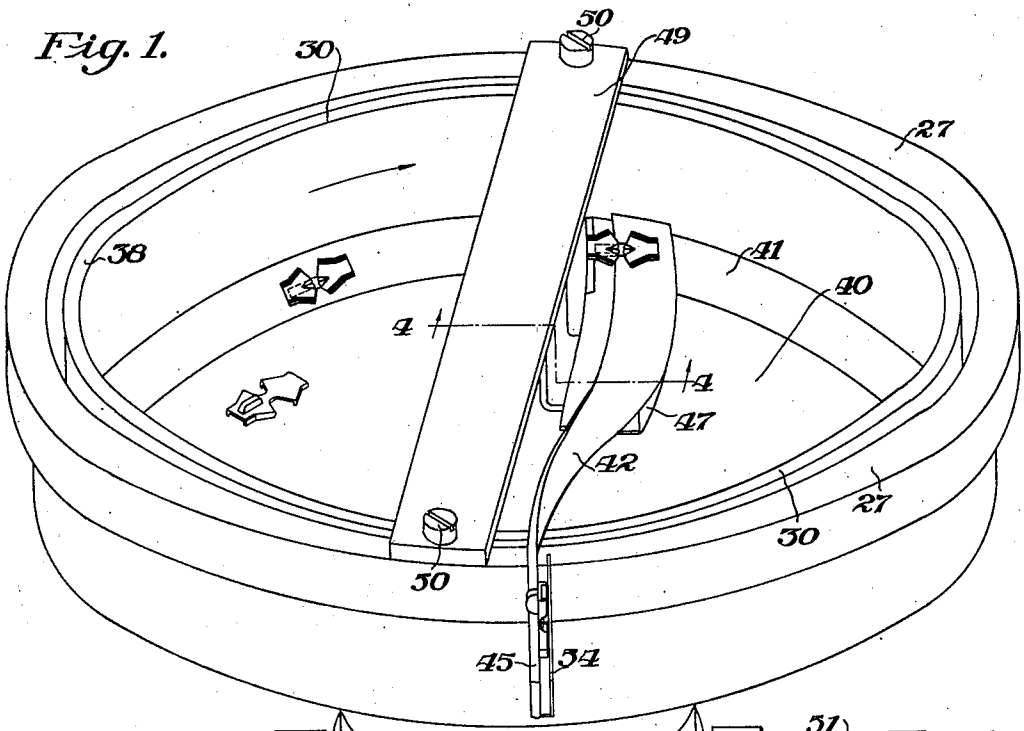
Sept. 18, 1934. K. G. LOCKIE 1,973,720

HOPPER MECHANISM

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Fig. 1.



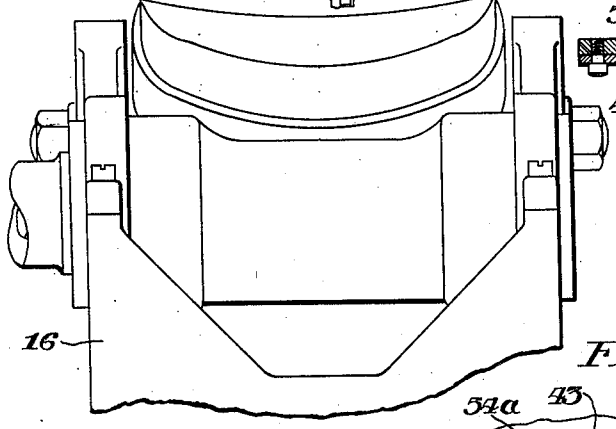


Fig.4.

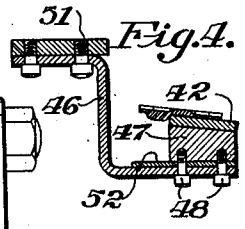


Fig.7.

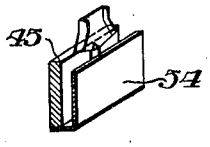


Fig.6.

