

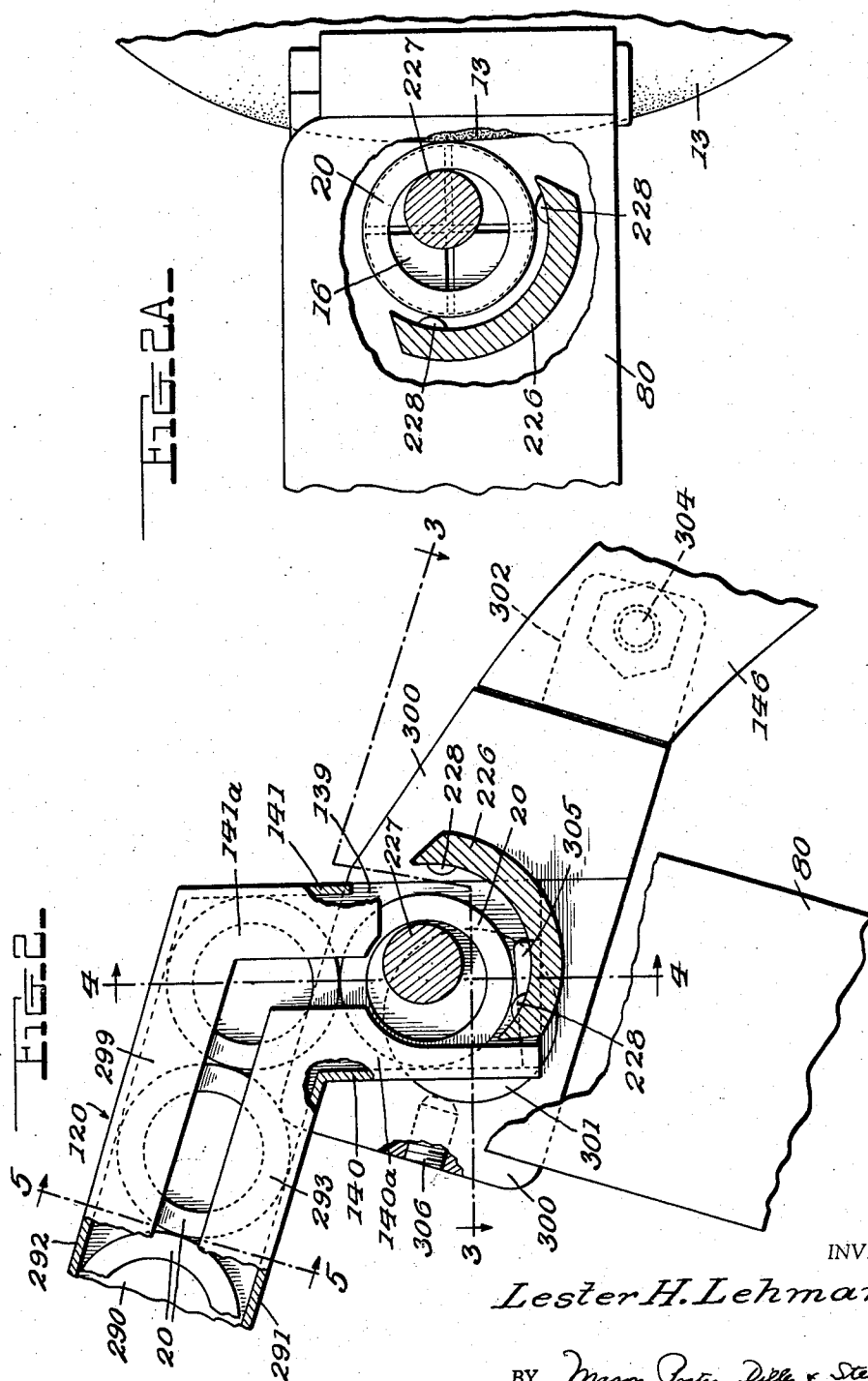
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L. H. LEHMAN
MAGNETIC HOLDER

