



**June 15, 1937.**

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**2,083,539**

MACHINE AND PROCESS FOR MAKING BOTTLE COLLARS AND THE LIKE

Filed Nov. 12, 1934

4 Sheets-Sheet 2.

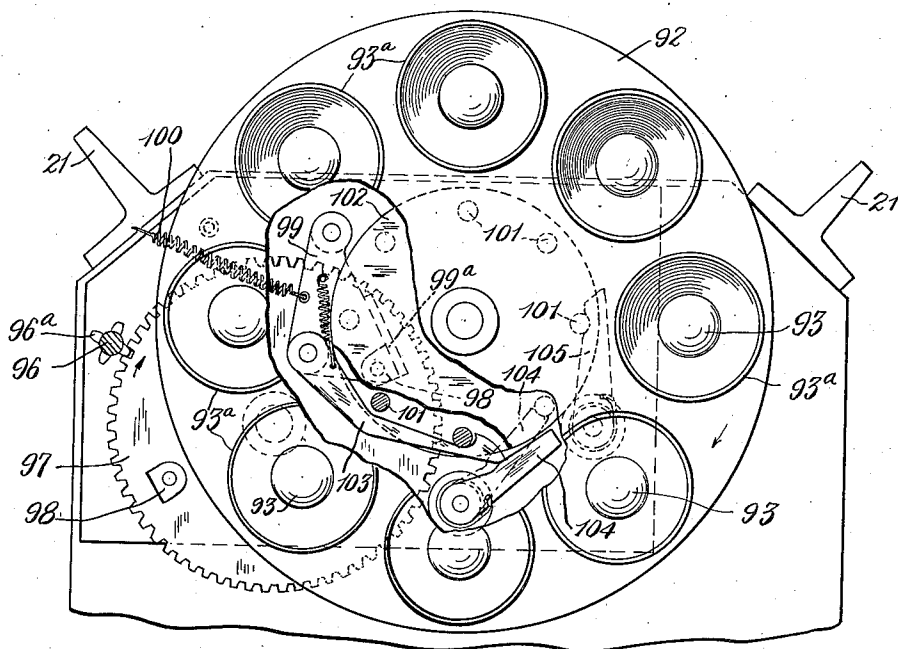


FIG. 3

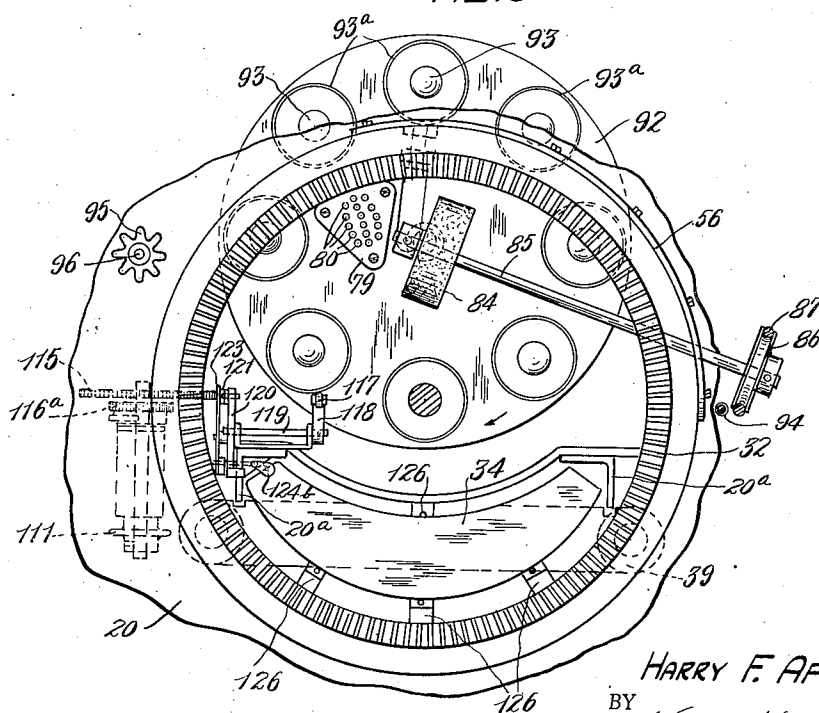


FIG. 2