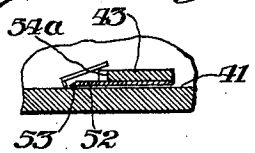
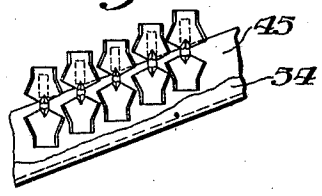


Fig.5.



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Fig.2.

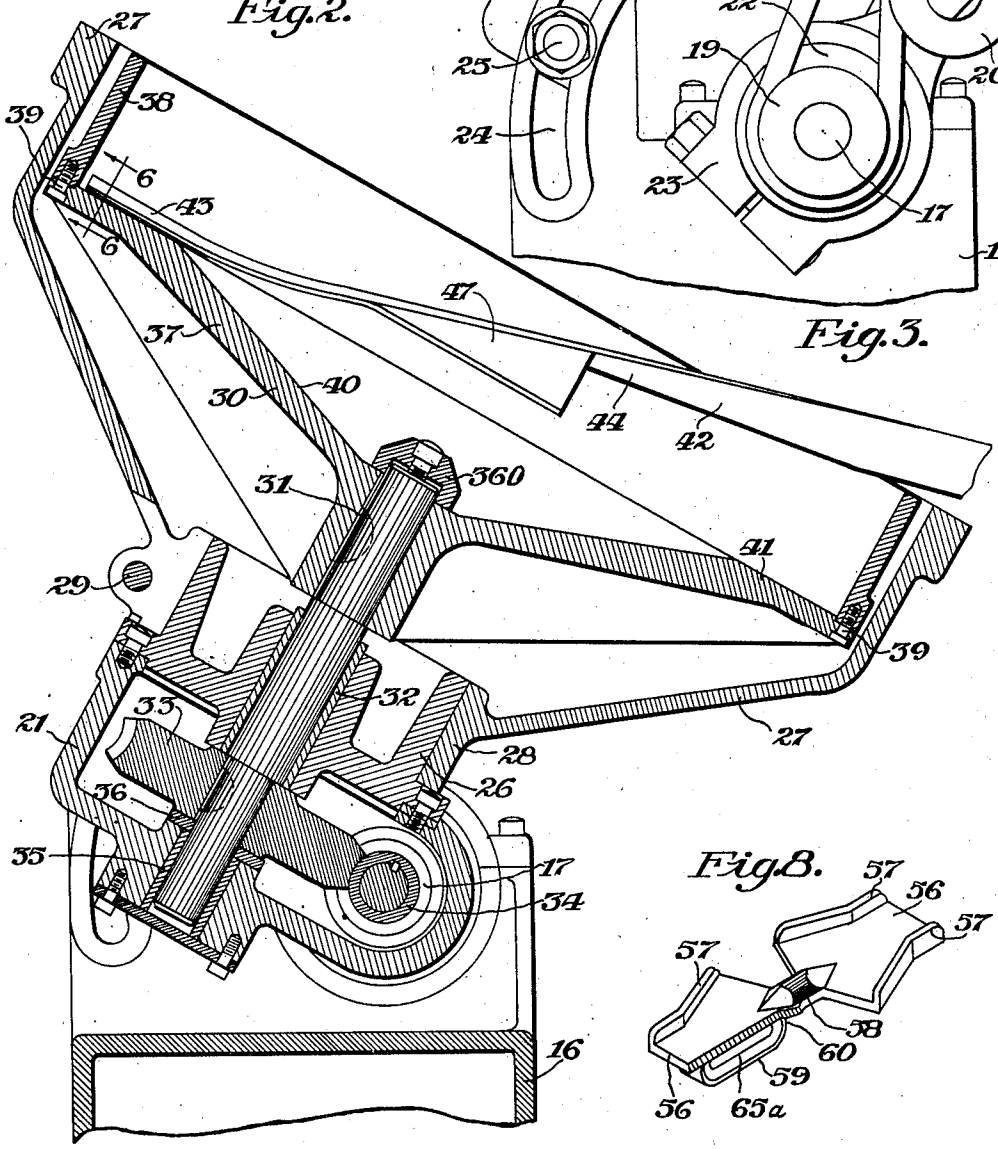
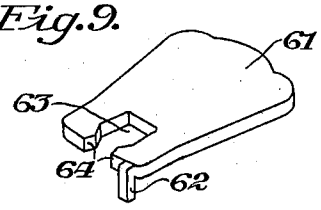


