

March 25, 1952

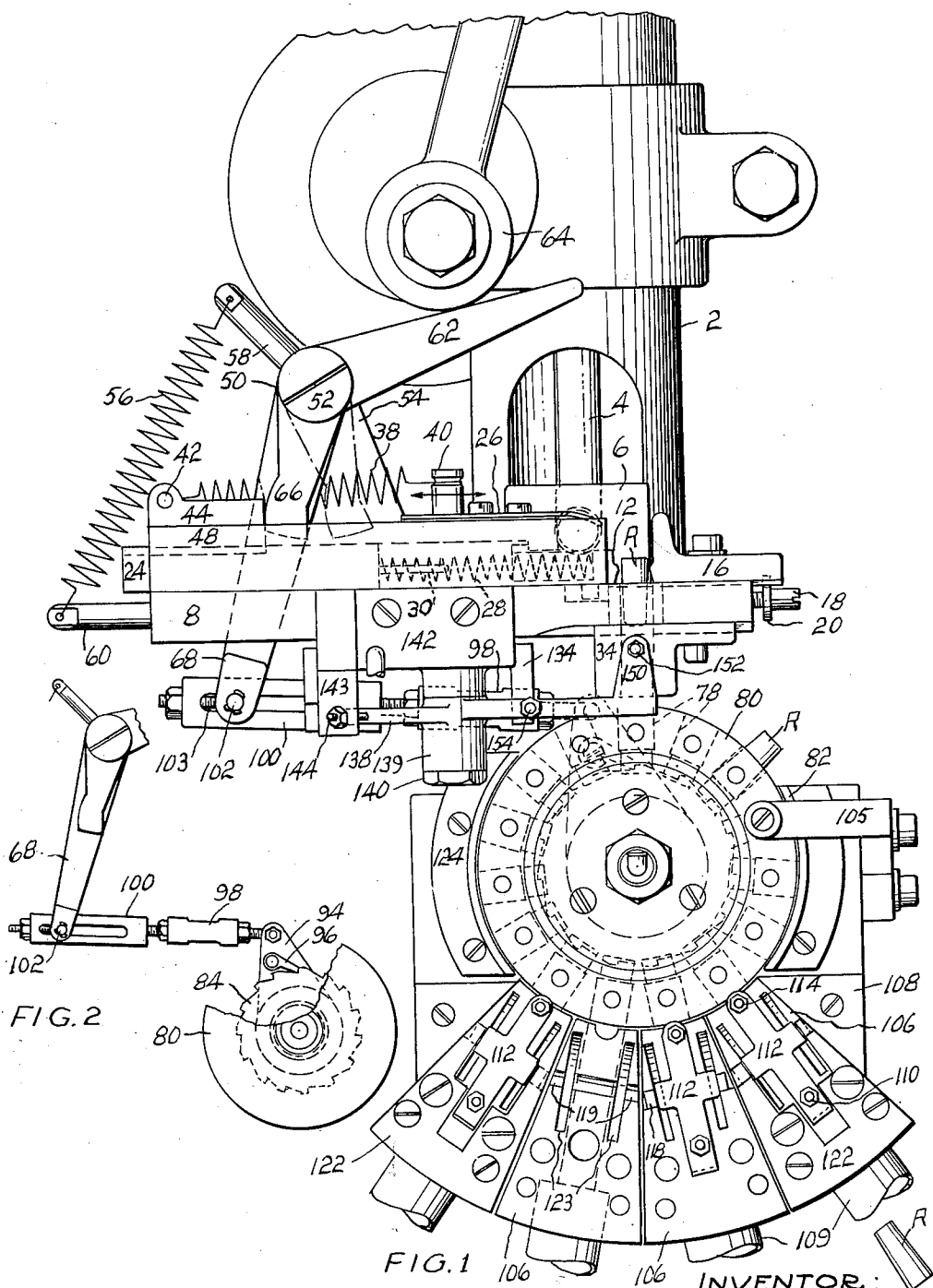
J. KLOPAK

2,590,710

FEEDING OF TAPERED ARTICLES

Filed Oct. 29, 1948

3 Sheets-Sheet 1



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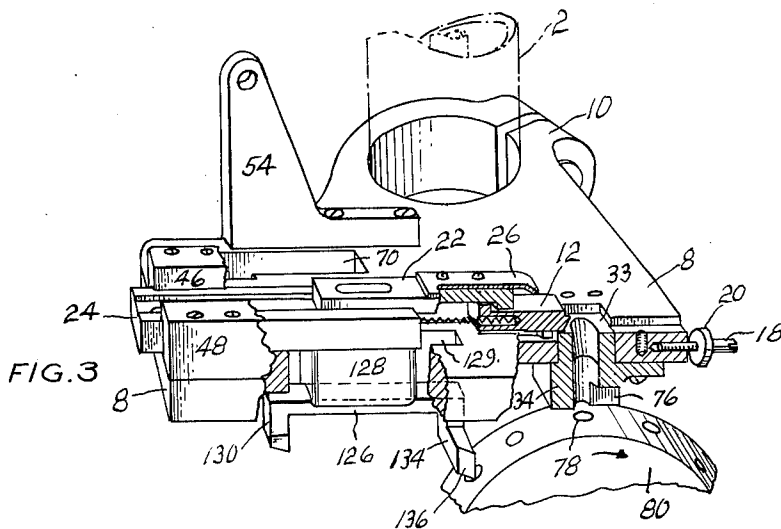
