

May 29, 1928.

1,671,697

E. F. BURKE

TRUING APPARATUS

Filed April 7, 1924

3 Sheets-Sheet 1

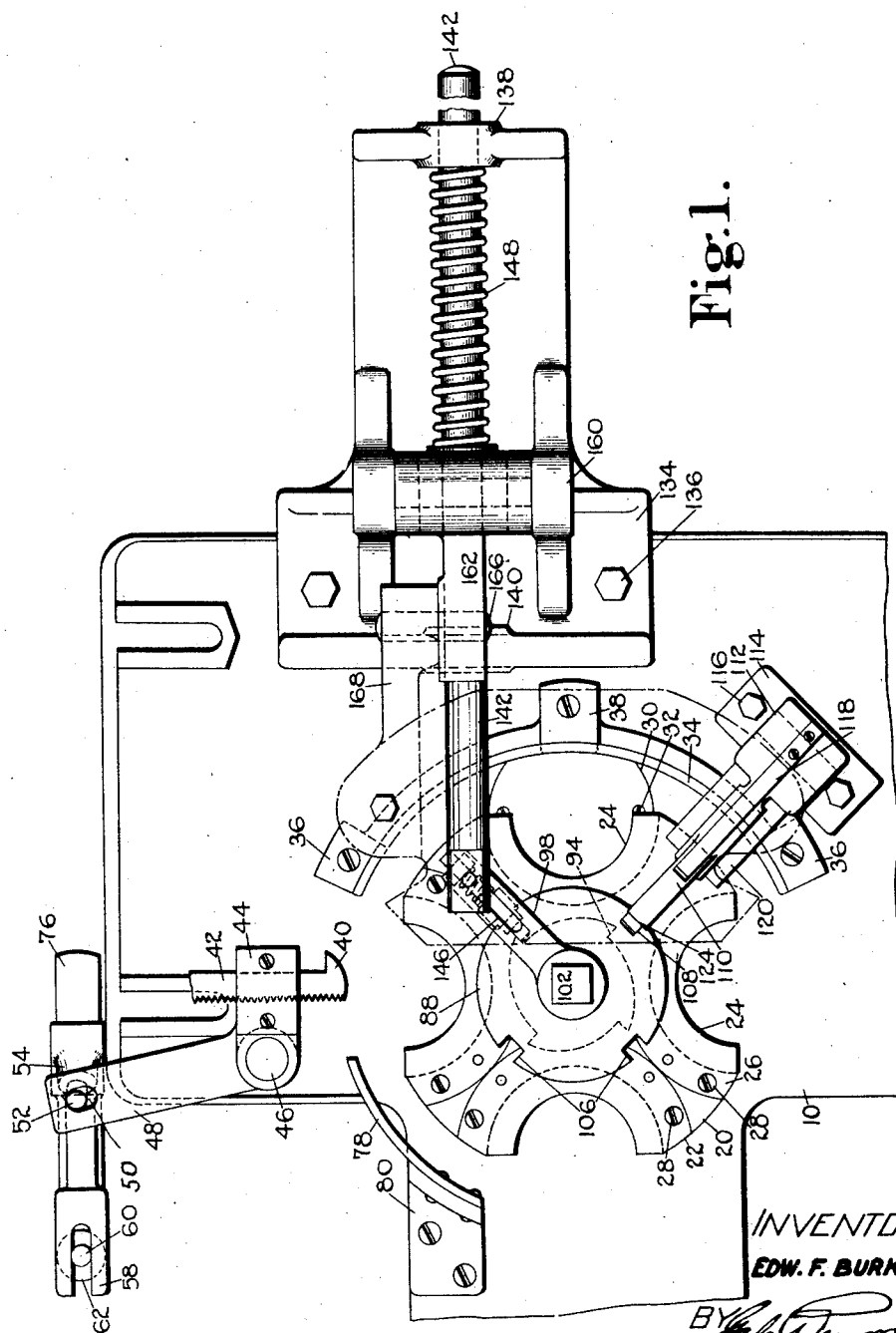


Fig. 1.

