May 26, 1964 H. MOORE 3,134,477

MECHANISM FOR DELIVERING UNIFORMLY DIRECTED HEADLESS SETSCREWS

Filed June 26, 1962 2 Sheets-Sheet 1

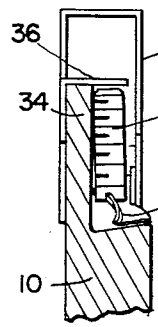


FIG. 8

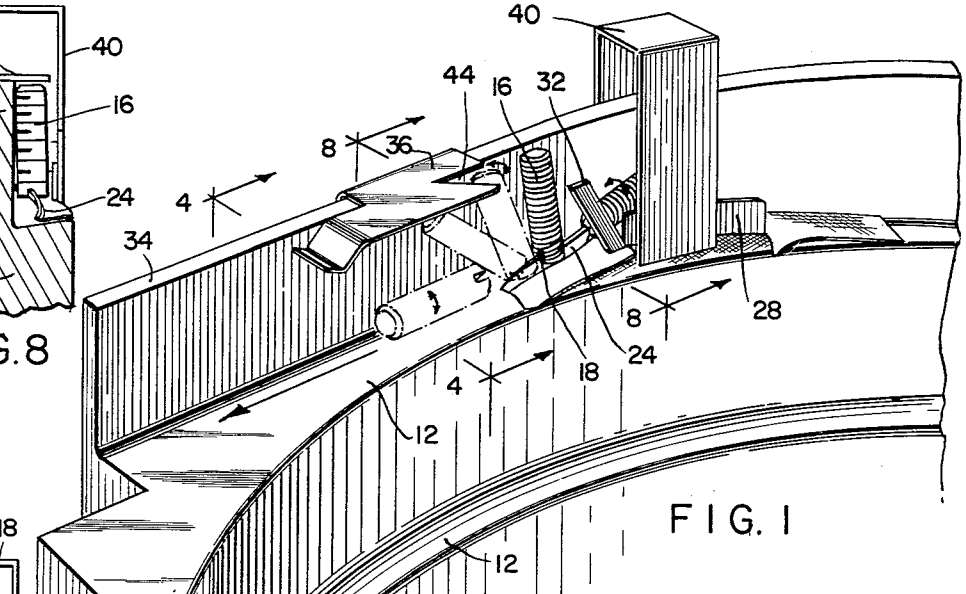


FIG. 1

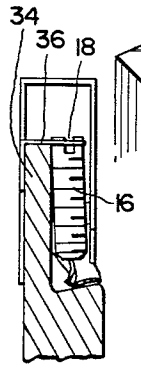