2,884,747

Filed Sept. 30, 1955

3 Sheets-Sheet 2



INVENTOR

Lester H. Lehman

BY Mason, Porter, Diller & Stewart,

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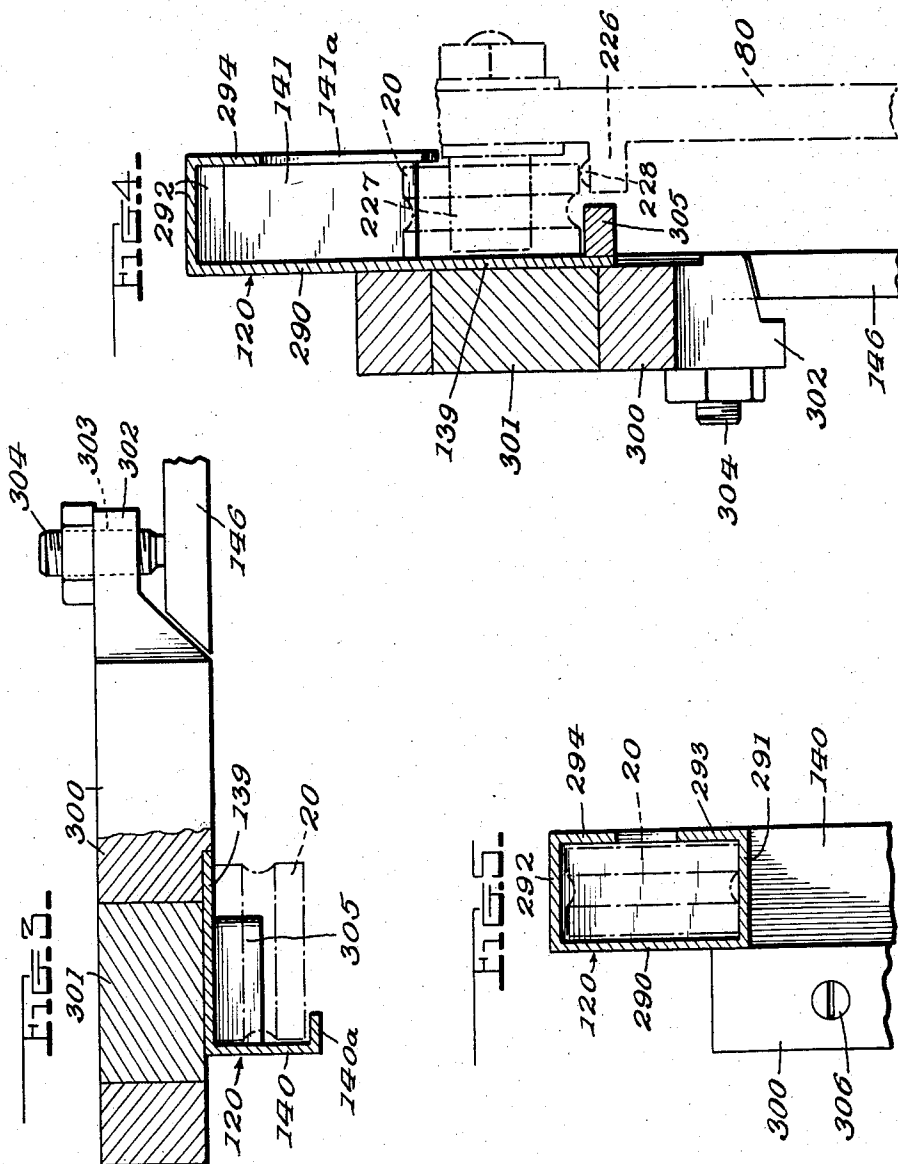
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ATTORNEYS

1

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MAGNETIC HOLDER

Lester H. Lehman, Hagerstown, Md., assignor to Landis Tool Company, Waynesboro, Pa., a corporation of Pennsylvania

Application September 30, 1955, Serial No. 537,796

5 Claims. (Cl. 51—215)

This invention relates to article supplying structures in which successive articles are presented at a delivery point ready to be taken therefrom.

An object of the invention is the provision of such an article supplying structure with magnet means positioned for detaining a magnetizable article at the delivery point.

Another object is the provision of such an article supplying structure as a gravity-feed magazine for magnetizable articles, with inclusion of a guide surface along which the article is to be fed and delivered, and magnet means for holding the article against such surface and detaining it against undesired movement therealong.

A further object is the provision of such an article supplying structure as a gravity-feed magazine for the articles, with inclusion of a guide surface along which the article is to be fed and delivered, guide walls for controlling the movement of the articles in the magazine and toward the delivery point, and magnet means for detaining a magnetizable article at a delivery point on said surface, one of the guide walls terminating at a level above the delivery point so that the articles can guidedly move by gravity toward the delivery point and a position opposite the magnet means and be carried from the delivery point by movement in a generally horizontal direction beneath said one wall.

An illustrative form of practice of the invention is shown on the accompanying drawings, in which the article supplying structure is shown as a gravity magazine and is employed with a grinding machine as shown and described in the copending Balsiger patent application Serial No. 414,198, filed March 4, 1954.

Fig. 1 shows the relationship of parts of the illustrative grinding machine with the structure of the present invention applied thereto.

Fig. 2 is a view, on a larger scale, showing a portion of the magazine and associated parts in elevation.

Fig. 2A is a view in elevation of parts shown in Figs. 1 and 2, on the scale of Fig. 2, showing the work piece in a grinding position.

Fig. 3 is a generally horizontal section substantially on broken line 3—3 of Fig. 2.

Fig. 4 is an upright section substantially on line 4—4 of Fig. 2.

