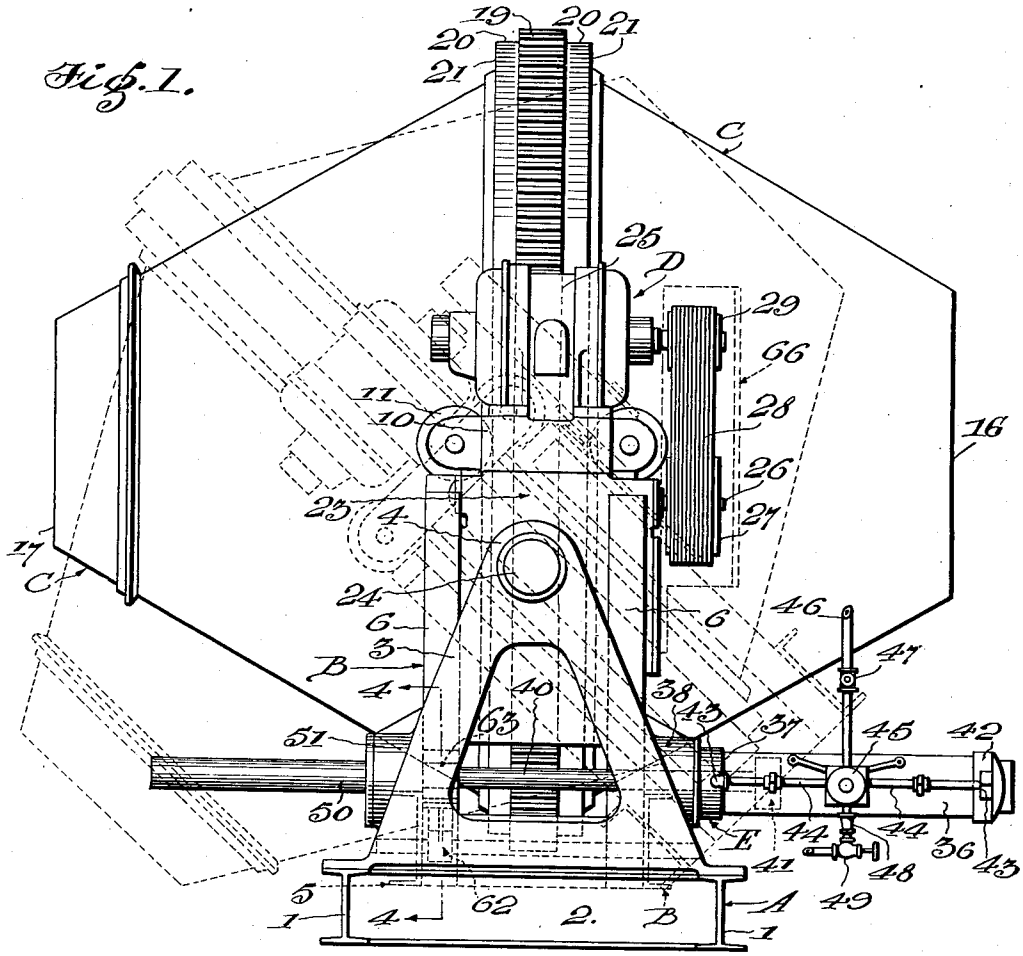
Sept. 15, 1936. A. W. RYBECK 2,054,469

CONCRETE MIXING MACHINE

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Fig. 1.



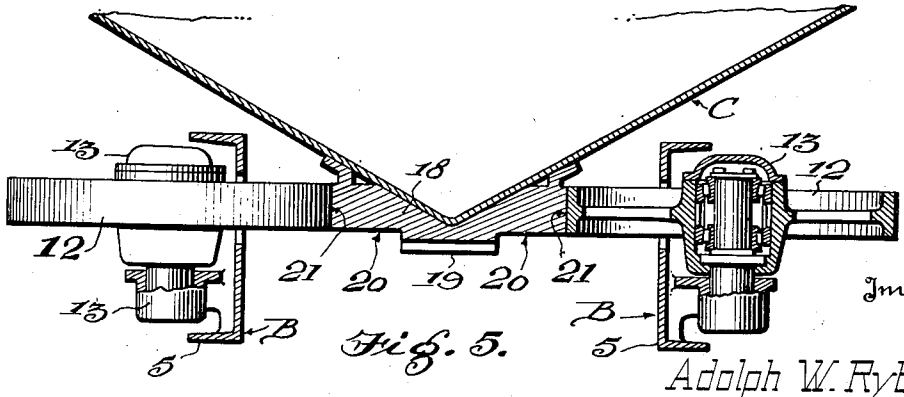


Fig. 5.

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CONCRETE MIXING MACHINE

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Fig. 2.

