March 27, 1951 J. F. CRAWFORD 2,546,496

BAND APPLYING MECHANISM

Filed April 28, 1945 4 Sheets-Sheet 1

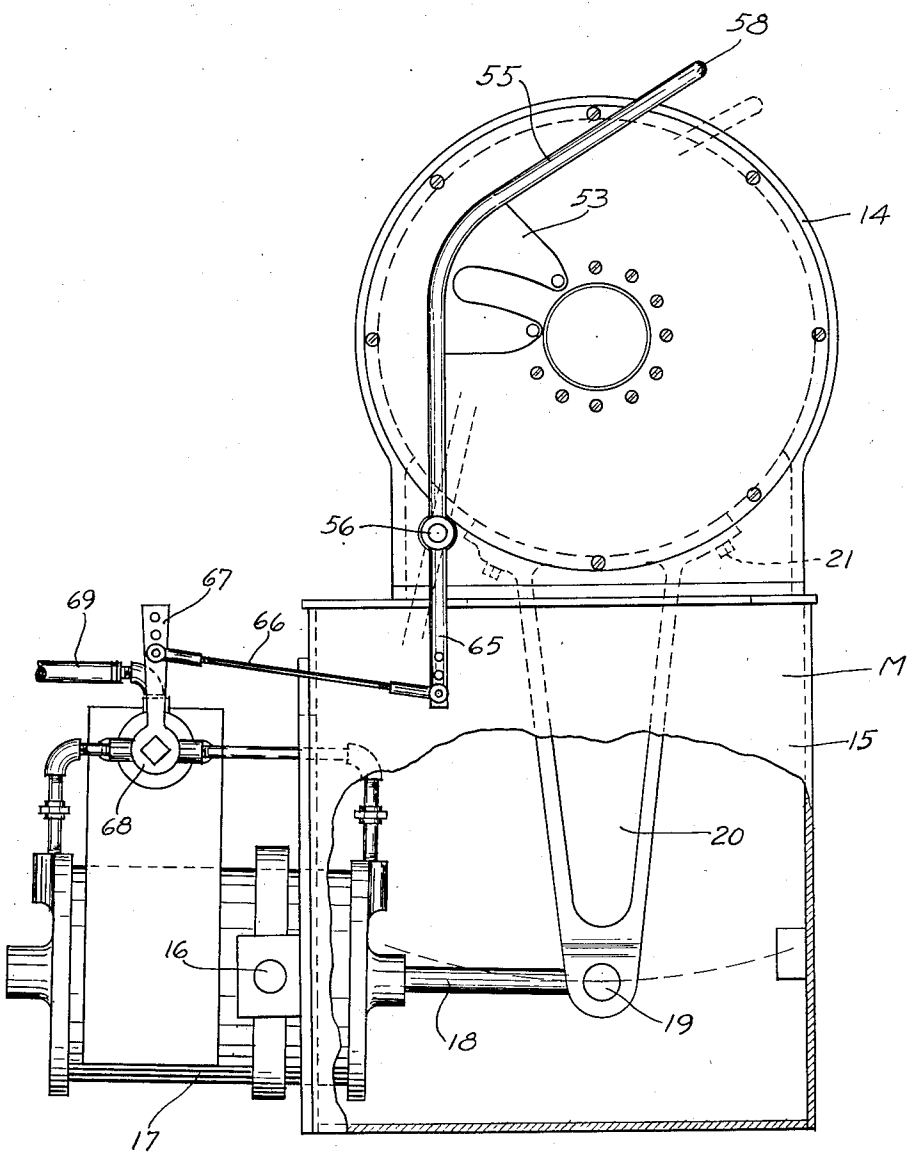


Fig. 1.

