

[54] **APPARATUS FOR CONTINUOUSLY CONVEYING SEMISOLID MATERIAL BY THE ACTION OF CIRCULATING SQUEEZE ROLLERS ON A FLEXIBLE CONDUIT FOR THE MATERIAL**

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[58] Field of Search..... **417/474, 476, 477, 417/900; 128/214 F, DIG. 12**

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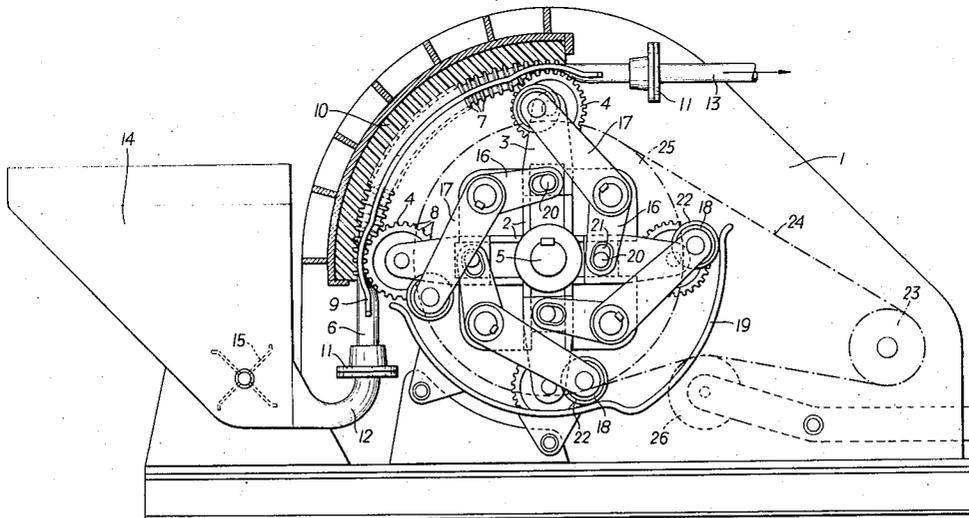
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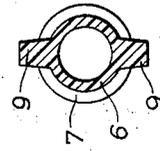
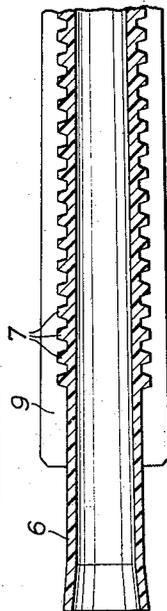
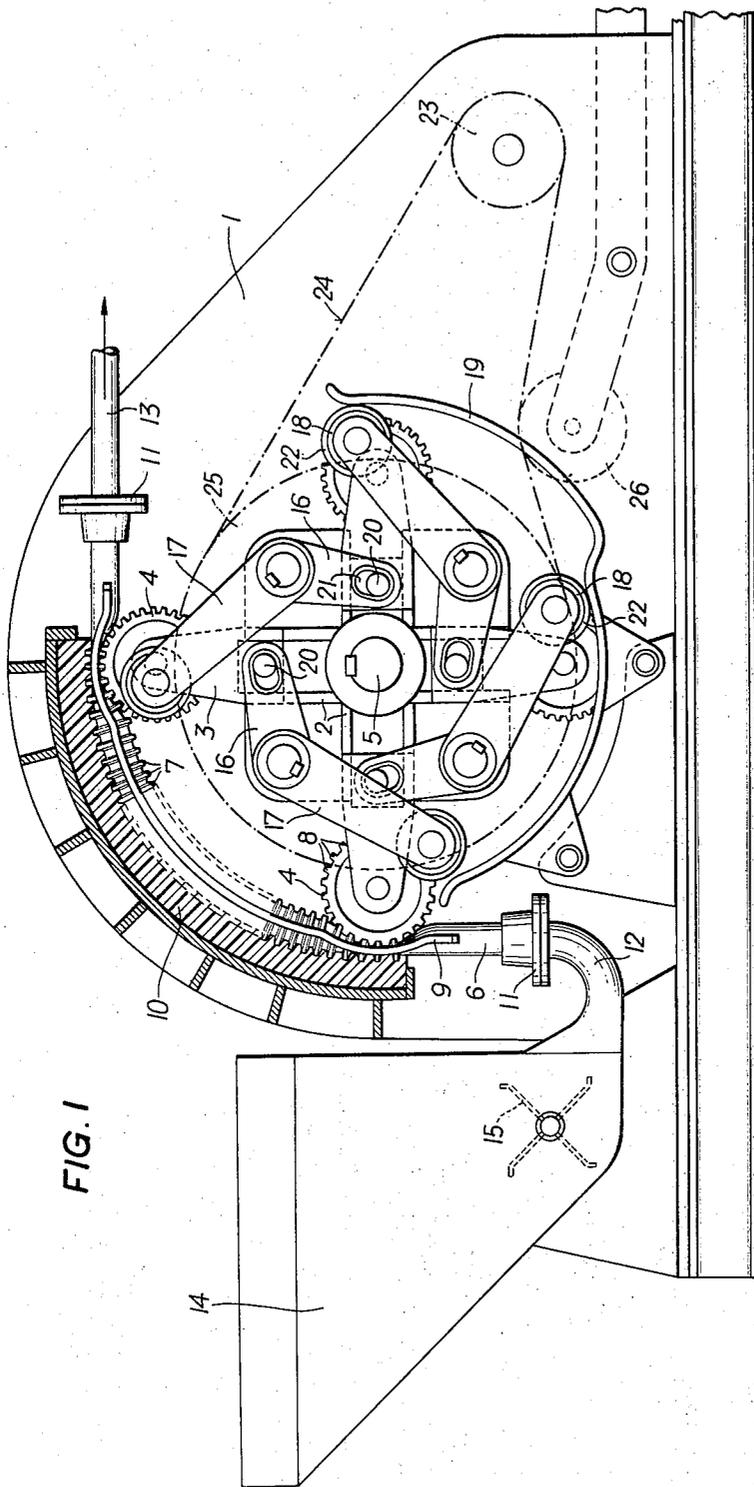
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[57] **ABSTRACT**