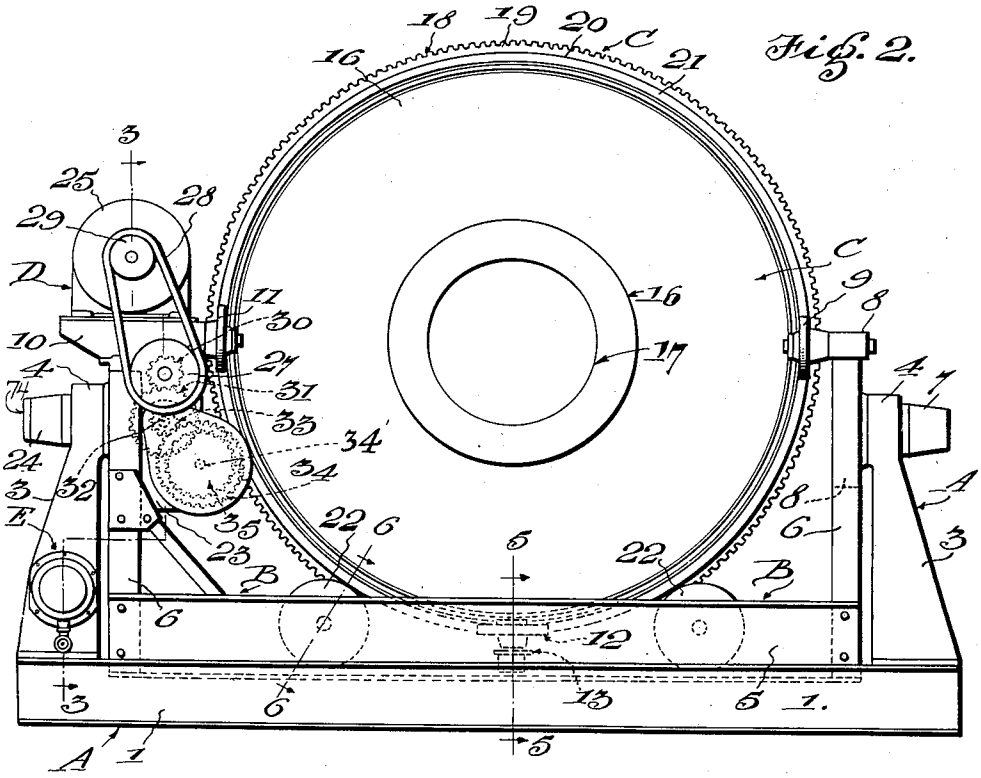
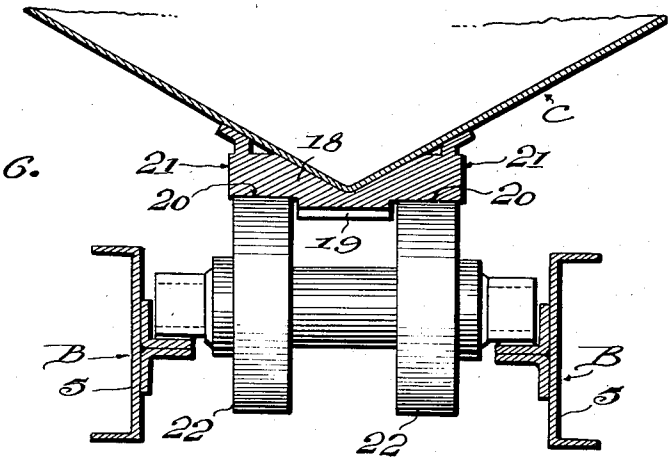


Fig. 6.



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CONCRETE MIXING MACHINE

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Fig. 3.

