United States Patent

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[54] ROTARY VIBRATORY FEEDER
6 Claims, 4 Drawing Figs.

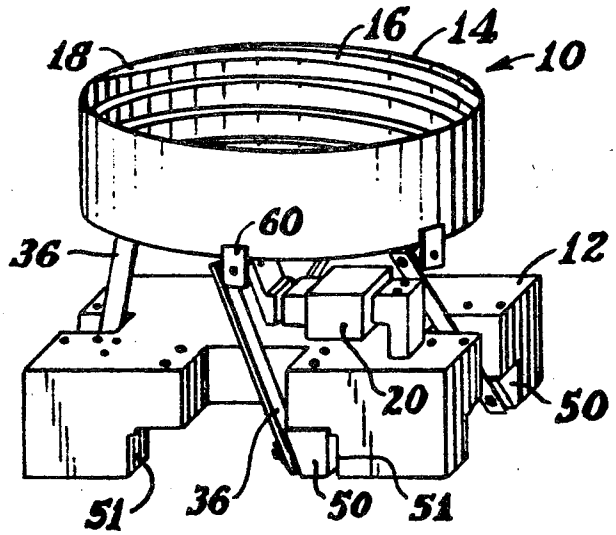
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[51] Int. Cl. B65g 27/00
[50] Field of Search 198/220 (C10), 220 (B40)

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ABSTRACT: A vibratory conveyor of rotary type, whose bowl-supporting springs are connected to the reaction base at a low location thereof, and the several components of the bowl-support and vibration-energization are provided in oppositely facing arrangement making the direction of work-feed easily reversible.



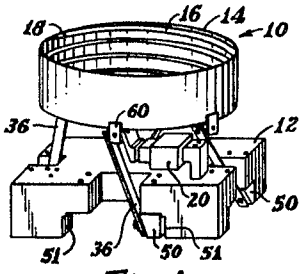


Fig. 1

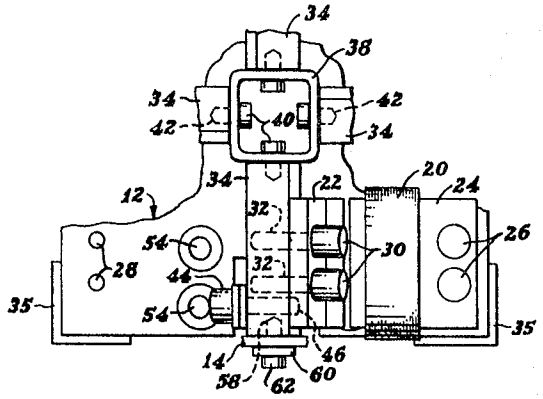


Fig. 2

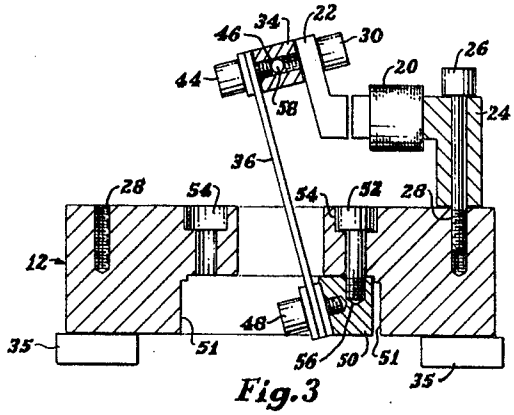


Fig. 3

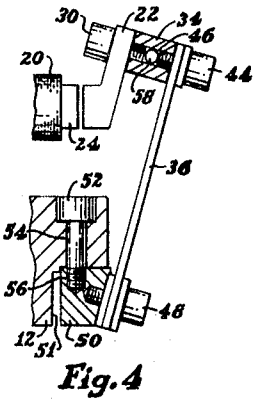


Fig. 4

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ROTARY VIBRATORY FEEDER

This invention relates to vibratory feeders, which achieve an orderly work-feeding of work pieces, with also a sorting and/or positioning thereof, by vibration of a bowllike hopper having an inclined ramp up which the work-pieces travel.

Concepts of the invention provide good vibratory operativity and long spring life, by connecting the bowl-supporting springs at a low location on the reaction mass or base of the device, thereby permitting the spring length to include the overall height of the base, and yet the overall height of the device is not proportionately increased by the desired longer length of the springs.

Other concepts of the invention provide for reversibility of the work-feed, by economical means which provide that a given base, energizing means, and bowl-supporting assembly can readily be changed over to give a reverse work-feed actuation.

In carrying out the inventive concepts, the base of the device is provided, for each of the bowl-supporting springs, with a pair of selectively usable recesses, adjacent the lowermost portion of the base; and a mounting lug, to which is connected the lower end of the respective bowl-support spring, is positioned in the desired recess and is connected to the base. Convenient means permit the selective interchange of each such lug in each such pair of recesses, and permit also the interchange of mounting of other components, achieving a desired reversal of bowl-actuation and correspondingly a reversal of work-feed travel.

