Jan. 15, 1957 H. C. EVELYN 2,777,189

STRIP FORMING AND INSERTING MACHINE

Filed June 23, 1947 3 Sheets-Sheet 1

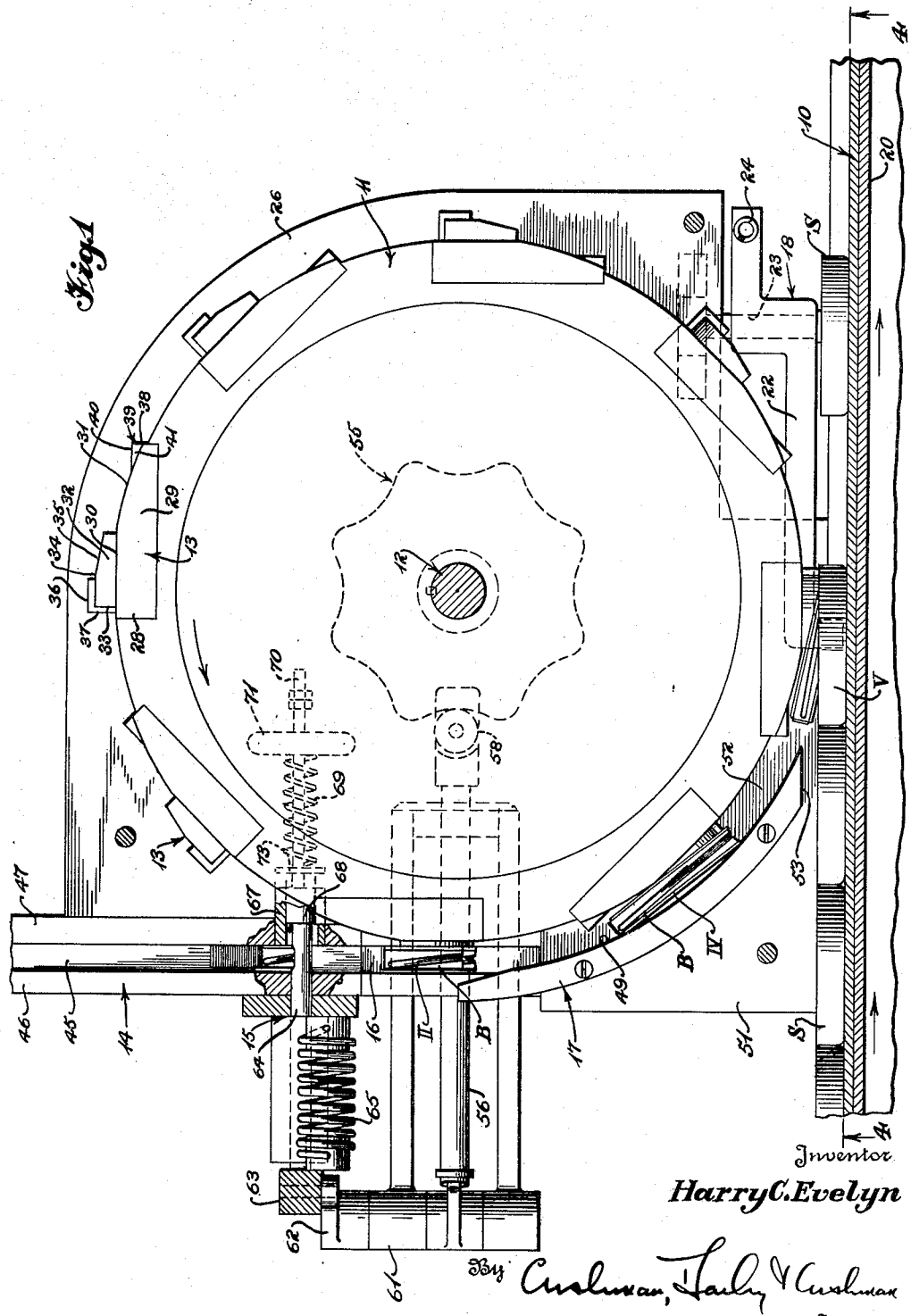


Fig. 1

Inventor
Harry C. Evelyn
By Cushman, Darby & Cushman
Attorneys

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Fig. 2

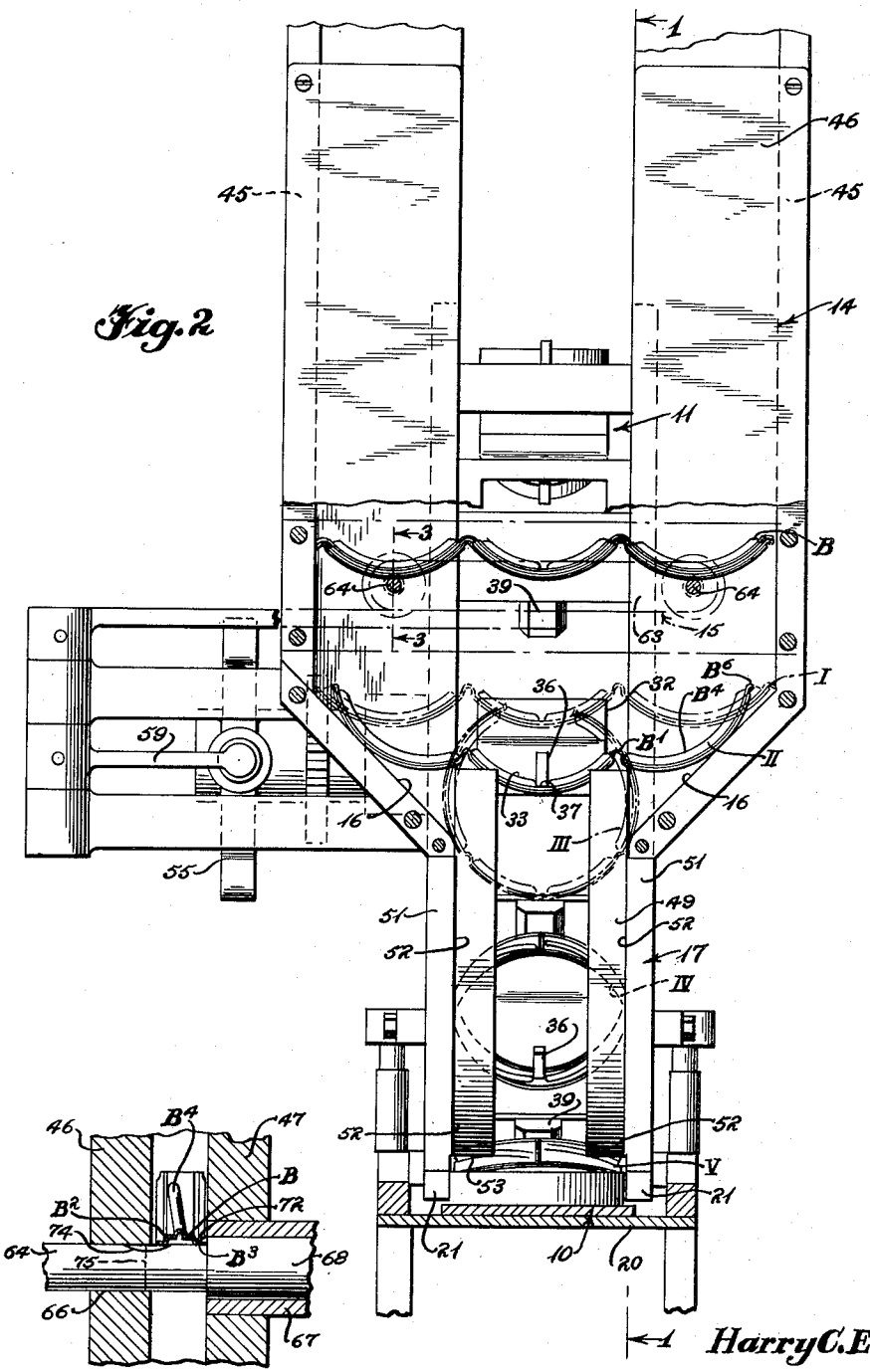


Fig. 3

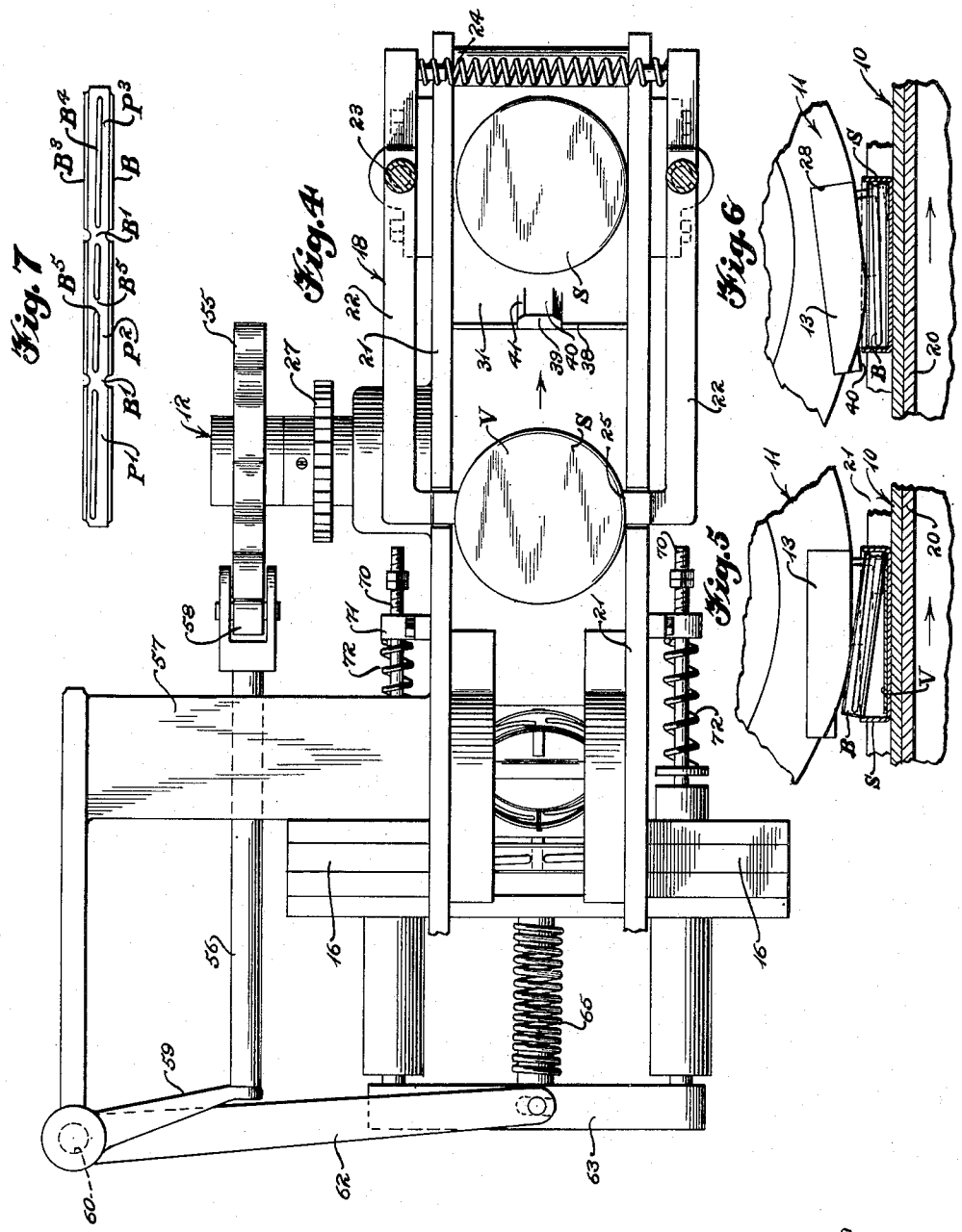
Inventor
Harry C. Evelyn

By Cushman, Darby & Cushman
Attorneys

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Filed June 23, 1947 3 Sheets-Sheet 3



Inventor
Harry C. Evelyn
By Cushman, Darby & Cushman
Attorneys

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2,777,189

STRIP FORMING AND INSERTING MACHINE

Harry C. Evelyn, Decatur, Ill., assignor, by mesne assignments, to Crown Cork & Seal Company, Inc., Baltimore, Md., a corporation of New York

Application June 23, 1947, Serial No. 756,419

15 Claims. (Cl. 29—33)

The present invention relates to strip forming and inserting methods and apparatus and, more particularly, to methods and machines for bending threaded strips and inserting the same in cap shells. The invention also includes a novel form of threaded strip for use in caps.

In order to manufacture a threaded cap provided with a smooth exterior surface, a cap shell having a non-threaded skirt has a threaded band element secured within the cap skirt. Leslie R. N. Carvalho Patent No. 2,348,957, issued May 16, 1944 for Apparatus for and Method of Making Circular Locking Bands for Caps or Closures, discloses