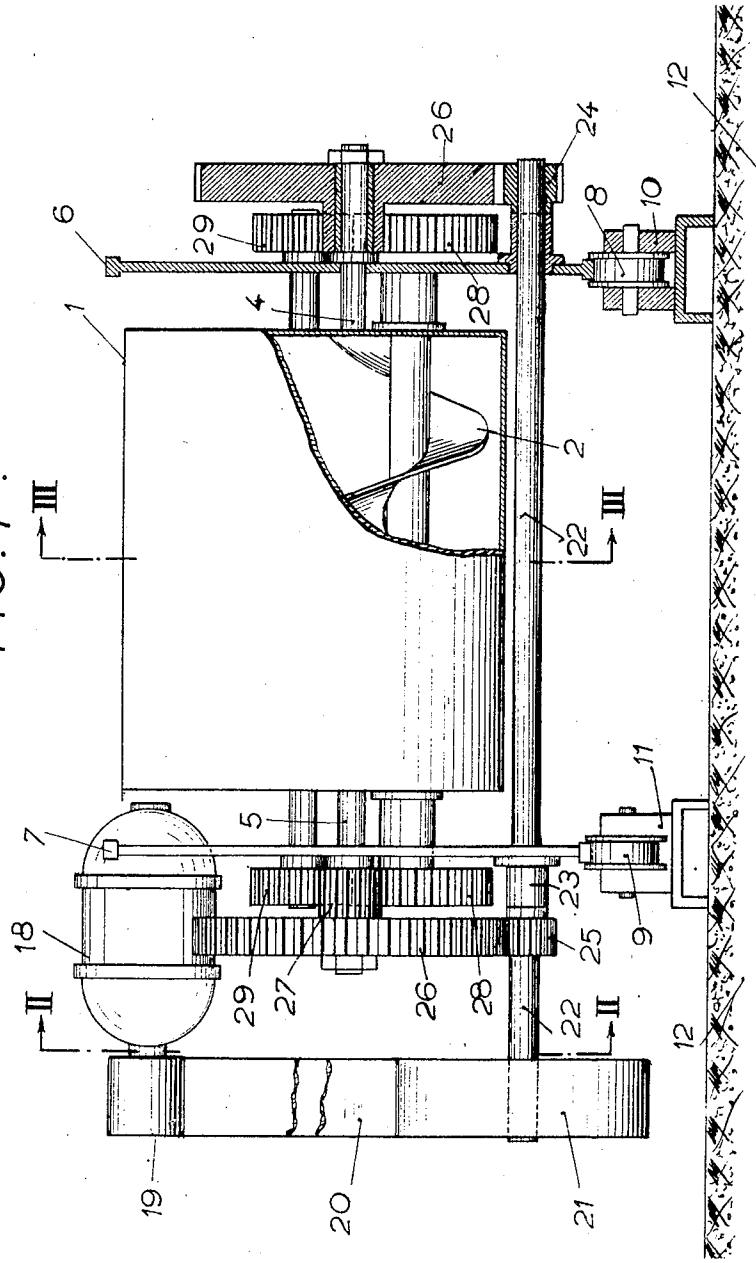
April 3, 1951 E. E. POURÉ 2,547,092

MIXING APPARATUS

Filed Dec. 11, 1948 4 Sheets-Sheet 1

FIG. 1.