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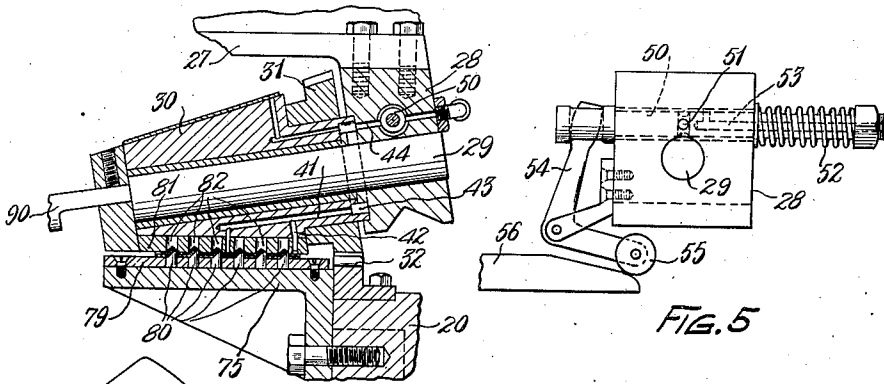


FIG. 4

FIG. 5

FIG. 13

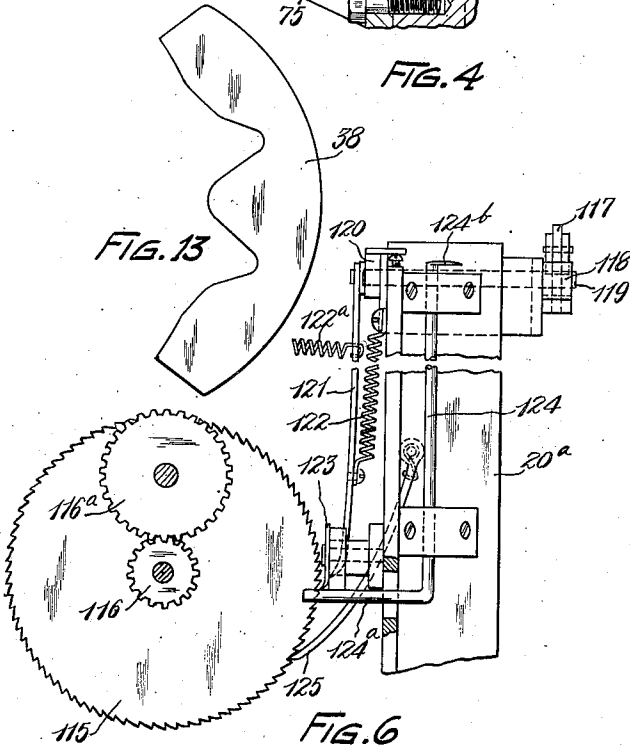


FIG. 6

FIG. 12

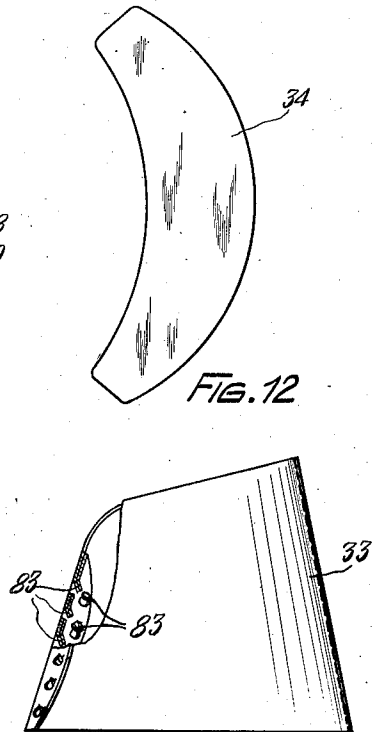


FIG. 14

FIG. 15

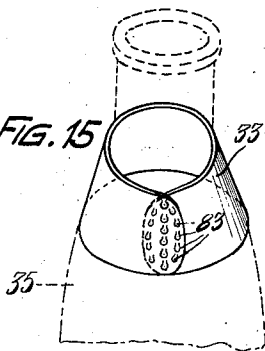
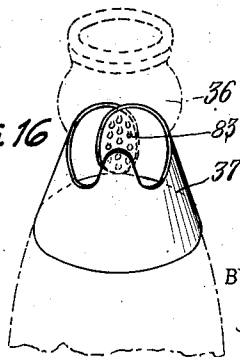


