March 26, 1946. F. A. MUCKLEY 2,397,324

MIXING APPARATUS

Filed Sept. 8, 1943 4 Sheets-Sheet 1

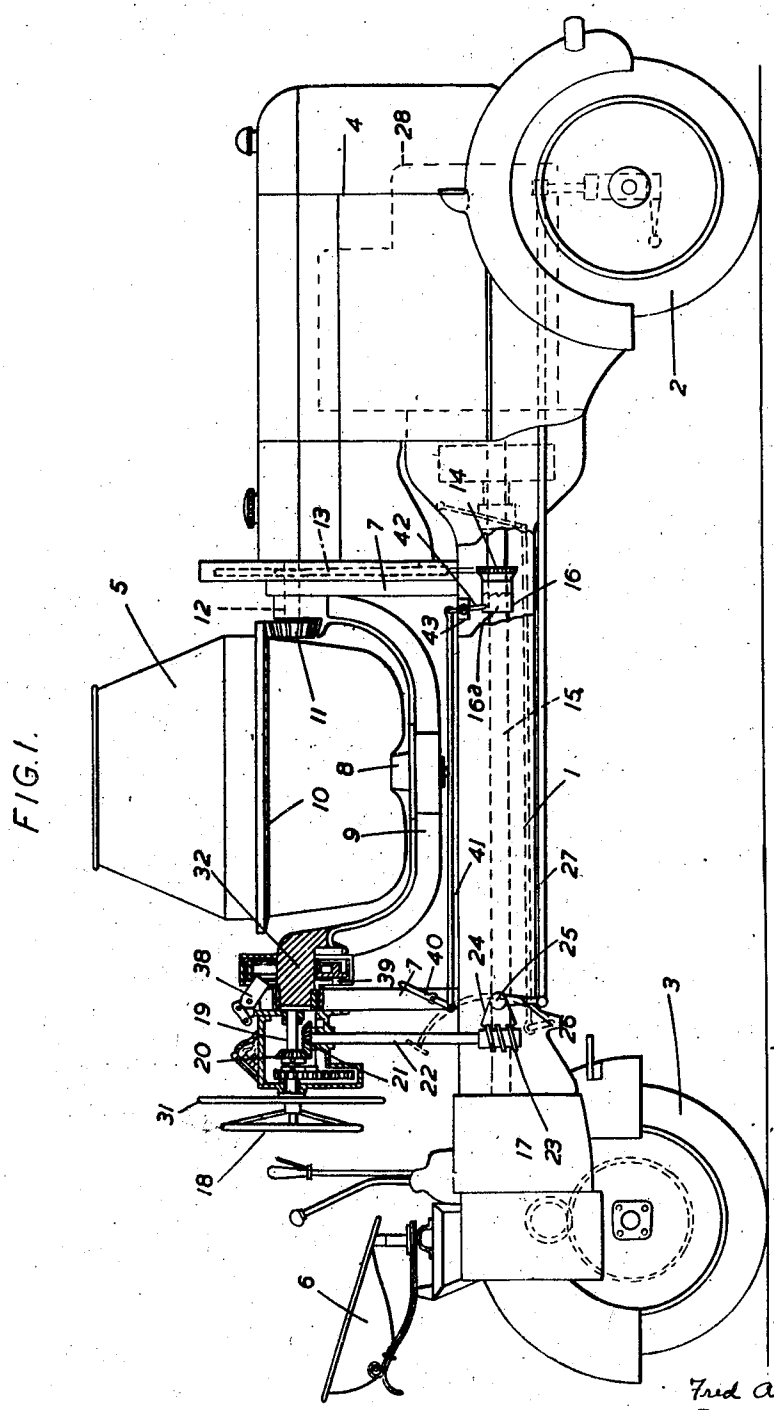


FIG. 1.