Inventor
Emile Edouard Pouré
By Robert E. Burns
Attorney

April 3, 1951 E. E. POURÉ 2,547,092

MIXING APPARATUS

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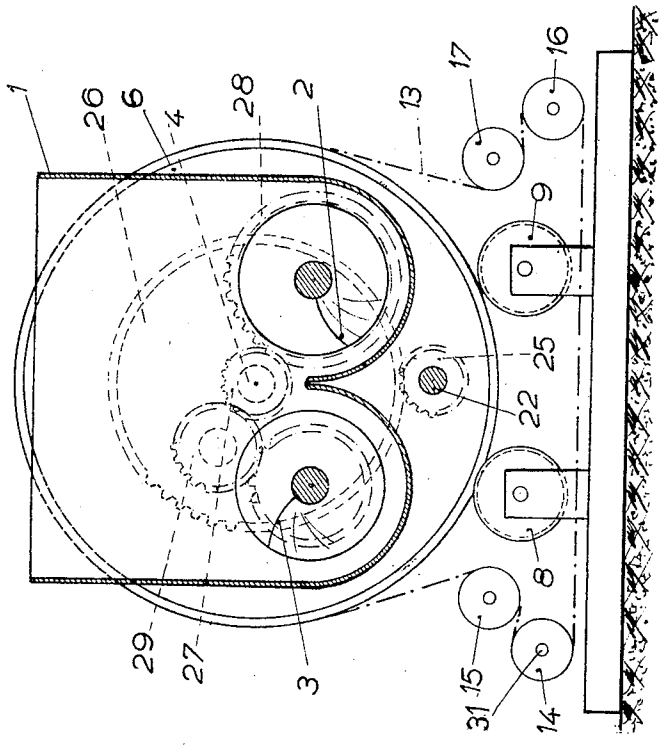

FIG. 3.

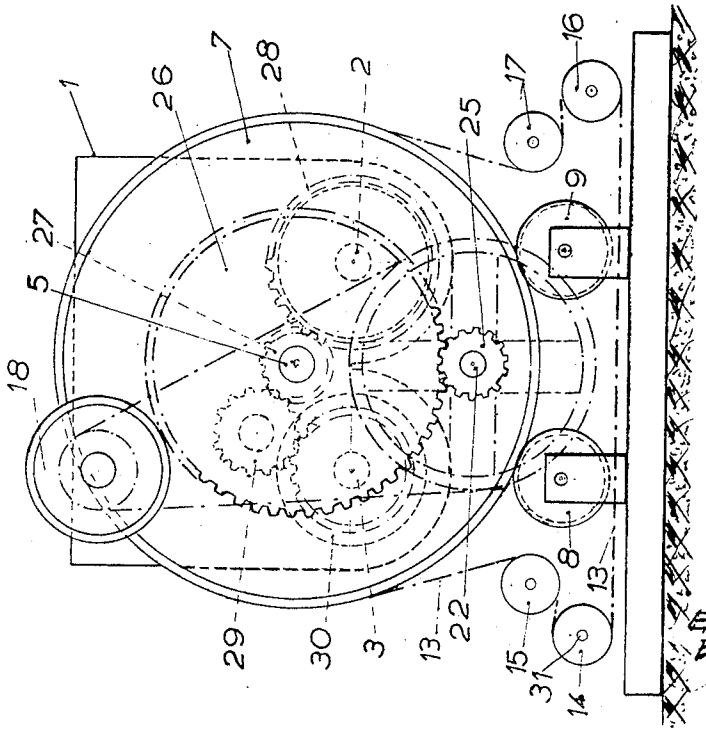

FIG. 2.