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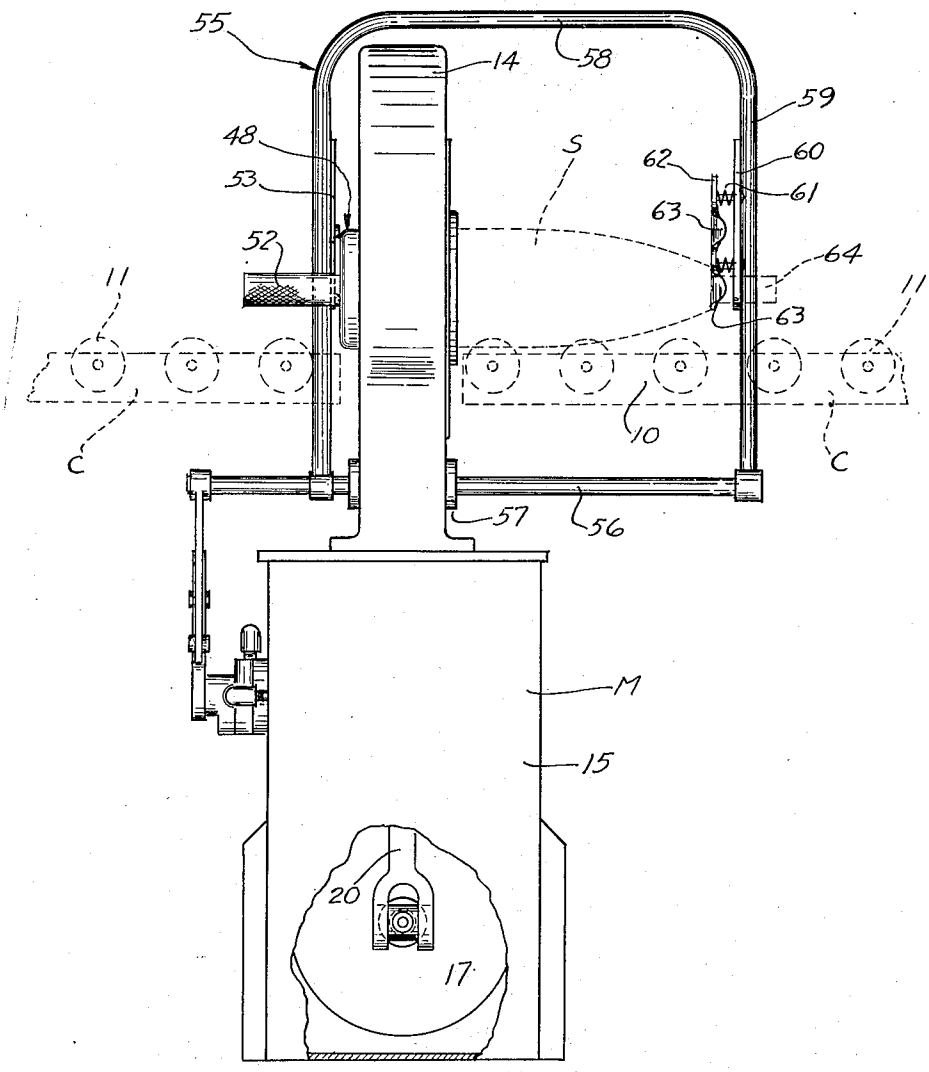


Fig. 2.