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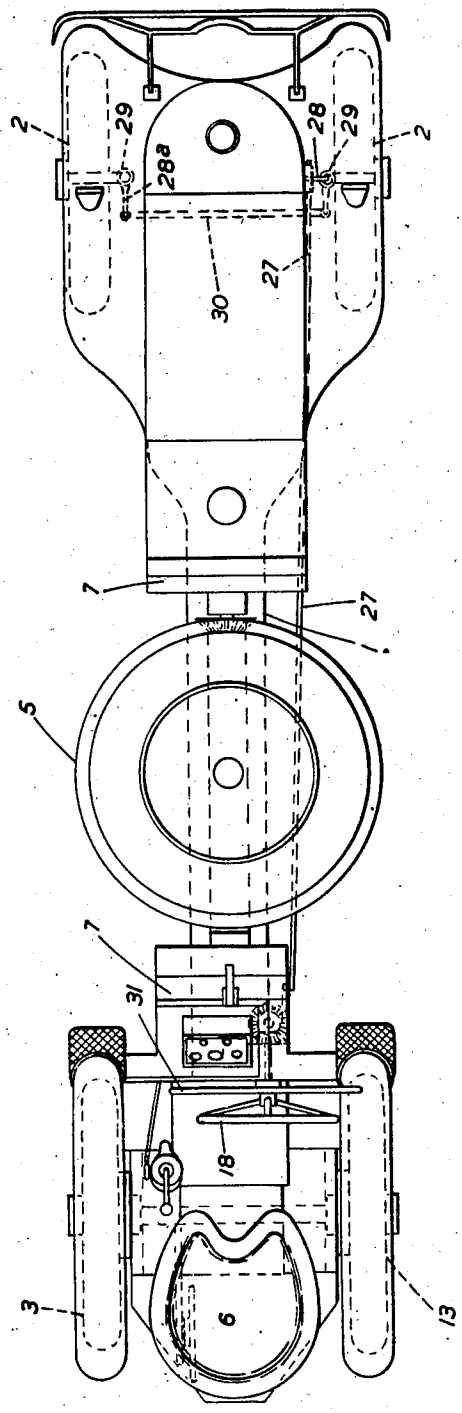


FIG. 2.

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FIG. 3.

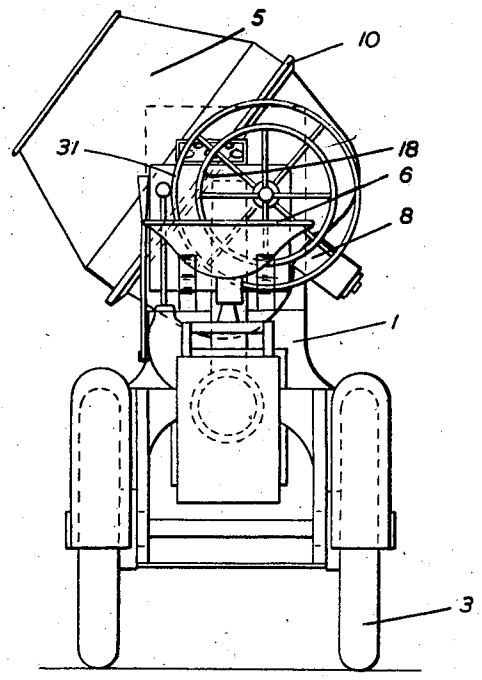


FIG. 4.

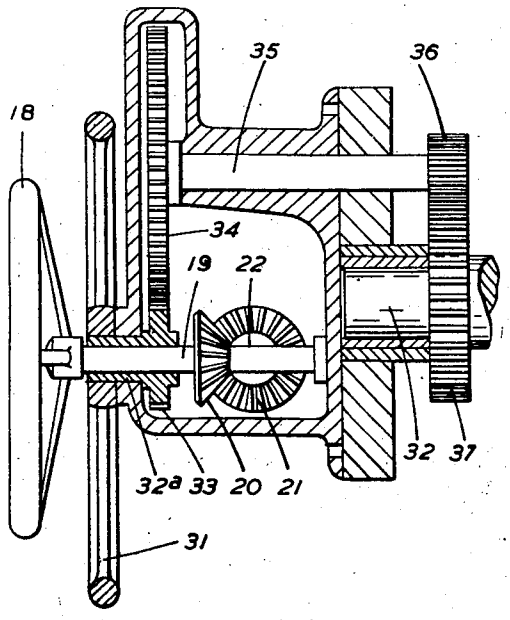
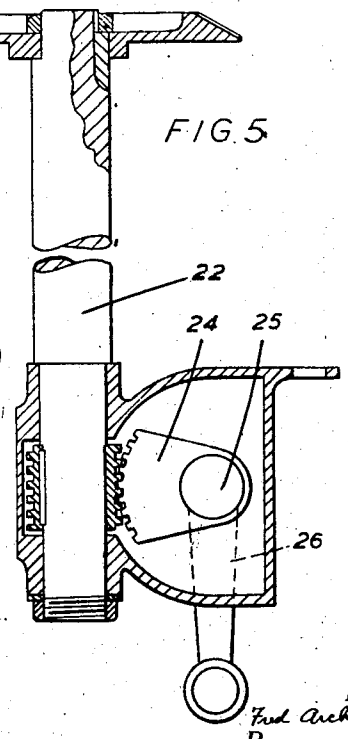


FIG. 5.