a threaded band of the type used in such caps. As is indicated in said patent, the band is usually formed of two longitudinally adjacent arcuate sections, each section being provided with approximately 180° of a helical thread and joined by a non-threaded hinge portion.

Manufacture of caps of the above-mentioned type heretofore has been primarily performed by hand. In more detail, an operator would pick up a threaded band element, bend it by hand upon its hinge portion so as to form an annulus, and then place it within a cap shell. The shell with its inserted band was then delivered to a machine which secured the band in the shell, usually by rolling the free edge of the cap skirt downwardly upon the adjacent edge of the band.

Because the bending of the band and its insertion in the cap shell were performed entirely by hand, it was impossible to obtain optimum production without a large force of skilled operators. Furthermore, non-skilled operators damaged bands, particularly during the bending operation.

An object of the present invention is to provide a method of and apparatus for bending a strip element including arcuate sections to provide an annulus.

Another object of the invention is to provide an apparatus for inserting threaded or thread engaging strips in a cap shell.

A further object of the invention is to provide a threaded band of such design that it readily can be formed to an annulus and has an improved thread engaging action.

Most threaded bands used in caps of the type under discussion include an even number of threaded sections. I have found that a band formed of an odd number of sections, usually three, can be bent more readily to annular form. In more detail, by holding the median section and applying force against the arcuately convex surfaces of the remainder of the band successively from the free ends to points adjacent the median section, the non-median sections readily can be brought into such relation with the median section as to form an annulus. In other words, provision of a band including an odd number of sections and, therefore, including a median section, permits the remaining sections in effect, to be brushed lengthwise and thereby swung through short arcs to form an annulus.

Still another object of the invention is to provide a

mechanism for separating the lowermost band or strip from a group of superimposed strips.

Other objects and advantages of the invention will be apparent from the following specification and accompanying drawings wherein

Figure 1 is a vertical section on the line 1—1 of Figure 2.

Figure 2 is an end view of the machine, the view looking toward Figure 1 from the left.

Figure 3 is a detail vertical section on the line 3—3 of Figure 2.

Figure 4 is a section taken on the line 4—4 of Figure 1, that is, generally looking upwardly toward the operating elements of the machine.

Figures 5 and 6 are detailed views illustrating successive stages of operation of the machine, and

Figure 7 is a plan view of a threaded band of the invention.

