

June 7, 1966

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3,254,753

HOPPER FEED APPARATUS

Filed Sept. 25, 1962

3 Sheets-Sheet 2

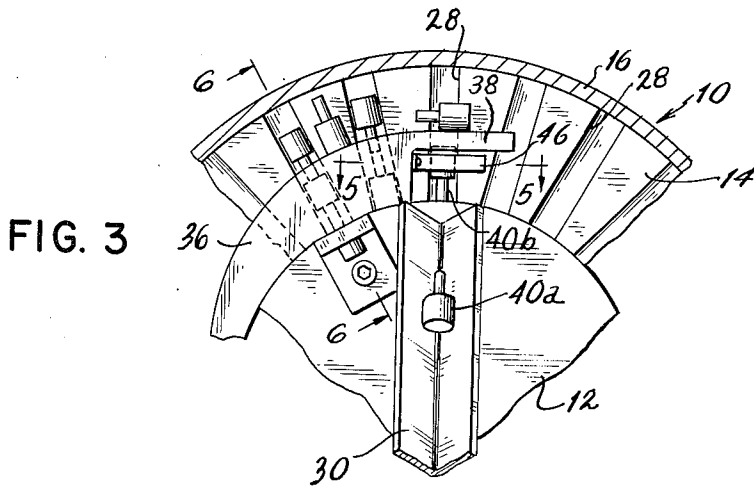


FIG. 3

FIG. 4

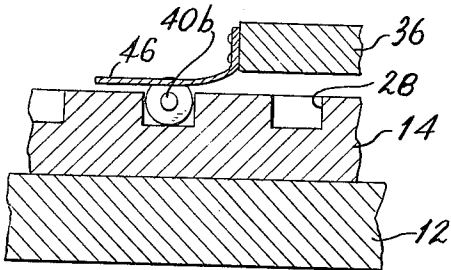


FIG. 5

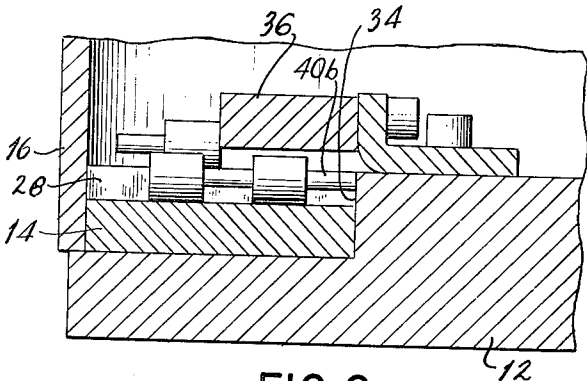
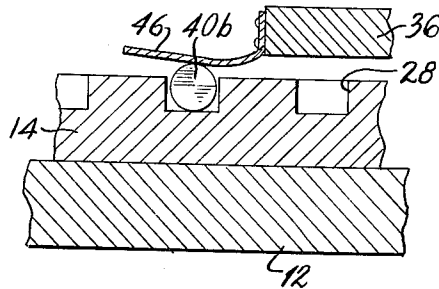