The above description is generally introductory in character; more specific details of the inventive concepts and features are given in the more detailed description which follows, of an embodiment to illustrate the inventive concepts, reference being had to the accompanying somewhat schematic and diagrammatic drawings, in which:

FIg. 1 is a pictorial view of a rotary vibrator according to an embodiment of the inventive concepts;

FIG. 2 is a fragmental, larger-scale plan view of the supporting assembly which supports the vibrator bowl shown in FIG. 1;

FIG. 3 is a fragmental elevational view, partly in section to illustrate interior details, of the vibrator shown in FIG. 1; and

FIG. 4 is a fragmental view similar to a portion of FIG. 3, but with the components arranged to give a work-feeding actuation in a direction reverse to that which is shown in FIGS. 1 through 3.

As shown in the drawings, the invention relates to a rotary vibrator **10** having a reaction mass or base **12**, and a work-feeding bowl **14**. In a rotary vibrator of the type of this illustrative embodiment, vibration imparted to the bowl **14** causes work-objects (not shown) to move along a peripheral ramp **16** which lies in a spiral configuration along the inner wall of the bowl **14** to an upper or discharge location **18**, where they may be acted upon by associated conveyor and/or sorting or arranging means (not shown) as desired.

Vibration of the bowl **14** is caused, electrically, by a coil **20** carried by base-supported components, and an armature **22** secured to the upper or bowl-connected components. Here the connection of the coil **20** to the base **12** is by the coil **20** being carried by a bracket **24** secured as by bolts **26** threaded into corresponding openings **28** provided on the reaction base **12**; and the armature **22** is secured as by bolts **30** threaded into corresponding openings **32** provided on a bowl-supporting arm member **34** yet to be described.

Vibration of the reaction mass or base **12** is accommodated by it being mounted on flexible pads shown as resilient feet **35**; and vibration of the bowl **14** is accommodated by its support legs **36** being made of resilient or spring-like stock. Work-feed of the work-objects (not shown) along the bowl-ramp **16** is achieved by the support springs **36** being positioned at an angle (here shown as approximately 15° to the vertical; and there are shown four such springs **36** spaced equally around the bowl **14**. All the springs **36** are inclined in the same rotational direction.

As so far detailed, the components as such form no part of the inventive concepts, and are shown for better background understanding of the inventive concepts now to be set forth.

According to the inventive concepts, the support springs **36** are connected to the base **12** at a relatively very low location of the base **12**. Substantially the entire height of the base **12** is added, in effect, to the distance between the base **12** and the bowl **14**, for the accommodation of the support springs **36**.

This low spring mounting permits a relatively long spring length, with a corresponding advantage of good operational character and long-life fatigue-resistant quality, and yet it avoids a correspondingly highness or tallness of the overall vibrator assembly. The low overall height, or a so-called low-silhouette of the overall device, permits its use in applications where, for one or more reasons, a higher discharge location would be undesirable.

According to other details of the inventive concepts, the device is reversible so as to obtain a work-feed direction of the work-objects in either rotational direction desired. This reversibility will now be detailed, it being noted preliminarily that the work-feed direction in FIGS. **1**, **2**, and **3** is counterclockwise as the device is viewed from above, and in FIG. **4** is clockwise as viewed in that manner.

As shown in FIG. **2**, the bowl-support assembly comprises four of the arms **34**, they being all connected to a central hollow hub or bracket **38**, each arm **34** shown connected thereto by a single bolt **40** which outwardly extends through the wall of the bracket **38** and into a radially-extending threaded hole **42** of the arm **34**.

The upper end of each spring **36** is provided with a bolt **44** which is threaded into a threaded opening **46** of the arm **34**. The opening **46** extends clear through the arm **34**; thus as the arm is selectively twisted (compare FIGS. **3** and **4** with respect to orientation of the arm **34**), as is readily accommodated by the single-spot connection by bolt **40** of the arm **34** and central bracket **38**, either end of the arm-opening **46** is oriented downwardly to receive the associated spring bolt **44**.

The lower end of each spring **36** is not connected directly to the reaction base **12**, but, instead, is connected thereto by the threaded connection of a bolt **48** to a mounting lug **50** which fits in a recess **51** of the base **12**, the lug **50** rather than the spring **36** being directly connected to the base **12**. More specifically, the connection of the lug **50** to base **12** is by a pair of bolts **52** which respectively extend downwardly through an opening **54** provided in the base **12** and thence threadedly into an upwardly directed opening **56** provided in the mounting lug **50**.

In mirror-image relationship, there are provided a recess **51** and base-opening **54** in both oppositely facing directions; thus, to achieve reversibility of the mounting of the springs **36** to the base **12** (compare FIGS. **3** and **4**), the bolts **52** which engage downwardly into the lug-openings **56** are selectively passed through a selected pair of the base-openings **54**.