The operation and construction of the machine may be generally described as follows:

As best shown in Figure 1, cap shells S are supplied to the machine by a conveyor **10** which moves the shells beneath a drum **11** rotatable with a horizontal shaft **12**. Drum **11** has a plurality of male dies or shoes **13** spaced about its periphery and having a form hereinafter described in detail. The threaded bands B to be inserted in the shells S are stacked in a chute-like hopper **14** as best illustrated in Figure 2. As is shown in Figure 7 and at position I in Figure 2, each band B includes a median section P2 and end sections P1 and P3, each section being of arcuate form and bearing a thread, and the sections being joined by hinge portions B1. A feeding means **15** is associated with the lower end of the chute **14** to successively separate the lowermost band in the stack from the superposed bands and so that the lowermost band will drop to position I indicated in Figures 1 and 2. Immediately thereafter, a shoe **13** on the rotating drum **11** will move downwardly into contact with the median section P2 of the band B at position I so as to carry the band downwardly between converging walls **16** as indicated at successive positions II and III in Figure 2.

The brushing contact of the end sections P1 and P2 of the band B with the converging walls **16** will cause bending force to be applied to those sections successively from their outer ends to points adjacent the median section P2. As a result, the outer sections will bend relatively to the median section upon the hinge portions B1 so that the band B will be given the annular form indicated at position IV in Figure 2.

As is indicated at position IV in Figures 1 and 2, the now annular band B moves from between the converging walls **16** into a curved chute **17** which has a width corresponding to the outside diameter of the completely formed annular band. Further rotation of drum **11** will cause the annular band to be deposited in a cap shell S, as illustrated at position V in Figures 1 and 5. The leading shell S illustrated at position V will be slightly biased against movement from that position by a spring-loaded shell holding means generally designated by the numeral **18** and best illustrated in Figure 4, which is a bottom view of the apparatus. However, the continued rotation of drum **11** will cause the shells to be moved through the holding device **18** with the threaded band properly positioned in the cap as illustrated in Figure 6. The assembled band and shell may then be moved to an apparatus for beading or bending the edge of the shell skirt inwardly and downwardly to retain the band in place.

The detailed construction of a strip or band B of the invention and as delivered to the present machine, is illustrated in Figures 7 and 3 and at position I in Figure 2. It will be observed from these views that the three sections P1, P2 and P3 of the band are spaced lengthwise

of the band and that each section is arcuate on a radius corresponding to the radius of the annular form to be given the band. As best shown in Figure 3, each section has side flanges B2 extending from its arcuately convex surface and these terminate in outwardly projecting flanges B3. Also, each section carries a thread B4 projecting from its arcuately concave surface. As is clear from Figure 7, the threads of the three sections will form a helix extending 360° when the sections are brought into annular relation. The thread of sections P1 and P3 extends the length of those sections, but section P2 has its thread interrupted midway of its length to form opposed shoulders B5 for a purpose hereinafter described. The sections P1 to P3 are joined by hinge portions B1 which are neither threaded nor flanged and the outer end of each outer section is provided with an end shoulder B6. As is customary, the flanges and threads formed in the sections P1 to P3 brace those sections sufficiently that proper bending force applied to the band will cause the sections to bend only at the hinge portions B1. When bent to annular form, the end shoulder B6 will abut as indicated at position IV in Figure 2.

The detailed construction of the apparatus is set forth below.

The endless conveyor **10** is preferably formed of fabric so as not to mar the cap shells and is moved across a horizontal table **20** by any suitable drive means, not shown. Conveyor **10** will be driven at sufficient speed in relation to the speed of rotation of drum **11** that a suitable number of cap shells S will always be maintained in line and with the leading shell in engagement with the shell holding device **18**. If desired, suitable means may be provided in association with the conveyor **10** to stop operation of the machine except when a predetermined number of shells are in the rear of holding device **18** (to the left of the holding device as viewed in Figure 1). For example, such control means may comprise a pivoted bar having one end portion normally adapted to rest upon one or two of the rearmost shells of the desired number or group to be maintained. The bar will be so pivoted or balanced that its shell-contacting end will swing downwardly in the event that the group to be maintained lacks a final shell. Such downward swinging of the bar will cause a circuit to be actuated to stop the machine until an additional supply of shells causes a shell to be moved beneath the control lever so that the desired number to be maintained will be at hand.

As is indicated in Figure 4, guide bars **21** spaced apart a distance substantially corresponding to the outside diameter of the cap shells are positioned above the conveyor **10** to hold the shells in a straight line. The guide bars are interrupted as indicated in Figure 4 to permit spring-urged arms **22** of the holding device **18** to engage a shell and hold it at position V. The arms **22** of holding device **18** are pivoted on a vertical axis as indicated at **23** and a spring **24** is adapted to urge the shell engaging ends of the arms **22** toward each other. These latter ends of the arms preferably are slightly concave as indicated at **25** to engage the leading shell. However, spring **24** only exerts sufficient force upon the cap shells to hold them stationary during the initial downward movement of a blank into the shell.

The shaft **12** to which drum **11** is fixed is journalled in side plates **26** which extend upwardly from the base of the machine at each side of the drum. Shaft **12** may be driven by a sprocket wheel and chain as indicated at **27** in Figure 5.

