 1



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CONCRETE TRANSPORTING APPARATUS

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Fig. 2

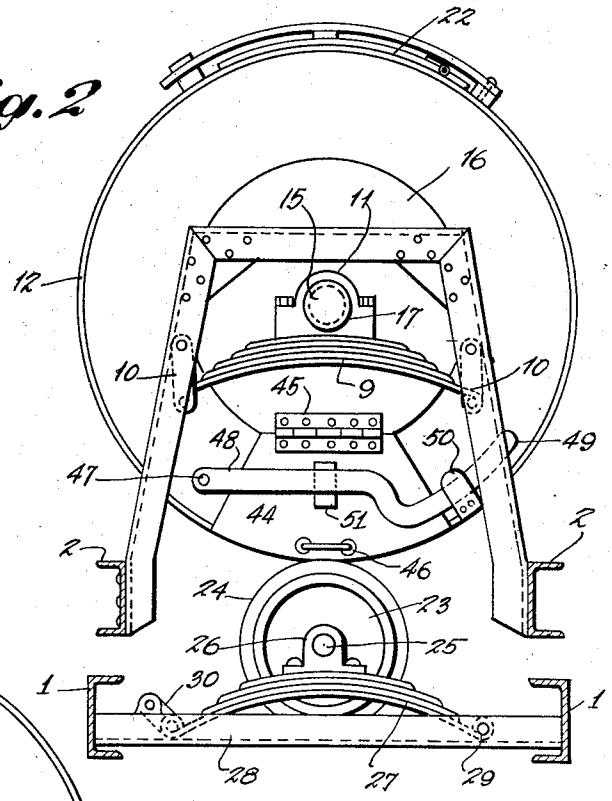


Fig. 3

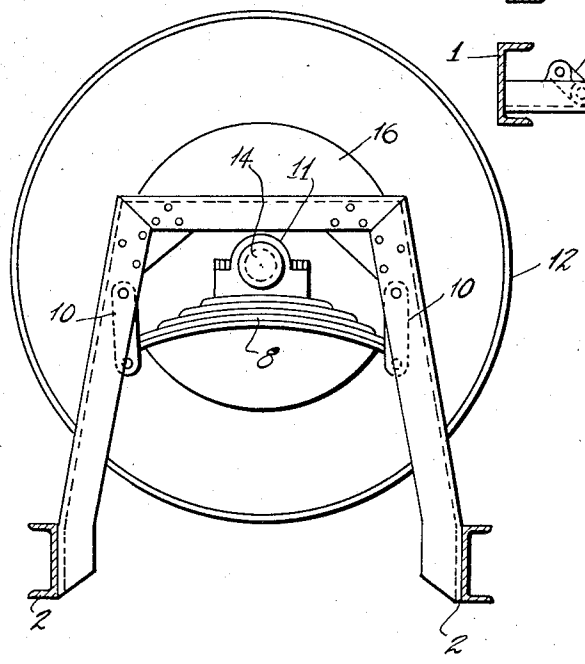
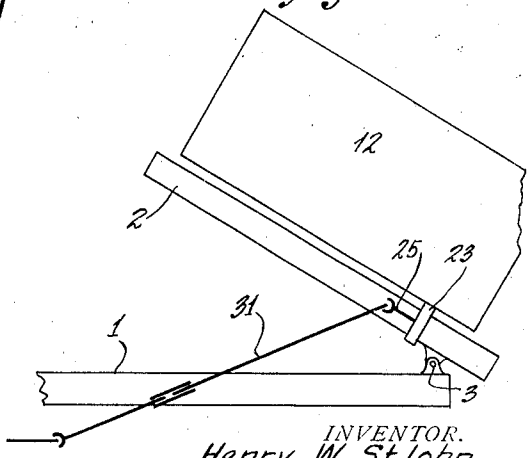


Fig. 4



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UNITED STATES PATENT OFFICE.

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CONCRETE-TRANSPORTING APPARATUS.

Application filed August 18, 1928. Serial No. 300,403.

This invention relates to concrete transporting apparatus and is more particularly directed to a power propelled wheeled vehicle, preferably an automobile truck for use in the transportation of concrete from a central mixing station to the zone of various construction operations. In other words, it is the purpose of the apparatus of this invention to receive mixed concrete at a central mixing plant and to transport this concrete without deterioration to the place where it is to be used. Trucks for this general purpose have been extensively used. They generally embody a cylinder adapted to serve as a receptacle for the concrete during transportation and which cylinder is mounted for rotation on a horizontal axis on a cradle mounted for tilting movement on the truck chassis. Suitable means is provided for imparting rotation to the cylinder in order to keep the concrete in a state of constant agitation during transportation, so that it will not be permitted to settle, stratify or set, but is maintained by a tumbling action in proper mixed condition and ready for pouring at the point of destination, mechanism of different forms being provided to permit of tilting of the cradle in order that the concrete may be discharged by gravity from the cylinder.