FIG. 16



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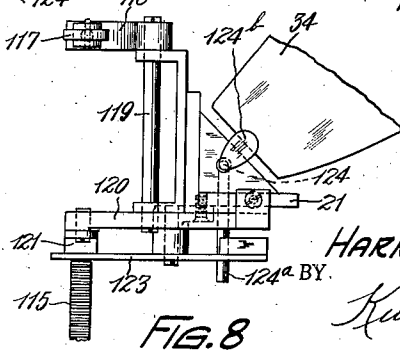
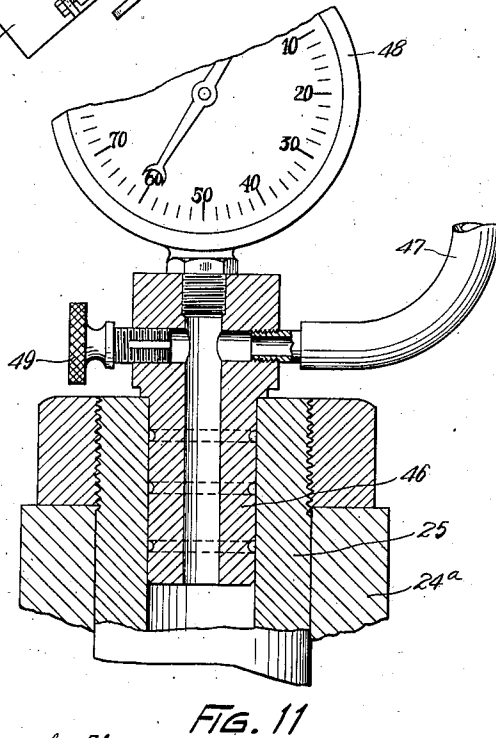
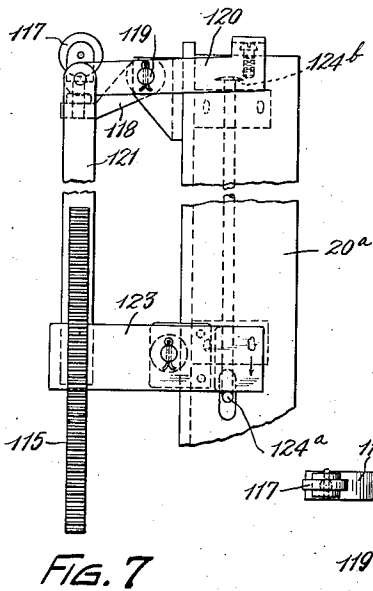
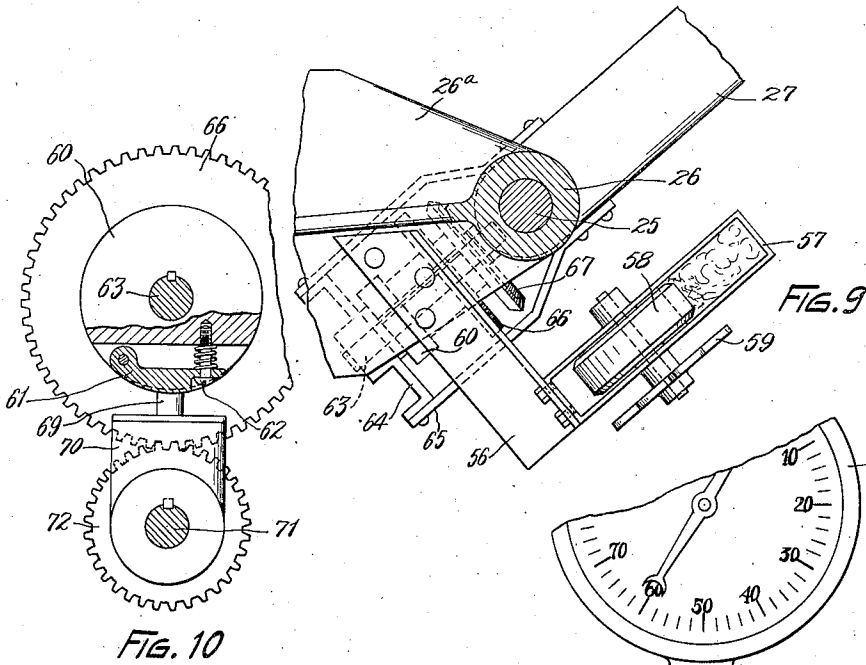
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4 Sheets-Sheet 4



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## UNITED STATES PATENT OFFICE

2,083,539

MACHINE AND PROCESS FOR MAKING  
BOTTLE COLLARS AND THE LIKE

Harry F. Affelder, Cleveland Heights, Ohio

Application November 12, 1934, Serial No. 752,666

19 Claims. (Cl. 93—79)

This invention relates to a machine and a process for making various articles which may be formed from paper and other flexible material in a variety of shapes, such as conical, frusto-conical, cylindrical, pyramidal, and the like.