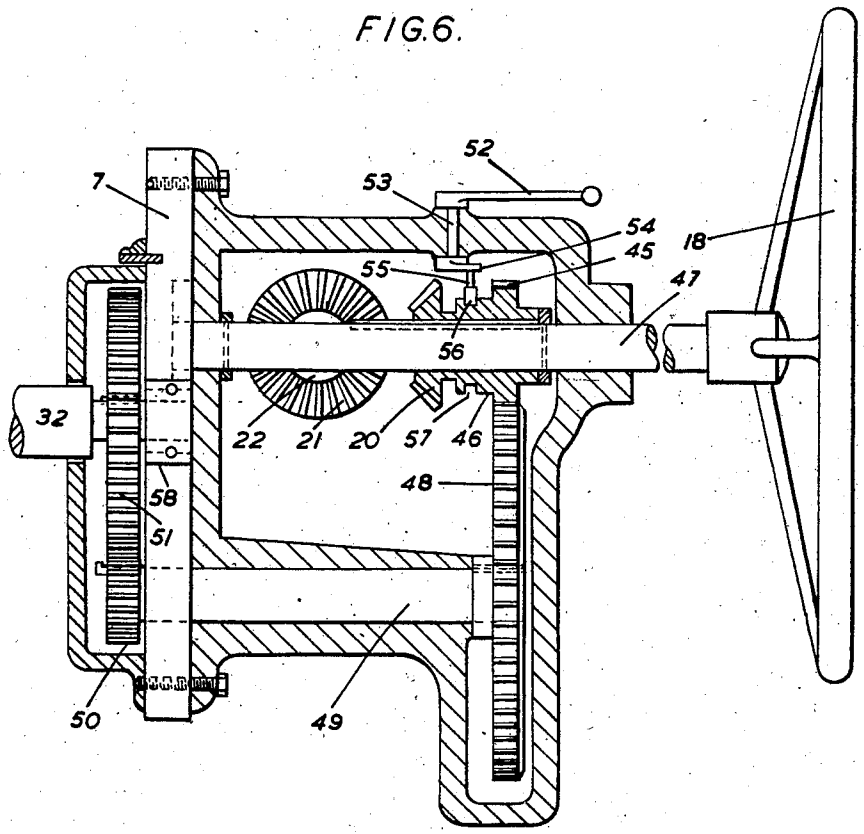
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FIG.6.



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UNITED STATES PATENT OFFICE

2,397,324

MIXING APPARATUS

Fred Archer Muckley, Tylers Green, Penn, England

Application September 8, 1943, Serial No. 501,523
In Great Britain September 17, 1942

5 Claims. (Cl. 259—177)

The present invention consists of a concrete mixer or the like, i. e., a mixer for wet or dry concrete, mortar, plaster, compo, and other materials, which is in itself constructed and arranged and powered to propel itself over the ground or site, so that delivery of the material at the desired place is performed without the intervention of Dobbin trucks, mechanical dumpers or labourers wheeling barrows to and from a station at which the materials for mixing concrete, mortar, plaster, tarmac or the like are concentrated. The mixer is charged at the station of materials by hand, or by a loading device, which may be embodied in or attached to the machine.

My invention is sharply distinguished from cases where horizontal drum mixers are mounted on motor lorries of conventional design for the bulk transport of the material and which are in some cases arranged to tip up at one end about a bottom hinge or pivot at the other end. On the contrary my invention relates to the tilting drum type of mixer which is towed from place to place and wherein the so called drum turns about a vertical axis or an axis which is steeply inclined to the horizontal, for which reason I define my drum as a bowl; generally the bowl is rotatably supported in a cradle which is trunnion-mounted for tilting the bowl, about an axis which intersects the axis of rotation, the tilting being effected by a hand wheel.

