United States Patent

Hacker

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[54] AUTOMATIC PART FEEDING EQUIPMENT

[72] Inventor: **Harold R. Hacker,** 522 Woodview Drive, Noblesville, Ind. 46060

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[52] **U.S. Cl.** ..... **198/220 CA**

[51] **Int. Cl.** **B65g 27/08**

[58] **Field of Search** ..... 198/220 A, 220 BC, 220 CA

[56] **References Cited**

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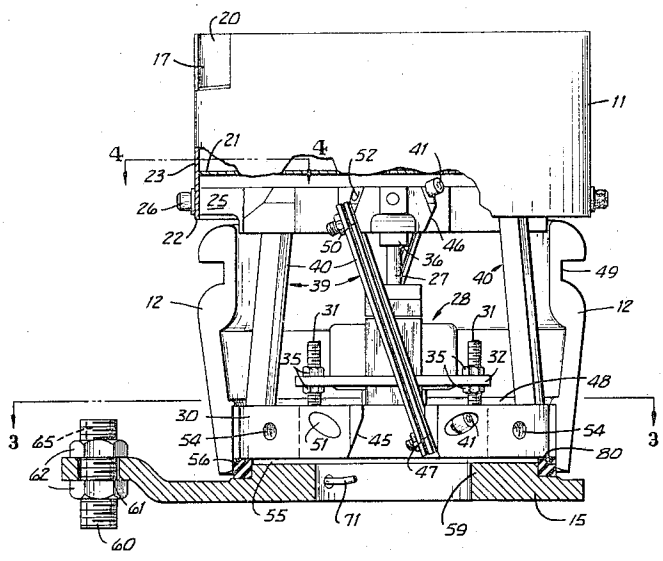
2,662,193	12/1953	Weyandt	198/220 BC
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Primary Examiner—Joseph Wegbreit
Assistant Examiner—Alfred N. Goodman
Attorney—Woodward, Weikart, Emhardt & Naughton

[57] **ABSTRACT**

A vibratory parts feeder including a bowl having a depending flange through which screw fasteners extend fixing the bowl directly to and against a spider frame inside of the flange. The bowl and frame are supported by springs which extend between the frame and a support member which is in turn supported on an annular flexible vibration damper. A motor drive also extends between the frame and the support member. The damper is held in position by a base adjustable as to attitude and adapted to be rigidly bolted to a mounting surface. The springs are so mounted that portions thereof may be reversed for driving in the opposite direction while some of the springs are still attached without requiring the unbolting and moving of spring attachment points which are permanently and integrally provided.

11 Claims, 4 Drawing Figures



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2 Sheets-Sheet 1

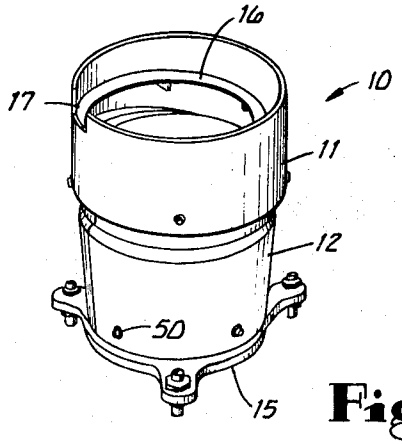


Fig. 1.