The machine and process of the present invention may be used for the production of articles for many specifically different purposes, as, for example, bottle collars and like articles for bearing advertising and descriptive matter, containers for temporary use, such as cones used in retailing ice cream, lamp shades, small megaphones, horns, squawkers, and other inexpensive toys.

Articles produced by the present invention are formed from properly shaped strips of paper or other suitable flexible material by rolling the strips, one at a time, around a former which preferably has both rotating and revolving motions, and suitably fastening together the ends of the strip by either or both of two methods, i. e., by punching and laterally displacing tabs in the overlapping ends, and by pasting the overlapping ends together. Preferably both methods are employed.

This application is in part a continuation of my prior application Serial No. 725,562 filed May 14, 1934, in which application I describe a milk bottle collar formed by the process referred to above carried out by the machine or apparatus which, together with various phases of the process, constitute the subject matter of the invention.

The principal object of the present invention is to provide a method and a machine by which articles of the type referred to can be produced effectively and rapidly, and therefore inexpensively.

Other objects are to provide a machine which is compact, durable, and rapid and reliable in action and composed of parts which cooperate to accomplish the general or main object stated above.

The invention may be here briefly summarized as consisting in certain combinations of parts, details of construction, and steps of the improved process which will be described in the specification and set forth in the appended claims.

In the accompanying sheets of drawings, wherein I have shown a preferred embodiment which operates very effectively in the production of bottle collars:

Fig. 1 is a side view of the machine;

Fig. 2 is an enlarged sectional view substantially along the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on a still larger scale along the line 3—3 of Fig. 1;

Fig. 4 is a sectional view through the frusto-conical former and certain associated parts;

Fig. 5 is a fragmentary view showing a detail of the suction means employed in connection with the former to pick up strips of paper;

Fig. 6 is a fragmentary detail view showing certain elements which form a part of the elevating mechanism for the platform which supports a stack of previously formed strips from which the articles are produced;

Fig. 7 is another view of the same looking toward the right of Fig. 6;

Fig. 8 is a top plan view of the major portion of the mechanism shown in Figs. 6 and 7 on a larger scale than shown in Fig. 2;

Fig. 9 is a sectional view substantially along the line 9—9 of Fig. 1, showing particularly the gum box for supplying the adhesive which is preferably applied to one end of each strip before it is formed into the article in question;

Fig. 10 is a sectional view taken substantially along the line 10—10 of Fig. 1, showing another detail of the adhesive applying mechanism;

Fig. 11 is a detail sectional view through the top of the main vertical shaft showing part of the vacuum or suction means utilized in causing the strip to be wrapped around and held onto the former from the time that it is picked up from the stack until the tabs are punched in the overlapping ends of the strip to fasten them together;

Fig. 12 is a view showing an arc-shaped strip for making one form of bottle collar;

Fig. 13 is a view showing another strip for making a somewhat differently shaped bottle collar;

Fig. 14 is a side view, on an enlarged scale, showing the collar which is produced from the strip of Fig. 12; and

Fig. 15 and 16 are views somewhat in perspective showing portions of two different shapes of bottles for receiving the collars produced from the strips of Figs. 12 and 13 respectively.

Referring now to the drawings, the machine has a horizontal bed or table 20 which is supported from the floor by legs 21. At one side of the bed is an upstanding standard 22 supporting a motor 23 which, through reduction gearing 24, drives a vertical centrally disposed shaft 25 supported in bearings located in the boss 26 of an arm 26a extending inwardly from the standard 22. The shaft has at the top a bevel gear 24a which forms a part of the reduction gearing 24 and will be referred to later.

Secured to the lower end of the shaft 25 so as to rotate therewith is an arm 27 on the lower free end of which is a block 28 supporting a diagonally disposed shaft 29 (see Fig. 4) on which is journaled a frusto-conical former 30 which extends inwardly with respect to the base or frame 20 with its axis inclined downwardly and intersecting the vertical axis of the machine. At the larger end of the former 30 is a bevel pinion 31 which engages a bevel ring gear 32 supported in fixed position on the bed 20. Consequently, as the shaft 25 and the arm 27 are rotated, the bevel pinion 31 is caused to roll around the ring gear 32, with the result that the former 30 revolves about the vertical axis of the machine and rotates on its own axis.