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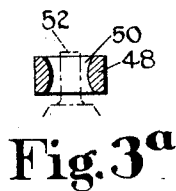
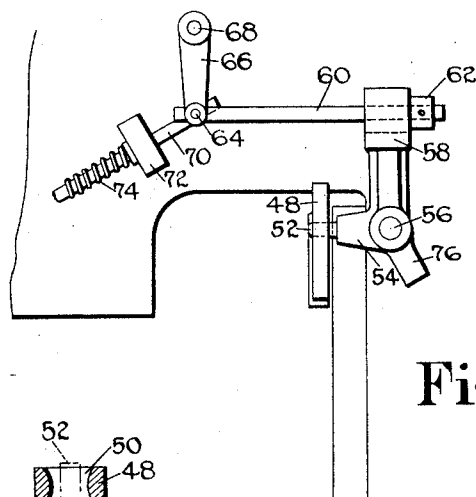
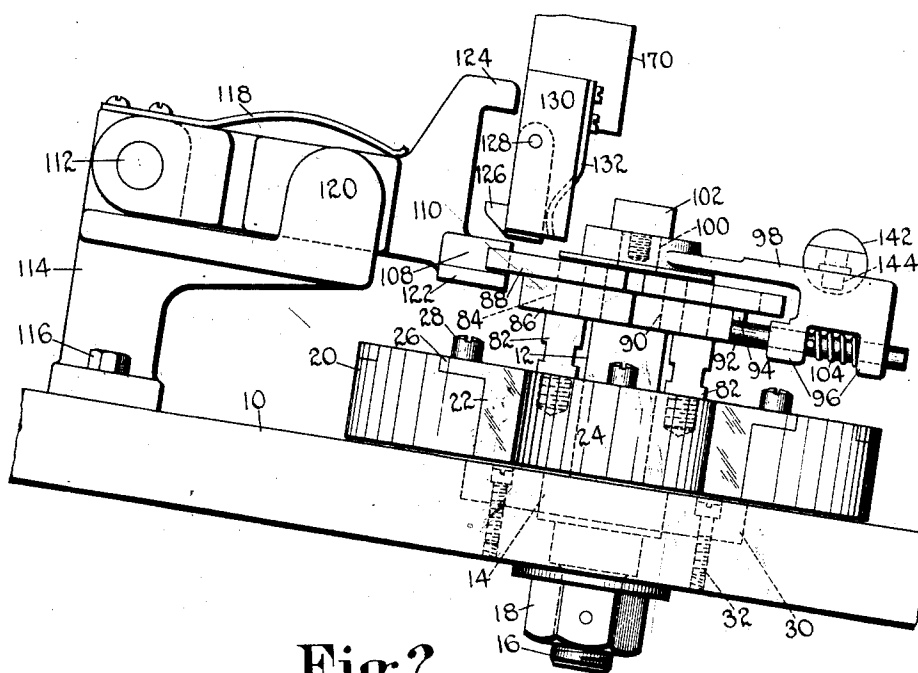
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TRUING APPARATUS

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

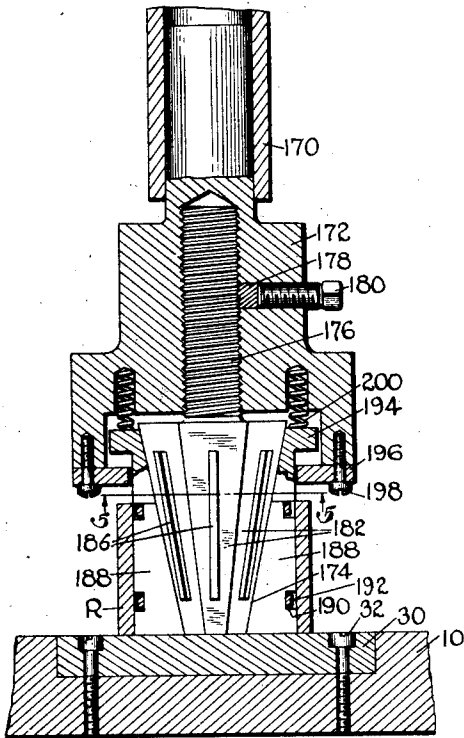


Fig. 4.

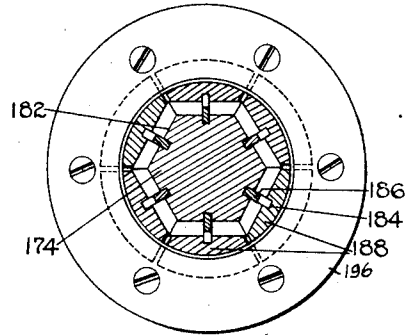


Fig. 5.