In practically all trucks which have heretofore been employed for the purpose stated, it has been the practice to mount the cylinders for rotation in two distinct ways, or a combination of them. One of these constructions consists in providing the cylinder with axial trunnions and mounting these trunnions in bearings fixed on rigid brackets carried by the craddle on the truck. The other construction consists in providing the exterior of the cylinder with bearing rings which are adapted to ride upon rollers carried by the cradle of the truck. A modified construction embodying both of these prior arrangements consists in providing the forward end of the cylinder with a trunnion operating in a rigidly supported bearing while the rear end of the cylinder is provided with a bearing ring adapted to ride on rollers supported on the cradle. All of these constructions are open to one or more disadvantages.

It is the practice in the transportation of concrete in the manner specified to employ cylinders of relatively large capacity and they are generally adapted to contain a charge of several yards of concrete. Such a quantity of concrete in semiliquid condition weighs considerable and as the truck travels from the central mixing plant, side sway, as well as the sudden stopping and starting of the truck and the passage of the truck over uneven roads subjects the mounting of the cylinder to very serious strains which not infrequently result in breakage of the parts.

For example, if a truck with a heavy load of concrete in its cylinder is braked, while traveling at a fair speed, so that the truck is brought to a sudden stop, the inertia or momentum of the concrete contained causes a sudden wash of the concrete against the forward end of the cylinder with tremendous force, so much in fact that it has frequently been found in practice necessary to greatly reinforce the forward end of the cylinder to guard against damage to it due to the conditions which I have described. This wash of concrete occurs of course in both longitudinal directions depending upon whether the truck is suddenly accelerated or braked. Similarly, other jars or shocks communicated from the road or due to side sway acting upon the supporting devices of the cylinder in such manner that it is extremely difficult in practice to keep the trucks in condition unless the parts are made so heavy that a great amount of excess weight is involved in the construction.

With the foregoing considerations in mind, the object of the present invention is to provide transporting apparatus of the character under consideration wherein the strains to which I have referred are so cushioned that they will not do serious damage under any conditions of normal operation. These objects are obtained in accordance with this invention by so constructing the mounting of the cylinder that such mounting will serve to absorb or dissipate shocks which would otherwise be transmitted from the truck chassis to the cylinder and vice versa.

In practically carrying out the invention, I have found it highly efficient and desirable to employ a novel construction which I term a floating suspension of the cylinder with respect to the truck chassis and I so constitute this floating suspension that it will cushion and dissipate the shocks for the

purposes stated. Thus, in its preferred practical form, the apparatus of this invention embodies a truck provided thereon with a pivoted cradle at the front and rear ends of which are rigid yokes on each of which is suspended a bearing by means of a spring which is preferably of the semielliptical type. Positioned between the yokes is a cylinder provided with axial trunnions extending through the bearings and around each trunnion at both sides of each bearing are coil springs. These coil springs cushion the trunnions against axial movement with respect to their bearings while the elliptical spring support of the bearings cushion the movement of these bearings in all other directions.

Novel mechanism also forming a part of the present invention is employed to rotate the cylinder while permitting of the floating suspension to which I have referred.

Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a side elevation of the truck embodying the present invention with certain parts shown in section.

Figure 2 is a section on the line 2—2 of Fig. 1.

Figure 3 is a section on the line 3—3 of Fig. 1.

Figure 4 is a diagrammatic view showing a modified arrangement for rotating the cylinder.

In the annexed drawings, 1 denotes the chassis of a motor truck or other self propelled vehicle which has a suitable prime mover such as an engine (not shown). A cradle 2 is pivoted to the chassis frame of the truck on transverse pivots 3. This cradle normally partakes of a substantially horizontal position, but may be tilted up on its pivots by any suitable mechanism such as a hydraulic hoist 4. Mounted near the front and back ends of the cradle 2 and rigid with the cradle are a pair of strong, rigid yokes 5 and 6 which are firmly secured to the side bars of the cradle as by riveting or bolting them thereto. Reinforcing plates 7 may be used to reinforce these yokes so that they will be able to withstand great strains. The front yoke carries a spring 8 and the rear yoke carries a spring 9. These springs are secured at their opposite ends by means of shackles 10 to the respective yokes and the yokes are preferably made of channel section with the shackles extending into the channels so as to reinforce the pivots of the shackles against strains in a direction longitudinally of the cradle.