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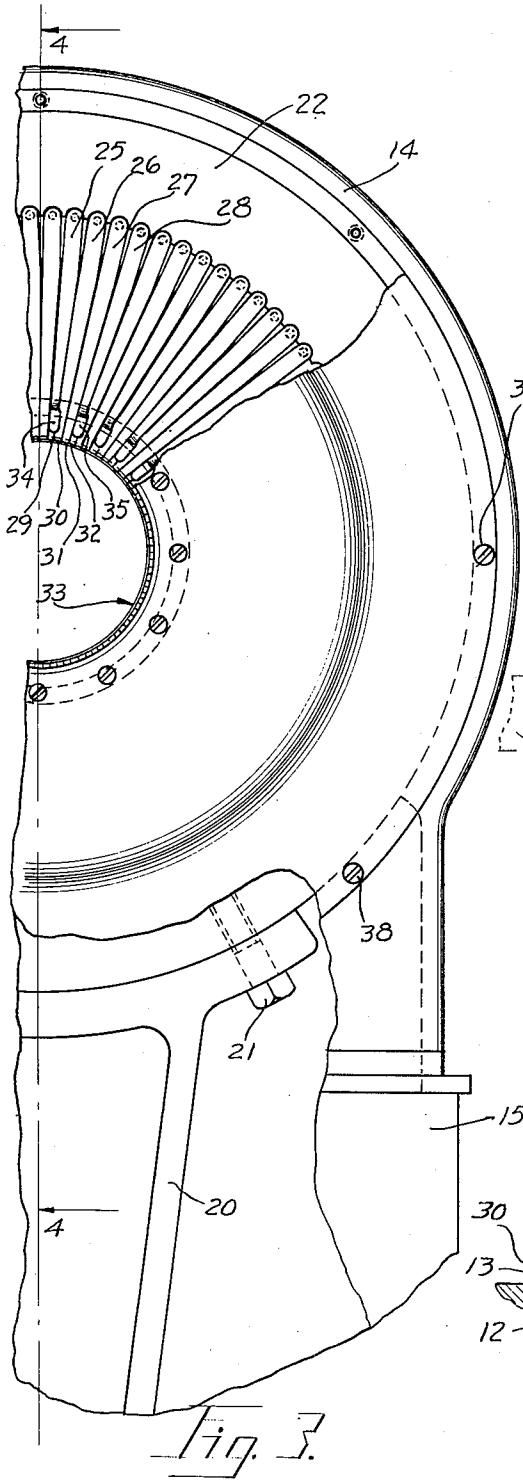


Fig. 3.

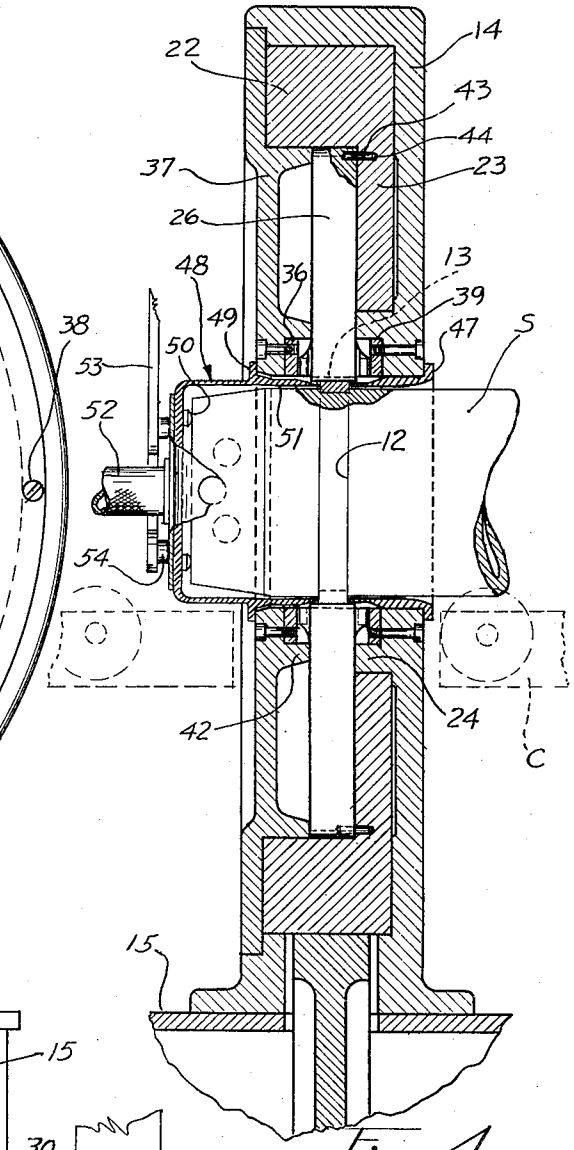


Fig. 4.

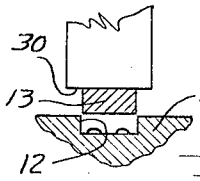


Fig. 9.