FIG. 9

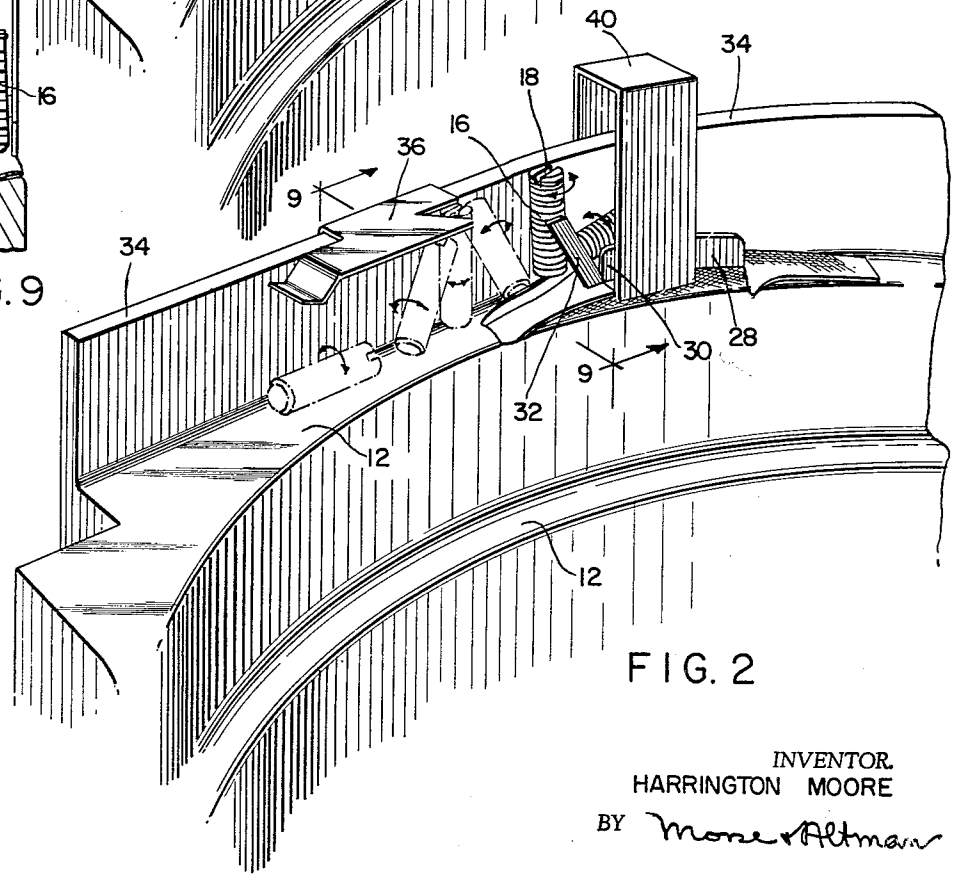


FIG. 2

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MECHANISM FOR DELIVERING UNIFORMLY DIRECTED HEADLESS SETSCREWS

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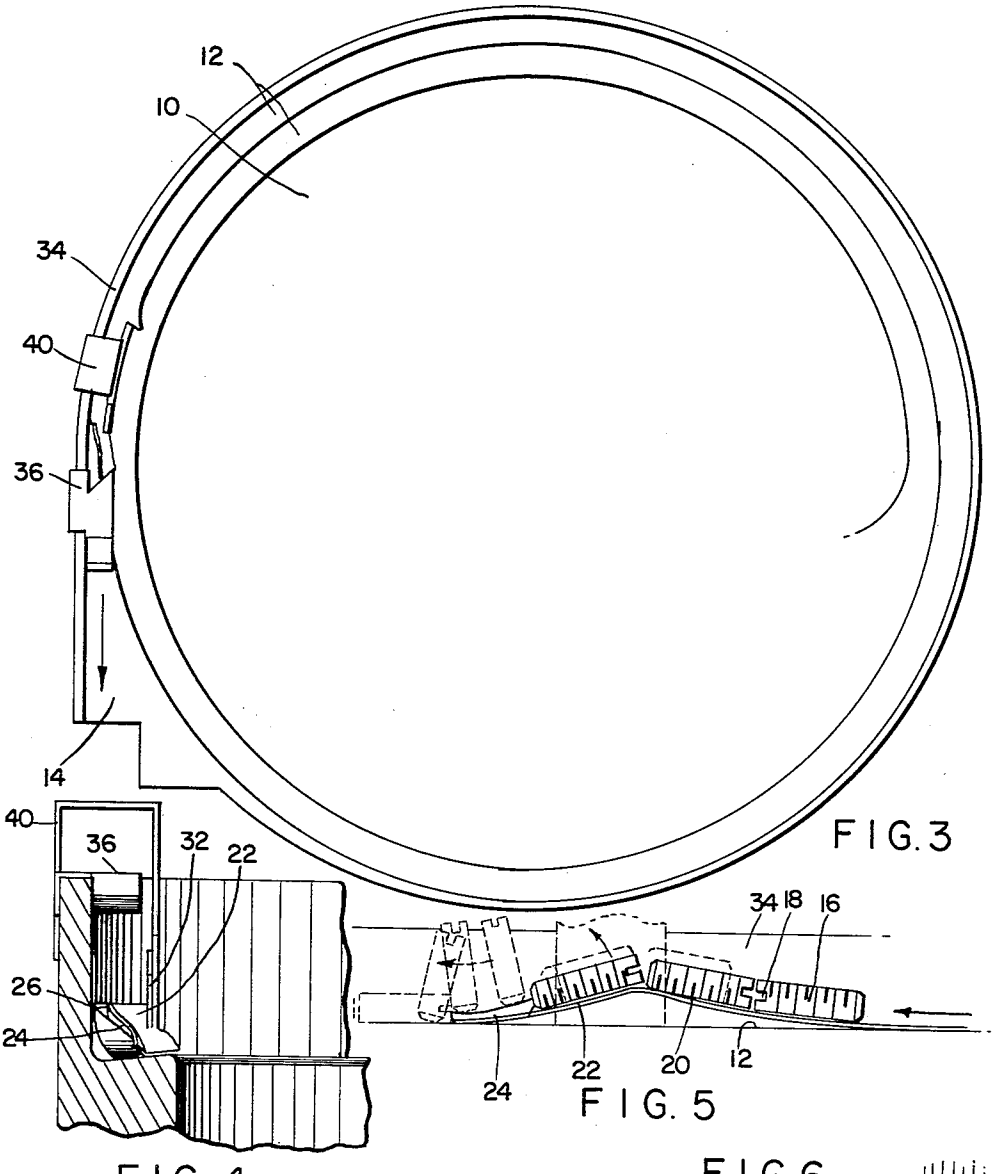