On each revolution of the former, there is adapted to be wrapped around its conical surface a strip of paper or the like from which one of the articles is to be produced, with the ends of the strip overlapping. While the former here shown is of frusto-conical shape, the particular shape will depend upon the shape of the article to be produced. That is to say, the former will have a frusto-conical shape when the article produced is frusto-conical. On the other hand, if the articles to be produced on the machine are conical, cylindrical, or otherwise shaped, of course the former will be similarly shaped. The machine having a former as here shown is designed for making bottle collars which may have the shape shown in Figs. 14 and 15 at 33, in which event there will be used strips of flexible material which, for convenience, will be referred to as paper, such as shown in Fig. 12 at 34. The collars 33 are adapted to be fitted onto a bottle 35, as shown in Fig. 15. On the other hand, with a bottle having an enlarged cream line neck portion, such as the bottle 36 of Fig. 16, the collar is preferably differently shaped, as shown at 37 in Fig. 16, in which event I use a paper strip such as shown at 38 in Fig. 13. In this connection, I might add that the collars may be otherwise shaped to suit specially shaped bottles, and, regardless of whether or not the bottles are specially shaped, the strips and collars may be specially shaped for ornamental and like purposes.

During each cycle of the revolving and rotating movements of the former 30, the latter picks up and causes to be wrapped around its frusto-conical surface, as stated above, one of the strips. For this purpose I arrange beneath and just inside the ring gear 32 an elevator 39 on which is adapted to be placed a stack of the strips (see Fig. 2) which in this instance consists of the strips 34 shown in Fig. 12, the arrangement being such that the former rolls over and picks up the uppermost strip of the stack during each cycle. By reference to Fig. 1 it will be seen that the elevator 39 is slidably mounted on vertically disposed guides 40. The manner in which this elevator is caused to automatically move upwardly to keep the uppermost strip of the stack at the right height relative to the former 30 will be explained presently.

Suction means is utilized to cause the strip to be firmly held to and wrapped around the former 30, and to accomplish this, suitably arranged air ports 42 extend from the periphery or outer surface of the former inwardly to a passageway 41 (see Fig. 4) which in turn is connected to an annular passageway 43 at the larger or outer end of the former 30. From this annular passageway 43 a passageway 44 extends through

the supporting block 28 at the outer end of the arm 27, and connected to the outer end of this passageway 44 is a suction tube 45 the inner end of which is connected to an opening extending axially through the central vertical shaft 25, this tube of course rotating with the arm 27, block 28, and former 30. In the upper end of the vertical opening through the shaft 25 is seated a fitting 46 (Figs. 1 and 11), and to this is connected a suction tube 47 leading to a vacuum pump not shown. A vacuum gauge 48 at the top of the fitting is preferably provided and an adjusting screw 49 is screwed into a passageway leading into the central passageway of the fitting, the shank of the screw being slotted so that, by exposing more or less of the slot, air can bleed into the fitting to adjust the degree of vacuum exerted in the suction line including the ports and passageways in the former 30, as may be desired. The fitting has a close fit in the top of the shaft 25 but does not rotate with the shaft, as the stiffness of the tube 47 is sufficient to hold it against rotation.

Thus as the rotating and revolving former 30 rolls over the uppermost strip of the stack, the suction exerted on the uppermost strip which the roller engages causes the strip to be wrapped closely about the surface of the former, and the suction continues to be exerted on the strip until its ends are securely fastened together in a manner to be explained, but after the ends are fastened together, it is desired that the suction exerted on the strip be released so that the formed article, such as the collar 33, may be stripped from the former. To relieve this suction at the desired point and, in fact, for a predetermined part of the travel of the former in its cycle of revolving movement, the block 28 is intersected by a passageway in which is slidably mounted a valve in the form of a slide bolt 50. The passageway in which the bolt 50 slides intersects the vacuum passageway 44, as shown in Fig. 4, but the bolt has an annular groove 51 (see Fig. 5) which normally establishes communication with the two parts of the passageway 44 on opposite sides of the bolt as long as the bolt is in normal position to which it is held by a spring 52 as shown in Fig. 5. However, when the former reaches a given position, the bolt is moved endwise so as to close the suction or vacuum system and at the same time to bleed or relieve the vacuum between the block 28 and the surface of the former 30 by bringing a relief port 53 (Fig. 5) into register with that part of the passageway 44 which extends from the block 28 to the former.

The bolt is caused to be moved in an endwise direction against the tension of spring 52 to relieve the vacuum exerted on the inner surface of the article on the former 30 by a bell crank 54 having one arm connected to the bolt 50 while its other arm has at its free end a roller 55 which rides up onto a cam track 56 which extends partway around the frame or bed 20 outside of the ring gear 32, as best shown in Fig. 2, a portion of the cam track being shown also in Figs. 1 and 5.

