June 27, 1967 H. BEICHLE 3,328,004

MIXING DEVICE

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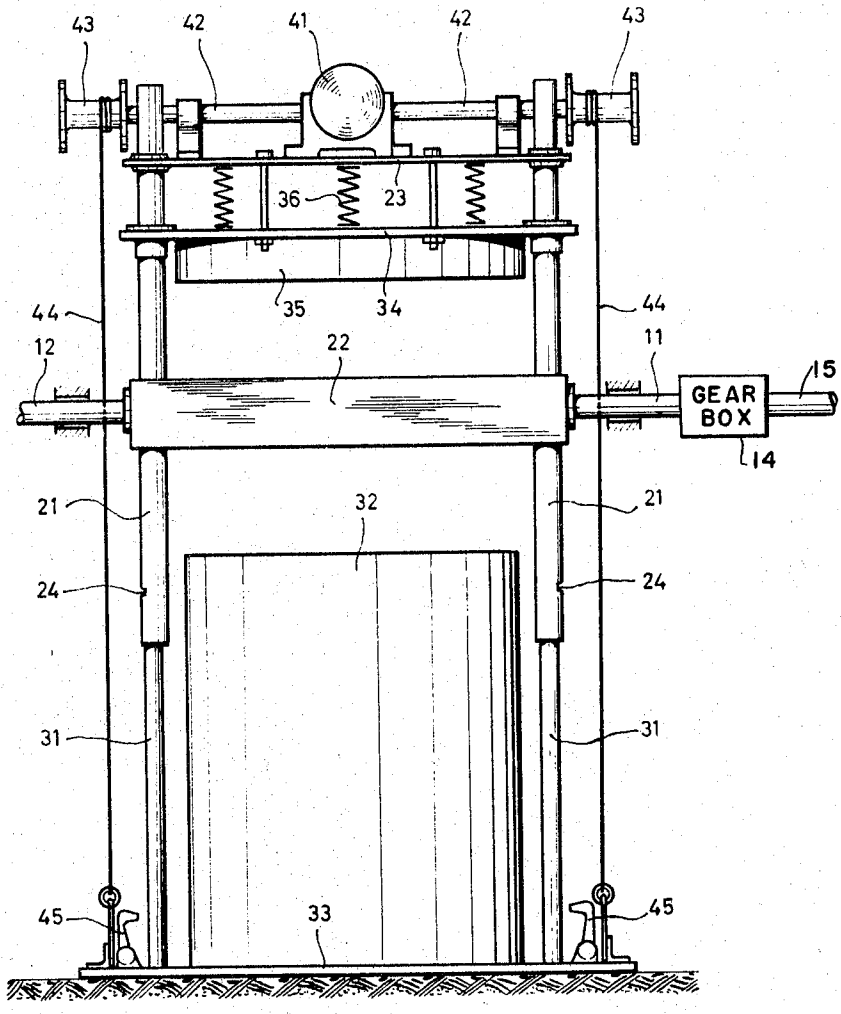


