Nov. 6, 1962 R. P. GREEN 3,062,515

CONCRETE MIXING MACHINES

Filed March 21, 1960 2 Sheets-Sheet 1

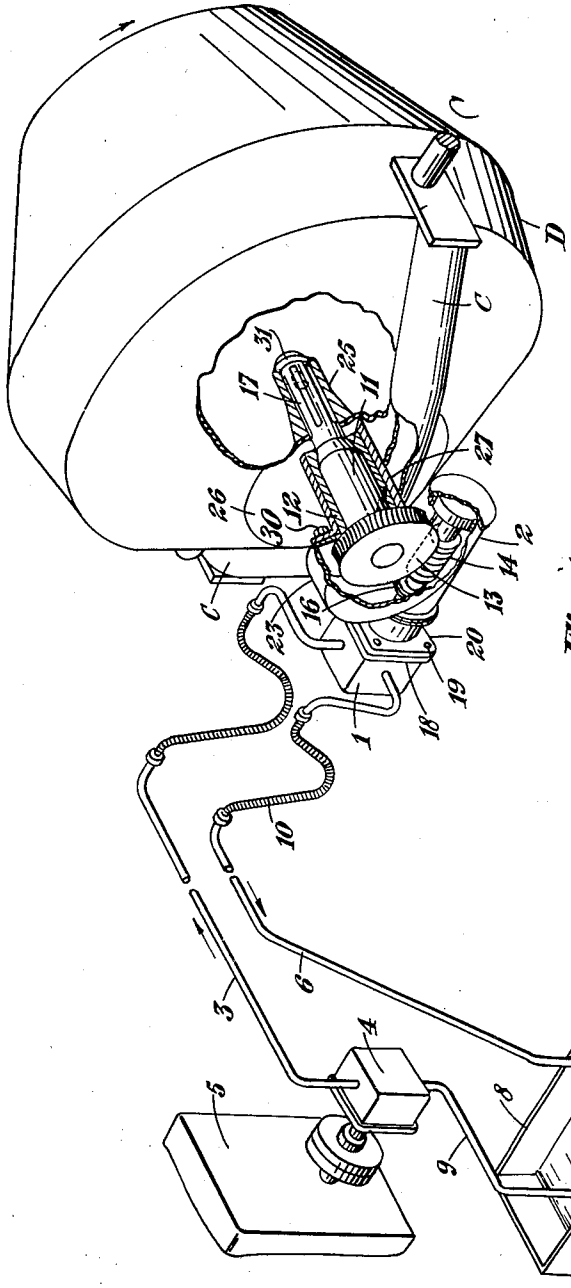


Fig. 1.

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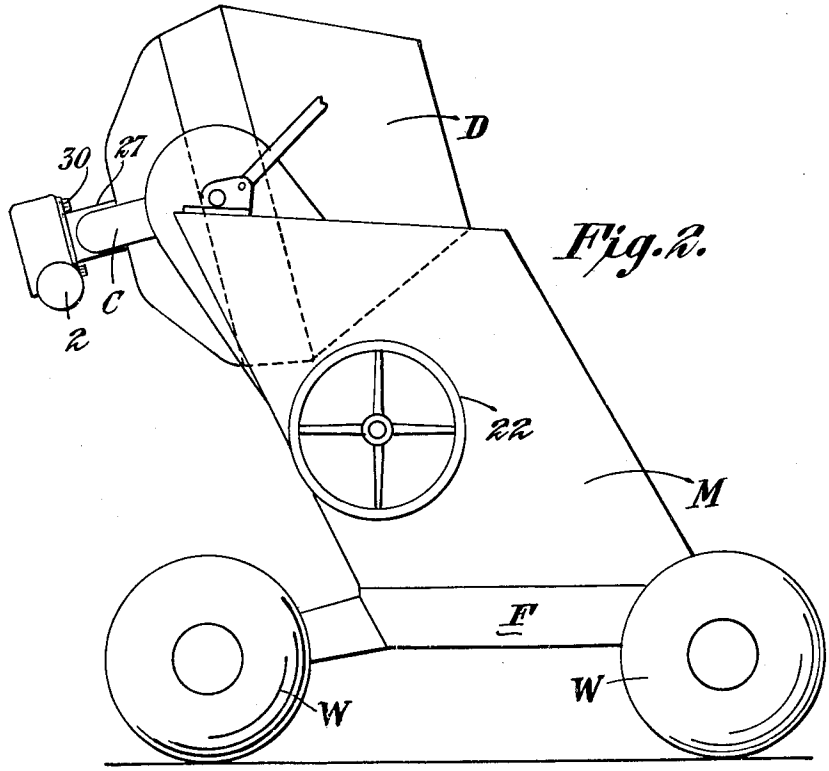


Fig. 2.