FIG. 6

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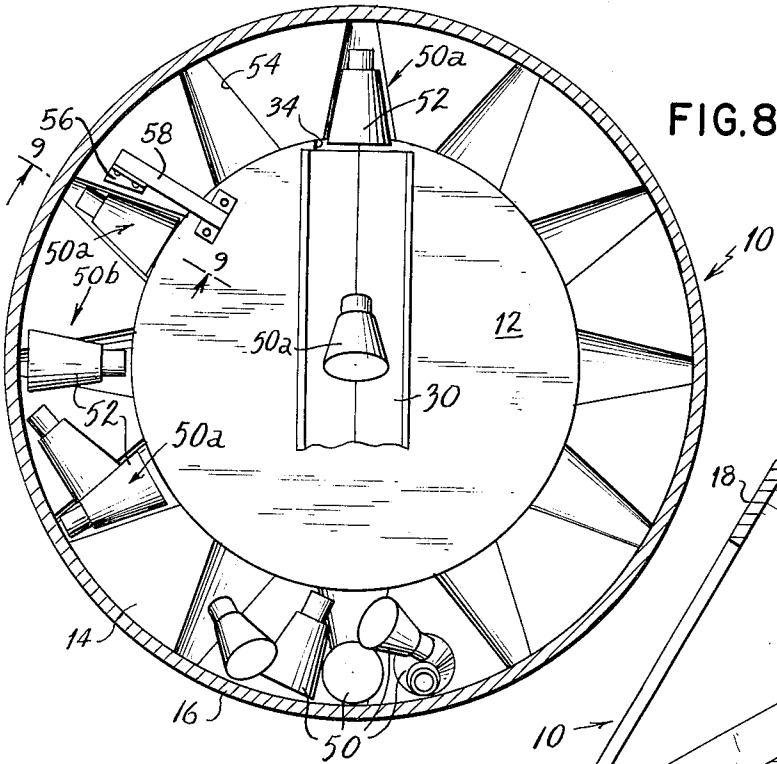


FIG. 8

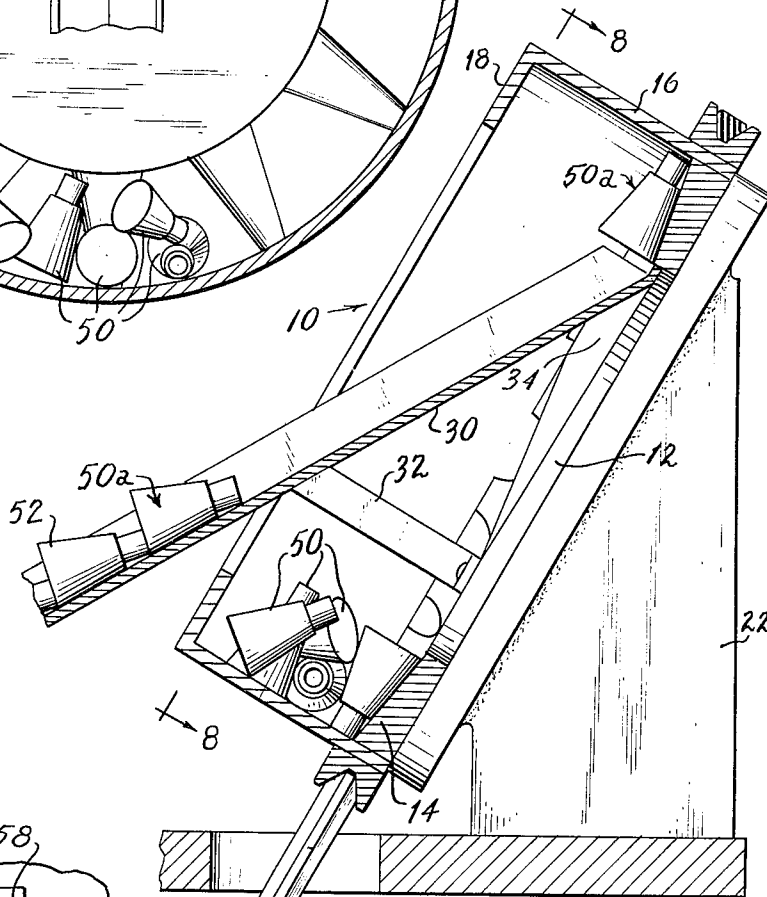
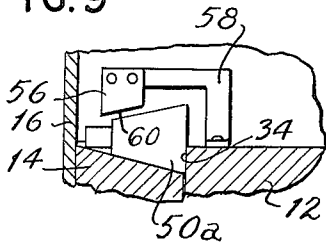


FIG. 7

FIG. 9



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HOPPER FEED APPARATUS

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 Filed Sept. 25, 1962, Ser. No. 226,102
 2 Claims. (Cl. 198—33)

The present invention relates to hopper feed apparatus, and more particularly to hopper feed apparatus for the automatic feeding, in uniformly oriented relation, of articles having one end portion of lesser thickness or diameter than other portions along its length, such as bottles, screw driver blades, bottle stoppers or plugs or other articles having enlarged heads or the like.