Before the former 30 rolls up onto the surface of the uppermost strip 34 of the stack which is supported on the elevator 39, a small quantity of adhesive is deposited on the end of the strip remote from that which the rotating and revolving former first engages, so when the strip is completely rolled on the former the overlapping ends will be held together by the adhesive. To apply the adhesive to the end portion of the strip

before it is picked up, the following mechanism is utilized:

Mounted in stationary position above the rotating arm 27 on a frame 56 secured to the inwardly projecting arm 26a of the standard 22 is a gum box 57 (Figs. 1 and 9) in the sides of which is journaled a small shaft carrying a gum roller 58 the surface of which is adapted to contact with the gum in the box, as will be apparent from Fig. 9. On one end of the shaft carrying the gum roller 58 is a star wheel 59. During each revolution of the arm 27, adhesive is transferred from the periphery of the roller 58 onto the surface of a rotating and revolving roller 60 (Figs. 1 and 10) preferably on a yieldable part of the periphery of the roller 60, and in this instance on the arc-shaped surface of a yieldable dog 61 pivoted in a slot in the roller 60 the free end being pressed out by a spring surrounding an adjustable retaining screw 62, as clearly indicated in Fig. 10. By having the adhesive transferred from the surface of the roller 58 onto a yieldable member at the periphery of the roller 60, the necessity for fine adjustments is done away with.

This roller 60 is fixed to a short horizontal shaft 63 which projects from the inner end of and is in line with the rotating arm 27. This shaft 63 has its inner end journaled in the adjacent end of arm 27 and its outer end is supported and journaled in a bracket 64 which in turn is supported by a frame 65 secured to and projecting from the arm 27, as clearly shown in Fig. 9. Also fixed to rotate with the shaft 63 is a spur gear 66 and a bevel gear 67, the latter engaging a stationary bevel gear 68 fixed to the lower inner part of the arm 26a concentric with respect to the shaft 25. By reason of this arrangement, the roller 60 revolves around the axis of the main vertical shaft 25 and it rotates with its supporting shaft 63, and each time that it passes the lower surface of the roller 58, a film of adhesive is applied to the arc-shaped surface of the dog 61.

From the surface of the dog 61 the adhesive is transferred to yieldable fingers 69 (see Figs. 1 and 10) at the free end of a rotating and revolving arm 70 which is fixed to a short horizontal shaft 71 journaled in the lower end of the revolving bracket 64 which, as previously stated, is supported by the frame 65 secured to the revolving arm 27. Also fixed to this short shaft 71 is a pinion 72 which engages a spur gear 66 on the upper horizontal shaft 63. By reason of this arrangement, the applying fingers 69 are carried around with the revolving arm 27 and they rotate about the axis of shaft 71. As they are passing through the upper arc of the circle in which they rotate, they pick up adhesive from the surface of the dog 61, and when they are rotating through the lower part of the circle they touch and transfer the adhesive onto the end portion of the uppermost strip 34.

In this instance, the pinion 72, because of lack of space, is made one-half the size of the gear 66, in which event the fingers 69 rotate twice while the upper roller carrying the dog 61 makes one rotation, but that is immaterial since it simply means that the adhesive applying fingers 69 rotate twice about the axis of the shaft 71 while they revolve once about the vertical axis of the machine, and therefore make one idle stroke and then an adhesive applying stroke, etc. That is to say, at each alternate rotation the fingers apply adhesive to the uppermost strip 34.

The roller 58 which projects into the gum box 57 is preferably turned at each revolution of the

revolving arm 27 so that there will always be plenty of adhesive on the lower part of the periphery of the roller, and for this purpose I provide at the top and outer portion of the bracket 64 a roller 73 (see Fig. 1) which on each revolution of the arm 27 strikes one of the teeth of the star wheel 59 and rotates it and the gum roller 58 a predetermined amount. To limit the rotative movement given to the star wheel and therefore to the gum roller 58, a stop pin 74 is arranged so that its lower end projects into the path of the upper tooth of the star wheel. This pin, which is spring-pressed downwardly, is movably supported in a strap 75 secured to a frame 76 projecting laterally from the upper part of the boss 26 supporting the main vertical shaft 25 (see Fig. 1). At the top of the pin 74 is a roller 77 which rides on the upper surface of the large bevel gear 24a which is secured to the top of the vertical shaft 25, and on the top of this bevel gear 24a is a cam or boss 78 which at each revolution of the gear 24a momentarily lifts the roller 77 and therefore the pin 74 just before the roller 73 engages the lowermost tooth of the star wheel so as to allow the star wheel to be turned through an arc equivalent to the distance between two adjoining teeth and not more than that distance, the lower end of the pin 74 being released and moving down into the path of the tooth next to the one which it had previously engaged so as to limit the movement of the star wheel and therefore of the gum roller 58 to the amount desired.