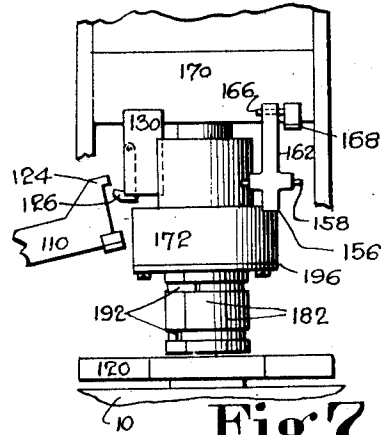


Fig. 7.

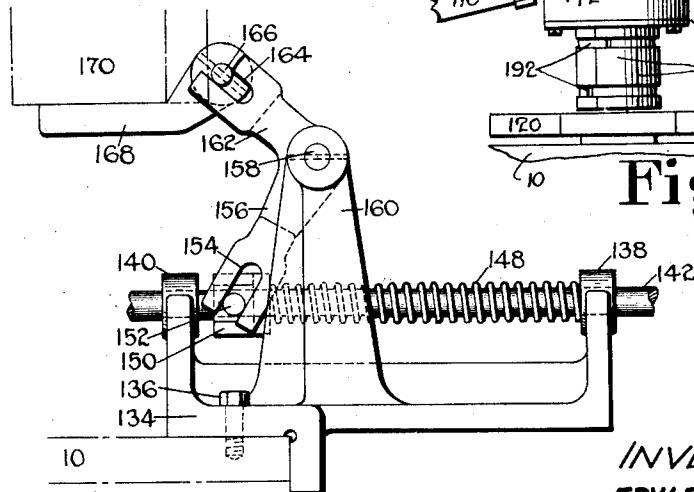


Fig. 6.

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TRUING APPARATUS.

Application filed April 7, 1924. Serial No. 704,741.

This invention relates to truing apparatus and is herein shown as embodied in a machine for automatically truing the race rings of roller bearings.

5 Race rings for roller bearings are usually case hardened on the surface which engages the rollers. During the process of carburizing, the rings get out of round and, after they come from the carburizing pots, must
10 be restored to a true cylindrical shape. One of the objects of the invention, therefore, is to true race rings or other hollow articles that are out of shape. In the illustrated construction, the truing is done by
15 supporting the article at one end and moving an expansible member into the article to stretch it, the expansible member presenting a substantially continuous expanding surface of the shape desired for the article.
20 Another object is to provide apparatus for presenting the articles automatically to the expander. As shown, this is effected by an intermittently rotatable carrier, preferably actuated by the operation of the expander.
25 Another object is to provide mechanism which will prevent injury to the machine or to the articles as, for example, when a defective work piece sticks to the expander.

To these ends and also to improve generally upon devices of the character indicated my invention consists in the various matters hereinafter described and claimed.

Referring to the drawings, Figure 1 is a plan view of the apparatus with the expander omitted.

35 Fig. 2 is an enlarged view looking from the right of Fig. 1.

Fig. 3 is a rear view of a portion of the clutch controlling mechanism.

40 Fig. 3^a is a detail.

Fig. 4 is a view of the expander partly broken away and in section.

45 Fig. 5 is a horizontal section on the line 5—5 of Fig. 4, looking in the direction of the arrows.

Fig. 6 is a front view of some of the mechanism of Fig. 1, to a smaller scale, and with the parts in a different position.

50 Figure 7 is a side view similar to Figure 2 with some parts added and others omitted for clearness.

The numeral 10 indicates a work support or table preferably inclined, with its higher end to the right and front as shown in Fig.
55 1. Extending upwardly from the work

support and fixed against rotation, is a trunnion 12 having a collar portion 14 fitting in an annular recess in the support and having a reduced threaded end 16 which receives a clamping nut 18 for fixedly securing the trunnion to the table. Rotatably
60 mounted on the trunnion 12 is a carrier 20 having a series of scalloped openings in its periphery to receive curved plates or work holders 22. The plates 22 have semi-cylindrical work-engaging surfaces 24 and also
65 flanges 26 fastened by means of screws 28 in recesses of the carrier. The plates 22 are removable and replaceable by other similar plates, the semi-cylindrical portions of
70 which are of larger or smaller diameter to hold work pieces of different sizes. The articles to be treated, usually hollow rings, are inserted by the operator at the front or
75 loading station and carried around a quarter of a revolution to an expanding station which is at the right as viewed in Fig. 1. Here there is fixed to the table or support 10 a thrust ring or wear plate 30 fastened by screws 32 in a recess. This plate
80 takes the thrust of an expansible member which is thrust into the work piece to true the latter. The articles are retained in the recesses of the carrier by a curved guide 34 having end lugs 36 and a middle lug 38 by
85 which it is secured to the table.