Moreover, an oppositely facing extra set of base-openings **28** is provided for selectively receiving the bolts **26** which support the vibrator coil bracket **24**. This provides that the direction faced by the vibrator coil may be readily reversed.

Cooperating with the reversibility components already mentioned, the arm-openings **32** extend clear through the arm **34**, thus accommodating the armature bolts **30** to connect the armature **22** to the arm **34** on either side of the arm **34**, to operatively confront the coil **20** regardless of which direction the coil bracket **24** is positioned to face.

The outer end of each arm **34** is provided with a radially directed opening **58** by which a bowl-gripping lug **60** is connected to the arm **34** by a bolt **62**.

Reversibility of work-feed direction is thus easily achieved (compare FIGS. **3** and **4**) by the following steps: Loosening the bowl-mounting lug-bolts **62**; removing the bowl **14**; loosening the inner arm-bolts **40**; removing the upper spring bolts **44**, the base-bolts **52** to free the lugs **50**, and the coil bracket bolts **26** and armature bolts **30**. The arms **34** are twisted about the axes of bolts **40**. Then the bolts **52** and **26**

are respectively positioned into the other base-openings **54** and **28**; and the bolts **44** and **30** are respectively positioned into the other ends of the arm-openings **46** and **32**. The various bolts are then tightened, using a bowl **14** whose ramp **16** is of opposite hand; and the operativity of work-feed is thus reversed.

It is thus seen that a rotary vibratory feeder provides novel and advantageous concepts and features of construction and operation, including low bowl-spring mounting permitting longer spring-length without increase of overall device height, and reversibility of the bowl-supporting and bowl-energizing components to provide reversibility of the direction of work-feed.

Accordingly, it will thus be seen from the foregoing description of the invention according to this illustrative embodiment, considered with the accompanying drawings, that the present invention provides a new and useful rotary type vibratory feeder, having desired advantages and characteristics, and accomplishing its intended objects, including those hereinbefore pointed out and others which are inherent in the invention.

Modifications and variations may be effected without departing from the scope of the novel concepts of the invention; accordingly, the invention is not limited to the specific form or arrangement of parts herein described or shown.

We claim:

1. A vibratory feeder of rotary type having a base, a bowl means, vibration means for imparting vibratory energy to the bowl means, and support springs which support the bowl means from the base:

in a combination in which the springs are connected to the base at a position adjacent the bottom thereof, the spring length being of such a length as to extend from that said position upwardly throughout the height of the base and also the distance above the base at which the spring is connected to the bowl means, yet the overall height of the device being relatively short by having a substantial portion of the overall spring length being disposed within the vertical limits of the base;

the combination also providing a mounting lug for the said springs adjacent the bottom thereof, and there are connecting means for interconnecting the said lugs to the base;

the bowl means includes a bowl-support means;

the bowl-support means is provided with means by which the springs are adapted to be supportingly connected thereto in either of at least two positions of each spring; and

and the connecting means for interconnecting the mounting lugs to the base accommodate a supporting connection thereof in said two positions of each spring.

2 A vibratory feeder of rotary type having a base, a bowl means, vibration means for imparting vibratory energy to the bowl means, and support springs which support the bowl means from the base:

in a combination in which there are provided, for each of said springs, selectively usable mounting positions of the base;

and there are also provided selectively usable mountings of the said vibration means;

all said selectively usable means cooperating to provide that the achieved work-feeding of objects positioned in the said bowl means can be caused to progress in either rotational direction desired; and

there are provided bowl-supporting means including radially disposed support arms, there being provided holes in said arms for the selective reception of connectors which engage the upper ends of said springs, the said arms being rotatable with respect to their respective radial axes to receive in said openings the said connectors regardless of the position of said springs as positioned to achieve either direction of work-feed travel.

3. The invention as set forth in claim **2**, in a combination in which:

mounting means are provided by which the lower end of each spring is operatively securable to the base by a connection means which extends operatively between the said mounting means and the selected one of the selectively usable mounting positions of the base;

and in which the base is provided with selectively usable means operatively engageable by the connection means to retain the lower end of the spring to the base with the spring oriented in either selected position in which it achieves the particular one of the directions of work-feed travel desired.

4. The invention as set forth in claim **3**, in a combination in which:

the said selectively usable base means includes a pair of selectively usable holes provided in the base, and the connection means extends through either selected one thereof.

5. The invention as set forth in claim **2**, in a combination in which:

the said arm holes respectively extend fully through the said arms to accommodate the selective reception thereinto of the respective one of the said connectors at each end of the hole, the selective orientation of the said arms accommodating the respective spring in an orientation to achieve the particular direction of work-feed travel desired.

6. The invention as set forth in claim **2**, in a combination in which:

The springs are connected to the base at a position adjacent the bottom thereof, the spring length being of such a length as to extend from that said position upwardly throughout the height of the base and also the distance above the base at which the spring is connected to the bowl means, yet the overall height of the device being relatively short by having a substantial portion of the overall spring length being disposed within the vertical limits of the base.