Inventor
Emile Edouard Pouré
By Robert E. Burns
Attorney

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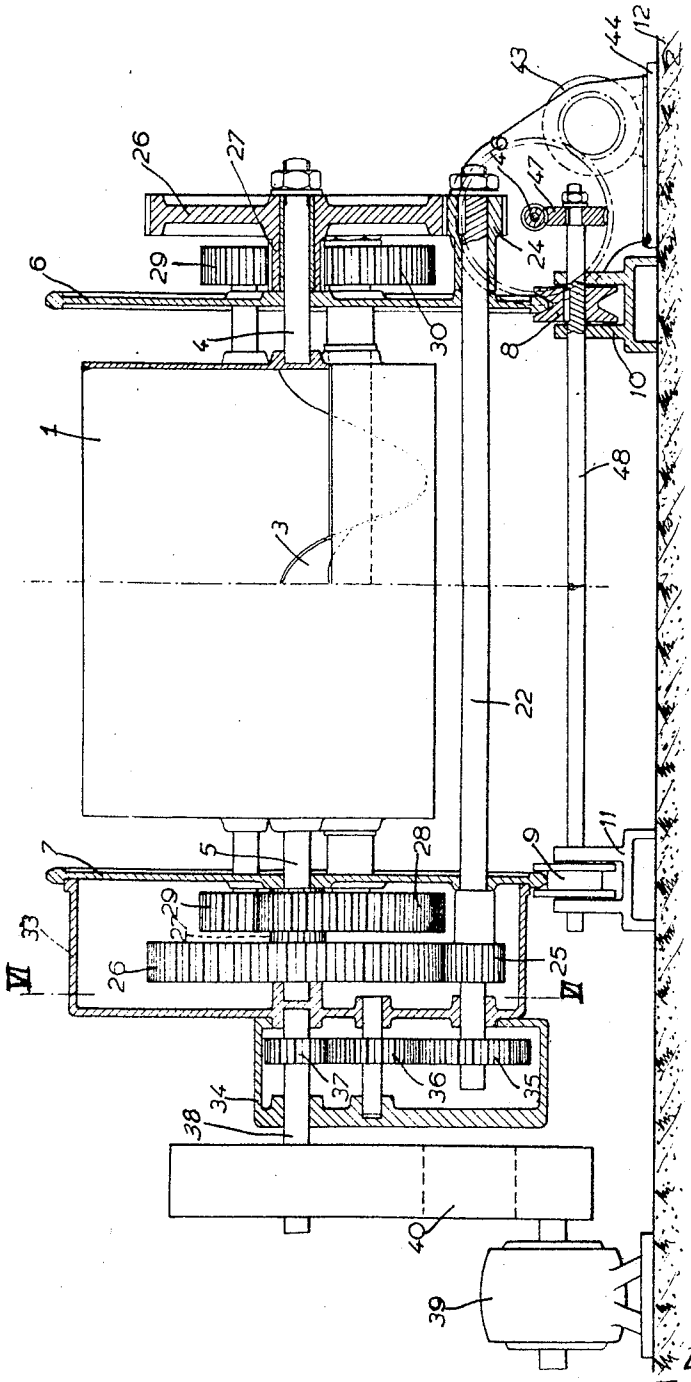

FIG. 4

Inventor
Emile Edouard Pouré
By Robert E. Burns
Attorney

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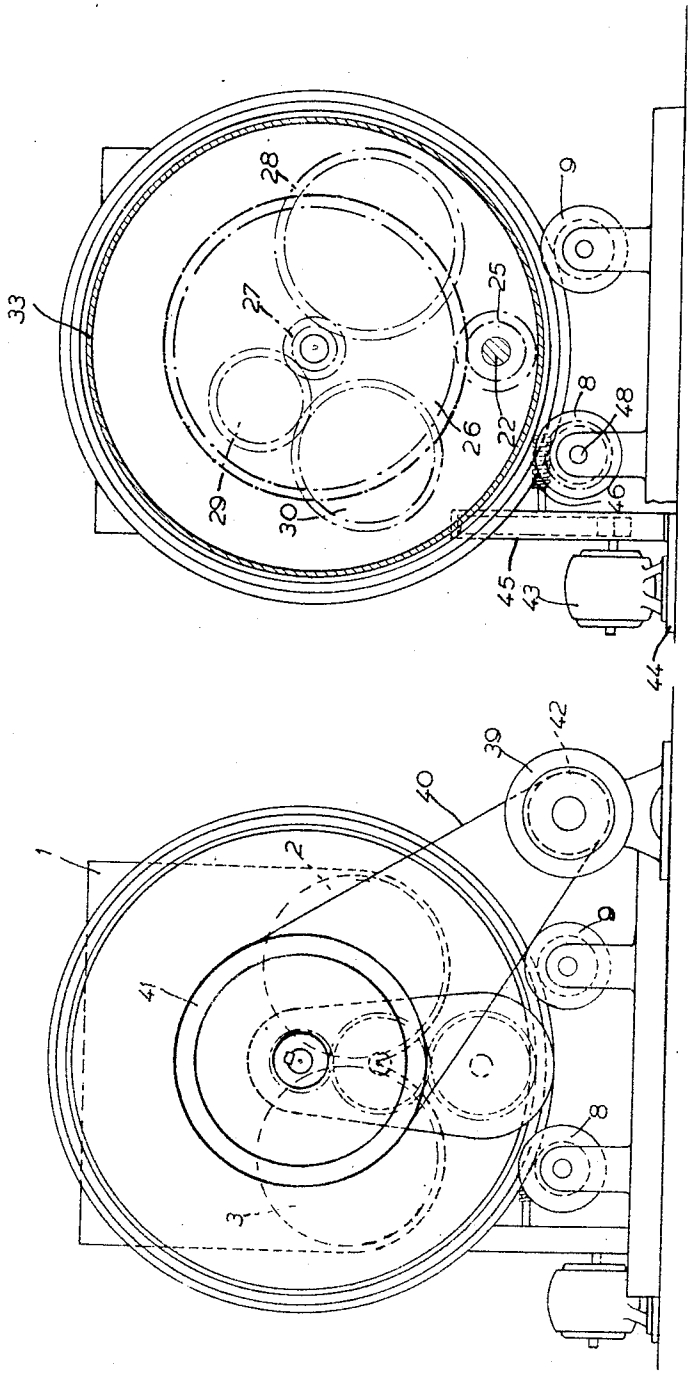