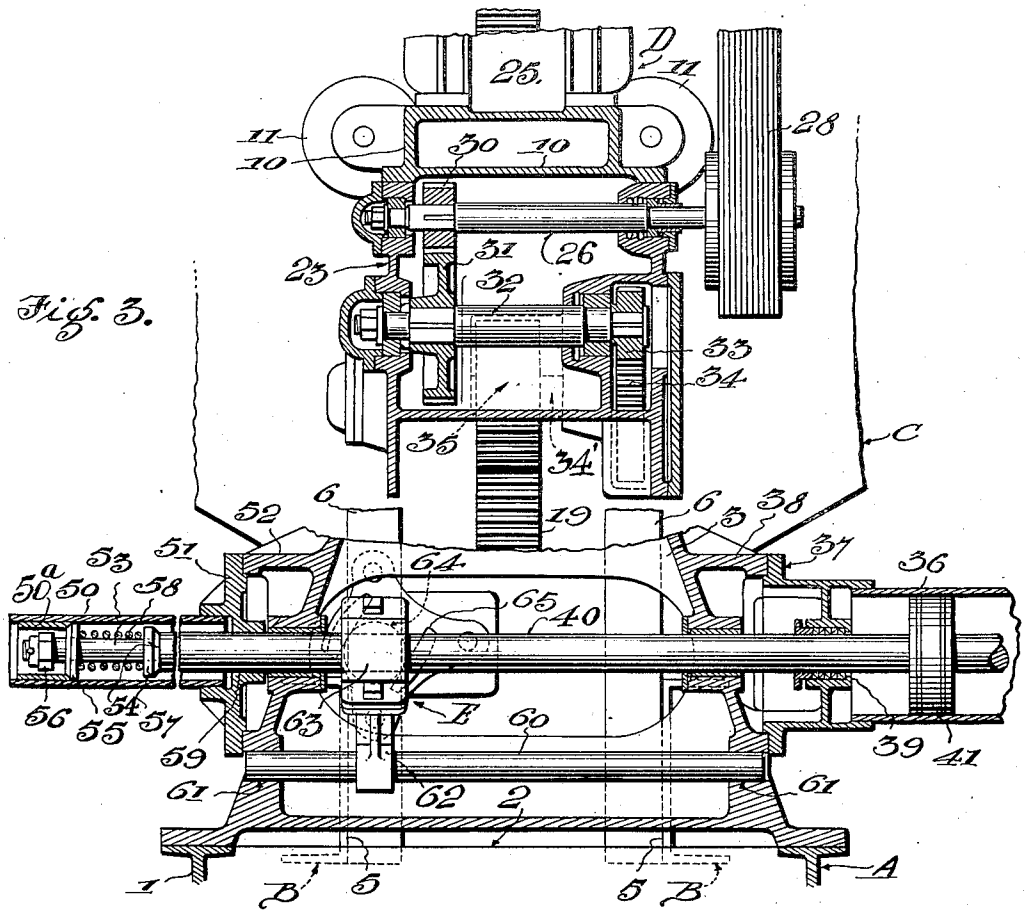


Fig. 4.

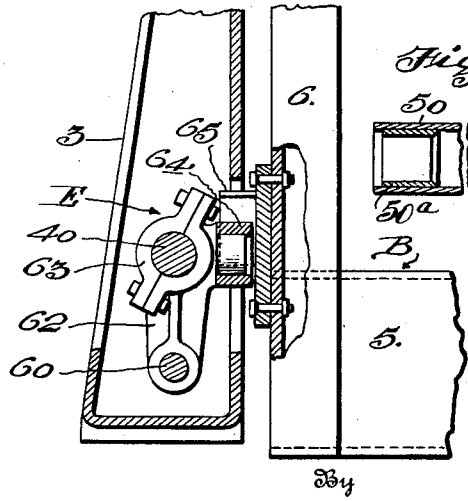
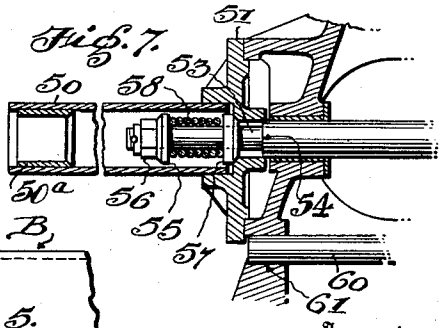


Fig. 7.



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CONCRETE MIXING MACHINE

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Fig. 8.