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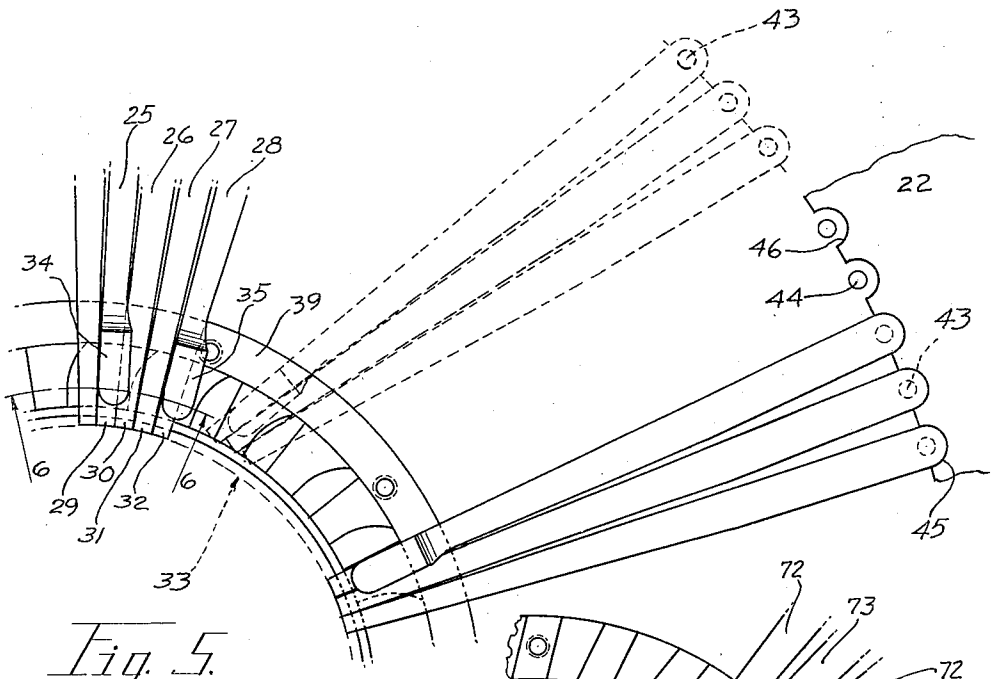


Fig. 5.

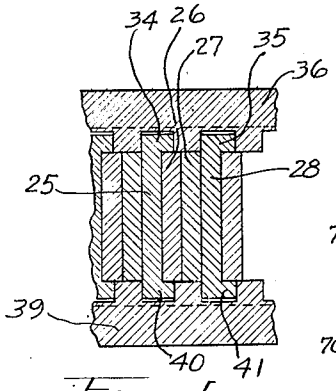


Fig. 6.

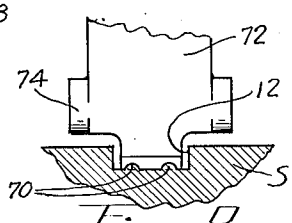


Fig. 8.

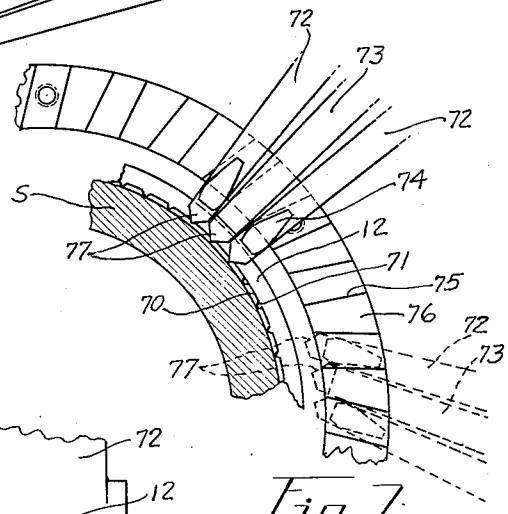


Fig. 7.

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Patented Mar. 27, 1951

2,546,496

UNITED STATES PATENT OFFICE

2,546,496

BAND APPLYING MECHANISM

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Application April 28, 1945, Serial No. 590,895

3 Claims. (Cl. 78—15)

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The present invention relates to devices for placing and securing rings in place on grooved round objects and a purpose of the invention is to generally improve the construction and operation of devices of this class. More specifically, an object of the invention is to provide a new mechanism for placing a rotating band on a shell case.

Other objects and advantages will become apparent from the following specification and the annexed drawings in which a satisfactory embodiment is shown. However, it is to be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention as herein expressed.