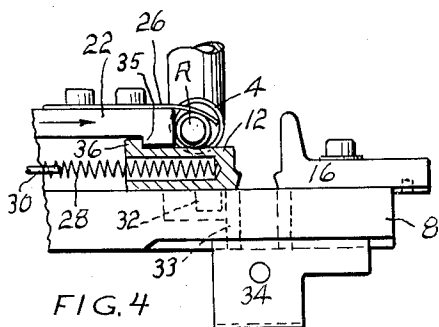
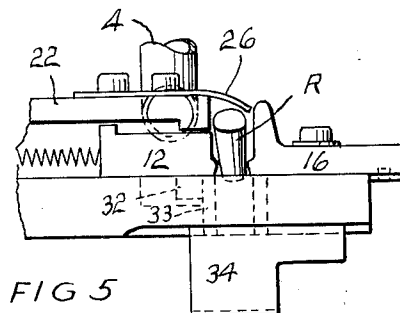
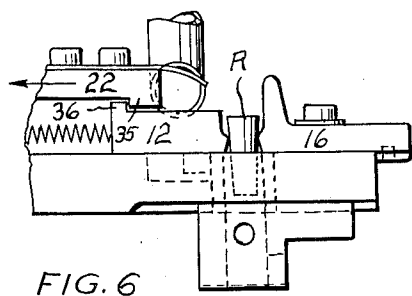
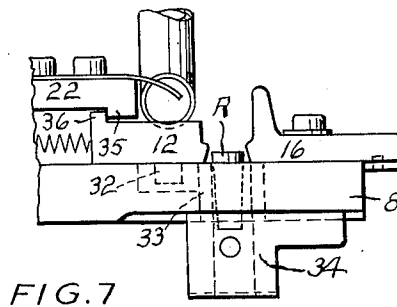
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FEEDING OF TAPERED ARTICLES