Fig. 1

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Fig. 2

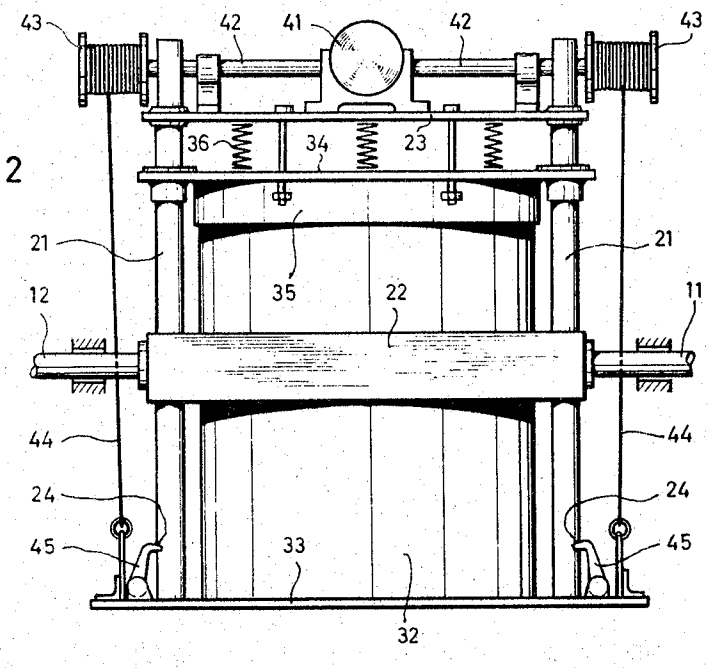
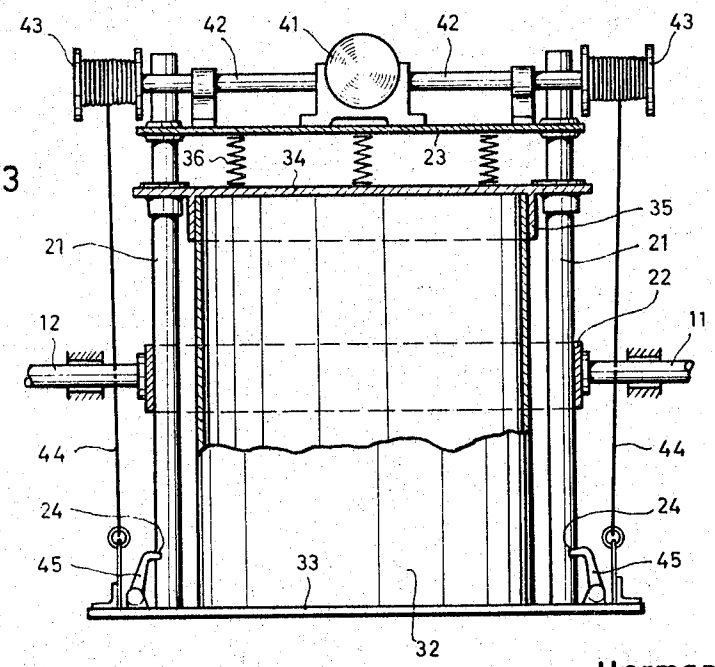


Fig. 3



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MIXING DEVICE

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5 Claims. (Cl. 259—81)

The present invention relates to a mixing device, and particularly to a device for mixing pulverized and granulated materials.

The present invention is particularly concerned with a device which is especially well adapted to mixing plastic granules with dyestuff, which device comprises a vertical receptacle mounted in a frame to rotate about an axis which is perpendicular to the longitudinal cylinder axis. Such an arrangement provides an especially good mixing of the materials contained in the receptacle because these materials are shown from one end of the receptacle to the other during each revolution thereof. The utility of such devices is enhanced if the loading and emptying of the receptacle can be carried out in a simple manner.

It is an object of the present invention to improve the mixing of solid, granulated materials.

It is another object of the present invention to facilitate the loading and emptying of the materials to be mixed in a mixing device.

With these and other objects in view, the present invention resides in a device including a frame having two telescoping members, a receptacle having an open end and carried by one of the members, and a cover carried by the other one of the members in alignment with the open end of the receptacle. The device further includes means for telescoping the members to each other between a first position in which the open end of the receptacle is in engagement with, and closed by, the cover, and a second position in which the receptacle and the cover are spaced from one another. In addition, there are provided means for rotating the frame, together with the receptacle and its cover, about an axis transverse to the direction of telescoping movement of the members.

According to a preferred embodiment of the present invention, the mixing device has a frame constituted by four hollow tubes disposed with their longitudinal axes substantially parallel to one another, a receptacle constituted by a cylinder mounted in the frame for rotation therewith about a horizontal axis perpendicular to the longitudinal axis of the cylinder, one end of the cylinder being open, and a cover plate which is carried by the frame in alignment with the cylinder for covering the open end of the cylinder when the latter is displaced longitudinally so as to come in contact with the cover plate.

Means for displacing the cylinder in a direction parallel to its longitudinal axis are provided by a base plate on which the cylinder is mounted, a plurality of bars mounted in an upright fashion on the base plate and each having its free end slidably inserted in one of the tubes and a base plate lifting apparatus made up of driving means rotating a plurality of drums about which cables are wound, each of the cables having its free end connected to the base plate, the lifting apparatus being mounted on the frame.

Additional objects and advantages of the present invention will become apparent upon consideration of the following description when taken in conjunction with the accompanying drawings in which:

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FIGURE 1 is an elevation view of a preferred embodiment of the present invention with the cylinder in its lower position.

FIGURE 2 is a view similar to that of FIGURE 1 showing the cylinder in its raised position.

FIGURE 3 is a partially cross-sectional elevation view of the device with the cylinder in its closed position, the view of FIGURE 3 being taken in the opposite direction from the views of FIGURES 1 and 2.