Fig.3.

Fig.8.

Fig.9.



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Fig. 10.

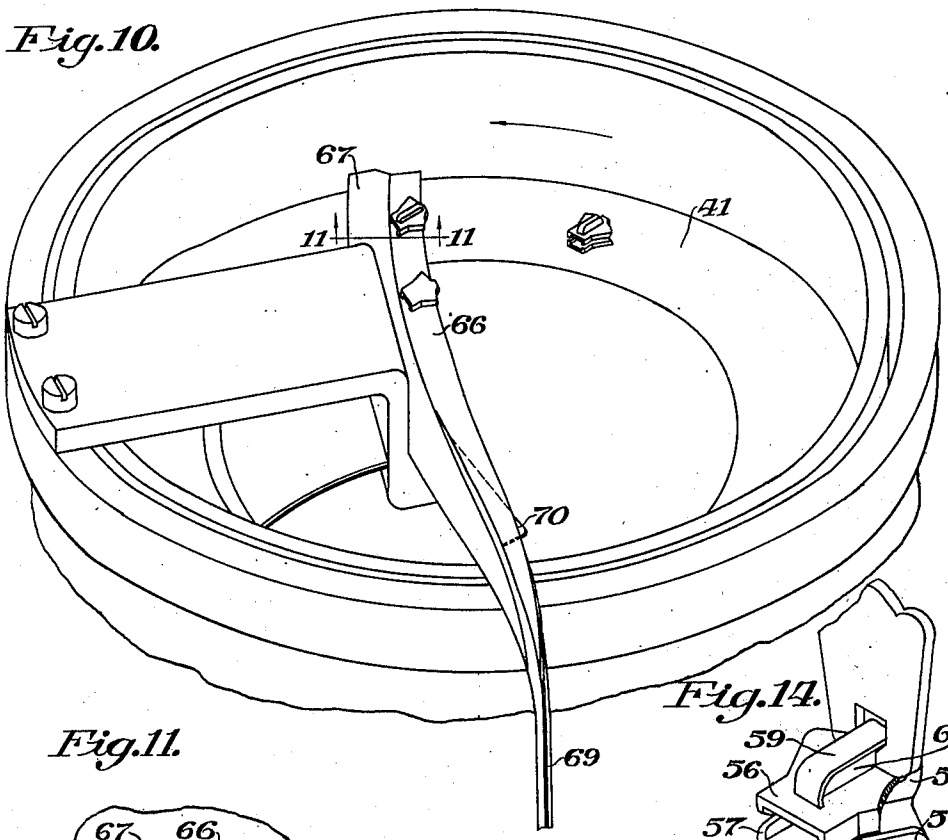


Fig. 11.

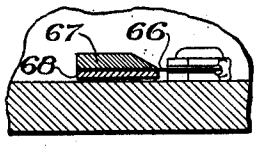


Fig. 14.

Fig. 12.