FIG. 3

FIG. 4

FIG. 5

FIG. 6

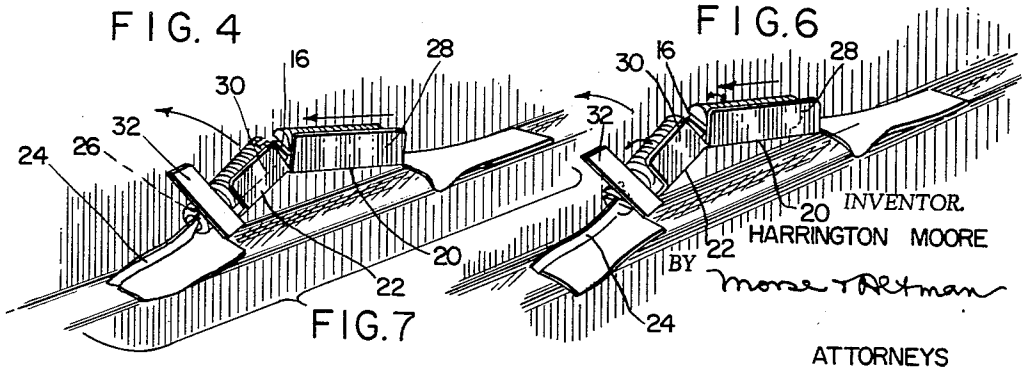


FIG. 7

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MECHANISM FOR DELIVERING UNIFORMLY DIRECTED HEADLESS SETSCREWS

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Filed June 26, 1962, Ser. No. 205,270
3 Claims. (Cl. 198—33)

This invention relates to mechanism for feeding headless screws same end first from a bowl into which a supply of such screws has been dumped in haphazard fashion. The bowl is electrically vibrated in the manner described in U.S. Patent No. 2,609,914 and now well known commercially to cause small articles such as setscrews in the bowl to progress upward along a narrow helical ledge or shelf on the inner face of the wall of the bowl. Vibrating bowls of this kind are commonly used to feed small articles to machines which operate on them, e.g., setscrews are fed to a machine which automatically drives them. For effective operation the screws must all be headed the same way when they reach the driving machine. Various devices have been employed to reject or reverse screws which approach the discharge point of the bowl with the wrong end leading. The device hereinafter described is for the same purpose and is believed to be more reliable in operation than the devices heretofore employed for such purpose.

For a more complete understanding of the invention, reference may be had to the following description thereof and to the drawings, of which

FIGURE 1 is a fragmentary enlarged view of the discharge portion of a vibrating bowl with an embodiment of the invention mounted thereon, showing how it reverses a setscrew which is wrongly headed;

FIGURE 2 is a similar view of the same, showing the progress of a correctly headed setscrew;

FIGURE 3 is a plan view, on a smaller scale, of the bowl a portion of which is shown in FIGURES 1 and 2;

FIGURE 4 is a section on the line 4—4 of FIGURE 1;

FIGURE 5 is a fragmentary elevational view of the device shown in FIGURE 2;

FIGURES 6 and 7 are fragmentary perspective views of the said device, showing screws at different stages of passage;

FIGURE 8 is a section on the line 8—8 of FIGURE 1; and

FIGURE 9 is a section on the line 9—9 of FIGURE 2.