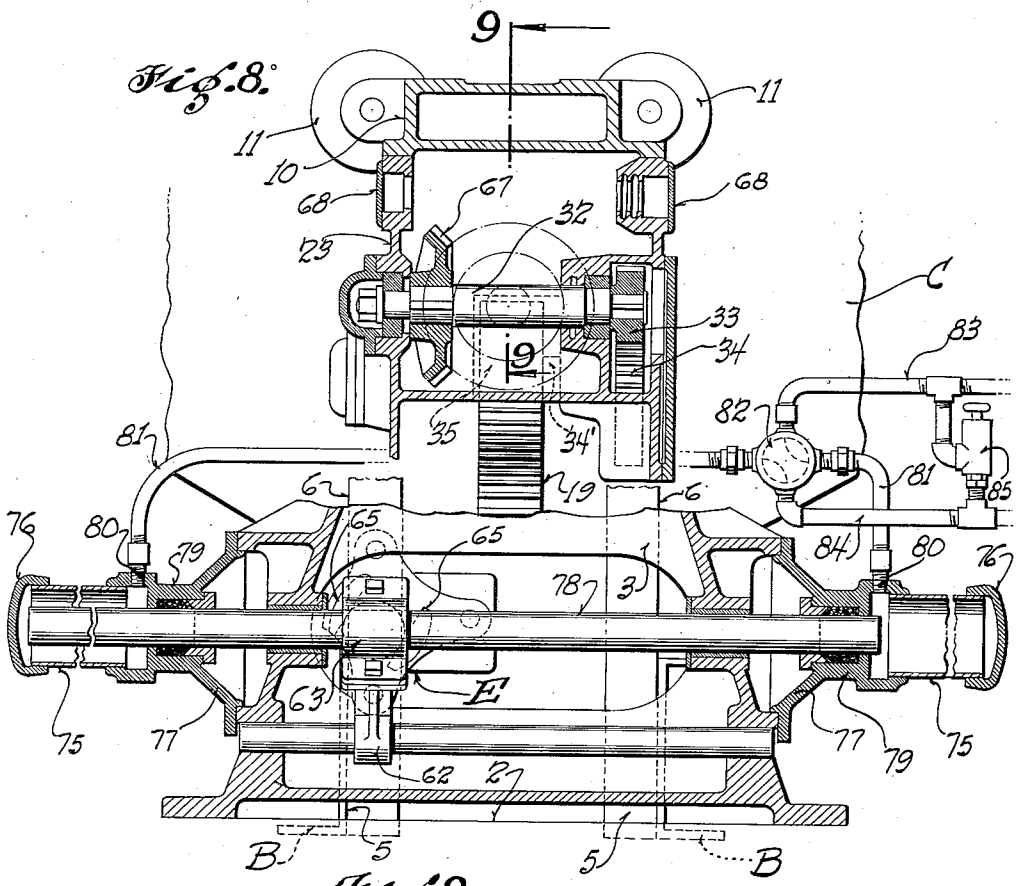
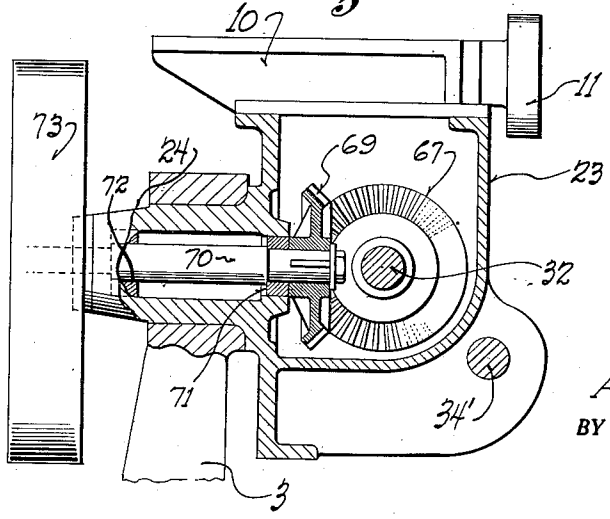


Fig. 9.



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UNITED STATES PATENT OFFICE

2,054,469

CONCRETE MIXING MACHINE

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Application May 14, 1931, Serial No. 537,277

13 Claims. (Cl. 83—73)

This invention relates to improvements in concrete mixing machines of the type having a rotatable mixing drum carried by a cradle to be bodily tiltable to effect a discharging of the mixed aggregates from the drum.

In concrete mixing machines of this character difficulty has been experienced in providing a practical and sturdy drive for the drum, and to provide a proper support for the drum. This invention therefore contemplates as one of its objects, the provision of an improved and greatly simplified manner of driving and mounting the drum, and to this end the entire drive means is supported wholly upon the cradle and tilts with the drum.

In some instances however, it is desirable and often times necessary that the drive means be independent of the cradle. It is therefore another object of this invention to provide a drive mechanism which is so arranged and designed as to readily enable its adaptation to a stationary power plant independent of the cradle without necessitating any change in the mounting structure.

Another object of this invention resides in the provision of novel means for positively swinging the cradle between its normal or mixing position and its tilted or discharging position.

A further object of this invention is to provide novel means for absorbing the shock incidental the cradle and drum reaching the limit of movement in either direction.

Another object of this invention is to provide fluid pressure means for positively swinging the cradle to and from its two positions and for holding the cradle in either position.

And a still further object of this invention is to generally improve and simplify the construction of concrete mixers of the character described.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings, I have illustrated several complete examples of the physical embodiment of my invention constructed according to the best modes I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is an end elevation of a mixing machine embodying this invention, the operative or material mixing position and the material discharging or tilted position of the mixing drum being shown in full and dotted lines respectively;

Figure 2 is a side view thereof;

Figure 3 is a detail vertical cross section taken on the plane of the line 3—3 of Figure 2, the motor being shown in side elevation;

Figure 4 is a detail vertical cross section taken on the plane of the line 4—4 of Figure 1;

Figure 5 is a detail cross section taken on the plane of the line 5—5 of Figure 2;

Figure 6 is a detail sectional view taken on the plane of the line 6—6 of Figure 2;

Figure 7 is a detail sectional view illustrating the cushion stop;

Figure 8 is a view similar to Figure 3, illustrating a slightly modified structure for tilting the drum and a drive connection for use with a stationary power plant; and

Figure 9 is a detail section view taken through Figure 8 on the plane of the line 9—9.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, the letter A represents a supporting frame on which a cradle "B" is tiltably mounted. Rotatably supported in the cradle and tiltable therewith is a mixing drum "C" adapted to be driven from a driving mechanism "D" which is also carried by the cradle. The cradle with the drum and its drive may be swung from one position to another namely, from the normal mixing position of the drum to the tilted discharging position thereof and vice versa, by means of a fluid pressure actuated mechanism "E" supported upon the frame.