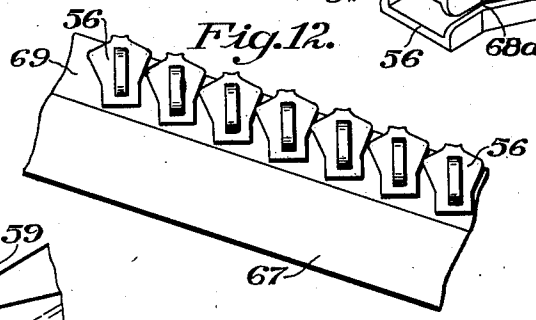
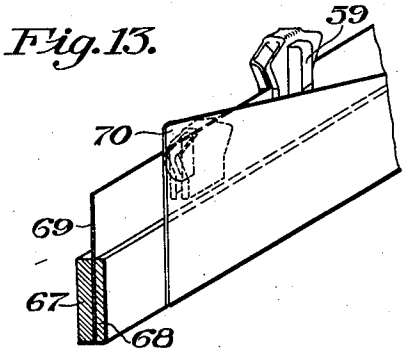


Fig. 13.



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UNITED STATES PATENT OFFICE

1,973,720

HOPPER MECHANISM

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Application April 10, 1930, Serial No. 443,193
Renewed December 9, 1933

10 Claims. (Cl. 153—1)

This invention relates to machines for arranging small irregular articles in a definite position for feeding to an automatic machine which performs work on such articles or assembles them with other articles. Such machines are generally called hoppers and my invention aims particularly to provide an improved hopper for the sliders and pull members used in slide actuated fasteners, although of course, the invention is equally applicable to numerous articles, especially to small articles having a transverse engaging surface or lug unsymmetrically located.

The general object of the invention is therefore to provide an improved hopper for articles of the character mentioned which shall be simple in construction and reliable and efficient in operation.

My improved hopper embodies the principle of a removable receptacle for the loose articles, and an interceptor arranged in the path of movement of the articles in the receptacle constituting a stop for engaging irregularities in, and obstructing normal movement of such articles as strike the interceptor in the proper positions, in combination with a guide for conveying the intercepted articles from the receptacle. The articles are maintained in their proper relative positions on the guide, from which guide the articles can be conveniently supplied to an automatic machine. Preferably the receptacle comprises a rotating bowl mounted on an inclined axis, and the interceptor and guide are formed from a blade which projects on an incline into the receptacle.

Other improved features embodied in the preferred form of the invention include the particular construction of the blade in which the end constituting the interceptor is normally parallel to the floor of the receptacle; also the blade is twisted on a spiral so that the guide portion is arranged in a vertical plane whereby the articles which are caught by the interceptor are changed from a horizontal position to a vertical position; a guard which surrounds the rotating receptacle and provides means for supporting the interceptor and guide blade; a deflector member in conjunction with the interceptor for preventing the jamming of the articles in the wrong position against the interceptor; a retaining member attached to the guide blade for holding the articles on the blade; means for returning to the receptacle articles which are caught in the wrong position; and other features and advantages which will more fully appear during the course of the following specification.

In the accompanying drawings, I have shown for purposes of illustration two embodiments which my invention may assume in practice and three examples of articles which may be conveniently handled by the hopper of my invention. In these drawings:

Fig. 1 represents a front elevation view of the principal parts of a hopper embodying my invention.

Fig. 2 is a central vertical section through the hopper of Fig. 1.

Fig. 3 is a fragmentary side elevation view showing a portion of the driving and adjusting mechanism.

Fig. 4 is a detail sectional view on line 4—4 of Fig. 1.

Fig. 5 is a fragmentary elevation view of the guide portion of the blade illustrating the articles as they are supplied by the hopper to a suitable automatic machine.

Fig. 6 is a fragmentary sectional view on line 6—6 of Fig. 2.

Fig. 7 is a detail view of the guide.

Fig. 8 is a perspective view with parts broken away, illustrating a slider intended for slide fasteners, in one stage of the process of manufacture.

Fig. 9 is a perspective view illustrating a pull member for attachment to the finished slider.

Fig. 10 is a front elevation view of a modified hopper embodying my invention, to accommodate sliders in their finished form, and similar articles.

Fig. 11 is a cross-sectional view on line 11—11 of Fig. 10.