It is an object of the present invention to provide apparatus of the character described that may automatically feed articles of the character described in uniformly oriented relation with their thicker portion foremost.

It is also an object of the present invention to provide apparatus of the character described that is capable of feeding such articles at relatively high speed.

It is another object of the present invention to provide apparatus of the character described which may be adapted for the feeding of articles having main body portions of various sizes and different shapes.

It is still another object of the present invention to provide apparatus of the character described that is certain and constant in its operation and will not readily clog or jam or otherwise get out of order.

It is a further object of the present invention to provide apparatus of the character described that is neat and compact.

It is still a further object of the present invention to provide apparatus of the character described that is of relatively simple construction, is relatively easy and convenient to operate and economical to maintain.

The foregoing and other objects and advantages of the hopper feed apparatus of the present invention will become more readily apparent to those skilled in the art from the several embodiments thereof shown in the accompanying drawings and from the description following. It is to be understood, however, that such embodiments are shown by way of illustration only to make the principles and practice of the invention more readily comprehensible and without any intent of limiting the invention to the specific details therein shown.

In the drawings:

FIG. 1 is a vertical elevational view, partly in section and showing one embodiment of the apparatus of the invention;

FIG. 2 is a sectional view taken along the plane of line 2—2 of FIG. 1 and showing the apparatus with a properly oriented article in feeding position;

FIG. 3 is a fragmentary view, similar to that of FIG. 2 and showing a mis-oriented article at the feeding position;

FIG. 4 is a fragmentary sectional view taken on the line 4—4 of FIG. 2;

FIG. 5 is a fragmentary sectional view taken on the line 5—5 of FIG. 3;

FIG. 6 is a fragmentary sectional view taken on the line 6—6 of FIG. 3;

FIG. 7 is a view similar to that of FIG. 1 but showing another embodiment of the apparatus of the invention which is intended for the feeding of articles having a thicker portion of varying cross-section;

FIG. 8 is a section taken on the line 8—8 of FIG. 7; and

FIG. 9 is a section taken on the line 9—9 of FIG. 8.

Generally stated, the apparatus of the invention is of the type of hopper feeder that is known and has been used

for the feeding of articles that do not require orientation, such as headless pins, rods, or the like. Such apparatus commonly includes a rotary flat-surfaced ring in the hopper which is provided with spaced radial grooves open at their inner ends. These grooves pick up the articles at the bottom of the hopper and carry them upwardly for discharge at the top of the hopper into a suitable chute or ramp. The open inner ends of the grooves are blocked along the ascending side of the ring by a suitable guard wall to prevent the dropping of the articles out of the grooves as they approach the top of the hopper.

The present invention contemplates, first, to provide the foregoing broadly described apparatus with groove means in the ring that will pick up, hold and carry upwardly articles having an end portion of reduced thickness or diameter, regardless of whether the remainder thereof is of uniform or varying thickness. Secondly, the invention contemplates the use of means inhibiting the discharge from the grooves at the top of the hopper those articles that are mis-oriented, or more specifically, those articles that are oriented with the portion of reduced thickness directed toward the center of the hopper.

In one form of the invention, the inhibiting means are provided at the very top of the hopper, at the article discharge position, to stop the gravitational movement of mis-oriented articles. In another form of the invention, the inhibiting means are provided adjacent the top of the hopper on the ascending side of the ring to prevent the mis-oriented articles from reaching the discharge position in the hopper.