In the drawings, Figure 1 is an elevation of the machine looking toward the exit side thereof, parts being broken away.

Fig. 2 is a similar view of the machine taken from the operator's position.

Fig. 3 is an enlarged fragmentary elevation showing in detail some of the mechanism indicated in Fig. 1.

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is an enlarged detail of certain mechanism indicated in Fig. 3.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5.

Fig. 7 is a view similar to Fig. 5 of a modification of the device for a slightly different operation.

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7.

Fig. 9 is an enlarged detail of certain mechanism indicated in Fig. 4 showing the parts in a different position.

Similar reference characters have been applied to the same parts throughout the drawings and specification.

Referring to Fig. 2, the machine is interposed in a suitable conveyor C which delivers the objects to be treated and conveys away the finished objects. As an example, a shell S is indicated as the object treated but it is to be understood that other objects of a similar nature can be treated or can have bands or rings applied in similar manner. Conveyor C, forming no part of the present invention need not be described other than to say that it comprises a suitable frame 10 carrying a series of rollers as 11—11 on which shell S may be readily propelled.

The banding machine generally designated as M comprises essentially a disk-like housing generally designated as 14 carried by a base 15 in the present instance of box-like form. Base 15 has pivoted thereto at 16 an air or other suitable fluid cylinder or motor 17 of well-known form, not necessary to describe in detail since it forms no part of the present invention. Cylinder 17 has a piston rod 18 which is pivoted as by a pin 19 to an arm 20. Arm 20, as best seen in Fig. 3, is suitably fastened as by screws 21 to a ring-like rim element 22 of an oscillatable disk 23, Fig. 4. Disk 23 is piloted on a boss 24 carried by above mentioned housing 14. Boss 24 has a central opening sufficient to admit shell S and which opening is suitably aligned with above mentioned conveyor C.

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Rim 22 can be oscillated about boss 24 and serves as part of a toggle mechanism for developing the necessary pressure on ring 13.

A plurality of pressing fingers as 25, 26, 27 and 28 are disposed generally radially within rim 22 and directed toward a region adjacent the central opening in boss 24. Fingers 24 to 28 have inner end portions 29, 30, 31 and 32 which are arranged in contiguous relation as perhaps best seen in Fig. 5. It is to be understood that fingers 25, 26, and 27 are duplicated as many times as necessary to extend entirely around the above mentioned central opening. Collectively, the inner ends of these numerous fingers define an inner surface of revolution which is substantially continuous and generally designated as 33.

The several fingers at their inner ends are restrained from circumferential movement and it will now be apparent that oscillating of rim 22 so as to move the fingers from a position at an angle to radii from the center of boss 24 to a radial position, will cause inward movement of said inner end portions which, if resisted, will develop enormous inward pressure with only moderate exertion of force on arm 20 by piston rod 18.

It is not necessary to pilot each individual finger 25, 26, 27, etc. In the present instance, fingers 25 and 28 are provided with laterally extending ears 34 and 35 respectively, as best seen in Fig. 6. Ears 34 and 35 engage suitable notches in a ring 36 carried in a cover 37 enclosing housing 14 and fixed thereto in any suitable manner as by screws 38. A similar ring 39, fixed in box 34, engages ears 40 and 41 on the opposite sides of fingers 25 and 28 from above mentioned ears 34 and 35. Fingers 26 and 27 occupying substantially all the space between fingers 25 and 28, cannot move circumferentially because of the resistance to such movement of fingers 25 and 28. It is to be understood that while 4 fingers only

have been described in detail, the entire interior of rim 22 is occupied by similar fingers. The latter being identical with the described fingers, need not be further explained.

Cover plate 37 has a boss 42 carrying above mentioned ring 36 and bosses 24 and 42 engage the edges of fingers 25, 26, etc., to maintain them in properly aligned position.

Each of fingers 25, 26, etc., is provided with a pin 43, preferably loosely engaged in an opening 44 in disk 23. The outer ends, however, of the several fingers are rounded as at 45 and seated in recesses as 46 in rim 22. In this manner, an ample bearing is secured between the fingers and rim 22 to withstand the very substantial pressure exerted between the fingers and rim as the true radial position or "dead center" position is approached. Since pins 43 are merely for retaining the fingers in place, they do not need to stand any substantial pressure.