The purpose of my invention is to make such a tilting bowl form of mixer self propelled, or in other words, I adapt the motor of the portable mixer to mix the concrete and to drive the track wheels or caterpillars thereby moving the machine over the ground or site with one or the same motor from the station of materials to the place where the mixer is required for use such as footings, floors, roads, etc., preferably mixing materials whilst they are being transported, it being a feature of my invention that the self propelled mixer is constructed so that the bowl is kept in the forward view of the driver.

According to the present invention therefore I provide a self-propelled concrete or like mixer with a tiltable mixing bowl which is rotatable for mixing by a power unit which also serves to propel the mixer, and is tiltable by the driver from a driving seat or station situated behind the body.

The mixing bowl will generally be constructed and arranged for tilting to discharge directly laterally outside of the track of the machine, thus enabling the machine to be made with a narrow wheel track, and preferably the drum will be tiltable to either side of the machine.

I prefer to construct the mixer so that the bowl is tiltable by a hand wheel located in front of the driver in his normal driving position through reduction gearing to the trunnions of the mixing bowl mount or cradle. The driver can therefore mechanically and visually control the tilting operation as readily as he controls steering.

The steering wheel and the wheel for operating the tilting gear may be arranged on the same axis but so that the driver can operate the tilting wheel independently of the steering wheel and thus he may tilt the bowl and discharge the mixed material as soon as he reaches the station where the discharge is to take place. In some cases he may tilt the bowl and discharge the mixed material while the mixer is moving along.

According to an alternative form of the invention, the tilting gear is mechanically operatable by the driver by means of the steering wheel, the construction being such as to enable the steering wheel to be disengaged from the steering mechanism and engaged with the tilting mechanism, or vice versa, at the will of the driver.

I prefer to arrange the power unit in the front and the driver's seat at the rear of the machine and the mixer between the power unit and the driver's seat to distribute the load satisfactorily and to keep the mixing bowl in the forward range of view of the driver.

A clutch under the control of the driver may be provided for disengaging the mixer from the power unit when required.

The preferred forms of machine comprise front steering wheels and rear driving wheels, but this arrangement may be reversed. Instead of using road wheels I may use caterpillar tracks or a combination of road wheels and caterpillar bands round the road wheels for cross country or rough or uneven work or I may employ the road wheels with skid chains attached for negotiating rough or uneven sites. I may arrange to use road wheels for steering and a caterpillar track for driving or caterpillar track for driving and steering in the conventional manner. Drive and steering of the road wheels and/or caterpillar tracks may be provided for in suitable manner.

Forms of machine according to this invention are illustrated by way of example in the accompanying drawings, in which Fig. 1 is a side elevation, Fig. 2 a plan view and Fig. 3 an end view of a preferred form of machine, Fig. 4 being an enlarged detail sectional view of the steering

and tilting control head and Fig. 5 an enlarged detail view of the main steering spindle mechanism. Fig. 6 is a sectional view of a modified steering and tilting control head.

The constructional form of machine illustrated is a side tilting bowl type mixer. A chassis frame 1 of suitable section and material is used, the chassis frame being carried in a low position on the road wheels, the front pair 2 steering and the rear pair 3 driving. The chassis carries a water or air cooled engine 4 to run on petrol or paraffin, or start on petrol and run on paraffin. I may alternatively use a heavy oil engine, such as a Diesel engine, or an electric motor. The engine will be of sufficient power to drive a mixing bowl 5 and at the same time propel the machine. The machine is provided with a rear driving seat 6 suitably positioned to give easy control of the machine and a clear view ahead.

The engine 4 is located in the front of the machine over or nearly over the front axle as in automobile construction, and the mixing bowl 5 is located between upstanding pillars 7 from the chassis frame between the engine and the driver's seat. Alternatively the engine or motor may be arranged at the rear or under the mixer drum instead of at the front, according to the model required. Furthermore the mixer instead of being of the side tilting form described and shown could be arranged for front tilting, the driver's position and the engine being suitably placed therefor.