Drum **11** has a plurality of shoes or male die elements spaced about its periphery as best shown in Figure 1. It will be observed from this figure, as well as from Figures 5 and 6, that the shoes are secured in recesses **28** spaced about the periphery of the drum and that each shoe includes a base portion **29** provided with a flat outer and leading surface **30** and a trailing arcuate surface **31**.

As is indicated in Figure 1, the flat surface **30** of each shoe **13** is normal to a radius of the drum **11** and, in effect, is a flattened surface on the drum. The flat surface **30** extends between the side surfaces of the drum so that it has a width axially of the drum substantially corresponding to the outside diameter of a band B after the latter has been bent to annular form. Each flat surface **30** has a length circumferentially of the drum which substantially corresponds to the radius of a band after the latter has been bent to annular form. Each shoe **13** has a projection **32** extending radially from the flat portion **30**. In a plane tangential to the drum **11**, the leading wall **33** of each projection **32** is curved on a radius corresponding to the inside radius of the median section P2 of a band B, as is indicated by the projection **32** illustrated at position II in Figure 2. As also shown in Figure 1, the central and leading portion of each projection wall **33** is positioned slightly rearwardly of the leading edge of the corresponding flat portion **30**.

It will also be observed from Figure 1 that the wall **33** has a height radially of the drum very slightly less than the height of a threaded band B. The leading portion **34** of the radially outward wall of each projection **32** may lie in a plane parallel to the flat surface **30** and the trailing portion **35** of this wall can be inclined as illustrated in Figure 1. A band centering lug **36** is fitted in the central and leading portion of the projection **32** so that the front wall **37** of each centering lug projects slightly ahead of the wall **33**. In addition, the centering lug **36** extends radially outwardly beyond the outer wall portion **34** of each projection **32**, the radial height of each projection **36** being slightly greater than the height of a band B. The front wall **37** of each centering projection **36** is adapted to seat between the shoulders B5 provided in the central section P2 of a band B, as indicated at position II in Figure 2.

The curved and trailing surface **31** of each shoe **13** is formed on substantially the same radius as the periphery of the drum **11** but the trailing end **38** of each such surface projects outwardly from the periphery of the drum to a very slight extent. As is best shown in Figures 1 and 4, at its trailing end **38**, each surface **31** is provided with a central lug **39** including a flat outer surface **40**, the side edges of each lug **40** being bevelled as indicated at **41** in Figure 4. Viewed radially of the drum, each curved surface **31** has a length circumferentially of the drum somewhat greater than the radius of a completely curved band B. Bearing in mind that the flat surface **30** of each shoe has a similar dimension circumferentially of the drum, it will be observed that a completely curved band B will lie entirely upon a shoe **13** as indicated at position IV in Figure 1 and with the leading and median section P2 of the band engaged by the leading wall **33** of the shoe projection, while the trailing portion of the band is opposite the flat portion **40** of centering lug **39**.

As best shown in Figures 1 and 2, the band hopper **14** includes side walls **45**, an outer wall **46** and an inner wall **47**. The central portion of each of the front and rear walls **46** and **47** is broken away as indicated in Figure 2 to enable an attendant to perceive how many bands B are in the hopper, as well as to enable bands to be placed in the hopper. The inside width of the chute **14** is slightly greater than the length of a blank band B. As is indicated in Figure 1, the front and rear walls of the chute are spaced apart a distance corresponding to the shorter dimension of a band B. The lower walls **16** of the chute **14** converge, as indicated in Figure 2. At the point where the walls **16** are most closely convergent, they are spaced apart a distance corresponding to the outside diameter of an annularly formed or completely curved band B. It will be observed from Figure 1 that chute **14** extends tangentially of the drum **11** and is preferably positioned in a vertical plane. Also, a radius of the drum normal to the plane of the chute **14** will inter-

sect the converging walls 16 of the chute substantially midway of the length of such converging walls.

At their lower ends the convergent walls 16 of chute 14 join a chute portion 17 curved to conform to but spaced from the periphery of the drum. The inner wall 49 of the curved chute portion 17 is spaced from the drum by a distance slightly greater than the smaller dimension of a band B so that the bands may move between wall 49 and the outer surface of the drum as indicated in Figure 1. The curved portion 17 of the chute also includes side plates 51 having their inner surfaces 52 spaced apart a distance corresponding to the outside diameter of a completely curved band B. As shown in Figure 1, the lower end 53 of curved chute 15 is spaced sufficiently above the conveyor 10 that shells S on conveyor 10 may move beneath the chute. However, as Figure 2 indicates, the side plates 51 extend directly immediately adjacent the shell down to the shell guiding strips 22 of conveyor 10. Walls 52 also extend adjacent the shell holding ends 25 of the shell holding arms 22.

Referring now to the band feeding means 15 for separating the lowermost band B from the stack in chute 14, this means is operated by a cam 55 fixed to the drum shaft 12 and including alternate rises and dwells so spaced and timed as to cause a blank band B to be delivered into the path of the shoes 13 in proper timing for engagement with each shoe. A rod 56 horizontally slidable in a frame 57 is provided with a roller 58 at its inner end and the outer end of rod 56 engages the free end of a rocker arm 59 fixed to a vertically extending pin journalled in a sleeve 61. Pin 60 also has a longer rocker arm 62 secured thereto and, as best shown in Figure 4, rocker arm 62 has a pin and slot engagement with a cross-bar 63. Cross-bar 63 is secured to two horizontal plungers 64 movable transversely of the stack 14 to normally support a group of bands B therein. As indicated in Figure 4, the plungers 64 are so spaced as to engage the outer sections of a band.