More specifically stated, and with particular reference to the form of the invention illustrated in FIGS. 1 to 6 of the drawings, the hopper feed apparatus of the invention, generally designated as 10, includes a bottom wall comprising a center disc 12, a rotary, flat-surfaced, peripheral ring 14 of substantial thickness fitted closely around and projecting above the central disc 12, and a cylindrical wall 16 extending forwardly and upwardly from the hopper bottom and preferably formed with an inwardly offset flange 18 at its outer edge. The hopper 10 may be supported at a conventional angle to the horizontal by the center of the disc 12, as on the canted platform 20 which is mounted on a stand 22 of any conventional construction.

In the instant embodiment of the invention, the disc 12 is shown as fixedly secured to platform 20 and the ring 14 is shown as fixedly associated with the wall 16 to rotate therewith. The rotating means for the ring and wall is shown, for the purpose of simplicity of illustration, as comprising a pulley ring 24 secured on the exterior of the wall 16 which is operatively connected to a driving motor (not shown) by the driving belt 26. It will be clear, however, that, if desired, another conventional arrangement may be provided wherein the disc 12 is rotatably supported on the platform 20 and the ring 14 is associated with the disc 12 for rotation therewith, the wall 16 being fixed in position and other suitable means being provided for driving the disc and ring 14.

The ring 14 is provided with spaced, radially extending grooves 28 around its periphery. The inner ends of grooves clear the outer edge of the center disc 12 particularly along the top or uppermost portion thereof and along the descending side of the ring 14 in the manner conventional with the general type of hopper feeder to which the apparatus of the invention relates.

A chute or ramp 30 is fixedly supported on the hopper 10 along its vertically extending diameter. The upper end of the ramp 30 is disposed closely adjacent to the inner face of the ring 14 in position to receive articles dropping or sliding gravitationally from passing grooves 28 of the ring 14. The lower end of ramp 30

extends to the exterior of the hopper 10, as is conventional. The chute 30 is shown as supported, at least at one point, by a bracket 32 mounted on disc 12. However, it may here be stated that the chute 30 may be supported from any other stationary part of the apparatus, as from the hopper wall 16, when the latter is not rotatable, or from a projection of the platform 20, in a manner that will be readily understood by those skilled in the art.

In order to prevent articles carried in grooves 28 from sliding out along the upper portion of their ascent along the ring 14 rotates and the center disc 12 is stationary, a guard means is provided for blocking the inner ends of the grooves 28. The guard means may be built up from the disc 12 at the upper quarter of the disc along the ascending side of the ring 14, as illustrated at 34 (FIG. 1), or may comprise a curved guard wall 36 overlapping the projecting portion of the inner edge of the ring 14 which wall may be suspended from a fixed point on the apparatus and may extend upwardly and inwardly along the inner edge of the ring 14 to the chute 30. The guard wall 36 may be provided with a top guard 38 at its upper end that overhangs the inner portion of passing grooves 28 to prevent articles being carried therein from bouncing out as they approach the point of discharge directly above the chute 30. Also, to prevent articles from bouncing out of the chute 30 after they are discharged from grooves 28, and thereby possible becoming disoriented, the chute 30 may be tubular instead of V-shaped, as shown.

The grooves 28 may be of a shape, width and depth that varies with the size and shape of the articles to be handled. In the embodiment of the invention illustrated in FIGS. 1 to 6, the articles being fed, generally designated as 40, are each shown as comprising a relatively thick cylindrical body section 42 and a relatively thin neck or stem 44, and the grooves 28 are each shown to be of a width and depth to receive and hold the article 40 during its upward movement but not deep enough to completely enclose the body section 42. Thus, when seated in a groove 28, a portion of the body section 42 of each article 40 will project above the surface of the ring 14.