Fig. 12 is a side elevation of the guide portion of the blade illustrating the arrangement of the finished sliders as they are fed from the hopper to an automatic machine, such as a pull assembling machine.

Fig. 13 is a perspective view of a portion of the guide.

Fig. 14 is a perspective view illustrating a finished slider as exemplifying articles which may be hoppered by the machines of Fig. 10.

The hopper shown in Figs. 1 to 7 inclusive may be mounted on a table or any convenient base frame as indicated at 16. A horizontal driving shaft 17 is rotatably mounted in suitable bearings supported by the base 16 and driven from any external source of power by means of a belt 18 which passes over the driven pulley 19 and idler pulley 20. A combined gear

housing and supporting casting 21 is also supported on the base frame in such a manner as to be adjustable angularly about the shaft 17, and for this purpose suitable bosses or shoulders 22 are formed on the frame concentric with the bearings for the shaft 17 and suitable clamping and bearing portions 23 of the supporting casting are fitted to such shoulders 22. In order to assist in supporting and determining the angular adjustment of the hopper, the frame is also provided with an arcuate slot 24, through which passes a clamping bolt 25 fixed to the supporting casting 21. Mounted on the supporting casting is a combined bearing and supporting block 26 which has a cylindrical outer surface for receiving the guard 27, which is provided with a bearing extension 28 fitting around the bearing block 26. The guard can thus be adjusted to any desired angular position and held in place on the block by a clamping bolt 29. The article receptacle or bowl 30 is supported on and keyed to a shaft 31 which is inclined at an acute angle to the vertical depending on the angular adjustment of the supporting casting 21 relative to the base, and preferably at an angle of about 30°. The shaft 31 is journaled in a bearing 32 in the block 26 which is concentric with the outer surface of the block and is driven by means of a worm gear 33 keyed to the shaft which is in turn driven by a worm 34 keyed to the driving shaft 17. The lower end of the shaft 31 is journaled in a bearing 35 in the supporting casting 21, and the weight of the shaft and worm gear is taken by a thrust bearing 36 below the worm gear. A small cap 360 is preferably attached to the shaft at its upper end to prevent access of dirt and metal chips from the receptacle to the bearings. The receptacle 30 is preferably made in two parts constituting the floor portion 37 and a cylindrical ring or bowl portion 38 attached to the member 37 by suitable screws 39. Referring now to the upper surface of the member 37 which constitutes the floor of the bowl or receptacle, the central portion is preferably of conical shape to provide a cup-like recess 40, while the surface nearer the periphery of the bowl is flat and preferably in the plane of the rotation, that is, perpendicular to the shaft 31, to provide a flat surface 41 for a purpose which will presently appear.

A blade generally designated 42 projects into the bowl on an incline and preferably extends almost to the wall 38. The free end portion of the blade constitutes an interceptor 43, which as shown in Fig. 6, is parallel to and spaced only a slight distance from the uninterrupted flat surface 41 of the floor of the bowl. The blade is preferably twisted in its central portion 44 into a vertical plane as indicated by the guide portion 45. The blade 42 is supported from a bracket 46 upon an angular block 47, positioned between the bracket and blade and held in position by screws 48. The bracket 46 is carried by and depends from a supporting bar 49 extending diametrically across the bowl and having its ends fixed to the upper edge of the guard member 27, by means of screws 50, the bracket being attached to the bar 49 by any suitable means such as screws 51.

A thin deflector blade 52 is mounted between the interceptor 43 and the flat surface 41 of the bowl and extends beyond the front edge of the blade. The edge of the blade 52 is beveled as shown at 53 in Fig. 6, to provide means for deflecting the ends of the articles upwardly at an angle and prevent them from jamming in the wrong positions against the front edge 54a of the interceptor. This deflector blade is of course supported from the bracket 46 in the same manner as the blade 42. Along the vertical portion of the blade which constitutes the guide for the articles after emerging from the hopper, is mounted a retaining member 54 which is spaced from and extends parallel to the guiding portion 45 of the blade. This retaining member may be supported in any convenient manner from the blade 45 or may be integral therewith.