The articles are next carried around another quarter of a revolution to a third station to actuate a clutch controlling mechanism. The clutch is ordinarily intermittently actuated to operate the expander and, if the expander properly releases the article so that the latter is carried around to the third or rear station, the article actuates the clutch when it rides against a cam face 40 on a serrated bar 42 adjustably fixed to an arm 44 pivoted at 46 on the support and having a rearwardly extending arm 48. At the rear end of the arm 48 is a slotted opening 50 the edges of which are rounded and are engaged by a vertically extending pin 52 on a vertical arm 54 of a three armed lever pivoted at 56 to the support. A laterally extending arm 58 is forked at its end and engages a vertical rod 60 having a collar 62 at its lower end and pivoted at its upper end at 64 to a horizontal arm 66 pivoted at 68 on the frame. Also pivoted at 64 is a rod 70 which slides through a lug 72 fixed to the frame and the rod is normally pressed
110

upwardly by a spring 74 attached at its upper end to the rod and bearing at its lower end against a washer on the fixed lug 72. The rod 70 at its upper end connects with a clutch controlling dog which causes the expanding member to descend whenever the dog is withdrawn. If an article is properly released by the expanding member and consequently carried around to the third station, it pushes the cam member 40, 42 to the rear. This swings the arms 54 and 58 clockwise (in Fig. 3) and, the forked arm 58, engaging the upper side of the collar 62, depresses the rod 60 and the clutch controlling rod 70 and the expander will then descend again into the following article at the expanding station. If, however, the article sticks to the expander, so that breakage would occur if the expander carried the article down against a following article, the members 40, 42, etc., are not actuated but are pressed forwardly into the empty work recess at the third station and the machine cannot operate. The spring 74, acting through the rods 70 and 60 and the collar 62, arms 58, 54, 48 and 44, causes this forward movement of the cam member 40. As shown in Fig. 3, there is a third arm or handle 76 for controlling the clutch by hand when desired. As the articles leave the third station, they are carried around and retained on the support by a guard 78 having a bracket 80 secured to the table by screws. At the fourth station which is at the left as shown in Fig. 1, the articles slide out by gravity, due to the inclination of the table.

The mechanism for intermittently rotating the carrier will now be described. As shown in Fig. 2, studs 82 have their lower ends threaded in the carrier and their upper reduced ends 84 pass through a cam member 86 and an index plate 88. These last two members are free to rotate on a reduced cylindrical portion 90 of the trunnion 12. The cam member 86 has a series of cam faces, herein shown as four, each face ending in a shoulder 94 engaged by the end of a sliding plunger 92 carried by depending lugs 96 on a swinging arm 98, the hub of which turns on a cylindrical portion 100 of the trunnion and is held thereon by a head 102 having a stud threaded in the end of the trunnion. The plunger 92 is pressed against the cam faces by a coil spring 104 and successively engages the shoulders 94 in the manner of a pawl and ratchet. The arm 98 is oscillated to intermittently turn the table and the table is locked intermittently by a latch engaging the index plate 88. This plate has a series of notches 106 into which fits the end 108 of a latch arm 110 pivoted at 112 to a bracket 114 fastened to the table by screws 116. A flat leaf spring 118 secured to the upper edge of the

bracket bears against the upper side of the latch arm 110 and tends to hold it down. The arm is held against lateral movement by upwardly extending lugs 120 forming a part of the bracket 114. In order that the end of the latch 108 may easily enter the notches, it is beveled or inclined as at 122. The latch arm 110 is periodically raised and lowered by the reciprocating ram of the expanding mechanism. It has a lug 124 lying in the path of a hook 126 carried on a swinging arm pivoted at 128 to a plate 130 on the ram 170. A flat spring 132 attached to the plate 130 holds the hook 126 in a position such that it will always engage the lug 124. As the hook 126 rises with the ram, it engages lug 124 and lifts the latch arm 110 whereupon the carrier can be rotated a portion of a revolution by the mechanism to be described. As the hook rises, it moves further away from the pivot 112 of the latch arm and releases the lug 124 so that the end 108 of the latch can ride along the top of the index plate 88 as the latter is turned and drop into the next notch 106. This accurately positions the carrier and the work piece in the proper position to be acted on by the expander.