The article orienting means is shown to comprise a preferably flat leaf spring 46 supported over the surface of the ring 14 at the upper end of the hopper 10 and transversely of any groove 28 disposed along the vertical diameter of the hopper. The leaf spring 46 is of a sufficient length to overlap the edges of a groove 28 that is so disposed and is not less than the width of the opening of chute 30. The spring 46 may be supported at its end nearest the ascending side of the ring 14 as by an upwardly offset extension that is connected to the edge of the guard wall 36. The leaf spring 46 is spaced from the face of the ring 14 a distance less than the amount the body section of an article 40 in a groove 28 projects above the surface of ring 14. The spring 46 also has its inner edge removed from the inner edge of ring 14 a distance greater than the length of the body section 42 but less than the entire length of the article 40.

The operation of the hopper feed of the invention will now become clear. As the ring 14 rotates, its grooves 28 will pick up articles 40 piled haphazardly at the bottom. Each groove 28 will pick up one or more such articles 40. Some of the articles 40a picked up by the grooves 28 will be disposed in the grooves in properly oriented relation with their body sections 42 nearer the inner edge of the ring 14. Other articles 40b will be picked up with their stems 44 facing the inner edge of the ring 14 and their body sections 42 facing away from the inner edge and will thus be in mis-oriented positions. As the grooves 28 of the ring 14 ascend, all articles being carried in the grooves will

be held therein by the guard wall 36 or other groove-blocking means. As grooves 28 pass beyond the guard wall 36, articles 40a which are properly oriented will pass freely under leaf spring 46, which overlies the stems 44 of articles 40a, and the articles 40a will therefore slide out by gravity into the chute 30. All the articles 40b which are mis-oriented with their stems 44 innermost will have their body sections 42 resiliently and frictionally gripped by the leaf spring 46 thus preventing articles 40b from dropping or sliding out of their grooves until they have passed beyond the spring 46 and thereby also beyond the opening of the chute 30. These articles will then drop back into the hopper interior.

FIGS. 7 and 8 illustrate an embodiment of the apparatus of the present invention modified for the feeding of articles in which the thicker end section is of varying shape, such as the bottles generally designated as 50 which have an upwardly tapering or frusto-conical body portion 52. In this embodiment of the invention each groove 54 in the ring 14 has at least the portion thereof adjacent the inner edge of ring 14 formed in the outline or shape of the thicker portion 52 of the bottle 50; namely, tapering outwardly in width and depth. The outer portion of each groove 54 may conform if desired to the shape of the bottle neck. In this embodiment, each groove 54 may be of an over-all length and width sufficient to receive and hold a properly oriented bottle 50a as it is carried upwardly by ring 14. That is, each groove 54 can receive and hold a bottle 50a whose thicker end portion 52 is oriented toward the inner edge of the ring 14 of the hopper. It will be apparent that when a mis-oriented bottle 50b is disposed in one of the grooves 54 so that its thicker end 52 overlies the narrower portion of the groove 54, the thicker end 52 will project above the surface of the ring 14 more than the thicker end 52 of a bottle 50a that is properly oriented.

Similar to the first embodiment, the embodiment of the invention of FIGS. 7 and 8 is provided with means for inhibiting or preventing the discharge of mis-oriented bottles 50b from the grooves 54 into the chute 30. Such means preferably may comprise a vertically disposed element or bar 56 that is supported from a fixed point on the hopper 10 as by the inverted, L-shaped bracket 58 which is located opposite the narrower or shallower portion of a groove 54. Thus, bar 56 extends over the portion of a groove 54 that accommodates the neck of a properly oriented bottle 50a. The bar 56 is preferably formed with a slightly offset or curved end 60 facing the ascending direction of the ring 14 and spaced from the surface of the ring 14 a sufficient distance to clear the underlying portion of a properly oriented bottle 50a moving thereunder. However, end 60 of bar 56 is spaced an insufficient distance from ring 14 to clear the underlying portion of a mis-oriented bottle 50b, thereby engaging the thicker end 52 and dislodging it from the groove 54 to return it to the bottom of the hopper. As will be seen from the illustrated embodiment, a mis-oriented bottle 50b has its thicker end 52 projecting a substantial distance out of the groove 54 so that the bar 56 will engage that portion at a sufficiently low point to knock it out of the groove. To facilitate the action of the bar 56, it preferably is not positioned opposite the chute 30, as in the embodiment of FIGS. 1 to 6, but rather bar 56 is located ahead of chute 30 to dislodge a mis-oriented bottle 50b from groove 54 before it reaches the discharge point of chute 30.