I do not regard it essential that the adhesive be applied precisely as here shown, that is, to the end of the strip remote from the one which is first rolled onto the former, for it may be applied onto the other end of the strip when the strip is partly rolled onto the former.

Furthermore, I do not regard it essential that the gum roller be turned by the specific mechanism herein illustrated, i. e., through the medium of the star wheel 59 and of the roller or equivalent means which revolves with the head. Obviously, a pawl and ratchet mechanism operated from a cam or other means on the rotating bevel gear 24a could be employed.

Next in the cycle of operations tabs are punched in the ends of the strip wrapped around the former 30. For this purpose there is provided a flat punch plate 79 in fixed position just inside the ring gear 32 at a height such that the former 30 will roll over it and at the desired point circumferentially of the ring gear with reference to the stack of strips 34, this punch plate being in this instance supported by a bracket 75 secured to the bed 20, as clearly shown in Fig. 4. This punch plate carries a series of punches 80 corresponding in number and arrangement to the number and arrangement of the tabs which are to be punched in the overlapping ends of the strip which is wrapped around the former 30. Likewise, there is provided on the conical surface of the former 30 a die plate 81 (which forms a part of the conical surface), this die plate having a series of dies or openings 82 corresponding in number and arrangement to the series of punches 80, the whole being so arranged that at each revolution of the former 30 the die plate 81 rolls over the punch plate 79 so that the protruding ends of the punches will enter the die openings. The overlapping ends of the strip 34 which is wrapped around the former 30 cover the die openings 82 of the die plate 81 so that, as the revolving and rotating former 30 rolls over the punch plate, tabs 83 are punched inwardly in the over-

lapped ends of the strip, thus locking the ends of the strip together and completing the formation of the article, which in this instance is the bottle collar 33 of Figs. 14 and 15.

- 5 In stating that the former 30 rolls over the punched plate, the word "over" is used in a broad sense, meaning that there is a relative rolling action between the former and the punch plate. For example, the punch plate may be supported at the proper level above the bed so that the  
10 former will roll along its surface beneath the same.

Naturally, the shape of the tabs 83 will depend upon the shape of the cooperating punches and  
15 dies. Preferably the ends of the punches are inclined and only portions of the inclined ends extend through the die openings in the formation of the tabs so as to provide uncut necks or unsevered portions which support the tabs. Obviously, the distance that the inclined ends of the punches project into the die openings determines the width of the unsevered or neck portions, which in this instance are chords of the circles defining the tabs, which chords are of less  
25 length than the diameter of the tabs. As the tabs, when punched, are deflected inwardly, they effectively lock together the ends of the collar or other article which is produced, and practice has demonstrated that the seam or joint thus  
30 formed, whether or not the adhesive is used, will yield or open only as a result of a considerable pull on the joined ends of the article as the tabs collectively withstand a very considerable shearing stress.

35 As soon as the former 30 passes the punch plate, the article, which is now completed, is stripped off the former at its smaller or inner end, and in this instance slides down into or onto any suitable receiving member. The stripping of  
40 the articles from the former 30 is preferably accomplished by a suitable stripper wheel 84 which is rotatably supported on the frame or bed 20 inside the ring gear close to the punch plate 79, as clearly indicated in Fig. 2, so that as the former  
45 30 passes the punch plate the collar or other article thereon comes in contact with the periphery of the stripper wheel which may be formed of rubber, such as sponge rubber, and causes the article to be slid off the former 30  
50 onto or into the receiving member. It will be remembered that the suction, which causes the strip to be picked up and held on the former is automatically relieved just before the stripper wheel engages the formed article to remove it  
55 from the former 30. In this instance the stripper wheel is mounted on a shaft 85 provided at its outer end with a sheave 86 engaged by a driven belt 87 (Figs. 1 and 2) passing around a second sheave 88 at the outer end of an upper horizontal shaft 89 supported on the frame 76 and  
60 provided at its inner end with a bevel pinion which engages and is rotated by the horizontal bevel gear 24a at the top of the machine.

As previously stated, it is not essential to the  
65 main features of the invention that the collars or other articles when stripped from the former 30 be received in or on any particular receiving member. However, I have provided as a part of this machine and as an important adjunct for the  
70 attainment of the highest efficiency a very effective receiving, stacking and counting mechanism which will next be referred to.