The structure of the slider and pull members, which may be hoppered by the mechanism which has just been described, will now be considered.

In Fig. 8 is shown a slider blank which has been forged from sheet metal into the shape illustrated. In this form it comprises a pair of wings 56 having flanges 57 and a thickened connecting portion 58. One of the wings is provided with an integral boss or attaching lug 59 having a shoulder 60, which is unsymmetrically located with respect to the ends of the blank.

In Fig. 9 is shown a slider pull comprising a plate 61 blanked out of sheet metal into the form shown and provided with a lug 62 bent up at right angles at one end of the plate. The function of this lug in a slide fastener is to lock the slider against movement relative to the fastener elements. The pull blank has a recess 63 stamped out and inwardly projecting connecting lugs 64 which can be bent into the indented recesses 65a in the attaching boss 59 of the slider The slider blanks as arranged in Fig. 8 are fed to a machine which bends the blanks to U-shape with the flanges 57 adjacent each other to lie on opposite sides of the fastener stringers, and then the pull is assembled with the finished slider.

In operation, a quantity of blanks will be placed in the bowl or receptacle and the bowl rotated at a suitable speed. The blanks will, of course, tumble around in the bowl and rotate with it and during the process many of them will strike the interceptor and blade. Those of the blanks which strike the interceptor in the position illustrated in Fig. 1 will be stopped by the interceptor engaging the shoulder 60 of the attaching lug on the slider blanks or the projecting lug 62 of the pull blanks. If any of the articles strike the interceptor with the lugs up they will pass by the interceptor without being stopped. The beveled edge of the deflector blade 52 will prevent jamming of any of the blanks against the interceptor. It is immaterial at what angle the articles strike the interceptor as long as the lugs are down, for the lugs will engage against the edge of the blade and the inertia of the moving article will swing it to the proper angular position, this being true due to the unbalanced location of the projecting lug. After the articles have been swung to the proper position, they are supported upon the flat portion of the interceptor blade in a horizontal position. The blade is inclined at this point and thus the articles slide down the blade. The blade is also preferably concave where the articles strike against it, or at least designed so that it is arranged at an angle to the radial line from the interceptor to the center of the bowl, which results in a component of the inertia acting to start movement of the articles along the blade and thus assist the force of

gravity. This inertia force also tends to hold the shoulders of the lugs against the edge of the blade and prevent the articles falling off as they slide along the blade. The articles thus move along the blade and are turned gradually by the spiral portion to a vertical position as illustrated in Figs. 1 and 5. At the vertical portion of the blade, they are held from falling off by the retaining member or guard 54, and are thus fed along the guide to a suitable machine for performing work such as the bending machine in the case of the slider blanks and the pull attaching machine in the case of the pull blanks.

In Fig. 10 I have illustrated a modified form of my invention in which most of the parts of the hopper are of the same or similar construction as the one shown in Figs. 1 to 6. The direction of rotation is the reverse of that in Fig. 1 and the blade which forms the interceptor and guide is of different construction. Such interceptor and guide blade comprises preferably a thin piece of steel 66 which is mounted in a heavier supporting member herein in the form of plates 67 and 68 on opposite sides of the base of the blade. The blade is thus supported along its entire length but has a thin edge which projects outwardly from the supporting members. This thin edge is preferably spaced a definite distance from the flat portion 41 of the bowl for a purpose which will presently appear.

In Fig. 14 is shown an example of an article to be hoppered by the modified form of hopper. This is the slider which has been formed from the blank of Fig. 8 by bending to U-shape and corresponding numerals designate like parts in both figures. A small slot or slit 68a is left between the flanges 57 when the slider is bent to finished shape, the wings being spaced and held in proper relation only by the connecting portion 58.