With the mechanism so far described, sufficient pressure can be developed to compress the metal band radially and cause it literally to flow into the contours of groove 12. It is to be noted that this is done at room temperature, no heating of the parts being necessary.

As will be apparent, if ring 13 is to enter into groove 12, the one must be properly aligned with the other before pressure is applied. In the present instance, this is accomplished in the manner best shown in Fig. 4. Within the above mentioned central bore of boss 24 is secured a gauging unit or locating bushing 47 which bushing extends within ring 39 so as to locate ring 13 in a predetermined position relative to fingers 25, 26, etc. Thus ring 13 when inserted into the machine from the left, as seen in Fig. 4, will stop in abutting relation to bushing 47. Ring 13 is thus readily located.

Shell S is located by a removable gauging unit or cap generally designated as 48 which has a rim 49 engageable with the outer surface of cover plate 37. Cap 48 encloses the butt end of the shell S and has one or more buttons or locating portions 50 which contact said end and limit its movement when the shell is urged to the left. Cap 48 also has an inwardly directed annular extension 51 which engages above mentioned ring 13 and prevents its displacement to the left so that ring 13 and shell S are definitely and properly located in relation to each other.

Cap 48 has a handle 52 by which it may be readily removed and replaced and it is held in position with rim 49 in contact with cover plate 37 by means of a notched plate 53 having buttons 54 engaging cap 48.

Plate 53, as seen in Fig. 2, is carried on a combination control and locating bar or device 55 and is normally removed from the path of shell S on conveyor C. Bar 55 is fixed with a shaft 56 journaled at 57 in an appropriate part of housing 14 and has a grip portion 58 and a portion 59, portion 59 serving to urge shell S to the left as seen in Figs. 2 and 4. For this purpose, portion 59 carries a notched plate 60 having spaced therefrom by springs as 61 a plate 62 provided with lips 63—63. When above mentioned plate 53 locates cap 48, plate 63, through spring 61 will urge shell S to the left into firm engagement with buttons 50 within cap 48, lip 63 guiding plate 62 into position at the right end of shell S with accompanying compression of springs 61.

The notch in plate 53 clears above mentioned handle 52 and the notches in plates 60 and 62 clear a protecting plug 64 commonly carried in the nose of shells of this character during processing to protect them from damage.

As heretofore suggested and for the purpose of saving as much time as possible, bar 55 controls the action of cylinder 17 simultaneously with gauging the location of shell S and ring 13. Thus pulling forwardly on grip portion 58, as seen in Fig. 2, places plates 53 and 62 in gauging relation with shell S and cap 48. At the same time, as more particularly shown in Fig. 1, such movement, through an arm 65 fixed with above mentioned shaft 56 actuates, through a link 66 and a lever 67, a valve of well-known type 68. Valve 68 controls pressure fluid from a supply pipe 69 causing it to actuate piston rod 18 in the desired direction according to the position of grip portion 58. In the present instance, most of the movement of portion 58 is used in positioning plates 53 and 62, the last portion of the movement, after the plates are in place, causing actuation of piston rod 18 and performing the compressing operation.

After the compressing is complete, control bar 55 and valve 67 are returned to the position shown in Fig. 1 whereupon piston rod 18 is returned and fingers 25, 26, etc. returned to the dotted position of Fig. 5. Cap 48 is then removed by means of handle 52 and shell S pushed to the left on rollers 11 to a subsequent operation.

In the modification of the device, seen in Figs. 7 and 8, the same principle of developing heavy radial pressure is utilized, most of the parts being substantially identical with those just described. Accordingly, only the distinctive parts will be described in detail.

Rings of the type contemplated are used for the purpose of giving to a shell its initial spin when fired from a gun. The rings must therefore be non-rotatively united with the shells. For this purpose, the groove 12 in shell S is formed with a plurality of circumferential ribs 70. Prior to the application of band 13, ribs 70 are provided with nicks or notches 71—71 into which the metal of ring 13 may be forced by the pressure of above mentioned fingers 25, 26, etc.