The mechanism for swinging the arm 98 to intermittently turn the carrier will now be described. See Figs. 1, 2 and 6. A bracket 134 is attached by screws 136 to the support 10 and has spaced bearings 138 and 140 for a sliding rod 142. The rod is flattened at one end and carries a depending stud 144 engaging a slot 146 in the arm 98 and a coil spring 148 is sleeved on the rod and bears at one end against the bearing 138 and at the other end against a collar 150 fixed to the rod. The spring is shown in its compressed position in Fig. 1 and in an expanded position in Fig. 6. The spring is compressed during the descent of the plunger and is thus energized so that, when permitted to expand, it will force the rod back to yieldingly turn the carrier. Projecting from the collar 150, is a stud 152 engaging a slot 154 in an arm 156 of a bell crank lever pivoted at 158 between standards 160 on the bracket piece. Another arm 162 of the bell crank lever has its ends slotted as at 164 and engages a pin 166 projecting horizontally from a plate 168 attached to the ram 170. It is apparent that the descent of the ram or plunger will cause the rod to slide and compress the spring and that, when the plunger rises and the latch is lifted from the index plate, the spring will then cause the rod to slide back and swing the arm 98 and turn the carrier.

Referring to Figs. 4 and 5, a holder 172 is carried by the reciprocating ram 170 and in turn carries a core 174 having a threaded shank 176 screwed into the holder and locked by a plate 178 and set screw 180. The core

is in the form of a frustum of a pyramid having flat pyramidal faces 182, each having a longitudinal key 186 engaging a slot 184 in a clamping section 188. The clamping sections have flat faces engaging the flat faces of the frustum and are arranged to move longitudinally thereon. The clamping sections, of which six are shown, have outer cylindrical surfaces which form a substantially continuous outer cylindrical surface to engage the interior of a ring or other hollow article. Such a ring is indicated at R in Fig. 4. Each clamping section 188 has peripheral slots 190 engaged by split spring rings 192 which constantly tend to press the sections towards the core so that when the sections are moved to the small end of the frustum, they are collapsed to their smallest diameters. At the upper ends of the sections are lateral extensions or projections 194 held in an annular recess of the holder by a retaining ring 196 fastened to the holder by screws 198. The recess is deeper than the thickness of the projections and of larger diameter so that the sections have lost motion connection with the holder both vertically and horizontally. Springs 200 are arranged in recesses in the holder and press against the extensions 194 and, whenever the holder is lifted, move the extensions against the retaining ring. In this position, the sections are at the small end of the frustum and are collapsed by means of the split spring rings 192. Hence, the expander can easily enter the ring R and as it enters the ring, the lower ends of the sections 188 strike the thrust plate 30 on the table and then continued descent of the core or frustum 174 wedges the sections outwardly, thus expanding the ring and restoring it to a true cylindrical shape. In all positions of adjustment, the sections present a true cylindrical surface to engage the article.

Although the invention has been described by reference to specific apparatus, it should be understood that, in its broader aspects, it is not necessarily limited to the precise form which has been selected for illustrative purposes.

I claim:

1. In apparatus of the character described, a carrier for hollow articles, a reciprocating member, an expansible member supported by the reciprocating member and movable into the articles to true the same, and means operated by the reciprocating member for intermittently moving the carrier; substantially as described.

2. In apparatus of the character described, a rotatable carrier for hollow articles, a reciprocating member, an expander carried by the reciprocating member and having a substantially continuous outer cylindrical surface movable into the articles to true the same, and means operated by the reciprocating member for intermittently rotating the

carrier to bring the articles successively into the path of the expander, substantially as described.

3. In apparatus of the character described, a rotatable carrier having a series of openings to receive hollow articles, an expansible member having a substantially continuous cylindrical surface movable into the articles at one station to true the articles and means for intermittently rotating the carrier to bring the articles successively into the path of the expansible member; substantially as described.

4. In apparatus of the character described, a rotatable carrier having a series of openings to receive hollow articles, a reciprocating member having an expander movable into the articles at one station to true the articles, and means operated by the reciprocating member for intermittently rotating the carrier; substantially as described.