On each of the springs 8 and 9 is mounted a bearing 11 and between the yokes is positioned a cylinder 12 provided at its opposite ends with trunnions 14 and 15, the former of which extends through the bearing 11 of the spring 8 on the front yoke while the latter of which extends through the bearing 11 of the spring 9 on the back yoke. These trunnions are positioned coaxial of the cylinder 12. They are of strong, rigid construction, are mounted rigidly upon the opposite ends of a cylinder on suitably reinforced end plates 16 and are of sufficient length so that they extend a distance beyond the opposite ends of the bearings. The end of each trunnion is provided with a head 17.

A coil spring 18 is positioned between the head 17 of the forward trunnion and the adjacent bearing 11, while the coil spring 19 is positioned between the head 17 of the rear trunnion and the corresponding bearing. Similar springs 20 and 21 are positioned between the end plates 16 and the adjacent bearings of the front and rear trunnions. All of these coil springs 17, 18, 19 and 20 embrace the trunnions and are all preferably normally under slight tension at all times.

The arrangement which I have thus far described constitutes what may be termed a floating suspension of the cylinder 12 because the cylinder is thereby mounted for resilient and cushioned movement in every direction. For example, in practice, the concrete is introduced into the cylinder through a charging opening provided with a suitable closure 22 in sufficient quantities to leave appreciable air space within the cylinder above the surface of the concrete. In fact the cylinder to give the best results should be filled more than half full, but not completely full.

It therefore follows that this relatively large body of concrete will have considerable inertia. Even when the truck is traveling along rough roads, the passage of the wheels of the truck over uneven places in a road will cause considerable shock and jar and if the cylinder is mounted rigidly, these shocks and jars are transmitted to the mounting of the cylinder with the result that the great weight in the cylinder places tremendous strains upon its mountings unless the floating suspension to which I have referred is employed.

With the floating suspension, however, up and down, as well as transverse shocks are efficiently cushioned by the springs 8 and 9. Furthermore, when the truck suddenly stops or starts, the heavy load of concrete in the cylinder is thrown forcibly against either the

front or rear end of the cylinder as the case may be. If the mounting of the cylinder is rigid, these shocks must be borne directly by the supporting elements. With the floating suspension, however, these longitudinal shocks are cushioned by the springs 18, 19, 20 and 21, in such manner as to dissipate the shocks entirely and to bring the load to a state of equilibrium without shock. Similarly lateral sway due to passage of the truck over uneven roads or in turning corners sharply are taken up by the shackles 10. It therefore follows that by the floating suspension to which I have referred, the shocks and jars which otherwise would have to be borne by the supporting mechanism are so cushioned that they can do no harm to the apparatus.

In accordance with this invention, the concrete is loaded into the cylinder at a central mixing station and is transported while in the cylinder to various construction jobs. It is necessary to keep the concrete in a constant state of agitation while thus transporting it, otherwise it would set or stratify and not only materially deteriorate but would be extremely difficult to remove from the cylinder. For this purpose, the cylinder is mounted to rotate and mechanism is provided for rotating it all the while it is transporting concrete. This cylinder rotating mechanism may partake of various forms without departing from the invention.

For example, in Figs. 1 and 2 one form of mechanism is shown. In these figures, I have shown a friction wheel 23 preferably faced with rubber as shown at 24 mounted on the chassis of the truck in a manner to engage with the circumference of the cylinder when the cylinder is in horizontal position. In the mounting shown in these figures, the driving wheel 23 is mounted on the shaft 25 supported in bearings 26. These bearings are mounted on springs 27 which extend transversely of the chassis and are mounted on transverse bars 28, the opposite ends of which are firmly secured to the side bars of the chassis frame of the vehicle.

The bars 28 are shown as of channel section rigidly secured to the chassis frame and one of the springs 27 is associated with each of these bars. One end of each spring is secured to a fixed pivot 29 carried by the corresponding bar 28, while the opposite end of such spring is secured to the bar through the medium of a shackle 30, so as to permit compression or expansion of the springs without binding. The springs 27 are so tensioned that they will hold the friction facing 24 of the drive wheel 23 firmly against the circumference of the cylinder and said springs 27 will flex with the springs 8 and 9 so as to provide driving friction between the driving wheel and the cylinder in spite of the floating suspension of the cylinder. The shaft 25 is connected by a shaft 31 embodying universal joints 32 and an extension joint 33 to any suitable source of power, such, for example, as some part driven from the truck motor or from an electric motor or other independent driving mechanism. Thus power transmitted through the shaft 31 rotates the driving wheel 23 which serves to drive the cylinder 12 through frictional contact therewith.