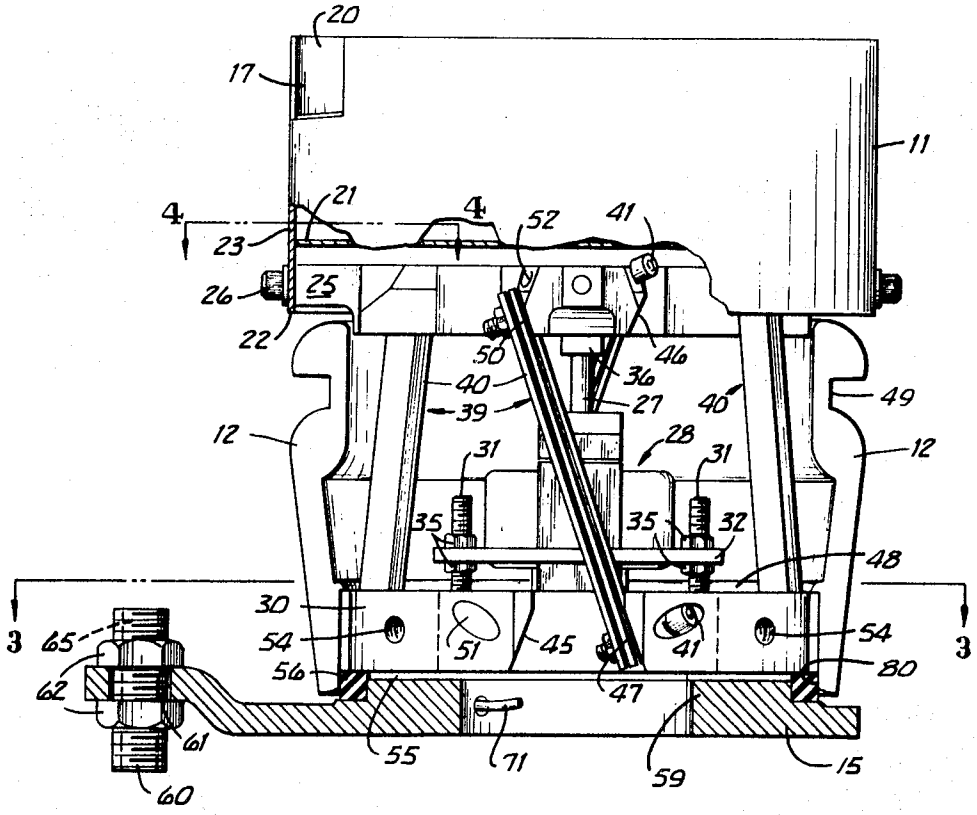


Fig. 2.

INVENTOR
HAROLD R. HACKER

BY

Woodard, Weikart, Emhardt & Naughton
ATTORNEYS

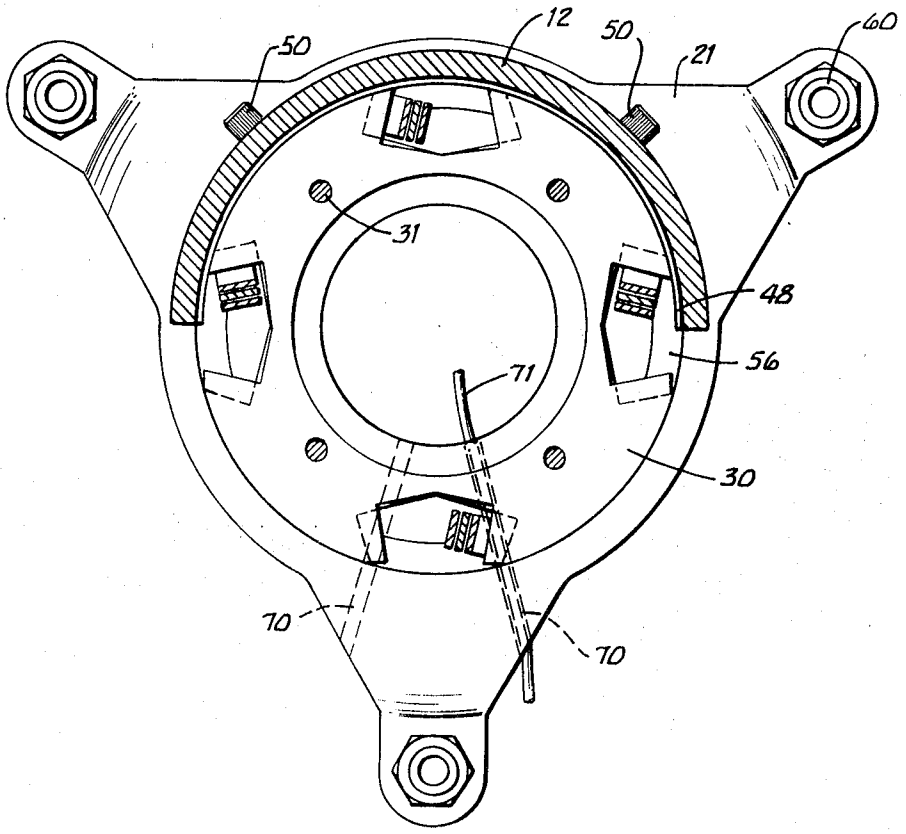


Fig. 3.