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3 Sheets-Sheet 2



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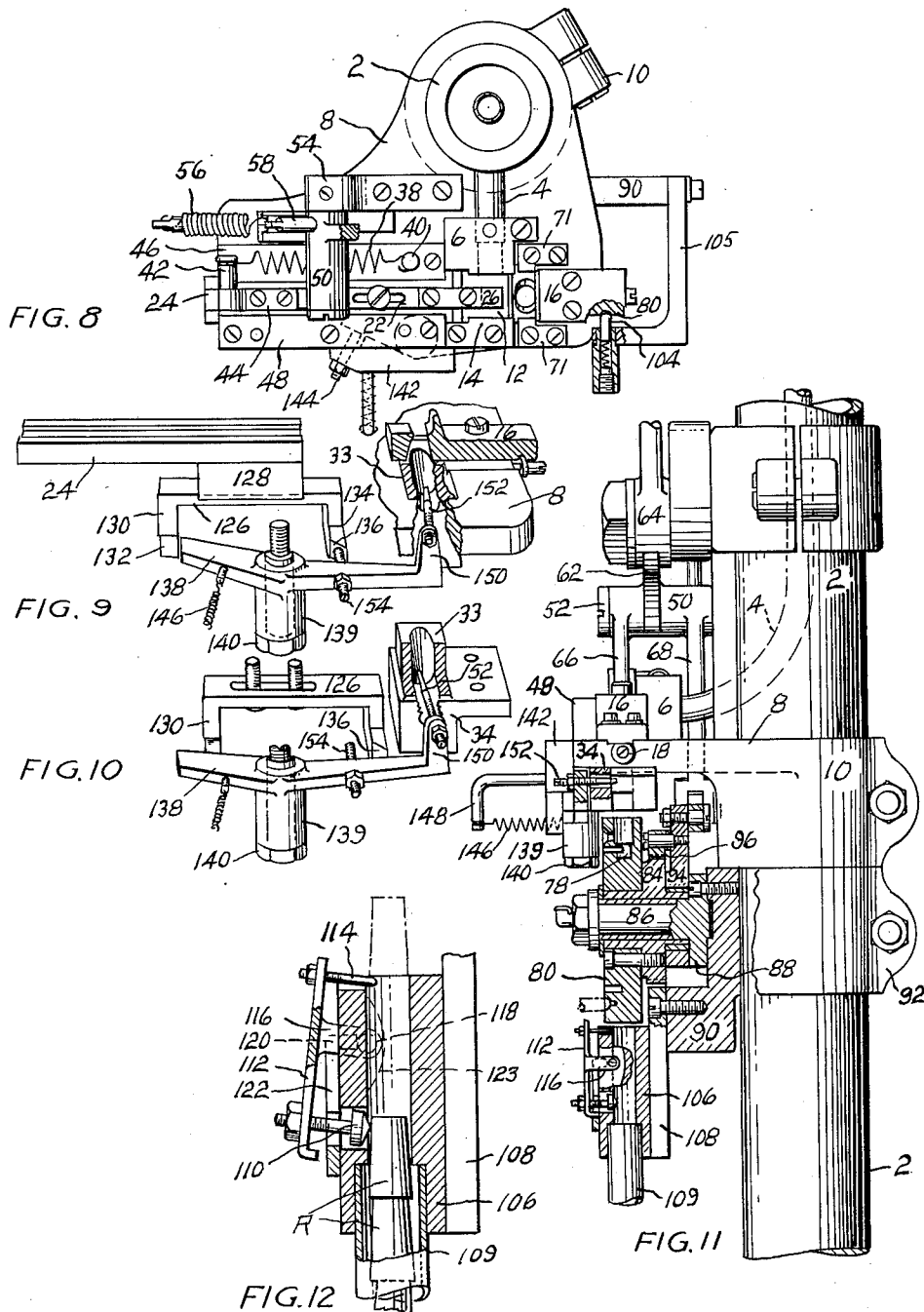
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FEEDING OF TAPERED ARTICLES

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,590,710

FEEDING OF TAPERED ARTICLES

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19 Claims. (Cl. 198—33)

1

This invention relates to the feeding of tapered articles and comprises all of the features and aspects of novelty herein disclosed. An object of the invention is to provide improved apparatus for feeding tapered articles with their larger ends foremost. Another object is to provide apparatus for feeding and distributing tapered articles at such speed that a plurality of outlet tubes can be supplied from one feeder, each tube being closed up when nearly full to make the excess articles go to the next tube, etc. To these ends and also to improve generally upon apparatus of this character, the invention consists in the various matters hereinafter described and claimed.