An elastic flexible conveying tube has a length portion provided on the outside with ribs. Revolvable squeeze rollers are movable along said length portion in engagement therewith and have teeth adapted to mesh with said ribs.

7 Claims, 3 Drawing Figures





APPARATUS FOR CONTINUOUSLY CONVEYING SEMISOLID MATERIAL BY THE ACTION OF CIRCULATING SQUEEZE ROLLERS ON A FLEXIBLE CONDUIT FOR THE MATERIAL

This invention relates to apparatus for continuously conveying mortar or the like by means of an elastic, flexible conveying tube and revoluble squeeze elastic, flexible conveying tube and revoluble squeeze rollers acting on said tube.

Such apparatus can well eliminate part of the disadvantages of the known equipment in which mortar or the like is conveyed by piston pumps. The disadvantages of equipment which uses piston pumps are due to the fact that the conveyance is intermittently effected by pistons having a short stroke and with an occurrence of extremely high pressure. Ball valves are required on the suction side and discharge side. Such equipment inevitably involves a segregation of the aggregates and mixing water because mixed lime or cement mortar is susceptible to impacts. If the valves are not tight, the intermittent application of pressure to the mixing water forces the latter back into the stirring trough before the mixture enters the conveying line so that the mortar increases progressively in stiffness and eventually clogs the conveying line. The hard aggregates of the mortar soon cause the ball valves to leak. A great disadvantage resides in that a continuous conveyance is not enabled and cannot be enabled even by a succeeding pressure-equalizing air chamber. Besides, the contact of the mortar with metallic structures should be minimized because it tends to deposit thereon. Finally, the use of piston pumps and ball valves has the disadvantage that the flow of the mortar cannot be slowed down because the mortar cannot be sucked if the speed of the piston is too low.

The known apparatus for conveying mortar and the like by means of an elastic, flexible conveying tube and revoluble squeeze rollers acting on said tube have the disadvantage that the squeeze rollers slip off the conveying tube and tend to pull the same along in their direction of revolution during the conveyance so that a satisfactory continuous conveyance is not enabled by these apparatus.

To eliminate the disadvantages pointed out, the invention teaches to provide ribs on the outside of the conveying tube and to provide the squeeze rollers with teeth adapted to mesh with said ribs. The invention prevents a slipping of the squeeze rollers from the conveying tube and the latter can be held fast in the apparatus by the ribs in such a manner that the squeeze roller cannot pull the tube along during the conveyance. The provision of ribs on the conveying tube has the further advantage that the tube when squeezed together can open more easily to receive the material being handled.

In one embodiment of the invention, the internal cross-section of the conveying tube tapers in the direction of conveyance. As a result of this design, the empty space which results from the lifting of a squeeze roller is quickly filled from the larger volume of the tube by the material which is pushed forward by the succeeding squeeze roller.

According to another feature of the invention, the conveying tube is stiffened by longitudinal ribs outside the tube portion which is engageable by the squeeze rollers. The combination of the longitudinal ribs, which are not involved in the squeeze operation, and the meshing ribs, which suitably extend around the convey-

ing tube, results in a considerable stiffening of the conveying tube so that the same highly reliably returns to its open condition when a squeeze roller has left the tube.