It will be obvious that the supporting frame "A" may be of the stationary type or it may be provided with a mobile mounting, and it will be observed that by mounting driving mechanism "D" by which rotation is imparted to the drum, wholly upon the cradle, a particularly compact and efficient driving means is obtained. The mounting of the cradle tilting mechanism "E" directly upon the frame "A" also contributes toward the compactness of the structure as a whole and to the efficiency of operation of said mechanism.

The supporting frame "A" comprises parallel side frame beams 1 which are joined by end cross-beams 2. An A-frame pedestal or bearing standard 3 is supported on each end of the frame and each standard is equipped with a trunnion bearing 4 at its apex.

The cradle "B" comprises spaced parallel side rails 5, 5, and a pair of joined end uprights or

standards 6, 6 mounted at and connecting the adjacent ends of said side rails. Fixed to the standards 6 at one end of the cradle frame by means of a cross-head 8, is a trunnion 7 which is journalled in the adjacent bearing 4, and cooperates with a second trunnion 24 fixed to the standard 6 at the opposite end of the cradle frame in a manner to be later described and journalled in the other bearing 4, to tiltably mount the cradle. The cross head 8 ties the adjacent standards 6 together and also mounts a pair of opposed rollers 9, 9 for a purpose to be later described.

The standards 6, 6 at the opposite end of the cradle frame are tied together by a gear casing 23 which not only forms a part of the drum driving mechanism, but also forms a part of the cradle in that it is wholly mounted upon the cradle and is bodily tiltable therewith. This gear casing mounts the trunnion 24 and with the adjacent standards 6, 6 supports a bracket 10 on which is journalled a pair of opposed rollers 11, 11 to cooperate with the rollers 9 and a third pair of spaced rollers 12 is supported beneath the drum in bearing brackets 13 carried by the cradle side rails 5, to provide a 3-point lateral guide means for the mixing drum. The guide rollers 12, 12 are disposed centrally beneath the drum and the sets of rollers 9 and 11 are positioned at diametrically opposite sides of the drums and are substantially in axial alignment.

The mixing drum "C" is of more or less conventional construction and comprises two truncated conical shells joined at their bases and providing intake and discharge throats 16 and 17 respectively. Suitable mixing devices are mounted on the interior of the drum, but as these form no part of the present invention they are not shown. Encircling the drum at its center is an external bearing and driving ring 18 equipped with a central ring gear 19, lateral shoulders forming bearing faces 20, 20, and lateral guide faces 21, 21. The lateral guide faces 21 are in constant contact with the sets of guide rollers 9, 11 and 12, and the bearing faces 20, 20 engage two sets of rollers 22, 22 arranged in spaced pairs to rotatably support the drum. One set of rollers 22 is disposed at each side of the axis of and beneath the drum as shown in Figure 2, and both sets are supported by the cradle frame side rails 5 as shown in Figure 6.

The driving mechanism "D" includes the gear casing 23 and an electric motor 25 mounted on the bracket 10. A shaft 26 journalled in the casing 23 has an end portion projected from the casing which mounts a large pulley 27, rotation being imparted to the pulley 27 through a suitable transmission belt or other connection 28 run from a small pulley 29 fixed to the motor shaft. The shaft 26 carries a pinion gear 30 within the casing which meshes with an intermediate gear 31 mounted on a counter shaft 32 journalled in the casing. The counter shaft 32 has a pinion 33 fixed thereto which drives a gear 34 secured on a third shaft 34' journalled in the casing and on which a driver pinion 35 is mounted to constantly mesh with the ring gear 19 of the drum. The motor 25 is thus drivingly connected with the mixing drum through a train of reducing gears and the entire drive unit including the motor and all driving connections between it and the mixing drum, is supported wholly and directly upon, and is bodily movable with the cradle.

The cradle swinging mechanism "E" is actuated by fluid pressure, and includes an air cylinder 36, best shown in Figs. 1 and 3, which is secured by a cap bearing 37 to a mounting boss 38 formed on one of the A-frame standards 3 of the supporting frame. The cap bearing 37 includes a gland packed bearing 39 through which a piston rod 40 is projected into the interior of the cylinder to mount a piston 41.