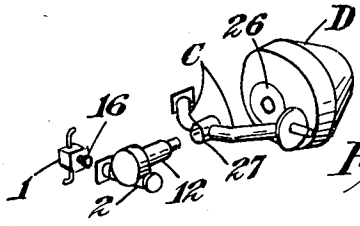


Fig. 3.

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CONCRETE MIXING MACHINES

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This invention relates to concrete and like mixing machines having a rotary drum for effecting the mix.

More particularly it is concerned with a concrete mixer of the type in which the drum is capable both of rotation and tipping simultaneously, tipping being about a horizontal axis provided by trunnion type mountings in the frame of the machine in which the drum is supported to rotate.

In existing types of concrete mixers drive to the drum is usually by means of a bevel pinion mounted on the machine frame and concentric with the swinging axis of the drum, this bevel pinion meshing with a bevel wheel or similar toothed ring secured to the wall of the drum.

In another method there is employed a chain and bevel drive through the arms of the cradle and connecting with a bevel wheel fast on the base of the mixing drum and concentric with the rotation axis.

It will be appreciated that both forms of drive transmission, because they have to transmit the drive through the swinging axis of the drum cradle, involve a considerable number of drive parts which are both costly as regards production and involve considerable maintenance when in operation.

According to the present invention in a concrete mixing machine of the type having a rotary mixing drum, drive to the mixing drum is by means of a hydraulic system having a hydraulic motor mounted on the frame in which the mixing drum rotates, drive from the motor being transmitted through a gear box to a spindle in driving connection with the mixing drum and the motive fluid for the motor being supplied by a hydraulic pump coupled to a prime mover.

Preferably drive from the hydraulic motor to the drum is by means of reduction gearing. Conveniently the reduction gearing comprises a worm spindle fast on the motor shaft meshing with a worm wheel fast on the spindle of the drum.

It is a further feature of the invention that the hydraulic motor and the gear casing housing the reduction gears are constructed as independent units so that they can be replaced without dismantling any internal mechanisms when in use in the field.

The invention is diagrammatically illustrated in the accompanying drawings in which:

FIGURE 1 is a layout of a hydraulic drive to the mixing drum of a concrete mixer;

FIGURE 2 is a side elevation of the mixer showing the frame, mixing drum, and a part of a jib for use in conjunction with a drag line scoop when loading the skip.

FIGURE 3 is a perspective view showing the drum, drum frame and motor and gear box disconnected.

Referring to FIGURE 2 of the drawings, M indicates generally the machine frame which is mounted on a four wheeled chassis F having ground wheels W. A mixing drum D is mounted to revolve in a drum cradle C which is provided with trunnion type mountings in the machine frame M so that the drum D and cradle C can be tipped to discharge its contents on completion of mixing.

The concrete mixer of this invention is provided with a hydraulic drive including a motor 1 (FIGS. 1 and 3) from which drive is transmitted through a gear box indicated

generally at 2, to a spindle 11 on which the mixing drum is carried, both the motor 1 and gear box 2 being supported on the mixing drum cradle C.

Pressure fluid is delivered to the motor 1 through a delivery line 3 from a pump 4 driven by a prime mover 5, usually an internal combustion engine or electric motor. A return flow line 6 from the motor 1 returns the motor fluid to a hydraulic fluid reservoir 8 which, together with the prime mover 5, is mounted on the machine frame M. The pump 4, which may be of the gear, centrifugal or piston type, draws fluid direct from the reservoir 8 through a suction line 9. Flexible pipe connections indicated generally at 10 are provided between the delivery and return lines 3, 6 and the motor 1 so that in the event of it being necessary to disconnect the hydraulic motor, this can readily be performed by detaching the pipes 10.

It is a futher feature of this invention that the gear box 2 together with the motor 1 are detachable as separate units as can be seen from FIGURE 3. For this purpose the gear box comprises a cylindrical shell or casing 23 having an axial extension 12 within which the spindle 11 is rotatably mounted in suitable bearings. The drum cradle C, which is of tubular construction has a central housing 27 provided with a machined bore to receive the gear casing extension 12.

A gear train comprising a worm wheel 13 fast on the spindle 11 meshes with a worm 14, the worm shaft being detachably connected to the motor shaft, preferably by a flexible coupling 16 so that the motor and gear box units can be separated. The drum, which is of all steel construction, has an internal boss 25 of cast steel, which is integral with a base or cap 26, the latter fitting a central opening in the base of the steel drum.