It may here be stated that when the bottle or similar article being handled is light in weight, as for instance, when the article is a thin-walled, lightweight synthetic plastic bottle, a compressed air nozzle (not shown) may be substituted for the bar 56, and a jet of air directed from the nozzle to strike the mis-oriented article and

dislodge it from the groove in which it rests and thereby return it to the bottom of the hopper.

It may here also be stated that the apparatus of the present invention may be adapted for the automatic feeding of numerous articles having shapes other than the ones illustrated in connection with the embodiments of FIGS. 1 to 6 and of FIGS. 7 to 9. Thus, the embodiments of FIGS. 1 to 6 may be utilized, with substantially no modification except for adjustment of the height of the retaining leaf spring 46, for the feeding of such articles as the metal parts of screwdrivers in which the operative end portion is of greater dimension in one direction than the stem thereof. In such a case the leaf spring 46 will tend to turn the flat operative end of the screwdriver within the groove and permit it to drop into the chute.

This completes the description of the hopper feed apparatus of the present invention. It will be apparent, however, that the present invention makes possible the use of a hopper feed apparatus to feed numerous varieties of articles of varying thickness, provided that one end thereof is of lesser thickness than other parts of its body. It will also be apparent that such apparatus is of relatively simple construction and economical to produce and operate; that it may be operated to feed articles at a relatively high rate of speed and that it is not prone to clog or jam, and may thus be in constant operation without loss of operating time or labor.

It will be further apparent that numerous modifications and variations in the hopper feed apparatus of the present invention may be made by anyone skilled in the art, in accordance with the principles of the invention hereinabove set forth, and without the exercise of any inventive ingenuity. I desire, therefore, to be protected for any and all such modifications and variations that may be made within the spirit of the invention and scope of the claims hereto appended.

What I claim is:

1. Hopper feed apparatus of the character described for the automatic feeding of articles having one end portion of lesser thickness than the other end portion thereof, the article tapering from its thicker end portion

to the thinner end portion, said apparatus including a hopper bottom disposed at an angle to the horizontal, said bottom including a rotatable peripheral ring, said ring having radially extending article-holding grooves formed in its upper surface, said grooves opening into the inner edge of said ring and each having an inner portion conforming in shape to the shape of said article and tapering inwardly from its inner edge, chute means arranged to receive an article discharged from a groove disposed in the uppermost position within said hopper, means on the ring-ascending side of said hopper for closing the inner ends of said grooves up to the point of article-discharge position of a groove, each said groove being of a depth less than the thickness of the thicker end portion of an article whereby said thicker portion projects above the surface of said ring, and means fixedly supported on said hopper and arranged opposite a narrower portion of a groove passing thereunder in spaced relation to said ring to clear an article disposed within a groove with its thicker end facing the inner edge of said ring and to engage against the side of an article held within a groove with its thinner end facing the inner end of said groove to thereby dislodge said last-described article from said groove.

2. The apparatus of claim 1 wherein said fixedly supported means are arranged to engage against a last-described article in advance of its reaching the position opposite said chute.

References Cited by the Examiner

UNITED STATES PATENTS

2,433,096	12/1947	Davis	-----	221-160
2,683,531	7/1954	Baehr	-----	221-160

OTHER REFERENCES

Pages 20 and 55-57 of Hopper Feeds (booklet), Machinery Yellow Back Series, #39; TJ, 1398, M3, C. 2 (Library catalog number).

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