The free end of the cylinder is closed by a cap 42 so that the piston 41 divides the cylinder 36 into two closed chambers into which fluid is adapted to be received through inlet and outlet ports 43, 43. Fluid conduits 44 lead from the ports 43 and through a 4-way valve 45 and connect with a fluid supply line 46, a control valve 47 governing the flow of fluid through the pipe 46. An exhaust pipe 48 leads fluid from the cylinder through a valve 49 which controls the flow of fluid through the pipe 48.

The valve 45 is so arranged that fluid under pressure may be led from the pipe 46 through the valve 47 to either side of the piston 41 to effect reciprocation of the piston, fluid from the opposite side of the piston 41 being exhausted through the valve 45 and the exhaust pipe 48. A valve 49 in the pipe 48 may be used to control the rate of exhausted fluid from the low pressure side of the piston and thus effectively control the speed of reciprocation of the piston.

The outer end portion of the piston rod 40 is slidably mounted in bearings carried by the legs of the A-frame and the extreme outer end of the rod projects into an enclosing sleeve 50 carried by a cap bearing 51 supported on a boss 52 on the adjacent leg of the A-frame standard 3, and this sleeve not only protects the end of the rod from undesirable contacts, but also serves to form a guard housing to preclude the possibility of having the reciprocating rod strike a workman.

The end of the rod 40 within the sleeve 50 is reduced as at 53 to provide a shoulder 54, the reduced end 53 slidably mounting a collar 55, detachment of which collar from the rod being prevented by a stop nut 56. A second collar 57 also slidably mounted on the reduced end of the rod, is normally held against the shoulder 54 by a spring 58 coiled about the rod and confined between the collars. The spring 58 provides a cushioned stop for limiting the movement of the rod and consequently the cradle and drum, for when the rod is moved to the right with respect to Figure 3, the collar 54 engages the fixed abutment 59 provided by the cap bearing 51 and the jar is taken up by the spring as shown in Figure 7; and upon movement of the rod in the opposite direction the collar 55 strikes an abutment ring or stop 50*a* secured in the outer end of the sleeve 50, compressing the spring 58 and cushioning the stop of the rod and cradle.

Motion of the piston rod 40 is imparted to the cradle in the following manner. A guide rod 60 is rigidly secured in bearings 61 provided therefor in the standard 3 below the rod 40, and forms a slide guide for an arm 62 which is secured by a clamp 63 to the piston rod. The arm 62 has a projected stud to freely rotatably mount a roller 64 which is received between the parallel sides of a roller guide 65 secured to the cradle frame with its longitudinal axis radial to the axis of the pivotal mounting for the cradle. The piston rod 40 is thus afforded a radially sliding positive connection with the cradle, and it will be observed that the cradle swinging mechanism "E" acts positively in both directions. It is also noted that the guide rod 60 retains the reciproca-

tory piston rod 40 against axial rotation and thus maintains the roller 64 and roller guide 65 in operative engagement.

If desired the transmission connections 27, 28 and 29 may be enclosed by a suitable guard 66 for safety and dust protecting purposes, as shown in Figure 1.

If the machine is to be used in localities where electricity is not available and drive means other than an electric motor must be employed, the drive mechanism and specifically the gears within the gear box 23 may be altered to permit the use of a stationary gas engine or other similar power plant without necessitating in any way a change in the structure of the gear box or any other part of the supporting structure.

In Figures 8 and 9 the driving mechanism has been illustrated as arranged for use with a stationary gas engine or other similar power plant, and it is observed that very little change is required to permit the device to be so driven. The spur gear 31 is removed from the shaft 32 and in its place a bevel gear 67 is provided. The shaft 26 and consequently the pinion 30 and the driving shaft over which the belt 28 is trained is removed and the bearing openings in the sides of the gear box and in which the shaft 26 is normally journalled are closed by cover plates 68.

Meshed with the bevel gear 67 is a second bevel gear 69 fixed to the inner end of a stub shaft 70 suitably journalled in bearings 71 and 72 at the opposite ends of the trunnion 24. As hereinbefore brought out the trunnion 24 is carried by and forms an integral part of the gear box and as it forms part of the tilting support for the cradle, and as the bearings 71 and 72 are in exact axial alignment with the trunnion, it follows that the shaft 70 and consequently the bevel gear 69 is exactly in axial alignment with the axis about which the cradle tilts so that tilting motion on the part of the cradle does not effect the drive connection between the bevel gears 67 and 69.

The outer end of the shaft 70 has a pulley 73 or other suitable power transmitting element fixed thereto, over which a belt or the like may be trained to drivingly connect the pulley with a gasoline motor or other suitable stationary power plant (not shown).

It is observed that when the drive mechanism is arranged to be driven from the electric motor 25 carried by and assembled with the cradle the outer open end of the trunnion 24 is closed by a cover plate 74 which, when the device is to be driven in the manner illustrated in Figures 8 and 9, is removed and replaced by the bearing structure 72.