Referring to Figure 4, a spring 65 connected between bar 63 and the frame of the machine urges the bar to the right as viewed in Figures 1 and 4, thereby holding the roller 58 in contact with the cam 55 and also urging the stack supporting plungers 64 to the band supporting position illustrated in Figure 1. It will be observed from Figure 1 and also from the enlarged detail of Figure 3 that the inner ends of the plungers 64 are slidable in bores 66 formed in the outer wall 46 of chute 14.

The inner wall 47 of chute 14 has sleeves 67 fixed therein opposite the plungers 64, each sleeve 67 having a bore of a slightly larger diameter than the plungers 64. A second and relatively short plunger 68 is slidable in each sleeve 67, the plunger 68 being urged into the chute, or to the left of Figures 1 and 3, by springs 69 which surround the shanks 70 of the short plungers 68 and bear upon an ear 71 fixed to the frame of the machine. At their inner ends, each short plunger 68 is provided at its uppermost portion with a tooth 72, the upper surface of the tooth being downwardly bevelled as indicated in Figure 3. As shown in Figure 1, left-hand movement of each plunger 68 is limited by contact with the outer end of sleeve 67 of a collar 73 fixed to the plunger.

The plungers 64 and the respectively opposed plungers 68 operate in the following manner to support a stack of bands B and periodically remove the lowermost band from the stack: When the roller 58 of operating rod 56 is in a dwell of the cam 55, as shown in Figure 1, the plungers 64 will be in the position illustrated in Figure 1 so that the stack of bands is supported in a notch 74 on the upper face of each plunger 64. At this time, the plungers 64 extend into the bores of the sleeves 67 so that the short plungers 68 and their teeth 72 are entirely clear of the stack of bands B. As the cam 55 rotates, rod 58 will be moved to the left so that the plungers 64 will likewise move to the left in Figures 1 and 3. Intermediate this left-hand movement, the plungers 64 will reach the position illustrated in Figure 3 and, simultaneously, the toothed plungers 68 under the urging of the springs 69 will move inwardly so that the tooth 72 of each plunger 68 will project between the lowermost band of the stack and the immediately superposed band. Contact with the respective sleeves 67 by the collars 73 on toothed plungers 68 will prevent further inward or left-hand (Figure 1) movement of the toothed plungers. It is to be noted that the above contact of the collars 73 with sleeves 67 takes place before the inner flat faces of the plungers 68 contact with the edge of a band B. In other words, the band will not be clamped in the chute by the plungers 68. Movement of the notch 74 with respect to the bands will cause the lowermost band to tilt slightly so that it will not be nested with the next band above when the teeth 72 engage the stack. When a rise of cam 55 moves directly beneath the roller 58 of operating rod 56, the plungers 64 will move further to the left with respect to Figures 1 and 3 until their ends reach the point indicated by the dotted line 75 in Figure 3. When this occurs, the plungers 64 will be entirely out of band supporting position so that the lowermost band in the stack, viz., the band B below the teeth 72 of the plungers 68, will drop to position I of Figure 2. The teeth 72 will act to support the remainder of the stack of bands until the rise of cam 55 moves from beneath roller 58 of operating rod 56, when plunger 64 will return to the position shown in Figure 1 to thereby force the teeth 72 from beneath the stack and so that the stack may drop from these teeth and directly onto the plungers.

The general operation of the apparatus has been set forth in the opening portion of this description. However, the action whereby blank threaded bands including several arcuate sections are bent to the form of an annulus and then placed in a cap shell is as follows: After a threaded band B, such as illustrated in Figure 7, has been dropped from the stack by the feeding mechanism 15, the band will lie at position I in Figure 2. This position, like that at III in Figure 2, is purely illustrative because with the embodiment of the machine illustrated, bands cannot be at positions I and III when shoes 13 are supporting bands at positions II and IV.

The band at position I will simply be supported at the upper end of the converging portion 16 of the chute by contact of the end portions of the band with the inclined walls. Rotation of the drum 11 will bring a centering lug 37 into engagement with the band at position I, the radially outward end of the lug 37 engaging the band B between the two shoulders B5 on the median section P2 of the band. As the rotation of the drum 11 continues, the band will be drawn downwardly as indicated as position II in Figure 2. During this movement, the convergence of the walls 16 will cause the end sections P1 and P3 of the band to bend upwardly on the hinge portions B1, and relatively to the median section P2 of the band. However, the outer sections P1 and P3 will not bend within their lengths and the median section P2 obviously cannot bend within its length because of its contact with the leading wall 33 of a shoe or male die 13. In other words, all bending action is at the hinge portions B1 so that the arcuate sections will not be marred or distorted in any way.