A plan view of a vibratable bowl **10** which may be similar to that illustrated in U.S. Patent No. 2,609,914 is shown in FIGURE 3, the bowl being equipped to be vibrated in such a manner that small objects, such as headless setscrews, piled at random therein, will move to and along an ascending helical shelf **12** which rises gradually to a point of discharge **14** at the rim of the bowl. Vibrating bowls of this type are useful in feeding a succession of small articles from a promiscuous heap on the bottom of the bowl to exit one after another at the discharge point **14**. In this way an automatic machine which operates on such articles can be supplied with the articles one by one. For example, setscrews may be driven automatically by a machine which receives them one at a time from a vibrating bowl. Since ordinarily only one end of a setscrew is slotted or otherwise recessed to receive a driving tool, the setscrews which are discharged from the bowl must be delivered to the machine in a uniform manner so that each will have its driving end presented to the driving tool. Since setscrews will travel up the helical shelf **12** either end foremost, means must be provided to ensure that every setscrew is delivered with the same end leading so that all which reach the driving machine will be properly presented to the driving tool. This is done by either reversing setscrews which approach the discharge point wrong end to, or by ejecting such screws from the shelf so that they fall to the bottom of the bowl to climb the shelf again. Several devices for this purpose have been made to orient a variety of small articles, including headless setscrews, with varying degrees of reliability. The present invention relates to a device for operating on headless setscrews **16** which have a tool-receiving slot **18** at one end. As the screws advance along the shelf **12** in an end-to-end succession, each screw is made to rise to a vertical position and to advance along a rail in that position until it falls forward if its entering entering end is uppermost, or falls backward if its slotted end is uppermost. In either case its advance from that point on is with its entering end leading. To bring about these movements a low hump is placed on the shelf, the hump consisting of an ascending ramp **20** and a descending ramp **22**. On the lower portion of the descending ramp **22** a short, longitudinally extending rail **24** presents a pointed end **26** to screws advancing down the ramp **22**. The rail is of a height and thickness to be straddled by the slotted end of a setscrew. Side guards **28, 30, 32** along the edge of the ramps **20, 22** prevent the screws on the ramps from toppling back into the bowl.

The vibrations of the bowl are such that the screws on the shelf advance up the inclination of the shelf and of the ascending ramp **20**. The distance from the apex of the ramp to a point **26** of the rail **24** is about one screw-length. Hence when a screw on the descending ramp **22** is stopped by the rail **24**, its leading end is in contact with the point **26** and its trailing end is at or near the apex of the ramp. This trailing end is then pushed by the leading end of the next screw which is then on the ascending ramp, with the result that the first screw is pushed up to an upright position in which it tends to rotate about its longitudinal axis as a result of the vibrations. If this screw has been advancing with its slotted end foremost, the rotation of the screw about its axis will bring the slot into line with the rail **24**, whereupon the screw will receive the rail into the slot and will advance along the rail in an upright position (FIGURE 1). As it reaches the other end of the rail, its upper end will pass under an elevated stop element **36** which is secured to the rim **38** of the bowl and is spaced above the shelf **12** just high enough to permit an upended screw to pass beneath it if the slotted end of the screw is straddling the rail **24** (FIGURE 8). When a screw in such a position reaches the end of the rail it tumbles off and falls forward to a horizontal position on the shelf, its entering end being in the lead, as indicated in FIGURE 1.

If a screw advances over the hump with its entering end in the lead, it is pushed up to an upright position after its leading end encounters the point **26** of the rail **24**. Then it travels along the rail until its upper end hits the fixed element **36** whereupon the upper end is stopped while the lower end continues to advance, thus causing the screw to tumble backward to a horizontal position on the shelf with its entering end in the lead. In this way the screws are delivered uniformly oriented with their entering ends leading and their slotted ends trailing.

As shown in the drawing, the ramp, guides and rail may conveniently be made of a piece of sheet metal and may be detachably mounted on the shelf **12** near the delivery end thereof. To hold this structure in place against the inner wall of the rim **34**, a clip **40** may be used, this being a strip of spring metal bent to a U shape with one leg bearing against the outer surface of the bowl and the other leg bearing against the inner edge of the ramp. The elevated stop **36**, as shown, is a separate piece of sheet metal mounted on the rim **34** of the bowl by any

suitable means. This stop member preferably is notched as at **44**, the notch being arranged to be entered by the upper ends of screws which are riding the rail **24** with their slotted end uppermost. This keeps such screws from falling sideways into the bowl and ensures that they will fall backward onto the shelf.

I claim:

1. In a vibratable bowl having an ascending helical shelf on its inner wall, a low hump on said shelf consisting of an ascending ramp and a descending ramp, a rail on a portion of said descending ramp extending longitudinally thereof, and an elevated stop spaced above the discharge end of said rail.

2. A device adapted to be removably mounted on a vibratable bowl having an ascending helical shelf on its inner wall, said device comprising an ascending ramp and a descending ramp in line therewith, a short rail on a portion of said descending ramp extending longitudinally thereof and adapted to be straddled by the slotted end of a headless setscrew, and an elevated stop adapted to be mounted over the lower end of said rail at a height to be cleared by the upper end of a setscrew straddling said rail.

3. A device as described in claim 2, and guards along one side of said ascending and descending ramps.

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