Fig. 5 is a section through the magazine, substantially on line 5—5 of Fig. 2.

The parts of the grinding machine are conventionalized as shown and described in the aforesaid Balsiger patent application.

A machine bed 10 (Fig. 1) supports a carriage 11 and the wheel base 12, with a rotatable grinding wheel 13 mounted on the latter. A head stock 15 rotatably supports a magnetic chuck 16 for presenting the article for grinding engagement by the wheel 13. As described in the copending Balsiger application, relative motion of the wheel 13 and the headstone 15 is accomplished during the grinding operation. A swinging loading arm 80 is actuated for the loading and unloading operations so that (Figs. 2 and 2A) the peripherally spaced shoes 228 and the work arbor or pin 227 at its upper end can engage the illustrative ring-like steel workpieces 20 and support the same to and for a grinding operation. A flexible finger 100 is mounted from the carriage 11 for engage-

2

ment by the workpiece so as to separate it from the work arbor 227 toward the end of an unloading movement of the arm 80.

A magazine 120 is mounted by pivot 121 for rocking in a vertical plane, with this pivot supported by a column 122 rotatably carried in a pad 123 supported on the carriage 11. An actuator (not shown) is provided for the column 122 so that the magazine can be rocked about a vertical axis as described in the stated Balsiger patent application.

A guide and locating plate 146 is mounted on the carriage 11 so that the article which is carried at the end of the arm 80 may be brought accurately to position at the chuck 16.

The upper part of the magazine 120 provides an inclined chute having (Fig. 5) the upright guide wall 290, the floor 291 and the ceiling 292, with partial wall portions 293, 294 respectively connected to the floor and ceiling and spaced from one another so that the operator can perceive the number of workpieces in the magazine, and manipulate them if desired. The structure of this part of the magazine can be made by folding a sheet of non-magnetizable material such as brass. A stiffening plate 295 (Fig. 1) is brazed to the floor 291, and to it is bolted the pivot bracket 296 connected by pivot 121 to the upper end of the column 122. An adjustment screw 297 threaded in the offset plate 298 at the upper end of the column 122 acts against a part of the bracket 296 for controlling the position of the magazine 120 about the pivot 121 and thereby determining the position of height of the magazine relative to the upper end of the loading arm 80. In the illustrative form the spring 299 connects the bracket 296 and the offset plate 298 and serves to hold the magazine at the position regulated by adjustment screw 297.

According to the present invention, the lower end of the magazine 120, located adjacent the chuck and grinding wheel, is provided (Figs. 2, 3 and 4) with the downwardly extending walls 139, 140, 141, 140a and 141a of non-magnetizable material such as brass, which guide articles from the magazine in a downward direction until they are opposite the detaining plate 300 secured to and moving with the magazine 120 and providing a guide surface along which the articles can move. The plate 300 has an aperture for receiving a magnetic means illustrated as a permanent magnet 301 in the form of a disk which is held in place by a set screw 306 with a surface of the disk flush with a rebated surface of plate 300. The plate 300 has a rebate for the wall 139, so that the surfaces of wall 139 and the part of plate 300 on which the article slides, are flush when the parts are secured together, as by brazing.

An extension 302 of plate 300 is provided with a threaded hole 303 which in the delivery position of the magazine is at a right angle to the wall 139, for receiving an adjustment screw 304 which engages the stop and guide plate 146 (Fig. 3) and thereby determines alignment of the magazine 120 and plate 300, with the plate 146.

A stop 305 is secured at the lower end of the magazine for limiting the downward movement of the successive articles as they move to the delivery point opposite the magnet 301 and are detained thereby ready to be picked off individually by the support and transfer parts including the arm 80. In the illustrated form, the magnetic element 301 is eccentric (Fig. 2) to the delivery position of the successive articles, whereby it acts upon the individual article, and acts to draw the article toward the stop 305 and the wall 140, when it is permitted downward movement within the walls 139, 140, 141, 140a, 141a.

In the illustrative embodiment shown in Fig. 2, the lower vertical portion of the magazine is of restricted

length, so that only one article is above the article 20 present at the delivery point, wherewith only a small load is present upon the latter. The article at the delivery point, in this illustrative form, is detained against axial movement away from its position not only by the magnet 301 but also by the wall portions 140a, 141a opposite it; likewise, the stop 305 prevents downward fall. Hence the presented article can be moved from the delivery point only by sliding along the rear wall 139 and the plate 300, and beneath the lower edge of wall 141. In the form in Fig. 2, the stop 305 has an upper surface which inclines slightly downward from its right-hand end and toward the wall 140: this avoids any rebounding of an article 20 in a direction toward the right in Fig. 2.