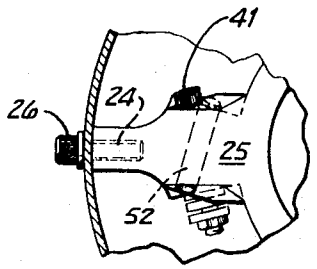


Fig. 4.

INVENTOR
HAROLD R. HACKER

BY

Woodard, Weikart, Emhardt & Naughton
ATTORNEYS

AUTOMATIC PART FEEDING EQUIPMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to vibratory parts feeders.

2. Description of the Prior Art

Vibratory parts feeders have been the subject matter of quite a number of U.S. patents. The devices of the prior art are not, however, always completely satisfactory and there is room for improvement. Thus difficulty is experienced in the prior art devices in adjusting the bowl of the feeder so that it feeds in precisely the correct direction with precisely the correct attitude and altitude. Another problem is the fact that setting up of the feeder to operate in the opposite direction is not easily accomplished. Also prior art feeders are not as safe as they might be and are not as easy to repair as they might be.

SUMMARY OF THE INVENTION

One embodiment of this invention might involve, in a vibratory parts feeder including a parts container, a frame member supporting said parts container, and means for vibrating said frame member and parts container, the improvement which comprises fasteners extending through said parts container and connected to said frame member for securing said parts container to said frame member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of automatic part feeding equipment embodying the present invention;

FIG. 2 is a side elevation of the structure illustrated in FIG. 1 with portions broken away to show internal structure;

FIG. 3 is a horizontal section taken along line 3—3 of FIG. 2 in the direction of the arrows with one cover removed; and

FIG. 4 is a horizontal section taken along line 4—4 of FIG. 2 in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, there is illustrated a vibratory parts feeder **10** which incorporates a bowl **11** and a two-piece cover or pair of cover members **12**. The parts feeder further incorporates a base plate **15** upon which the apparatus is adjustably supported. The bowl **11** has mounted therein the conventional ramp **16** upon which the parts inside the bowl travel upwardly and out of the bowl through the opening **17**. Referring now more particularly to FIG. **2**, the bowl or parts container **11** includes a cylindrical wall **20** and a base **21** which is secured to the wall **20** around the complete periphery of the base, thus forming the bowl **11**. Because the base **21** is secured to the wall **20** above the lower edge **22** of the wall, a depending flange **23** is provided which is used to secure the parts container **10** to the frame member **25**. This attachment is made by screw fasteners **26** which extend through suitable openings in the wall **20** and are tightly threaded into bores **24** in the frame member **25**.

A motor **28** having an armature **27** drives the bowl **11** and the frame member **25** for the vibration thereof. The motor **28** is fixedly mounted to a support member **30** by means of screws **31** threaded into the support member and horizontal bars **32** as well as nuts **35**. The bars **32** are fixed directly to the motor **28** by welding or the like. The armature **27** is fixed to a bar **36** which is in turn fixed to the frame member **25**. It should be mentioned that various other means might be used for driving the vibrating action of the present apparatus, such as, for example, the "side saddle" motor mounting illustrated in U.S. Pat. No. 2,407,357 to Weyandt or, for example, the driving arrangement used in the U.S. Pat. to Flint No. 2,098,034.

The frame member **25** and the support member **30** are also connected together by means of springs **40**. It can be seen that all the springs **40** extend in the same direction about a central vertical axis so that the vibrating action of the bowl tends to move the parts in a rotary direction about the axis of the parts feeder. In the illustrated form of the invention, there are three

individual springs **40** in each group **39** of springs. Each group of springs is secured to the frame member and support member by a respective one of a plurality of bolts **41**. Occasionally it becomes necessary to detach the spring members **40** and to re-attach them with a greater or lesser number of springs in each group or with the springs arranged at an opposite angle to that illustrated. Thus, springs might be detached and re-attached to the surfaces **45** and **46** after removal of the springs from the surfaces **47** and **50** in order to move the parts in the opposite direction. The appropriate bolt openings **51** and **52** are so located that when the springs **40** are detached at one location, such as at the surfaces **47** and **50**, they can be immediately re-attached in the other direction with the remaining groups of springs still attached in the forward direction. This arrangement of the present apparatus makes possible rapid and convenient rearrangement of the apparatus for driving the parts in the opposite direction. Also, it should be noted that bolts **41** are used instead of screws which thread into the frame member and support member. Thus, if the threads on either the nuts or bolts become damaged, it is only necessary to replace the nuts or the bolts. On the other hand, if the threads were tapped into the support member and the frame member, these members would have to be retapped in case of damaged threads.