As will be readily apparent the drive from the bevel gears 67 is continued through the shaft 32 and the gears 33 and 34, to the shaft 34' and consequently the drive pinion 35 which is meshed with the ring gear on the drum.

In Figure 8, a slightly modified construction of tilting mechanism is illustrated. This construction is considerably cheaper than that illustrated in Figure 3 and obviates the necessity for shock absorbing means. In place of the cylinder 36 and the shock absorbing means at the opposite side of the frame, cylinders of slightly different construction are provided. These cylinders are identical in construction and each consists merely of a cylindrical shell 75 having its outer end closed by a cap 76 and its inner end welded or otherwise fixed to a mounting bracket 77 which is suitably secured to the adjacent side portion of the mounting frame.

The brackets 77 are bored to receive a shaft 78 and suitable packing glands 79 are provided at the entrance of shaft end portions into the cylinders.

Each cylinder is provided with a port 80 to which a pipe 81 is attached. The pipes 81 lead to a three-way valve 82 which is connected, by means of a duct 83 with a suitable source of fluid under pressure, preferably oil. A return pipe 84 is also connected with the valve, and the valve is so constructed that either cylinder may be communicated with either the pressure source through the pipe 83 or with the return pipe. In this manner the shaft 78 may be positively shifted in either direction without the need for pistons. A smooth action is thus obtained, and the movement of the shaft 78 to effect tilting is at all times under the control of the operator and may be arrested at any position of adjustment and when in either limit of movement the fluid pressure serves to hold the same, a relief valve 85 being provided across the ducts 83 and 84 to open after a predetermined pressure is attained.

It is also apparent that the shaft end entering the cylinder and compressing the oil at the end of its stroke, cushions the stop of the tilting motion and thus obviates the necessity for additional cushioning means.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which an invention of this character appertains, that I provide a practical and sturdy structure for tiltably mounting the drum of a concrete mixing machine in which the drive for the drum is greatly simplified by mounting the entire drive mechanism on the drum supporting the cradle to be bodily tiltable therewith and that when so positioned the structure supported by the cradle is balanced and facilitates tilting of the cradle and consequently the drum from loading to discharging position and vice versa.

It is also apparent that the drive mechanism is so constructed as to readily permit the same to be so arranged as to be driven from a stationary power plant without requiring an extensive change in the structure of the driving mechanism, and that novel fluid pressure actuating means for positively tilting the drum in both directions is provided and so associated with the drum to effect a compact and efficient construction.

What I claim as my invention is:

1. In a mixing machine, the combination with a supporting frame having spaced standards, of a cradle pivotally mounted between the standards, a mixing drum rotatably mounted on the cradle and having an external ring gear, said cradle including two bearing standards, a trunnion carried by one cradle standard and engaging in one frame standard, a second trunnion engaging in the other frame standard, and means to impart rotation to the drum through said ring gear including a driving pinion, a motor, and intermediate speed reduction gearing, and a casing for said gearing, said casing, motor and gearing being supported by the other cradle standard and said second trunnion being supported by said casing.

2. In a mixing machine, the combination with a supporting frame, of a cradle pivotally mounted on the frame, a mixing drum rotatably supported on the cradle, and means for swinging the cradle including a rod reciprocable along a fixed axis parallel to a vertical plane through the axis of rotation of the drum, means connecting the rod and the cradle, and fluid pressure actuated

means for reciprocating said rod to positively swing the drum in both directions comprising a cylinder into which one end of the rod projects, a piston on the projected end of the rod, and means to direct fluid under pressure alternately at opposite sides of the piston.

3. In a mixing machine, the combination with a supporting frame, of a cradle pivotally mounted on the frame, a mixing drum rotatably supported on the cradle, means for swinging the cradle including a rod reciprocable along a fixed axis parallel to a vertical plane through the axis of rotation of the drum, means connecting the rod and the cradle, fluid pressure actuated means for reciprocating said rod to positively swing the drum in both directions between the positions stated, and cushioning means cooperating with the rod to limit the swinging movement of the drum.

4. In a mixing machine, the combination with a supporting frame, of a cradle pivotally mounted on the frame, a mixing drum rotatably supported on the cradle, and means for swinging the cradle including a rod supported on the frame and reciprocable along a fixed axis parallel to a vertical plane through the axis of rotation of the drum, means connecting the rod and the cradle, fluid pressure actuated means for reciprocating said rod to positively swing the drum in both directions between the positions stated comprising a cylinder into which one end of the rod projects, a piston on the projected end of the rod, and means to direct fluid under pressure alternately at opposite sides of the piston, the end of the rod opposite the piston being reduced to form a shoulder, a sleeve surrounding the reduced end of the rod and fixed to the frame, a stop secured within the outer end of the sleeve, a stop secured to the outer end of the reduced portion of the rod, collars slidable on the reduced portion of the rod, and a coil spring arranged around the reduced portion of the rod between said collars.