In operation, magnetizable articles to be ground, such as hardened steel races for ball bearings, are fed into the upper end of the magazine 120 and move downward by gravity along the magazine ways, with the first article dropping downward by the action of gravity in the upright lower part of the magazine between the walls 140, 141 and coming to rest by the magnetic attraction of the member 301 in a delivery position in which it presents the central aperture of the illustrative article opposite an opening present between the overhanging walls 140a, 141a. The wall 140 and the stop 305 establish the lowest position which may thus be assumed and occupied. The magnetic attraction also holds the article tightly against the wall 139 and opposite the member 301.

When an article feeding or loading operation is initiated by the machine, the mechanical parts are driven, illustratively as in the copending Balsiger application, and the arm 80 swings from the position of rest shown in Fig. 1 in a clockwise direction until its pin 227 is opposite the aperture in the article 20 now held in the aforesaid delivery position. The magazine 120 is now swung relative to pin 227 and arm 80, so that the article approaches and passes onto the pin 227 which enters the article aperture (Fig. 4). Movement of the arm 80 is then continued in the clockwise direction, and the mechanical engagement of the pin 227 with the inner wall of the article causes the article to be moved away from the magnet 301 and along the guide surface of the plate 300 and thence onto the surface of plate 146, and be delivered to the magnetic chuck 16. When the article leaves its position opposite the magnet member 301, a new article drops to the delivery position. Grinding is then accomplished upon the article which has been carried by arm 80, illustratively at the outer peripheral surface of the article, with the reaction force of the article being taken up (Fig. 2A) by the elevations 228 on the reaction member 226, so that in effect a centerless grinding operation is being performed with the article detained against the chuck and by the guide elevations 228 of the arm 80. After the grinding has been finished, the mechanism is again operated for causing the arm 80 to return in a counterclockwise direction, carrying the article with it, again supported by the pin 227: the magazine 120 is swung away so that the arm 80 and the article thereon can pass: toward the end of the movement of arm 80, its upper end passes the spring finger 100, which enters between the finished article 20 and the upright part of the arm 80, and serves to strip the article from the arm, and thus discharge it. The arm 80 then begins a new cycle by a further clockwise movement, pausing for the relative magazine movement so that its pin 227 receives another article from the delivery position on plate 300 in which it has been held by the magnetic member 301, and the arm 80 then takes and carries the same to the grinding point for a similar grinding operation.

It will be noted that these operations can be accomplished without the provision of any spring-held or other movable structure for detaining the article at a delivery point ready for engagement by the parts on the arm 80.

It will be understood that the illustrated embodiment is not restrictive and that the invention may be practiced

in many ways within the scope of the appended claims. What is claimed is:

1. An apparatus for handling magnetizable articles in grinding and like machines, comprising an article magazine terminating at a delivery point and including a guide wall of non-magnetizable material having a surface at said delivery point against which a face of the successive articles can rest, said magazine having an opening adjacent said surface, a loading device movable along the surface for engaging and causing an article to slide along said surface and through the opening, and a magnetic member fixed on the magazine and separated from the said surface by the said guide wall and being effective through said guide wall for releasably detaining the successive articles upon said surface at said delivery point and against movement through the opening, whereby the magnetically detained article is engaged by said loading device at the delivery point and thereby removed from said point by movement along said surface.

2. A feeding device for magnetizable articles, comprising an article magazine having a delivery point and including a wall of non-magnetizable material providing a guide surface at said delivery point, a magnet positioned on said magazine adjacent said delivery point for detaining the successive articles upon said surface with the said wall interposed between the magnet and the successive articles, said magazine including an article guiding wall terminating opposite the delivery point and providing an opening through which the successive articles may be moved, and a loading device movable along the surface for engaging an article at said delivery point and causing the article to slide along said surface away from the magnet and through the opening.

3. A device as in claim 2, including a stop mounted on the magazine and extending adjacent said surface and in the path of movement of the articles for limiting the movement of the successive articles at the delivery point.

4. A feeding device, comprising a chute having a downwardly inclined upper portion and at its lower end a short portion downwardly inclined to a greater degree than the upper portion, said chute having guide walls for the articles, with one guide wall terminating at a higher level than a second guide wall for providing a delivery opening for the successive articles, said second guide wall being of non-magnetizable material, a magnet fixed at one surface of said second guide wall adjacent the lower end of said short portion and effective through said second guide wall for attracting the successive articles against the other surface of the said second guide wall as the articles pass downward in said short portion and detaining the successive articles against passage through the delivery opening, and a loading device movable in a direction for passing said opening and effective for engaging an article detained by the magnet and moving the article through said opening.

5. A device for delivering magnetizable articles to a point of operation, including a chute having walls of non-magnetizable material providing a passageway for the articles, and a movable loading device for removing the articles successively from the end of the passageway, the invention which comprises a magnet mounted on the chute and located at the end of the passageway and spaced therefrom by one of said walls and acting through said one wall for detaining the articles successively in position for engagement by the loading device.

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