FIGURES 1, 2 and 3 will be discussed together since they all illustrate the same embodiment. It may be seen from the figures that the mixing device constituting the preferred embodiment of the present invention is formed by a telescoping rotating frame assembly made up of a frame member having four guide tubes **21** connected together by a collar **22** constructed from four flat bars arranged at right angles to one another to form a square. One of these bars is connected to a drive shaft **11** mounted in a stationary bearing and another one of these bars, which is parallel to the first-mentioned bar, is connected to a support shaft **12** which is also mounted in a stationary bearing. The shafts **11** and **12** are in axial alignment with one another and the rotation of the frame is effected by a driving arrangement constituted by a gear box **14** connected to shaft **11** and driven by a driving shaft **15** connected to a suitable rotation producing device (not shown). The frame also includes an upper plate **23** in which all of the tubes **21** are rigidly mounted, the plate **23** serving to further insure the rigidity of the frame. The frame is thus mounted for rotation about a horizontal axis substantially perpendicular to the axes of the tube **21**. The frame assembly further includes a base member having a base plate **33** upon which the cylinder **32** for receiving materials to be mixed is mounted. The cylinder **32** is mounted in such a way that its longitudinal axis is substantially parallel to the axes of the tubes **21**, the length of this cylinder thus also being substantially perpendicular to the axis of rotation of the frame. A plurality of solid bars **31** are mounted in an upright fashion on the base plate **33** and are positioned so that each bar **31** has its free end slidably disposed within a respective one of the tubes **24**. The bars **31**, like the tubes **24**, are disposed with respect to one another so that each lies at one corner of a square whose sides are longer than the outer diameter of the cylinder. This arrangement insures that the cylinder can slide longitudinally in the frame without being impeded either by the tubes **21** or the collar **22**. The cylinder **32** has its free end open for receiving and discharging materials to be mixed. A cover plate **34** is disposed opposite the open free end of cylinder **32** and is provided with a plurality of openings through which the tubes **21** pass in a relatively slidable manner. The cover plate **34** carries a hollow cylindrical lid member **35** facing the cylinder **32** and positioned to surround the cylinder wall portion adjacent its open end when the cylinder is brought into contact with the cover plate, as shown in FIGURES 2 and 3. In this position, the lid member **35** seals the open end of the cylinder **32** and thus prevents the escape of material during the mixing operation. The cover plate **34** is supported from the upper plate **23** by means of a plurality of nuts and bolts and its movement toward the upper plate, which is caused by movement of the cylinder **32** into contact with the cover plate **34**, is elastically controlled by a plurality of interposed compression springs

36 which act to hold the cover plate firmly against the open cylinder end when the cylinder is in its closed position.

The movement of the cylinder from the open position of FIGURE 1 to the closed position of FIGURES 2 and 3 is effectuated by means of a series of cables 44 wrapped around drums 43 and having their free ends connected to points near the edges of the base plate 33. The drums are driven by means of drive shafts 42 connected to the output shaft of a motor 41. The motor 41 and the bearing supporting shafts 42 are mounted on the upper plate 23. Catches 45 are mounted on the base plate 33 and are arranged to each engage in a respective one of the notches 24 in the tubes 21, when the cylinder is brought into its closing position, for locking the cylinder in this position.

The locking and unlocking of catches 45 and the movement of cylinder 32 from its opened to its closed position are controlled by well-known automatic control devices which have not been illustrated.

Preferably, the two mixing devices of the type described above are arranged in offset relationship with respect to one another and are driven by the single shaft 11.

In operation, the cylinder is first placed in its open position, as shown in FIGURE 1, with the base plate 33 resting on the floor of the installation in which the mixing device is housed. The cylinder is then loaded with material to be mixed by introducing the material into the open upper end of the cylinder. Motor 41 is then activated to drive drums 43 in a direction which raises the base plate 33 until the cylinder 32 comes in contact with the cover plate 34, the lid 35 then seating around the upper extremity of the cylinder wall, as is shown in FIGURES 2 and 3. The catches 45 engage in the notches 24 and the device is then in its closed position, sealing the materials to be mixed within the cylinder 32. The provision of the catches 45 permits the cables 44 to be relieved of tensile stresses during the rotation of the mixing device. The lid 35 is given a sufficient height to insure that the cylinder will continue to be sealed if the cover plate 34 should be displaced slightly when the material contained in the cylinder is thrown against this cover plate during the mixing operation.