It should also be mentioned that the springs **40** are attached at their upper ends to the frame adjacent to the connection of respective ones of the fasteners **26**.

The covers **12** are fixed to the support member **30** by means of screws **50** which extend directly through the covers into threaded bores **54** in the support member. Each cover has a hand hold recess **49** for lifting the parts feeder and for removing the covers. Of course, certain sizes of parts feeders are too heavy to lift by hand in which case the recess is used only for removing the covers. Each cover also has a lip **48** which supports it on the support member **30** prior to attachment by screws **50**. The covers **12** have substantial mass and are located a substantial distance away from the axis of the apparatus so that a very substantial portion of the inertia of the structure upon which the motor **28** is mounted is involved in the covers **12**. In order for the present apparatus to operate, it must vibrate at a tuned or resonant frequency. Because the covers **12** make up a substantial portion of the mass of the structure upon which the motor is mounted, removal of one or both of the covers detunes the apparatus so that it will not vibrate and feed properly. Therefore, the feeder cannot be operated with electrical connections exposed to the possibility of damage to the feeder from being unprotected as well as increased possibility of personal injury.

It will be noted that the support member **30** and the covers **12** cooperate to define a downwardly opening recess **55**, within which is seated an annular flexible damper member **56**. This damper member **56** also seats upon the base plate **15** which has an upwardly projecting ring or collar **59** upon which the vibration damper **56** is received. The structure above the support member **30** and cover **12** can be rotated to any desired position, or in other words, to an infinite number of positions completely around 360°. Thus, the opening **17** can be arranged to dispense parts in any desired direction. This is made possible by the cylindrical shape of the vibration damper **56** which permits such adjustment.

The base plate **15** can be adjusted as to any desired attitude and altitude by means of the externally threaded cylinders **60**. The base plate **15** has three bores **61** therethrough so as to receive the various externally threaded members **60**. A pair of nuts **62** is positioned on the opposite side of the base plate **15** in threaded relationship to each of the cylinders **60**. It can be appreciated that by adjustment and tightening of these nuts, the base plate can be adjusted as to attitude and altitude. The base plate can also be fixed to a supporting surface by means of the hollow passage or opening **65** through the center of each cylinder **60** which permits a further bolt to be projected through this hollow opening or center. The cylinders can have openings **65** therein which are somewhat larger than the bolts

so as to permit horizontal adjustment and precise positioning of the axis of the parts feeder.

Referring to FIG. 3, a pair of passages 70 are provided through the base plate. These passages function to receive wiring 71 to the motor 28. If desired, a conduit can be fixed to the base plate in order to receive these wires. Because the vibrations of the apparatus are substantially absorbed in the damper 56 and not transmitted to the base plate, fixed rigid conduit can be used without damage thereto and can be mounted or secured to the base plate 15.

It will be evident from the above description that the present invention provides an improved automatic part feeding apparatus. It can be seen that the bowl of the present apparatus can be adjusted by the nuts 62 and cylinders 60 so as to be at the correct height and attitude. Also the bowl can be positioned at any desired position around the complete 360° by merely rotating of the complete apparatus on the damper 56. It will also be evident from the above description that the setting up of the feeder to operate in an opposite direction is quickly and easily accomplished by leaving some of the springs in position while others of the springs are reversed as to their connection. It will be evident that the present apparatus is safe by reason of the removable covers which stop operation and it will also be evident that the device is easily repaired because of the avoidance of certain thread tapping into the relatively complex and costly castings such as the base plate 15, the frame member 25 of the support member 30. Instead, bolts are used to mount the springs or, in the case of the threaded member 60, a pair of nuts are used to position the base plate.