As the band B is moved further downwardly between the converging walls 16, the bending upon the hinges B1 continues until the band has the form illustrated at position III in Figure 2. It will be observed from position III that the end portions P1 and P3 of the band are not yet entirely clear of the converging walls 16 and, therefore, the free ends B6 of these sections have not yet come into contact to form an annulus. However, the ends B6 will come into contact to form an annulus when the band has moved slightly further downwardly so that the point of greatest diameter of the band has passed between the point of closest convergence of the walls 16.

Summarizing the above bending or forming action, it

will be observed that while the median section P2 of a band B is held, force is applied to the arcuately concave surfaces of the non-median sections P1 and P3 by the converging walls 16. Furthermore, the force is first applied to the outer end portions of the sections P1 and P3 and then successively along them to a point adjacent the ends of the median section P2.

It will be observed that the movement by the shoe 13 of a band along the converging walls 16 and between the points of closest convergence of the walls 16 results in an action analogous to die forming. In other words, the walls 16 have the effect of a female die, while the shoes 13 have a male die effect.

As is indicated above, position IV of Figures 1 and 2 illustrates a band B bent to the form of an annulus and with its ends in contact. The same formation is illustrated at position IV in Figure 1 but Figure 1 also illustrates how the lower and leading portion of the band then rests upon the inner and upper surface 49 of the curved chute portion 17. This position of the band is possible because of the curved formation of the trailing surface 31 of a shoe 13. In other words, as the bands move downwardly through the chute portion 17, they rock on a horizontal axis, the point of rocking on the shoe 13 being at the point where the flat surface 30 of the shoe is joined by its curved surface 31. In any event, the result is to space the leading portion of the band outwardly and away from the surface of the drum 11 and to bring the trailing portion of the band somewhat closer to the drum surface than would be the case if the curved surface 31 were not provided.

Position V in Figures 1 and 5 illustrates the relative position of a band B and a shell S at the moment that the drum 11 moves a band into engagement with a shell. It will be observed from these two showings that the leading portion of the band has entered the shell and has been brought into engagement with the inside leading wall of the latter. The position of the shell S at this time is also indicated by position V of Figure 4 from which it will be observed that the shell is lightly held against forward movement by the holding means 18. At this instant, the trailing portion of the band is inclined upwardly. In other words, the lowermost and leading portion of the band is in contact with the skirt and top wall of the shell S and the trailing portion of the band is still slightly above the shell but the entire band is rocking at the apex of the surfaces 30 and 31 of the shoe 13.

Because a band B is in contact with the inner surfaces 52 of the side walls of curved chute portion 17 until at least position V is reached, the band cannot spring outwardly from an annular form. From that point onwardly, the fact that somewhat more than the leading half of the band is within the walls of the shells S at position V will prevent spreading movement.

Furthermore, as the shell S is drawn forward to the position illustrated in Figure 6, and free of the holding device 18, the downward pressure exerted by shoe 13 upon the trailing portion of the band, together with the fact that the major length of the leading portion of the band is already surrounded by the shell skirt will result in a positive action guiding the trailing ends of the band down into the trailing portion of the cap skirt. In short, once the major length of the leading portion of the band is guided down into the shell, the trailing portion must follow down into the shell. Figure 6 further illustrates the action of the trailing curved surface 31 in forcing the band downwardly into the shell, as well as the final action of the lug 39 in pressing the trailing portion of the band into the shell.

After a shell S has had a band inserted therein as illustrated in Figure 6, the shell may be moved by conveyor 10 to an apparatus for curling the shell skirt downwardly over the upper edge flange B3 of the band to lock the band in position in the shell and in accordance with the usual practise. The movement of the conveyor 10 will also bring a second shell S into contact with the shell holding element 18 in readiness for the insertion of a band B therein.

It will be perceived that the band B is particularly advantageous in connection with a method included in my invention. In more detail, the provision of a band provided with an odd number of threaded sections enables the holding of a portion of the band, namely, the median section P2, against movement and bending while force is successively applied along the remaining sections. Furthermore, the shoulders B5 are extremely advantageous because they prevent the lengthwise movement of the band during its bending and insertion in a shell S.

The terminology used in the specification is for the purpose of description and not of limitation, the scope of the invention being indicated in the claims.

I claim:

1. Apparatus for inserting a threaded band in a cap shell comprising means to support a shell with its skirted portion uppermost, means to support a threaded band, moving means opposite the skirted end of a shell on said support to engage a band and carry it to and insert it in the shell, means in the path of movement of said moving means to cooperate with the latter to bend the band to the form of an annulus and maintain the band in annular form while the band is placed within the shell.

2. Apparatus for inserting a threaded band in a cap shell comprising means to support a cap shell with its skirted portion uppermost, a member movable opposite the skirted portion of a cap shell on said support and provided with means to engage a band, means cooperating with said member to support and bend the band to annular form, said member including means to guide the leading portion of the annular band into the shell and to press the trailing portion of the band into the shell.