The bowl is rotatable with or about spindle 8 in a cradle 9 which is rockable for tilting the bowl as hereinafter explained. The bowl has a large bevel wheel 10 gearing with a bevel pinion 11 on a shaft 12 which is coaxial with the tilting axis and is driven by chain drive 13 comprising a sprocket wheel 14 loosely mounted on the engine-driven propeller shaft 15 and constructed as one element of a clutch for clutching with a companion clutch element 16 which is connected by a feather key 16a to the shaft 15. The clutch element 16 is displaceable by operating hand lever 40 whence motion is transmitted through link 41 to a lever 42 fulcrumed to bracket 43 on the chassis and pivoted to clutch element 16.

The shaft 15 propels the driving wheels 3 through a clutch, forward and reversing gears and differential gearing, all of which may be of the conventional character employed in motor vehicles, and indicated generally by numeral 17. These may be a simple single speed drive and reverse or a multiple-speed and reverse.

In the form illustrated the chassis encloses the transmission including the power unit, propeller shaft, gear box and rear axle, but an open frame type may be employed.

The chain drive turning the mixer bowl is situated on the propeller shaft in a suitable position (as shown) to keep the bowl revolving in one direction whether the machine is moving forward or reversing. The clutch 14—16 enables the bowl to be entirely disengaged while driving the machine from site to site, or on the road from one town to another. The clutch may be arranged ahead of the propeller shaft clutch so that the mixing bowl may be maintained in constant rotation and in certain cases the wheel base shortened.

The steering wheel 18, arranged at a convenient position in front of the driver-operator's seat is on a shaft 19 geared through bevel wheels 20, 21 to a spindle 22 which carries at its lower end a worm 23 meshing with sector 24, this sector being on shaft 25 to which is secured drop arm 26 which operates drag link 27, the other end of which is pivoted to the upper steering arm 28 of the steering head 29 of one of the front wheels, the track link 30 connecting the lower steering arm 28a with a corresponding arm 28a on the stub axle of the other front wheel, all in manner well known in connection with the steering of automobiles.

On the same axis as the steering wheel and also within convenient control of the driver, a wheel 31 is mounted controlling tilting of the mixer bowl with trunnions 32 which are supported in bearings in the pillars 7.

Motion is transmitted from the wheel 31 to the trunnions through reduction gearing. The wheel 31 is on a hollow shaft 32a around the steering shaft 19, a small spur pinion 33 being secured to the shaft 32a and meshing with a large spur wheel 34, on a counter shaft 35 to which is secured a small spur pinion 36 meshing with a large spur wheel 37 on the rear trunnion.

Provision is made for locking the mixing bowl and gear in normal upright position or in a desired tilted loading or discharging position, e. g., a lever 38, pivoted to the rear pillar 7, may engage locking projections 39 on the trunnion, the lever 38 being also under the control of the driver-operator, either directly or through a transmission operated from a position, e. g., by a lever, closer to the driver's seat.

It will be seen that the driver-operator from his rear seat can drive the machine like an ordinary automobile and while the engine is running, and if desired while the machine is travelling, the mixing drum is rotating by chain drive 13 and bevel gearing 10, 11 this drive being derived from the engine. When the machine reaches discharging position the driver-operator can tilt the drum to one side or the other of the machine at will by operating the wheel 31. In the form of the invention described, the wheel track is narrower than the chord or diameter of movement of the mouth of the drum so that the drum can discharge outside of the wheel track without the aid of additional devices such as chutes. The driver can moreover in the form of machine described either discharge the mixed concrete at a selected site or spread it along the surface before bringing the machine to a standstill. He also has the control over the locking lever 38 so that he can set the drum in the upright position or any desired tilted position for loading or discharge.

A tow bar may be fitted to a hitch at the front of the machine for pulling the machine from site to site where the machine is not licensed to drive upon the highway. A towing hitch may be fitted at the rear of the machine for pulling a trailer with plant to the site.