The blade is twisted on a spiral as in Fig. 1 into a vertical plane to form the guide portion 69 of the blade. In this embodiment of the invention there is shown a kick-off member 70 which is attached in any suitable manner to the spiral portion of the blade so that if any of the blanks are caught in the wrong position, they will be returned to the bowl.

In operation the sliders or similar blanks are placed in any quantity in the bowl and the bowl rotated to cause the sliders to pass the stationary blade. The projecting part of the blade 66 at the interceptor portion is spaced from the floor of the bowl only slightly more than the thickness of the lower wing 56 of the slider and its flanges, to allow such wing to pass under it, but not to allow the opposite wing with its lug 59 to pass. It will therefore be apparent that such blanks as are resting on the floor of the bowl with the lugs up, will slip over the thin blade as shown in Figs. 10 and 11 and if they are not in the proper angular position they will be pivoted around the connecting portion 58 by inertia as in the case of the articles above described. There is a remote possibility that an article near the center of the bowl will be thrown up against the blade and be caught in the wrong position and in this case it will be thrown off by the kick-off member 70 which is spaced from the blade only enough to allow the lower wing 56 to pass between it to the blade but not the upper wing with its lug 59. The articles slide along the inclined blade and are turned to the vertical position and fed to any suitable machine arranged as shown in Fig. 12.

As a result of my invention it will be observed that a very efficient high speed hopper for small articles of the character mentioned, has been devised which is extremely simple in construction and reliable in operation.

While I have in this application specifically described two embodiments which my invention may assume in practice, it will be understood that these embodiments are merely for the purposes of illustration and description and that various other forms may be devised within the scope of my invention as defined in the appended claims.

What I claim as my invention is:

1. In a machine for delivering irregularly shaped articles in orderly arrangement, a receptacle containing the articles to be arranged and having at least a portion of its bottom rotatable on an inclined axis, the supporting surface of such portion being flat and substantially uninterrupted, a blade projecting into said receptacle and having a portion constituting an interceptor arranged adjacent said flat rotatable portion across the path of normal rotative movement of said articles, said interceptor constituting a stop for engaging transverse surfaces of and holding such articles as strike the interceptor in the proper position while being moved in a circular path by said rotative portion, and the other portion of said blade constituting a guideway for conveying the intercepted articles from the machine.

2. In a hopper for delivering irregularly shaped articles in orderly arrangement, a rotating bowl containing loose articles to be hoppered having a portion of its bottom adjacent its periphery flat and uninterrupted whereby said articles are carried along said portion in a circular path, said bowl being supported to rotate on an axis inclined at an angle to the vertical, means for rotating said bowl, an interceptor mounted in said bowl in the circular path of said articles, said interceptor constituting a stop for engaging irregularities in and obstructing movement of such articles as strike the interceptor in the proper position, and a guideway for conveying the intercepted articles from the machine while keeping them in said proper position.

3. In a hopper for delivering lugged articles in orderly arrangement, a receptacle mounted to rotate on an axis inclined at an angle to the vertical, said receptacle having at least a portion of its bottom adjacent its periphery substantially flat and uninterrupted, means for continuously rotating said receptacle, and a blade arranged on an incline and projecting into said rotating receptacle, the end portion of such blade extending over and adjacent to said flat portion constituting an interceptor having an abrupt shoulder for engaging the lugs on and obstructing rotative movement of such articles as strike the interceptor in the proper position, and the remaining portion of said blade constituting a guideway for conveying the orderly arranged intercepted articles from the machine.

4. In a hopper for delivering irregularly shaped articles in orderly arrangement, a rotating receptacle containing articles to be hoppered, a blade projecting into the receptacle and having a portion constituting an interceptor arranged in the normal path of rotation of the articles, said interceptor having an abrupt

shoulder for engaging irregularities in and obstructing rotative movement of such articles as strike the interceptor in the proper positions, said interceptor portion also having a supporting surface adjacent said shoulder which is substantially parallel to the direction of normal movement of said articles, said blade also constituting a guideway for conveying the intercepted articles from the machine, the delivery end of said blade being twisted into a vertical plane.