In the drawings,

Fig. 1 is a front elevation.

Fig. 2 is a front view of details of Fig. 1.

Fig. 3 is a perspective view, some parts being broken away and in section and some parts being removed.

Fig. 4 is a front view, partly in section, of details associated with the early movements of the articles.

Figs. 5, 6 and 7 are similar views showing the parts of Fig. 4 in different positions.

Fig. 8 is a plan view to smaller scale with parts in section.

Fig. 9 is a perspective view, with parts in section, of a latch mechanism.

Fig. 10 is a perspective view similar to Fig. 9 with the latch in another position.

Fig. 11 is a right hand end view of Fig. 1 with parts in section.

Fig. 12 is an enlarged sectional view of a discharge block and associated mechanism.

First outlining important functions, tapered rollers are fed from a hopper in a stream, either end first, through an outlet tube onto a movable support where they successively impinge against a stop. Each roller is then pushed sideways along the movable support until it hangs by its larger end between that movable support and a companion support which is fixed. The movable support is then retracted from the fixed one to release the roller small end first into the upper pocket of a rotary carrier. The carrier intermittently turns and carries each roller down to an exit tube into which it slides large end first for transfer to a machine such as a honing machine. There is a series of exit tubes and when each one fills up with rollers, the following rollers go to the next tube until that fills up and so on. If all tubes fill up, further feed from the hopper ceases until one or more tubes begin to empty.

The numeral 2 indicates a hollow post which supports the entire mechanism including the hopper (not shown) from which the rollers R are guided to the terminal end of a curved tube 4 clamped by a set screw in a block 6 fastened on the top of a platform 8. Patent to Erickson 2,336,676, shows a similar hopper feed mechanism. The platform has an enlarged hub portion

2

10 which is split vertically and clamped in adjusted position on the post. As each roller is forced out of the tube by the following rollers, it slides endwise over a movable support 12 against a stop plate 14. The support 12 has a short sliding motion between the block 6 and the stop plate towards or from a normally fixed support 16 of angular form fastened by a cap screw to the platform. The support 16 is adjustable in a groove of the platform by a screw 18 threaded in the platform and having a collar 20 engaging a groove in the support. The adjacent portions of the supports 12 and 16 have parallel projecting ribs which, when the former is advanced, are sufficiently close together to support a roller by its larger end.

Each roller is moved sideways over the support 12 to the hanging position by the end face of a narrow pusher 22 which is slotted and adjustably fastened by a screw to the top of a slide 24, the slide having a shallow groove to locate the pusher. A leaf spring 26 is fastened on the top of the pusher and projects beyond its end to hold a roller against the pusher until the roller is pushed beyond the end of the support 12 as indicated in Fig. 5. The support 12 is urged forwardly by a light coil spring 28 partly housed in the support and piloted at the other end on a pin 30 projecting from the slide 24. Forward motion of the support 12 under the influence of the spring is limited by a depending lug 32 engaging a hollow upstanding projection 33 on a rectangular inlet block 34 through which the rollers are dropped. The projection extends up into a rectangular slot in the platform. To release a roller, the support 12 can be retracted a short distance from advanced position as shown in Fig. 7 by a depending lug 35 on the pusher 22 which overlaps an upstanding rib 36.

The slide 24, the pusher 22 and the support 12 are urged forwardly as a unit by a strong coil spring 38 anchored to a post 40 on the platform and to a pin 42 projecting laterally from a plate 44 fixed in a shallow groove on the top of the slide. The slide is guided (Fig. 3) between a rear guide plate 46 and a front guide plate 48 both fastened on the platform and partly overlying the slide. The slide is positively retracted by a bell crank lever having four arms extending from a hub portion 50 which is pivoted by a shouldered screw 52 to an upright bracket 54 secured on top of the platform. A coil spring 56 fastened to a short arm 58 on the lever and to a pin 60 on the platform urges the lever anti-clockwise to hold another arm 62 against a crank device 64 which is a part of the actuating mechanism for agitating and feeding articles from the hopper. This crank device positively actuates the bell crank lever clockwise and forces a short arm 66 against the end of the plate 44 to retract the slide and associated mechanism. A long depending arm 68 on the bell crank lever extends downwardly through a slot 70 in the

platform and actuates an intermittently rotated carrier which reverses the positions of the rollers to feed them large end foremost as will be later described.