In the construction shown in Figs. 1 and 2, the tilting of the cylinder to discharge the contents thereof will lift the cylinder out of engagement with the driving wheel 23. However, if it is desired to employ a construction wherein the cylinder may be driven while it is in tilted position, the driving wheel may be supported on the cradle 2 as shown in Figure 4. In other words, instead of mounting the bar 28 on the chassis frame as shown in Fig. 2, it may be mounted on the cradle and this will permit of driving while the cylinder is either in tilted or horizontal position.

It will of course be understood that the cylinder is provided with a suitable charging opening having an appropriate closure as shown at 22 and that it is also provided with a discharge opening in its rear end. This discharge opening is illustrated in Fig. 2 as in the form of a gate 44 hinged at 45 and adapted to be locked in closed position by a lever 48 pivoted at 47, and having a handle 49 engageable with the keeper 50. A wedge 51 is formed on the gate to insure its tight closing and the gate has a handle 46 which may be grasped to assist its opening. These details of gate construction may of course be varied without departing from this invention which is particularly directed to the floating suspension to which I have referred. This floating suspension will efficiently support the concrete carrying tanks of large capacity without subjecting the operating or supporting mechanism to serious shocks and will thus materially prolong the life of the apparatus.

I wish to call particular attention to the the fact that the floating suspension of this invention automatically compensates for the shifting weight of the concrete within the cylinder during transportation of such concrete. When the truck is traveling along a road, the semi-liquid concrete contained within the cylinder is constantly changing position therein. That is to say, there is the ever present forward and backward wash of the concrete and this is accompanied by lateral wash in one direction or the other and the normal lateral wash of the concrete incident to rotation of the cylinder. This ever changing position of the concrete within the cylinder brings about a corresponding constantly changing center of gravity of the mass and as a result the line of direction of

such center of gravity is constantly changing from front to back and also from side to side.

Thus in the trucks of the prior art where the cylinder is mounted on fixed axial trunnions, the weight of the moving mass of concrete is not carried in a manner to centralize the weight with respect to the axis of rotation, but tends to cause side sway of the truck. In contradistinction, the floating suspension of the present invention serves to centralize the load which would otherwise effect side sway with the result that the weight is carried in the center line of the vehicle at all times irrespective of the lateral wash to which I have referred. In the prior art where the cylinders are carried on rollers which are positioned to engage the under side of the cylinder on either side of the medial line of the truck, the lateral wash of the concrete mass is constantly transferring the whole weight on to one of these rollers or the other as the case may be whereas with the floating suspension of this invention, the lateral wash of the mass is transmitted with an equalizing force at all times to the axis of the trunnions on which the cylinder is suspended and the unequal imposition of force such as is found in the roller mountings of the prior art is entirely eliminated in the present construction. It therefore follows that when the present invention is employed, the floating suspension thereof will centralize the weight at all times irrespective of longitudinal or lateral wash and as a result the weight will be imposed in the center of the vehicle at all times and will not tend to place undue stresses upon the mounting in any direction. Neither will it tend to produce side sway in the truck with consequent tendency to top-heaviness on uneven roads.

The accompanying drawings show the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims. I wish it particularly understood that while the type of springs which I have shown have been found to operate with high efficiency, that springs of other kinds may be substituted without departing from this invention.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A power propelled vehicle for transporting concrete, a cylinder to contain concrete, and mechanism comprising a floating suspension for mounting the cylinder for axial rotation on the vehicle, and means for rotating the cylinder, for the purpose of maintaining the concrete in a constant state of agitation while it is being transported to preclude settling or solidification.

2. A power propelled vehicle for transporting concrete, a concrete containing cylinder mounted on the vehicle on a substantially horizontal axis extending longitudinally of the vehicle, means for rotating the cylinder to maintain the concrete therein in a constant state of agitation, means interposed between the vehicle and the cylinder for cushioning shocks in a direction longitudinally of the axis of the cylinder.

3. A power propelled vehicle for transporting concrete, a concrete containing cylinder mounted on the vehicle on a substantially horizontal axis extending longitudinally of the vehicle, means for rotating the cylinder to maintain the concrete therein in a constant state of agitation, means interposed between the vehicle and cylinder for cushioning shocks in a direction longitudinally of the axis of the cylinder and for also cushioning against shocks between the cylinder and vehicle in an up and down direction.