In the form hereinbefore described the wheel for operating the tilting gear can be operated independently of the steering wheel and if desired the driver may spread the mixed concrete along the surface being traversed while the machine is travelling, but in the alternative form illustrated in Fig. 6 the same hand wheel 18 serves to control steering and tilting, the wheel being geared to either the steering gear or to the tilting gear at the will of the driver. For this purpose the bevel wheel 20 and small bevel wheel 45 are on a single sleeve 46 splined to and slidable along the shaft 47. Bevel wheel 45 meshes

with a large bevel wheel **48** on a countershaft **49** to which is secured a small spur pinion **50** meshing with large spur wheel **51** on the trunnion **32**. In the drawings the sleeve is shown at the right with the tilting gear engaged. When this gear is to be disengaged and the steering gear engaged the sleeve is advanced to the left by turning a hand lever **52** which is on a spindle **53** from which projects a radial arm **54** engaging a projection **55** from a forked member **56** which fits in a groove **57** in the sleeve **46**. Sufficient displacement of the sleeve brings the bevel wheel **20** into gear with the bevel wheel **21** on the steering spindle **22**. Provision may be made for locking the sleeve in either position. If the lever advances the sleeve to a mid position the gears are both disengaged or in neutral.

In either form the trunnions may advantageously be supported in roller or ball bearings, e. g., as shown by **58**, Fig. 6.

A foot or hand operating brake may be fitted or a foot brake which may be locked in position by a hand lever. Number plates may be fitted to enable the machine to conform with the road traffic act, where the machine is to be licensed to run under its own power on the highway. Mudguards and lights may also be added with this object in view.

Where the mixer is required to run over soft or uneven ground between the station at which the constituent materials are placed and the delivery places, endless or caterpillar tracks may be employed with appropriate modification of the propulsion drive when necessary.

What I claim is:

1. A self-propelling concrete mixer or the like comprising a chassis including a power propulsion unit for propelling the mixer, supports upstanding from said chassis and a cradle rockably hung from said supports, a mixing bowl rotatably supported in said cradle, operative means between said power propulsion unit and said mixer bowl for rotating the bowl through the power of said unit, said means including an external ring gear on said bowl and a driving pinion cooperating therewith, said cradle having trunnions by which the cradle is rockably hung in said upstanding supports to enable the cradle to be tilted with said bowl about an axis co-incident with that of said driving pinion, a driver's station with driving controls behind said bowl in the direction of the forward motion of the mixer so as to allow the driver a view ahead for driving while the bowl is in his general forward view, reduction gearing to the cradle trunnions and gearing to a downwardly extending spindle which is operatively connected to the lower steering mechanism, said reduction gearing and said gearing to the steering mechanism including co-axial driving gear elements, one to one of said gearings and one to the other of said gearings and manually operated means for operating said co-axial driving gear elements from said station so that therethrough the driver can steer the mixer or tilt the cradle for discharge of the bowl solely by manual effort while the bowl remains in his general forward view.

2. A self-propelling concrete or like mixer according to claim 1, in which said upstanding supports from the chassis are in spaced relation in the direction fore and aft thereof, said cradle trunnions extending in the same direction, and in which said gearing to the downwardly extending spindle and said reduction gearing to the cradle trunnions including said co-axial gear elements are in a combined steering and tilting gear box arranged between the driver's station and the bowl, said bowl discharging laterally of the mixer.

3. A self-propelling concrete or like mixer according to claim 1, in which said co-axial driving gear elements are arranged one on one shaft and one on another shaft, said shafts being arranged co-axially one within the other, a hand-actuated steering control member on one shaft and a hand-actuated cradle tilting control member on the other shaft, said gearing elements being simultaneously in gear with the said steering gearing and cradle-tilting gearing and said control members being independently operatable.

4. A self-propelling concrete or like mixer according to claim 1, comprising a shaft along which said co-axial driving gear elements are displaceable and means so to displace them to put one of said elements into gear and one out of gear with said steering and cradle-tilting gearings respectively and a common steering and tilting control member on said shaft.

5. A self-propelling concrete mixer or the like comprising a chassis including a power propulsion unit for propelling the mixer, supports upstanding from said chassis and a cradle having trunnions mounted in said supports, a mixing bowl rotatably supported in said cradle, operative connecting means including bevel gearing between said power propulsion unit and said mixer bowl for rotating the bowl through the power of said unit, a driver's station with driving controls arranged behind said bowl in the direction of forward motion of the mixer so as to allow the driver a view ahead for driving while the bowl is in his general forward view, a reduction drive to the cradle trunnions and a transmission to the steering mechanism, and means operatable by the driver from his said station by rotation about a single control axis for transmitting power solely by manual effort optionally through said transmission for steering or through said drive for tilting said cradle and thereby said bowl to discharge the contents of the bowl while it is in his general forward view and while the said bevel gearing remains in gear.

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