FIG. 6

FIG. 5

Inventor
Emile Edouard Pouré
By Robert E. Burns
Attorney

Patented Apr. 3, 1951

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MIXING APPARATUS

Emile Edouard Pouré, Montreuil-sous-Bois, France, assignor of one-half to Camille Le Gall, Montreuil-sous-Bois, France

Application December 11, 1948, Serial No. 64,865
In France December 13, 1947

6 Claims. (Cl. 259—41)

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My invention relates to mixer apparatus, and more especially to mixing machines of the type including an oscillating container or tank adapted to receive therein a charge of materials to be mixed, and one or more rotatable vaned mixer members or screws extending through said container, drive means being provided both to oscillate or rock said container and to rotate said screws.

In conventional apparatus of such type, the oscillatory axis of the container is usually the same as the axis of one of the said mixer screws. The container is adapted to be rotated through 90° about said axis in order to allow discharging the mixed products therefrom. In such a construction the container, in order to be more readily oscillated, is provided with balancing means, such as counterweights. Moreover, the container has associated with it the drive means for the mixer screws, said drive means being generally arranged to one side of the container. Such a construction is cumbersome, heavy and comparatively expensive to make. It requires a frame which also is heavy and costly to install.

It is a general object of this invention to overcome the above drawbacks inherent to conventional mixer apparatus of the type described, and thus to provide a simpler, more lightweight, more compact and cheaper construction therefor, and one that is easier to install.

Another object is to provide a mixing machine of that type in which the geometric and mechanical relationships between the parts of the structure with respect to the centre of gravity thereof are such as to make it possible to dispense with the usual balancing means such as counterweights or the like, while maintaining the desirable facility in the oscillational movements thereof.

A further object is to provide such a mixing machine which may be directly installed on a suitable foundation block without requiring a supporting frame structure.

A related object is to provide an oscillating mixing machine in which the oscillating container is adapted to be swung to a completely overturned position for discharging purposes, thus facilitating evacuation of its contents.

Another object is to provide a mixer machine having the above-defined improved characteristics and in which the drive motor is mounted in a fixed position.

And an object lies in the provision of a mixer having all or part of the above improvements and in which the drive mechanism for the mixer

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screws is so designed as to impart oppositely directed differential rates of rotation to the mixer screws.

In the construction of a mixer according to the invention, the container carrying the mixer screws is mounted for oscillation on a central axis independent from the screw shafts and spaced therefrom, said axis passing substantially through the centre of gravity of the container when full. The said container is rigid with a pair of circular side flanges resting on supporting roller members.

In this way the oscillating structure is effectively balanced by itself without provision of counterweights or similar means, whereby it may be made considerably lighter in weight. The said oscillating structure is directly supported, without any metal frame having to be provided, upon the bearing roller means secured to the foundation. Mounting of the apparatus is thus simplified and adapted to be quickly carried out without requiring the use of important hoisting means. Due to the absence of any frame structure, the underside of the mixer is entirely clear and unobstructed; thus the container may have a 180°-rotation imparted to it for emptying purposes, whereby the emptying operation will be more reliably and completely insured.