5. In apparatus of the character described, an article support having one end higher than the other, a rotatable carrier overlying the support and having a series of scalloped openings to receive hollow articles and slide them laterally while they rest on the article support, an expansible member movable into the articles at one station to true the same, means for expanding the member, and means for intermittently rotating the carrier; substantially as described.

6. In apparatus of the character described, a carrier having means to hold hollow articles, a work support under the carrier for supporting articles during the movement of the carrier, an expansible member movable successively into the articles to true the same, and means for moving the expansible member against the support to cause the expansion; substantially as described.

7. In apparatus for truing hollow sleeves and the like, a flat support for supporting a sleeve on end, a plurality of sections forming a substantially continuous cylindrical expansible surface, outwardly extending projections at one end of said sections, a holder having a recess to receive said projections, means for loosely retaining the projections in the recess, springs engaging said projections and urging the sections downwardly in the recess, a core fixed to the holder and having inclined flat faces engaging corresponding faces on the interior of the sections, and means for reciprocating the holder to carry the sections into contact with the support to expand the sections within the sleeve; substantially as described.

8. In apparatus for truing hollow sleeves and the like, a member for contacting with one end of a sleeve, a plurality of sections forming a substantially continuous, cylindrical expansive surface, a holder having

vertical and horizontal lost motion connections with the sections, a core rigidly secured to the holder and having a plurality of flat inclined faces engaging corresponding faces on the interior of the sections, and means for causing a relative movement between the member and the holder to expand the sections against the interior of the sleeve; substantially as described.

9. In apparatus for truing hollow sleeves and the like, a member for contacting with one end of a sleeve, a plurality of sections having flat inclined faces, a central core having flat inclined faces engaging the flat faces of the sections, means for loosely holding the sections to the core, said sections having a substantially continuous outer cylindrical truing surface, and means for causing a relative movement of approach between the member and the core for expanding the sections to true the inner surface of a sleeve; substantially as described.

10. In apparatus of the character described, a rotatable carrier having a series of openings to receive hollow articles, an expansible member movable into the articles at one station, a clutch controlling member projecting into the path of the articles at another station to control the movement of the expansible member, and means for intermittently rotating the carrier; substantially as described.

11. In apparatus of the character described, a flat support having one end higher than the other, a rotatable carrier overlying the support and having a series of scalloped openings to receive hollow articles, an expansible member for engaging the articles at a high station, means for retaining the articles in their openings till they reach a low station; and means for intermittently rotating the carrier; substantially as described.

12. In apparatus of the character described, a flat support having one end higher than the other, a rotatable carrier overlying the support and having a series of scalloped openings to receive hollow articles, an expansible member movable into the articles at the high station, a clutch controlling member projecting into the path of the articles at another station, a curved guard beyond the last said station to retain the articles on the carrier till the articles reach the low station, and means for intermit-

tently rotating the carrier; substantially as described.

13. In apparatus of the character described, a rotatable carrier for hollow articles, an expansible member movable into the articles at one station, a plunger for operating said member, a spring compressed by the movement of the plunger, and a one-way connection between the spring and the carrier for intermittently rotating the latter; substantially as described.

14. In apparatus of the character described, a rotatable carrier for hollow articles, an expansible member movable into the articles at one station, a plunger for operating said member, a spring compressed by the movement of the plunger in one direction, a one-way connection between the spring and the carrier, means for latching the carrier against rotation, and means operated by the movement of the plunger in the other direction to release said carrier; substantially as described.

15. In apparatus of the character described, a rotatable carrier for hollow articles, an expansible member movable into the articles at one station, a plunger for operating said member, a sliding rod, a connection between said plunger and said rod to slide the latter in one direction, a spring compressed by the movement of said rod, and a one-way connection between the rod and the carrier for intermittently rotating the latter; substantially as described.

16. In apparatus of the character described, a rotatable carrier, a reciprocating plunger, a spring energized by the movement of the plunger in one direction, a one-way connection between the spring and the carrier, and means operated by the movement of the plunger in the other direction to render said spring effective to turn the carrier; substantially as described.

17. In apparatus of the character described, a rotatable carrier, a reciprocating plunger, a spring energized by the movement of the plunger in one direction, a one-way connection between the spring and the carrier, a pivoted latch for the carrier, and means connected to the plunger for lifting said latch; substantially as described.

In testimony whereof I hereunto affix my signature.

EDW. F. BURKE.