It is also a feature of the invention that that side of the conveying tube which is remote from the squeeze rollers is retained in a bed of elastic material. As a result of this retention, the conveying tube cannot follow the conveying movement and cannot be elongated in its longitudinal direction. Such elongation would render the re-opening of the tube more difficult. Besides, the elastic bed prevents a yielding of the conveying tube to large particles which have entered and also prevents to a high degree any damage to the tube.

Details of the invention will be explained more fully with reference to the accompanying drawing, which shows diagrammatically and by way of example an embodiment of the apparatus according to the invention for a continuous conveyance of mortar or the like.

FIG. 1 is a vertical sectional view taken through the apparatus.

FIG. 2 is a longitudinal sectional view showing a detail, and

FIG. 3 is a transverse sectional view thereof.

The apparatus for continuously conveying mortar or the like comprises a housing 1, in which a spider 2 provided with a drive shaft 5 is rotatably mounted. Squeeze rollers 4 are mounted with bearings 3 on the spider 2 and cooperate with a flexible conveying tube 6. The conveying tube 6 is provided on the outside with ribs 7, which extend around the tube. The squeeze rollers carry teeth 8, which cooperate with these ribs 7. The conveying tube is provided with longitudinal ribs 9 outside that portion of the tube which is engageable by the squeeze rollers 4. The conveying tube is shown in a longitudinal sectional view in FIG. 2 and in a transverse sectional view in FIG. 3. It is apparent from FIG. 2 that the conveying tube has a slight taper in the direction of conveyance. The conveying tube 6 is concentric to the axis of rotation of the spider and is supported in the housing 1 on a bed 10 of elastic material. The ribs 7 prevent a displacement of the conveying tube 6 in the direction of revolution. The conveying tube 6 is connected by quick-action couplings 11 to a feed pipe 12 and a discharge pipe 13. The mortar to be conveyed is mixed in a trough 14. A stirrer 15 is operated to prevent a segregation of the mixed mortar.

The spider 2 is provided with rotatably mounted bell-crank levers, which serve to move the squeeze rollers toward the conveying tube. One arm 16 of each bell-crank lever is formed with a longitudinal slot 21, which receives a pin 20 mounted on the bearing 3 of a squeeze roller. The other arm 17 is provided with a roller 18, which has an elastic covering 22. The rollers 18 of the bell-crank levers cooperate with a camway 19. As is apparent from FIG. 1, the cooperation of the rollers 19 and the camway 19 causes each of the successive squeeze rollers 4 to be moved approximately horizontally against the conveying tube 6 and to roll on the conveying tube during a revolution around one quarter of a circle so that the conveying tube is compressed and the mortar contained therein is advanced. When the vertical position is reached, the squeeze roller 4 is lifted from the conveying tube. This lifting may be assisted by the weight of the squeeze roller and, if desired, by a spring or the like which acts on the bearing 3 of the squeeze roller 4 or on the bell-crank lever

16, 17. In the embodiment shown, the drive shaft 5 for the spider 2 is driven by a chain sprocket 25, a chain 24, and a driving chain sprocket 23. A chain tensioner 26 ensures a sufficiently high tension of the chain.

The embodiment which has been shown and described serves only to explain the nature of the invention, which is not restricted to details. For instance, a straight conveying tube may be used of the conveying tube and the squeeze rollers are arranged to be movable relative to each other and transversely to the direction of conveyance.

What is claimed is:

- 1. Apparatus for continuously conveying semisolid material, which comprises an elastic flexible conveying tube having a length portion provided on the outside with ribs, support means engaging said ribs to prevent slippage of said tube, and revoluble squeeze rollers movable along said length portion in engagement therewith and having teeth adapted to mesh with said ribs.
- 2. Apparatus as set forth in claim 1, which is adapted

to convey mortar.

3. Apparatus as set forth in claim 1, in which said ribs extend transversely to the longitudinal direction of said tube.

4. Apparatus as set forth in claim 1, in which said tube has an internal cross-section which tapers in a predetermined longitudinal direction and said squeeze rollers are revoluble to move along said length portion in said predetermined direction.

5. Apparatus as set forth in claim 1, in which said ribs extend around the periphery of said tube.

6. Apparatus as set forth in claim 1, in which said tube is provided with longitudinal ribs outside said length portion.

7. Apparatus as set forth in claim 1, in which said squeeze rollers are provided only on one side of said tube and

said support means comprising a bed of elastic material on the side of said tube opposite said squeeze rollers.

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