5. In a mixing machine, the combination with a support, of a mixing drum pivotally mounted on the support to swing back and forth between a normal mixing position and a tilted discharging position, means for swinging the drum including a reciprocable member, means at one end of the member for reciprocating the same, and resilient cushioning means at the other end of the member acting in a direction opposite to said last named means at one end of the reciprocating stroke to cushion the end of the stroke and prevent sudden jars on the machine.

6. In a mixing machine, the combination with a support, of a mixing drum pivotally mounted on the support to swing back and forth between a normal mixing position and a tilted discharging position, means for swinging the drum to and from either position including a reciprocable shaft, fluid pressure actuated means for reciprocating said shaft, and cushioning means cooperating with said shaft to limit the reciprocation of the shaft and consequently the swinging movement of the drum.

7. In a mixing machine, the combination with a support, of a mixing drum pivotally mounted on the support to swing back and forth between a normal mixing position and a tilted discharging position, means for swinging the drum to and from either position including a reciprocable rod, fluid pressure actuated means at one end of the rod for reciprocating the same, housing means enclosing the opposite end of the rod, and cooperating means carried by the rod and said housing means to provide cushioning means for limiting the reciprocation of the rod and consequently the swinging movement of the drum.

8. In a mixing machine, the combination with a supporting frame of a cradle pivotally mounted on the frame, a mixing drum rotatably supported on the cradle, and means for swinging the cradle including a shaft reciprocable along a fixed axis disposed substantially parallel with a vertical plane through the axis of rotation of the drum, means connecting the shaft with the cradle, closed cylinders into which the end portions of the shaft project, and means for simultaneously connecting one cylinder with the source of fluid pressure and the other, with an exhaust to reciprocate the shaft.

9. In a mixing machine, the combination with a supporting frame, of a cradle pivotally mounted on the frame, a mixing drum rotatably supported on the cradle and means for swinging the cradle comprising a shaft reciprocable along a fixed axis disposed substantially parallel with a vertical plane through the axis of rotation of the drum, and means connecting the shaft with the cradle, a closed cylinder at each end of the shaft, said shaft being of such length that when one end portion thereof is wholly received within one cylinder it is moved substantially out of the other, and means for conducting fluid under pressure selectively to either cylinder to expel the shaft therefrom and reciprocate the same, and means for controlling the exhaust of fluid from the cylinder into which the shaft is being moved whereby the limiting of the shaft movement is cushioned.

10. In a mixing machine, the combination with a supporting frame having spaced standards, a cradle having trunnions journalled in said standards to swingingly mount the cradle from the standards, a gear case associated with one of said trunnions, a rotatable mixing drum, means carried by the cradle and engageable with a medial portion of the mixing drum to rotatably mount the mixing drum on the cradle and retain the same assembled with the cradle for bodily swinging movement therewith, a ring gear encircling the medial portion of the mixing drum, a driving pinion in mesh with the ring gear and mounted on the exterior of said gear case, reduction gearing within the gear case to drive said pinion, power means mounted on said gear case to drive said reduction gear, and fluid pressure actuated means mounted on one of the standards to positively swing the cradle back and forth to carry the mixing drum from a normal mixing position to a tilted discharging position and vice versa.

11. A concrete mixer comprising a base, spaced pedestal bearings carried by said base, a normally vertically disposed U-shaped yoke provided with horizontally extending axially aligned outwardly projecting shafts adjacent the free ends of the legs of the yoke supported in said bearings, a mixing drum, means on the yoke rotatably supporting the drum between the legs of the yoke, a motor, a motor support on one of the legs of the yoke mounting said motor, transmission drive means connecting the motor and drum for rotating said drum, and bearings on the yoke independent of said shafts and pedestal bearings wholly mounting the transmission drive means.

12. In the construction as defined in the last preceding claim, said motor support being disposed over one of the pedestal bearings.

13. A concrete mixer comprising a base, spaced axially aligned pedestal bearings carried by said

base, a normally vertically disposed U shaped yoke provided with horizontally extending axially aligned outwardly projecting trunnions adjacent the free ends of the legs of the yoke supported in said pedestal bearings, a mixing drum, means on the yoke rotatably supporting the drum between the legs of the yoke, a motor, a motor support on the yoke mounting said motor to one side of the drum axis with the motor axis normal to the major plane of the yoke, transmission drive means connecting the motor and drum for rotating said drum, and bearings on the yoke independent of said trunnions and pedestal bearings wholly mounting the transmission drive means with all of the axes of rotation of the transmission drive means and its bearings parallel to the axis of the motor.

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