When the slide 24 advances under pressure of the spring 38, the pusher 22 moves with it and so does the support 12 but only for a short distance. Fig. 4 shows the support and the pusher after beginning their simultaneous advance. When the lug 32 engages the projection 33 (Fig. 5) the support 12 stops and the pusher continues to push the roller beyond the end of the support and between a pair of centering plates 71 (Fig. 8). The opening in the projection is flared or elongated crosswise of the slideway to permit the roller to tilt into vertical position and hang by its larger end as indicated in Fig. 6. As this occurs, the pusher 22 retreats while the support 12 remains advanced. When the lug 35 again encounters the rib 36 (Fig. 7) the support 12 is retracted and the roller drops into the passage in the block 34.

When the roller drops, it passes down through the vertical passage in the inlet block 34 which is fastened in a recess on the bottom of the platform. The block is open laterally at 76 so that any roller which may not be wholly down through the block can be moved out laterally. As a roller drops through the block, it enters small end first in one of the pockets 78 of an intermittently rotated carrier 80. Each pocket has two diameters (Figs. 1 and 11), the diameter for a little over half the depth being large enough to take the large end of the roller and the deeper portion being of smaller diameter than the large end of the roller. Hence, if for any reason a roller should improperly enter large end first, it will stick out beyond the carrier as indicated in Fig. 1 and will be carried against the edge of an arcuate guide 82 and stop the carrier which is normally intermittently turned by the pawl and ratchet mechanism which is yieldably actuated. Normally the larger ends of the rollers will be upwards and lie flush with the periphery of the carrier.

The carrier 80 (Fig. 11) is secured by cap screws to a ratchet wheel 84 which has extended hub portions journaled on a bushing carried by stud 86 which has a supporting flange 88 secured by screws to a bracket 90. The bracket has a split portion 92 which is clamped to the post 2. Rockable on a bushing on the extended hub of the ratchet wheel is an arm 94 to which a pawl 96 is pivoted. The arm (Figs. 1 and 2) is connected by a turnbuckle 98 to a slotted plate 100 hung on a cross pin 102 carried by a fork at the lower end of the bell crank lever arm 68. Hence whenever the bell crank lever is oscillated, the lever arm will, near each end of its stroke, actuate the pawl. The amplitude of oscillation is adjustable by a stop screw 103 threaded in the slotted plate for engagement by the cross pin. Advance of the pawl is effected yieldingly due to the spring 56. Overtravel of the carrier is prevented by a spring pressed plunger 104 (Fig. 8) which snaps into tapered recesses in the carrier. The plunger is carried in a casing on a bent arm 105 fixed to bracket 90.

As the rollers in a pocket pass down beyond the end of the arcuate guide or retainer 82, they enter one of a series of hollow discharge blocks 106 mounted in fan fashion on a rectangular plate 108 attached to the bracket 90. An inlet opening through each block registers with a feed pipe or outlet tube 109 leading to the machine selected for treating the rollers. When the first of the

feed pipes and the corresponding block fills up (Fig. 12) as far as a cam herein shown as a cone headed screw 110 which projects through a hole in the block, a lever 112 to which the screw is attached is swung clockwise and projects a pin 114 into the upper end of the block. The next rollers then pass over the pin to the next outlet block and enter that one until the entrance is blocked and so on. Each of the levers 112 has a pair of forwardly projecting lugs 116 with laterally projecting trunnions 118 which fit in round bottom recesses 119 in the block for pivotal movement. The trunnions are held in the recesses by lugs 120 carried by a cap 122 attached to the block. The cap is shown removed from the second block in Fig. 1 and both cap and block are removed from the third block to reveal the recesses. Each block is provided with a pair of arcuate parallel kerfs 123 to accommodate movement of the lugs 116.