In one embodiment, the mixer screws are driven from a motor not supported on the container but on one of the side flanges thereof and from which the movement is supplied through a suitable transmission comprising meshing gears mounted at the end of the container, this arrangement reducing the overall dimensions of the apparatus. It is desirable to provide said gears in such a way that they will impart to the screws reverse and differential rates of rotation, thus improving the conditions of the mixing operation.

In one desirable modification of the invention, the shafts of the mixer screws are connected through meshing gears mounted on one of the end flanges to a common central shaft coaxial with the container and driven through a suitable transmission from a fixed motor.

Some exemplary embodiments of the invention will now be described for purposes of illustration and not of limitation, in connection with the accompanying drawings, wherein:

Fig. 1 is a view in longitudinal elevation of the mixer, with parts in section;

Fig. 2 is a side view on line II—II of Fig. 1;

Fig. 3 is a transverse section on line III—III of Fig. 1.

Fig. 4 is a view in side elevation with parts in axial cross-section relating to another embodiment;

Fig. 5 is an end elevation of the mixer of Fig. 4 from that side thereof where the screw-drive mechanism is arranged;

Fig. 6 is a section on line VI—VI of Fig. 4 of the frame.

As shown in Figs. 1 to 3, the mixer essentially comprises a container 1 in which are disposed two oppositely-rotating revolving mixer means or mixer screws 2 and 3. The container 1 is rigid with two fixed shafts 4 and 5, the common geometric axis of which is arranged substantially to pass through the centre of gravity G of the container when full. Said shafts 4 and 5 are independent from the screw shafts 2 and 3 and serve as shafts for mounting the lay pinions referred to later.

Said shafts 4 and 5 are respectively secured to the centres of two circular side flanged discs 6 and 7. The flanges 6 and 7 bear along the outer periphery thereof upon two pairs of rollers 8 and 9 preferably comprising ball bearings mounted on supports 10 and 11 which directly rest on the concrete base 12. It will thus be seen that the mixer does not require any metal frame.

The rocking movement of the container is effected by rotation of the flanged discs 6 and 7 on the rollers 8 and 9, and said rocking movement may extend throughout an entire half-circle, so that the container assumes a vertical position reversed from its charging position, and the discharge of the mixed products is facilitated.

The absence of any frame, clearing the underside of the container, enables such complete overturn or capsizing of the container 1, and thus facilitates gravity-discharge therefrom. To guide this overturning movement, chains 13 are secured to each of the flanged discs 6 and 7 at the periphery of the latter. Each of said chains 13 is actuated through a pinion 14 and lay pinions 15, 16, 17. The two pinions 14 mounted on a common longitudinal shaft 31 ensure simultaneous rotation of the chains 13 driving the flanges 6 and 7. The shaft 31 is driven through a worm and worm gear drive in order to provide the necessary one-way or irreversible character for the movement of the container.

On one of the flanges, say 7, the motor 18 which controls the movement of the screws is mounted. The motor shaft 18 carries a sheave 19 whose movement is transmitted through the belt 20 to another similar sheave 21 driving the shaft 22. Said shaft extends throughout the entire length of the mixer, passing through the flanges 6 and 7 and being journalled in bearings 23, 24 carried thereon.

Transmission of the drive from shaft 22 to the screws 2 and 3 is effected through a dual set of meshing gears arranged at the end of the mixer on shafts carried on the flanged discs 6 and 7. Considering one of those sets of drive gears, the operation of both of which is identical, it will be seen that it comprises a pinion 25 driven by shaft 22 and meshing with a gear 26 freely rotatable on the shafts 4 and 5. A pinion 27 rigid with the pinion 26 is arranged to drive: firstly, and directly, a pinion 28 actuating the screw 2, and secondly, indirectly through lay-gear 29, the pinion 30 actuating the screw 3. With such arrangement, both screws 2 and 3 are rotated in opposite directions. The drive-ratio of the gears may be so selected as to cause the screws 2 and 3 to be driven at different rates, this making for a more efficient mixing operation.

With the construction described, the container is perfectly balanced while it does not include any counterweight or similar means. It may be designed for large capacities without any difficulty and without undue weight and bulk. It is especially easy and economical to make and to mount.