4. In an apparatus for transporting concrete, the combination of a suitable power propelled vehicle, a cylinder adapted to contain concrete and provided with a discharge opening, means for mounting the cylinder upon a vehicle for rotation on a substantially horizontal axis, a closure for normally sealing the discharge opening, means for rotating the cylinder constantly while the concrete is being transported, and means interposed between at least the forward end of the cylinder and the means for supporting such forward end thereof to cushion shocks imparted to the construction in a direction of the axis of rotation of the cylinder.

5. In an apparatus for transporting concrete, the combination of a suitable power propelled vehicle, a cylinder adapted to contain concrete and provided with a discharge opening, means for mounting the cylinder upon the vehicle for rotation on a substantially horizontal axis and for tilting movement on the vehicle, a closure for normally sealing the discharge opening, means for rotating the cylinder constantly while the concrete is being transported, and means interposed between at least the forward end of the cylinder and the means for supporting such forward end thereof to cushion shocks imparted to the construction in a direction of the axis of rotation of the cylinder, and means for tilting the cylinder into a position to permit the concrete to be poured from the cylinder through the discharge opening when the closure thereof is opened.

6. In apparatus for transporting concrete, the combination of a suitable power propelled vehicle, a cylinder adapted to contain concrete and provided with a discharge opening, means for mounting the cylinder upon the vehicle for rotation on a substantially horizontal axis, a closure for normally sealing the discharge opening of the cylinder, means for rotating the cylinder constantly while the concrete is being transported to preclude deterioration of the concrete, and

means for cushioning the mounting of the cylinder against shocks due to the wash of the concrete longitudinally of the axis of the cylinder.

7. In apparatus for transporting concrete, the combination of a suitable power propelled vehicle, a cylinder adapted to contain concrete and provided with a discharge opening, means for mounting the cylinder upon the vehicle for rotation on a substantially horizontal axis, a closure for normally sealing the discharge opening of the cylinder, means for rotating the cylinder constantly while the concrete is being transported to preclude deterioration of the concrete, and springs introduced between the cylinder and the means for mounting the same on the vehicle for cushioning said means against shock due to wash of the concrete in the cylinder.

8. In an apparatus for transporting concrete, a suitable power propelled wheeled vehicle, a cylinder adapted to contain concrete, means for supporting said cylinder for rotation on the vehicle, means for rotating said cylinder constantly while the concrete is being transported to preclude deterioration of the concrete, and resilient cushioning devices acting upon the cylinder in a direction longitudinally of its axis to cushion the parts against shocks due to wash of the concrete longitudinally within the cylinder.

9. In an apparatus for transporting concrete, a suitable power propelled wheeled vehicle, a cradle pivotally mounted on the vehicle for tilting movement, a cylinder, means for mounting the cylinder for rotation, normally on a horizontal axis, on said cradle, means for constantly rotating the cylinder while the concrete is being transported to preclude deterioration of the concrete during transportation, said means for mounting the cylinder on the cradle comprising yokes rigidly mounted on the cradle at the front and back of the cylinder, a bearing associated with each yoke in which the cylinder is supported, and springs for supporting said bearings on the yokes, in combination with means for tilting the cradle to discharge the concrete therefrom when desired.

10. In apparatus for transporting concrete, a suitable power propelled vehicle, a cradle mounted for tilting movement on the vehicle, yokes spaced apart on the cradle, a cylinder positioned between the yokes on a normally horizontal axis and provided at its opposite ends with axial trunnions, a bearing embracing each trunnion, means for resiliently mounting each bearing upon one of the yokes, and means for cushioning each trunnion against axial movement with respect to its bearing, in combination with means for constantly rotating the cylinder while the concrete is being transported to preclude deterioration of the concrete, and means for tilting the cradle to discharge the concrete from the cylinder at the point of destination.

11. In apparatus for transporting concrete, a suitable power propelled vehicle, a cradle mounted for tilting movement on the vehicle, yokes spaced apart on the cradle, a cylinder positioned between the yokes on a normally horizontal axis and provided at its opposite ends with axial trunnions, a bearing embracing each trunnion, a resilient swinging suspension connecting each bearing to the corresponding yoke, and springs for cushioning the trunnions against axial movement with respect to the associated bearings in combination with means for constantly rotating the cylinder during transportation of the concrete to preclude deterioration of the concrete, and means for tilting the yoke to discharge the concrete from the cylinder at the point of destination.

12. In concrete transporting apparatus, a power propelled vehicle, a cylinder having a floating suspension on the vehicle, and adapted for rotation, a member for imparting rotation to the cylinder, and means for resiliently mounting said member for driving cooperation with the cylinder irrespective of movement of the cylinder incident to the floating suspension thereof.

In testimony whereof I have signed the foregoing specification.

HENRY W. ST. JOHN.