3. Mechanism for inserting a resiliently expansible threaded band including terminal ends in a cap shell including a top wall and skirt, comprising a band supporting element, a shoe rigid with said element movable in an arcuate path, a projection on said shoe including a leading portion which is convexly curved about an axis radial to said path and having a radius slightly smaller than the inside radius of the shell skirt, means cooperating with said projection to retain a band moving through said path curved and contracted about the axis of said convex leading portion of said projection with the centrally lengthwise portion of the band in contact with such convex leading portion of the shoe projection and with the terminal ends of the band in abutting relation, a shell supporting surface extending tangential to a point intermediate the length of said path, said surface being arranged to receive the top wall of a cap shell and being radially spaced from said path a sufficient distance that the free edge of the skirted end of the shell will be immediately adjacent said path, means to move said band supporting element in such direction in said path that the leading and central portion of the band will contact with the inner wall of the shell skirt, and shell holding means to hold the cap shell against free movement along said supporting surface during such contact of the band and skirt, said shell holding means being operative to then release the shell for movement along said shell supporting surface, said shoe including a second projection at its trailing end to then press the trailing ends of the band into the shell.

4. Mechanism of the character described in claim 3 wherein said band supporting element is a rotary drum provided with a circumferential series of said shoes.

5. Mechanism of the character described in claim 3 wherein said means cooperating with said shoe projection to retain a band curved and contracted comprises fixed guide plates to laterally engage a band carried by said band supporting element.

6. Mechanism of the character described in claim 3 wherein said means to hold the cap shell against move-

ment and then release it for movement includes a spring-loaded arm.

7. Mechanism for inserting a resiliently expansible threaded band including terminal ends in a cap shell including a top wall and skirt, comprising a band supporting element, a shoe on said element movable in an arcuate path, said shoe including two faces lying substantially in and tangential to said path and at an angle to each other, one of said faces leading the other with respect to said path, a projection on said leading face of said shoe, said projection including a leading portion which is convexly curved about an axis radial to said path and having a radius slightly smaller than the inside radius of the shell skirt, means cooperating with said projection to retain a band moving through said path curved and contracted about the axis of said convex leading portion of said projection with the centrally lengthwise portion of the band in contact with such convex leading portion of the shoe projection and with the terminal ends of the band in abutting relation, a shell supporting surface extending tangential to a point intermediate the length of said path, said surface being arranged to receive the top wall of a cap shell and being radially spaced from said path a sufficient distance that the free edge of the skirted end of the shell will be immediately adjacent said path, means to move said band supporting element in such direction in said path that the leading and central portion of the band will contact with the inner wall of the shell skirt, and shell holding means to hold the cap shell against free movement along said supporting surface during such contact of the band and skirt, said shell holding means being operative to then release the shell for movement along said shell supporting surface, the non-leading face of said shoe including a second projection at its trailing end to then press the trailing ends of the band into the shell.

8. Mechanism of the character described in claim 7 wherein said band supporting element is a rotary drum provided with a circumferential series of said shoes.

9. Mechanism of the character described in claim 7 wherein said means cooperating with said shoe projection to retain a band curved and contracted comprises fixed guide plates to laterally engage a band carried by said band supporting element.

10. Mechanism of the character described in claim 7 wherein said means to hold the cap shell against movement and then release it for movement includes a spring-loaded arm.

11. Apparatus for inserting a resiliently expansible threaded band including two terminal ends in a skirted cap shell comprising a base, a member provided with a rigid radial projection and movable relative to said base through an arcuate path to engage the interior median portion of the threaded band to move the latter in such path, means to move said member in said path, supporting means to support a cap shell in a plane substantially tangential to the path of movement of said projection and with the skirted portion of the shell facing said projection, band engaging means including spaced strip elements at each side of the arcuate path of movement of said projection to engage diametrically opposite exterior points of the band to hold it to annular form with its terminal ends in abutting relation and with an outside diameter corresponding to the inside diameter of the cap skirt, the outfeed of said band engaging means being immediately adjacent the edge of the cap skirt on said supporting means, said member and band engaging means cooperating to maintain the leading portion of the band closest to the plane of the cap shell so that said leading portion of the band will first engage the interior of the cap shell, and means on said member spaced behind said projection to press the trailing portion of the band into the shell skirt.

12. Apparatus of the character described in claim 11 wherein said member is a rotary drum provided with a circumferential series of said radial projections, and said band engaging means comprises plates fixed to said base.

13. Apparatus of the character described in claim 11 wherein said means on said member spaced behind said radial projection also is a radial projection rigidly mounted on said member.

14. Apparatus of the character described in claim 11 wherein said cap supporting means is a straight-line conveyor and including means to momentarily hold the cap shell against movement with the conveyor during insertion of the leading portion of a band therein.

15. Apparatus for inserting a threaded band in a cap shell comprising means to support a shell with its skirted portion uppermost, a rotary member, a chute having a first section including side walls spaced apart in accordance with the length of a threaded band in a direction parallel to the axis of said rotary member and converging to a point at which they are spaced apart by a distance corresponding to the inside diameter of the cap shells, said chute including a second and arcuate section including parallel side walls extending from the convergent ends of the side walls of said first section and arranged concentric with and adjacent a portion of the periphery of said rotary member, said rotary member having a series of circumferentially spaced projections on its periphery including means to guide the leading portion of the annular band into the shell and to press the trailing portion of the band into the shell, said rotary member having its axis so located with respect to said chute that rotation of said member will cause one of said projections to engage a threaded band while the latter is in said first chute section and move the band through said second chute section, the chute side walls and rotary member cooperating to bend the band to the form of an annulus and maintain the band in annular form while it is placed within the shell.

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