In the modified form of my invention shown in Figures 4 to 6, the gear trains at the end of the structure corresponding to flange 7 are enclosed in a housing 33 carried by this flange. The drive mechanism for the shaft 22 comprises a gear 35 mounted on an extension of the shaft 22 beyond the pinions 25 and enclosed in a housing 34 secured on the housing 33. The gear 35 is connected through an intermediate gear 36 to a pinion 37 secured on a shaft 38 mounted on the housing 34 in alignment with the shaft 5 and consequently in coaxial relationship with the oscillational axis of the mixer,

Said shaft 38 is connected through a suitable drive with a fixed drive motor 39 which may, as shown in Fig. 4, be mounted on the floor. The said drive may comprise as shown a belt transmission 40 cooperating with a drive sheave 42 on the shaft of the fixed motor 39 and a driven sheave 41 on the shaft 38.

With the arrangement just described, the motor will at all times be capable of driving the screw shafts to produce the desired mixing effect, regardless of the position imparted to the container, and it is unnecessary that the motor be provided movable with the container as in the first-disclosed embodiment.

As a further alternative, the shaft 38 may be directly coupled with a fixed motor disposed with its drive shaft in alignment with the shaft 38.

To produce the requisite oscillatory movements of the container, a fixed motor 43 is provided on a frame 44 supported on the floor and connected through a reducer gearing 45 to a shaft 46 having thereon a worm engaging a worm gear on a shaft 48 which is common to both rollers 8. To improve the adherence characteristics thereof, said rollers are formed with a V-shaped or trapezoidal groove in which the complementarily formed trapezoidal peripheral margins of the flanges are wedgingly engaged. Thus, the continuously-rotating motor 43 will be adapted to impart the desired oscillatory motion to the container, with the rollers 8 driving the flanges through friction. The remaining two rollers 9 merely serve the function of bearing or supporting rollers as in the first-described embodiment.

While two main embodiments of my invention have been particularly described hereinabove and illustrated in the accompanying drawings, it is to be understood that such embodiments are merely illustrative in character and that modifications and improvements may be provided therein within the purview of the ensuing claims.

I claim:

1. A mixer comprising in combination a base, rollers supported on the base, a pair of spaced coaxial vertical flanged discs resting on said rollers, a horizontal container open at its top and rigidly disposed wholly between said discs, revolving mixer means mounted in the bottom of said container parallel to said axis and journalled in said flanged discs, a longitudinal driving shaft journalled in said flanged discs, gearing means rotatably supported by said flanged discs

and comprising a driving connection between said shaft and said revolving mixing means, driving means for said shaft, and driving means for turning said flanged discs to overturn the container.

2. A mixer according to claim 1, in which the shaft driving means comprise a motor fixed on one of said flanged discs and drive connecting means between said motor and said shaft.

3. A mixer according to claim 1, in which the shaft driving means comprise a motor fixed on the base, a shaft supported by one of the flanged discs coaxially to its axis, gearing means between both said shafts and drive connecting means between said motor and the last said shaft.

4. A mixer according to claim 1, in which the driving means of the flanges comprise chains passing on the flanges and driving means for said chains.

5. A mixer according to claim 1, in which for driving the flanges the margins of the flanges are trapezoidal in cross section and wedgingly engaged in trapezoidal grooves of two of the supporting rollers, said rollers being mounted on a common shaft driven by a fixed motor.

6. A mixer comprising in combination a base, rollers supported on the base, a pair of spaced coaxial vertical flanged discs resting on said rollers, a horizontal container open at its top and disposed wholly between said discs with its end walls spaced from said discs, connecting means between said container and said discs for mounting the container in fixed endwise position between the discs with the horizontal axis of the container when full coinciding with the central axis of the discs, revolving mixer means mounted in the bottom of said container parallel to said axis and journalled in said flanged discs, a longitudinal driving shaft journalled in said flanged discs, gearing means rotatably supported by said flanged discs and comprising a driving connection between said shaft and said revolving mixing means, driving means for said shaft, and driving means for turning said flanged discs to overturn the container.

EMILE EDOUARD POURÉ.

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