It is desired that all of the outlet tubes be supplied with rollers at all times for feed to the four machines. Hence in feeding rollers at the necessary speed to insure this, all of the outlet tubes may become blocked. The excess rollers then continue upwardly in the carrier inside of a second arcuate guide 124 and the first one will ultimately arrive at the top under the block 34. This roller is utilized in conjunction with another in the block to prevent advance of the slide 24 and the pusher 22 until the outlet tubes have room for more rollers. This mechanism (Figs. 3, 9 and 10) includes a cam carrying plate 126 which is slotted and adjustably secured in a shallow groove in the bottom of a depending extension 128 on the slide 24, this extension projecting downwardly through an elongated slot 129 in the platform. One end of the plate 126 has a downwardly projecting lug 130 with a bevelled face 132 on one side and the other end has a downwardly and laterally projecting lug 134 with a cam face 136 at the end.

A latching lever 138 (Figs. 1, 9 and 10) has a vertically elongated hub portion 139 pivoted on a vertical pivot stud 140 secured to the bottom of a bracket 142 which is fastened on the front of the platform. This bracket also has a depending lug 143 receiving an adjustable stop screw 144 against which the latch lever is urged by a coil spring 146 connected to the lever and to a bent anchor pin 148 secured to the front of the bracket 142. The longer arm of the latch lever has an upwardly projecting lug 150 in which a detector pin 152 is adjustably secured in a position to project intermittently into the block 34. The pin is retracted from the block at every retreat of the plate 126 by contact of the cam face 136 with a screw 154 adjustably secured to the longer arm of the latch lever. This contact occurs at the end of the retreating stroke as indicated in Fig. 9 and causes the short arm of the latch lever to ride in behind the lug 130 and stay there under certain conditions to latch the plate 126 and the slide 24 from advancing. The latching condition is maintained only when a roller in the block is prevented from entering a carrier pocket. This condition prevents the pin 152 from entering the block but normally the pin can enter as indicated in Fig. 10 and the coil spring 146 will release the latch.

Assuming all four outlet tubes 109 are full of rollers, the remaining rollers in the pockets of the carrier will continue around intermittently until the first one reaches the uppermost position. This occurs as the slide 24, the pusher 22,

5

the support 12, the plate 126 and the ratchet pawl 96 reach their forward positions. Next the bell crank lever retracts all of the foregoing parts and another roller is dropped on top of the uppermost roller in the carrier. During this retraction, the lug 130 moves a little beyond the latch lever while the cam face 136 engages the screw 154 and moves the short arm of the latch lever to latching position behind the lug 130. The pin 152 is simultaneously withdrawn from the block. As the slide 24 and its associated parts including the plate 126 next try to advance, the cam face 136 moves a short distance away from the screw 154 but the pin 152 immediately engages the blocking roller and prevents release of the latch lever. Accordingly the slide 24 is locked from further advance while the jam persists and no rollers will be advanced from the hopper. The jam will ultimately be cleared because the bell crank lever continues its oscillation and will cause the pawl and ratchet to turn the carrier around until the outlet tubes have room for more rollers whereupon the carrier empties into them and an empty pocket will ultimately come under and receive the blocking roller from the inlet block. Thereupon the pin 152 can enter the inlet block and the latch lever is released by its spring. As long as no roller blocks the pin, the pin will swing freely out of and into the block as the cam face 136 engages and releases the screw 154.

I claim:

1. In apparatus of the character indicated, a circular carrier having a series of peripherally spaced radial pockets, means for intermittently rotating the carrier, means for inserting tapered articles small end foremost into the pockets, an arcuate retainer covering a portion of the periphery of the carrier and retaining said articles small end foremost in the pockets as the articles travel beyond a horizontal position, and a discharge block adjacent to the retainer and receiving the articles large end foremost from the pockets.