In the present instance, fingers as 72 and 73 are seated in a ring substantially identical with above mentioned ring 22, fingers 72 being provided with ears 74 engaged in suitable notches as 75 in rings 76 occupying similar positions to above mentioned rings 36 and 39. Thus fingers 72 and 73 are urged inwardly by oscillation of the outer ring in the manner above described for Fig. 5. Fingers 72 and 73, however, have wedge-like points 77 and the travel of the parts is so proportioned that upon actuation of fingers 72 and 73 into substantially true radial positions, as seen in full lines in Fig. 7, points 77 will encounter ribs 70 and produce nicks or notches 71 desired. In their retracted or angular position, seen in dotted lines in Fig. 7, points 77 are withdrawn for enough to clear the outer diameter of shell S as is apparent.

Since the location of shel S for this operation is much less critical than for applying band 13, any simple well-known gauging device is sufficient for locating the shell with sufficient accuracy.

Commonly the modification shown in Figs. 7 and 8 and the machine shown in the remaining figures are interposed successively in conveyor C so that shell S first stops at the Fig. 7 embodiment and receive nicks 71 whereupon it is immediately passed on to the Fig. 1 embodiment where it receives band 13.

In operation, the attendant places the ring 13 against gauge 47 and slides shell S approximately into place, applies cap 48 and pulls downwardly on grip 58. The compressing operation is complete in a few seconds whereupon the pressure is released with raising of grip 58, cap 48 is removed and the shell passed on over conveyor C to the next operation.

The above being a complete description of the novel illustrative embodiments of shell banding machinery, that which is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A compressing finger arrangement for use in a band compressing machine including a hollow disk-like housing having an oscillatable circumferential rim member therein, said housing providing a central object receiving aperture, a plurality of compressing fingers inwardly directed from said rim toward said aperture, spaced notched rings encircling said aperture, within said housing and means connected with said oscillatable circumferential rim member, operable upon actuation to oscillate said rim member; each of said fingers including a rounded outer end engaged with said oscillatable circumferential rim member, and a relatively thin inner work engaging end, and certain of said fingers constituting guiding fingers, each having a pair of guiding ears at each outward side of said fingers of a thickness greater than and projecting circumferentially from said work engaging end, on opposite sides of such fingers and engaged with notches of said rings to substantially prevent circumferential movement of the inner ends of such fingers, but to provide for relatively free radial movement thereof, and a plurality of other fingers, the spaces between said guiding fingers receiving at least one of said other fingers so as to be guided thereby, at least one of said fingers located in each said spaces being disposed in close proximity to the projecting ear side of each of said first mentioned fingers and received between the projecting ears of its corresponding first mentioned finger whereby a larger number of work engaging ends may be provided around said object receiving aperture than would be possible if all of the fingers were provided with guiding ears.

2. A hand compressor comprising, a work positioning gauging means, and a band compressing device, said device having a housing providing a substantially horizontal opening adapted to receive a band and an object within the band about which said band is to be compressed, means adjacent the perimeter of said opening for compressing the band; said gauging means comprising the combination of a cup-like device having a rim engaging the housing at the margins of said substantially horizontal opening when urged in one direction and an annular extension projecting within said opening into locating engagement with said band, said cup-like device including a head portion spaced outwardly from said opening providing a locating portion contacting an object within said cup-like device when said object is urged in the other direction to locate said object in a predetermined position in relation to said cup-like device, and consequently in relation to said band, and a locating device shiftably supported on said band compressing device outside the opening, means on said locating device for engaging said cup-like device for urging it in the first mentioned direction and thereby maintaining it in place in said opening with said rim against the margins thereof, and means on said locating device for engaging said object to urge it in the second mentioned direction to press it into said cup-like device against said locating portion, said locating device being shiftable to a position clear of said opening to provide for removal of said cup-like device and for progress of objects entirely through said opening.

3. A band compressor as set forth in claim 2 including, a motor for actuating said compressing means, a control for said motor, means for shifting said locating device, and a connection between said shifting means and said control for actuating said control when said locating device is shifted to said gauging position.

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