A further means for preventing operation with the covers removed is provided by the interior surfaces of the covers. Thus, the surface 80 of each cover contacts the damper 56 thereby positioning the feeder on the damper. When the cover is removed the positioning action is eliminated preventing proper operation and further insuring against operation of the unit with the cover removed.

While the invention has been disclosed and described in some detail in the drawings and foregoing description, they are to be considered as illustrative and not restrictive in character, as other modifications may readily suggest themselves to persons skilled in this art. For example, the two covers 12 might be replaced by three or more cover members in larger heavier units in order to improve ease of handling and accessibility. Also, as a further example, the cylinders 60 might be replaced with bolts having a hollow interior.

The invention claimed is:

1. In a vibratory parts feeder including a parts container, means for supporting and vibrating said parts container, said means including a support member, the improvement which comprises a base plate, an annular flexible vibration damper received upon said base plate, said base plate being provided with projecting portions adapted to hold said damper in position on said base plate, said support member being proportioned to engage said damper and to be supported thereby, said support member being rotatable to infinite positions on said vibration damper.

2. The invention of claim 1 additionally comprising externally threaded members for supporting said base plate on a mounting surface and adjusting the attitude of said base plate, said base plate having bores therethrough which receive said externally threaded members, and a plurality of pairs of nuts with each pair threadedly received on a respective one of said externally threaded members on opposite sides of said base plate for locking said members in position relative to said base plate.

3. In a vibratory parts feeder including a parts container, a frame member supporting said parts container, and means for vibrating said frame member and parts container, the improvement which comprises fasteners extending through said parts container and connected to said frame member for securing said parts container to said frame member, said parts container being a bowl including a cylindrical outside wall and a base spaced upwardly from the bottom edge of said wall, said fasteners being screws which have their heads positioned outside of said wall and their shanks extending through said wall, said wall having openings in the portion of said wall below said base through which said screws extend, said frame member contacting the inside surface of said wall at a portion of said wall adjacent said screws.

4. In a vibratory parts feeder including a parts container, a frame member supporting said parts container, and means for vibrating said frame member and parts container, the improvement which comprises fasteners extending through said parts container and connected to said frame member for securing said parts container to said frame member, a base plate, and an annular flexible vibration damper received upon said base plate, said base plate being provided with projecting portions adapted to hold said damper in position on said base plate, said means for vibrating including a support member, said support member being proportioned to engage said damper and to be supported thereby, said support member being rotatable to infinite positions on said vibration damper.

5. The invention of claim 3 additionally comprising an annular flexible vibration damper, said means for vibrating being supported on said annular flexible vibration damper and rotatable to infinite positions thereon.

6. The invention of claim 3 additionally comprising a base plate, an annular flexible vibration damper received upon said base plate, said base plate being provided with a cylindrical ring adapted to hold said damper in position on said base plate, said means for vibrating including a support member, said support member being proportioned to engage said damper and to be supported thereby, said support member being rotatable to infinite positions on said vibration damper.

7. The invention of claim 6 additionally comprising externally threaded members for supporting said base plate on a mounting surface and adjusting the attitude of the base plate, said base plate having bores therethrough which threadedly receive said externally threaded members, and a plurality of pairs of nuts with each pair threadedly received on a respective one of said externally threaded members on opposite sides of said base plate for locking said members in position relative to said base plate.

8. The invention of claim 7 wherein said means for vibrating said frame member and parts container includes a motor means mounted on said support member and connected to said frame member for the driving thereof, spring means extending between said frame member and said support member, means securing said spring means to said frame member and support member, said frame member and support member having first surfaces which said spring means are fixed against by said securing means, said frame member and support member having additional surfaces against which said spring means can be fixed by said securing means, said spring means being adapted to move parts in one direction when said spring means are fixed against said first surfaces and adapted to move parts in another direction when said spring means are fixed against said second surfaces, said securing means being so proportioned and arranged as to permit removal of said spring means from said first surfaces and attachment of said spring means to said second surfaces while portions of said spring means are still attached to said first surfaces.

9. The invention of claim 8 wherein said spring means are secured to said frame member and said support member by bolts.

10. The invention of claim 9 wherein said cover and said support member define a downwardly opening recess for seating of said damper.

11. The invention of claim 3 wherein said means for vibrating includes springs each of which is connected to said frame adjacent the connection of a respective one of said fasteners to said frame.

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