2. In apparatus of the character indicated, a circular carrier having a series of radial pockets, means for intermittently rotating the carrier, means for inserting tapered articles small end foremost into the pockets, an arcuate retainer covering a portion of the periphery of the carrier to retain the articles in the pockets as they travel beyond a horizontal position, a discharge block adjacent to the retainer and having an inlet opening to receive articles large end foremost from the pockets, and means for closing the inlet opening when the articles pile up to a predetermined level.

3. In apparatus of the character indicated, a circular carrier having a series of radial pockets, means for intermittently rotating the carrier, means for inserting tapered articles small end foremost into the pockets, an arcuate retainer covering a portion of the periphery of the carrier to retain the articles in the pockets as they travel beyond a horizontal position, a discharge block adjacent to the retainer and having an inlet opening to receive articles large end foremost from the pockets, means for closing the inlet opening to prevent entrance of articles when the articles pile up to a predetermined height, and a second discharge block adjacent to the first one to receive the excess articles which fail to enter said inlet opening.

4. In apparatus of the character indicated, a circular carrier having a series of radial pockets,

6

means for intermittently rotating the carrier, means for inserting tapered articles small end foremost into the pockets, an arcuate retainer covering a portion of the periphery of the carrier to retain the articles in the pockets as they travel beyond a horizontal position, a discharge block next to the retainer and having an inlet opening for receiving the articles large end foremost from the pockets, and a lever pivoted on the block and having means actuated by the articles piling up in the block for closing the inlet opening.

5. In apparatus of the character indicated, a circular carrier having a series of radial pockets, means for intermittently rotating the carrier, means for inserting tapered articles small end foremost into the pockets, an arcuate retainer covering a portion of the periphery of the carrier to retain the articles in the pockets as they travel beyond a horizontal position, a discharge block next to the retainer and having an inlet opening for receiving the articles large end foremost from the pockets, a lever pivoted on the block and having a pair of members projectable into the block, one member arranged at the inlet opening to close the latter and the other member having a cam in the path of articles in the block for actuating said one member.

6. In apparatus of the character indicated, a circular carrier having a series of radial pockets, means for intermittently rotating the carrier, means for inserting tapered articles small end foremost into the pockets, an arcuate retainer covering a portion of the periphery of the carrier to retain the articles in the pockets as they travel beyond a horizontal position, a plurality of discharge blocks adjacent to the retainer, each block having an inlet opening, means for closing the inlet openings when the articles pile up to predetermined heights in the blocks, a second arcuate retainer beyond the blocks for causing any excess articles to remain in the carrier pockets for a portion of a revolution, and means for causing such excess articles to interrupt the insertion of new articles into the carrier.

7. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, means for moving the articles successively sidewise over one of the supports to hanging position between the two, a circular carrier having a series of article pockets, means for turning the carrier intermittently to bring the pockets successively under the supports, and mechanism for separating the supports after each pocket reaches article receiving position to drop an article small end foremost into said pocket.

8. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, means for moving the articles successively to hanging position, a circular carrier having a series of radial pockets, means for turning the carrier intermittently to bring the pockets successively under the supports, mechanism for separating the supports after each pocket reaches article receiving position, and a discharge block having an inlet opening for receiving the articles large end foremost from the pockets.

9. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, means for moving the articles successively to hanging position, a circular carrier having a series of pockets, means for turning the carrier to bring the pockets suc-

cessively under the supports, mechanism for separating the supports after each pocket reaches article receiving position, a discharge block having an inlet opening at a low point on the carrier, and an arcuate retainer for retaining articles in the pockets until they gravitate large end foremost into the inlet opening.

10. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, a circular carrier having a series of pockets, mechanism for intermittently turning the carrier to bring the pockets successively under the support and for simultaneously moving the articles successively sidewise over one of the supports to hanging position between the two, and mechanism for separating the supports to drop the articles successively small end foremost into the pockets.

11. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, a circular carrier having a series of pockets, a bell crank lever, ratchet mechanism actuated by the bell crank lever for intermittently turning the carrier to bring the pockets successively under the supports, a spring pressed pusher controlled by the bell crank lever for moving the articles successively sidewise over one of the supports to hanging position between the two, and mechanism actuated by the bell crank lever for separating the supports to drop an article into the advanced pocket of the carrier.

12. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, means for moving the articles successively sidewise over one of the supports to hanging position between the two, an inlet block having a passage below the supports, mechanism for separating the supports to drop an article small end foremost into the passage, and mechanism for receiving the articles from the passage and reversing their travel from small end first to large end first.

13. In apparatus of the character indicated, a pair of supports spaced apart to suspend a tapered article by its larger end, means for urging one of the supports to a fixed distance from the other, a pusher overlapping one of the supports, means for advancing the pusher to push an article sidewise over said one support to suspended position between the supports, means for retracting the pusher over said one support, and interengaging means between the pusher and said one support to retract the latter from the companion support.

14. In apparatus of the character indicated, a circular carrier having a series of radial pockets, mechanism including a yieldable member and imparting an intermittent turning movement to the carrier, mechanism for inserting tapered articles small end foremost into the pockets, each carrier pocket having an inner portion of smaller diameter than the larger ends of the articles to prevent complete entry of an article with its larger end foremost, and means for engaging the protruding portion of such article to stop turning movement of the carrier.

15. In apparatus of the character indicated, a rotary carrier having a plurality of radial pockets, means for delivering articles endwise into the pockets, a plurality of adjacent discharge outlets below the carrier, means for preventing the articles from gravitating from the pockets as they pass the horizontal and approach the first outlet, and mechanism actuated by the ar-

ticles piling up in an outlet for compelling the excess articles to pass to the next outlet.

16. In apparatus of the character indicated, an inlet block having a passage therethrough, a slide, means for reciprocating the slide to drop articles into the passage, a rotatable carrier having a series of pockets to receive articles from the passage, a detector pin movable into the passage when the uppermost pocket in the carrier is empty, and a latch connected to the pin for stopping the slide when an article fails to leave the passage and blocks the pin.

17. In apparatus of the character indicated, an inlet block having a passage therethrough, a slide, means for reciprocating the slide to drop articles into the passage, a rotatable carrier having a series of pockets to receive articles from the passage, a detector pin movable into the passage when the uppermost pocket in the carrier is empty, a latch connected to the pin for stopping the slide when an article fails to leave the passage, a spring for urging the latch in a direction to project the pin into the passage, and a cam carried by the slide for retracting the pin from the passage.

18. In apparatus of the character indicated, an inlet block having a passage therethrough, a slide, means for reciprocating the slide to drop articles into the passage, a rotatable carrier having a series of pockets to receive articles from the passage, a discharge block having an inlet opening adjacent to the carrier to receive articles from the pockets, means for closing the inlet opening when the articles pile up to a predetermined level, means for retaining in the pockets those articles which fail to enter the inlet opening, a detector pin movable into the passage in the inlet block when the uppermost pocket in the carrier is empty, and a latch connected to the pin for stopping the slide when an article is held up in the passage by a full carrier.

19. In apparatus of the character indicated, an inlet block having a passage therethrough, a circular carrier having a series of pockets to receive articles from the passage, a discharge block having an inlet opening adjacent to the carrier, means for turning the carrier to carry articles from the receiving position to the inlet opening, means for closing the inlet opening when the articles pile up to a predetermined height, means for retaining articles in the pockets as they travel beyond the discharge block to the inlet block, a slide, means for reciprocating the slide to drop articles into the passage, a detector pin movable into the passage when the uppermost pocket is empty, and a latch controlled by the pin for stopping the slide when an article in the passage is held from entering the carrier.

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