The inside of the boss 25 is splined to receive a splined extension or stub 17 on the other end of the worm wheel spindle 11 so that drive from the stub 17 is directly transmitted to drum D.

As can be seen from FIGURE 1, the motor casing is provided with a flange 18, by which it is bolted through four bolts 19 to a flange 20 on the gear box casing 23, which is circular. This enables the motor 1 to be uncoupled from the gear box 2, following which it is a simple matter to withdraw the gear box 2 and extension 12 with its spindle 11 by releasing the holding screws 30, by which a radial flange on the rear end of the bearing housing 27, is secured to the gear casing 23. The drum boss is secured to the spindle 11 by a single set screw and washer indicated at 31.

By providing a hydraulic drive in accordance with this invention, it has the advantage that the drive unit i.e. the motor 1 and gear box 2 are totally enclosed, which not only eliminates risk of accident both to the operator and to the machine, but affords complete protection to ingress of dirt and abrasives, which is particularly liable to occur due to the presence of sand when making concrete.

As compared with a drum having an external driving ring and driving bevel, economy in space can be effected owing to the small size of the hydraulic motor; and the minimum of gearing, namely a worm and worm wheel may be employed. This results in a smooth drive with absence of vibration.

A hand wheel 22, together with a chain drive, is provided for moving the drum from the mixing to the discharge position, together with an automatic locking device consisting of a spring loaded pin to check the movement of the drum cradle at suitable positions for loading, mixing, discharging and cleaning.

A feature of the hydaulic drive is that it can be conveniently used for reversing the direction of rotation of the drum on machines designed for mixing in one direction and discharging in the opposite direction. This

method dispenses with expensive clutches which may be subject to rapid wear and deterioration, thus increasing maintenance costs.

It will be appreciated that instead of a worm or worm wheel reduction gearing, use could be made of an epicyclic spur gear reduction unit.

What is claimed is:

1. A concrete mixing machine comprising a machine frame, a mixing drum, a cradle supporting said drum for rotation on its axis and mounted on said machine frame to provide for movements of the drum to and from its discharge position, said cradle having a tubular bearing housing coaxial with said drum, a gear casing having a tubular extension fitting within said bearing housing, a spindle journaled within said tubular extension and adapted to enter into driving engagement with said drum on the attachment of said gear casing to said bearing housing, means for detachably connecting said gear casing to said cradle, a gear train totally enclosed within said gear casing and connected to said spindle, and motor means for driving said gear train.

2. A concrete mixing machine comprising a machine frame, a mixing drum, a cradle supporting said drum for rotation on its axis and mounted on said machine frame to provide for movements of the drum to and from its discharge position, said cradle having a tubular bearing housing coaxial with said drum, a gear casing having a tubular extension fitting within said bearing housing, a spindle journaled within said tubular extension and adapted to enter into driving engagement with said drum on the attachment of said gear casing to said bearing housing, means for detachably connecting said gear casing to said cradle, a gear train totally enclosed within said gear casing and connected to said spindle, said gear train including a worm wheel connected to said spindle and a worm engaging said worm wheel, a motor having a housing detachably connected to said gear casing and provided with a drive shaft, and means for detachably connecting said drive shaft to said worm.

3. A concrete mixing machine comprising a machine frame, a mixing drum, a cradle supporting said drum for rotation on its axis and mounted on said machine frame to provide for movements of the drum to and from its discharge position, said cradle having a tubular bearing housing coaxial with said drum, a gear casing having a

tubular extension fitting within said bearing housing, a spindle journaled within said tubular extension and adapted to enter into driving engagement with said drum on the attachment of said gear casing to said bearing housing, means for detachably connecting said gear casing to said cradle, a gear train totally enclosed within said gear casing and connected to said spindle, said gear train including a worm wheel connected to said spindle and a worm engaging said worm wheel, a hydraulic motor having a housing detachably secured to said gear casing and provided with a drive shaft detachably connected to said worm, and means for supplying hydraulic fluid under pressure to said hydraulic motor.

4. A concrete mixing machine comprising a machine frame, a mixing drum, a cradle supporting said drum for rotation on its axis and mounted on said machine frame to provide for movments of the drum to and from its discharge position, said cradle having a tubular bearing housing coaxial with said drum and provided at its end remote from said drum with a flange perpendicular to said drum, a gear casing seating against and detachably secured to said flange and having a tubular extension fitting within said bearing housing, a spindle journaled within said tubular extension and adapted to enter into driving engagement with said drum on the attachment of said gear casing to said flange, a gear train totally enclosed within said gear casing and connected to said spindle, and a hydraulic motor having a drive shaft connected to said gear train and including a housing detachably connected to said gear casing.

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