The device is then placed in rotation about a horizontal axis by the rotation of shaft 11. The shaft 11 is driven by the shaft 15 through the intermediary of gear box 14. Gear box 14 may be constituted by any well known type of gear box, and is preferably of the type which induces a non-uniform rotation in the frame, it having been found that a rotation of this type produces a superior mixing action. After the materials in the tank 32 have been sufficiently mixed, the shaft 11 is brought to rest in a position where cylinder 32 is once again vertical and base plate 33 is at the bottom of the device. The catches 45 are then opened, by means of any well known automatic control device, and the motor 41 is driven in the other direction in order to unwind the cables 44 from the drums 43. The cylinder 32 is thus lowered until the base plate 33 once again rests on the floor. The raw material may then be discharged through the open end of cylinder 32.

It will be understood that the above description of the present invention is susceptible to various modifications, changes and adaptations, and the same are intended to be comprehended within the meaning and range in equivalents of the appended claims.

What is claimed is:

1. A mixing device comprising, in combination:
(a) a rotatable frame having a plurality of tubes disposed with their longitudinal axes substantially parallel to one another;
(b) a cylinder disposed in said frame with its longitudinal axis substantially parallel to said tube axes, said cylinder being slidable in a direction parallel to said axes and rotatable with said frame about a rotation axis transverse to said cylinder longitudinal axis, said cylinder being open at one end;
(c) a cover plate carried by said frame in alignment with said cylinder for covering said one end of said cylinder;
(d) a base plate attached to said cylinder;
(e) a plurality of bars fastened to said base plate, each of said bars being slidably disposed in a respective one of said tubes;
(f) an upper plate having openings in which the upper ends of all of said tubes are mounted;
(g) an electric motor mounted on said upper plate;
(h) a plurality of shafts connected to be driven by said motor;
(i) a plurality of cable drums each keyed to a respective one of said shafts; and
(j) a plurality of cables each wound around a respective one of said drums and each having its free end attached to said base plate, near an edge thereof.

2. An arrangement as defined in claim 1 wherein said cover plate is supported from said upper plate, said arrangement further comprising: a plurality of compression springs disposed between said upper plate and said cover plate; and a cylindrical lid member connected to said cover plate and aligned with said cylinder for surrounding the extremity of the wall of said cylinder adjacent said one end thereof when said cylinder is brought into contact with said cover plate.

3. An arrangement as defined in claim 1 further comprising drive means connected to said frame for rotating said cylinder about said rotation axis at a non-uniform rate.

4. A mixing device comprising in combination:
(a) a telescoping frame assembly mounted to rotate about a horizontal axis, said assembly including a frame member and a base member mounted to slide with respect to said frame member in a direction transverse to said horizontal axis, said frame member including a plurality of tubes and said base member including a plurality of bars each of which has one end slidably inserted in a respective one of said tubes;
(b) a drum for containing materials to be mixed mounted on said frame member with the longitudinal axis of said drum transverse to said horizontal axis, said drum having one end open for receiving and discharging materials to be mixed;
(c) cover means supported from said frame member for covering said open drum end; and
(d) power means mounted on said frame member and connected to said base member for sliding said base member with respect to said frame member between a first position in which said drum is spaced from said cover means and a second position where said cover means closes said open drum end, said power means including a motor mounted on said frame member, a plurality of drums connected to be driven by said motor and each having a cable wound thereon, and connecting means on said base member connected to the free end of each of said cables.

5. A mixing device comprising, in combination:
(a) a telescoping frame assembly mounted to rotate about a horizontal axis, said assembly including a frame member and a base member permanently attached to said frame member and mounted to slide with respect to said frame member in a direction transverse to said horizontal axis, said frame member including a plurality of tubes and said base member including a plurality of bars each of which has one end slidably inserted and permanently disposed in a respective one of said tubes;
(b) a drum for containing materials to be mixed permanently mounted on said frame member with the

longitudinal axis of said drum transverse to said horizontal axis, said drum having one end open for receiving and discharging materials to be mixed;

(c) cover means permanently supported from said frame member for covering said open drum end; and

(d) power means mounted on said frame member and connected to said base member for sliding said base member with respect to said frame member between a first position in which said drum is spaced from said cover means and a second position where said cover means closes said open drum end; and

(e) locking means connected between said base member and said frame member for controllably locking said base member in said second position.

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