5. In a hopper for delivering irregularly shaped articles in orderly arrangement, a rotating receptacle containing articles to be hoppered, a blade projecting into the receptacle and having a portion constituting an interceptor arranged in the normal path of rotation of the articles, said interceptor having an abrupt shoulder for engaging irregularities in and obstructing rotative movement of such articles as strike the interceptor in the proper positions, said interceptor portion also having a supporting surface adjacent said shoulder which is substantially parallel to the direction of normal movement of said articles from the machine, said blade being twisted into a vertical plane in the guide portion, and a retaining member arranged parallel to said vertical guide portion for retaining the articles thereon.

6. In a hopper for delivering unsymmetrical articles in orderly arrangement, a rotating bowl arranged on an inclined axis, driving means for rotating such bowl, a blade arranged on an incline, and projecting into said bowl, the end portion of said blade constituting an interceptor arranged in the path of movement of the articles in said bowl, said interceptor constituting a stop for engaging unsymmetrically located portions of and holding such articles that strike the interceptor in the proper position, the remaining portion of said blade constituting a guideway for conveying the intercepted articles from the hopper, a stationary guard surrounding said rotating bowl, and means for supporting said blade from said guard.

7. In a hopper for delivering unsymmetrical articles in orderly arrangement, a stationary base, a driving shaft mounted in said base, a rotary bowl mounted on said base and angularly adjustable about said shaft as a pivot, power transmission mechanism for rotating said bowl from said shaft about an inclined axis in any adjusted position of said bowl, and a blade projecting into said bowl, said blade having a portion constituting an interceptor in the path of movement of said articles for engaging unsymmetrically located portions of and obstructing rotative movement of said articles, said blade also constituting a guideway for conveying articles from said bowl.

8. In a hopper for articles each having a projecting lug adjacent one of its ends, a bowl mounted to rotate about an axis inclined at an acute angle to the vertical, driving means for rotating said bowl, a blade projecting into the bowl and having an interceptor portion arranged parallel to and adjacent a portion of the floor of the bowl between its outer periphery and the edge of said blade, said interceptor constituting a stop for engaging said lugs and obstructing rotative movement of said articles when they strike the interceptor with the lugs in the proper position, and a deflector mounted adjacent the edge of said interceptor to deflect the ends as they approach the interceptor for preventing the ends of said articles catching against the edge of said blade, and a guide for conveying the intercepted articles from the hopper.

9. In a mechanism for gathering irregularly shaped articles from a loose mass and feeding them in orderly arrangement, a rotating receptacle for the articles in mass having a flat uninterrupted surface adjacent its periphery, means for rotating said receptacle whereby the articles are thrown to the peripheral portion of the receptacle by centrifugal force, an interceptor projecting into the path of said articles, said interceptor having a surface adapted to engage portions of the articles only when the articles are presented in the proper position and thus to intercept such articles while moving in a circular path around the receptacle, and means for conveying the intercepted articles in orderly arrangement.

10. A mechanism for gathering irregularly shaped articles having a lug or projection offset from the center of gravity and feeding them in orderly arrangement, comprising a receptacle for receiving a loose mass of the articles, the bottom of said receptacle having a substantially flat uninterrupted surface adjacent the periphery of the receptacle inclined to the horizontal, means for rotating such portion of the bottom of said receptacle about an axis substantially perpendicular to the plane of said surface whereby the mass of articles move in a continuous orbital path around the periphery of said receptacle, being carried to the upper edge thereof by centrifugal force, an interceptor extending across said path of the articles having an edge against which the lugs of certain of said articles strike during their orbital movement for intercepting said articles, said interceptor also having a supporting portion extending from said edge on which the heavier articles rest when intercepted, and a guide for conducting articles from said interceptor in orderly arrangement.

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