In this instance, the articles when stripped from the former pass down a gooseneck 90 which forms  
75 a continuation of the non-rotating shaft or stud

29 about which the former 30 rotates, this gooseneck being a pipe or rod which projects from the inner end of the shaft or stud 29, as indicated in Figs. 1 and 4, and having a vertical portion which extends down beneath the bed 20 in line with the axis of the machine and therefore in line with the axis of revolution of the forming head. Supported a suitable distance beneath the bed is a stationary platform 91, and above this is a turntable 92 supported at its center from the platform 91 so that it may be turned or indexed in a horizontal plane, and projecting up from this turntable is a series of receiving pins 93 with conical cups 93a surrounding their lower ends. The axis of rotation of this turntable is so located that as the turntable is indexed the pins 93 will come directly beneath or in vertical alignment with the lower end of the gooseneck 90 down which the collars or other articles slide when stripped from the former 30.

In conjunction with this turntable with its upstanding receiving pins 93, I provide an indexing mechanism which gives a quick indexing movement to the turntable in the brief interval between the delivery of two successive collars or formed articles after a predetermined number have been received in nested relation on the receiving pin immediately beneath the delivery member 90. This indexing mechanism is operated by a roller 94 (see the righthand side of Fig. 1) which roller is supported on the outer face of the block 28 which supports the former 30. On each revolution of the block and former, this roller engages and moves one step a star wheel 95 (see the lefthand side of Fig. 1) mounted on the top of a vertical shaft 96 suitably supported by the frame of the machine and having an enlarged lower end toothed at 96a, the teeth engaging the teeth of a gear 97 rotatably supported in horizontal position on the platform 91, this gear having on its upper surface two lugs 98 spaced 180° apart. The gear 97 is thus moved step by step at each revolution of the former 30. I might add at this point that it is not at all necessary that there be two lugs 98 on the gear 97 spaced 180° apart, as there may be three or more equally spaced around the axis of the gear, depending upon the number of articles which are to be delivered between successive indexing movements. Furthermore, the indexing of the gear 97 and the vertical shaft 96 may be accomplished by a pawl and ratchet mechanism rather than by the star wheel 95 and revolving roller 94.

Supported on the stationary platform 91 is a somewhat triangularly shaped lever 99 which extends over the gear 97 and is provided with a downturned flange 99a, shown in dotted lines in Fig. 3 and by full lines in Fig. 1, which flange is in the path of and is adapted to be engaged successively by the lugs 98 carried on the top of the gear 97. A spring 100 is connected to the lever 99 and tends to pull it outwardly away from the center of the turntable 92, as indicated in Fig. 3. On the lower side of the turntable 92 is an annular series of pins 101 which in this instance extend between a pair of circular plates 102 which, together with the pins, form a unit which is fixed to the lower side of the turntable concentric therewith, the pins being spaced an equal distance apart and being equal in number to the number of article receiving pins 93 projecting upwardly from the top of the turntable. Pivotaly mounted on the lever 99 is an indexing finger 103 which is adapted to extend inwardly between the plates 102, this finger having at its free end a

hook which is adapted to engage behind one of the pins 101 in the manner indicated in Fig. 3.

As the gear 97 is moved circumferentially step by step, each of the lugs 98 successively engages the downturned flange 99a of the lever 99 and cams it inwardly, substantially the innermost position being shown in Fig. 3. As the lever is being cammed inwardly against the tension of spring 100, the finger 103 also moves inwardly and its hooked free end finally engages behind one of the pins 101. The lug 98 then rides beyond the flange 99a of lever 99, whereupon the spring 100 pulls the lever with a quick motion back to normal position against a suitable stop, and, in so doing, the finger 103 gives the turntable a quick indexing motion so as to move one receiving pin 93 away from beneath the delivery member 90 and to bring the next succeeding pin into alignment with the delivery member, this occurring when the pin beneath the delivery member has received a predetermined number of formed articles.

Normally, a stop pawl 104, which is pivoted on the platform 91 and is urged inwardly by a spring, stands in the position indicated by dotted lines in Fig. 3 in engagement with one of the pins, but as the lever 99 is cammed inwardly in the manner just explained, the finger 103, which is spring-pressed inwardly, serves to move the stop pawl 104 to the full line position shown in Fig. 3 or out of engagement with the pin which is engaged in the dotted line position, so as to make it possible for the finger to give the turntable the quick indexing movement when the roller rides off the flange 99a of lever 99, but as soon as the finger moves away from the stop pawl 104 during the indexing movement, the latter again moves inwardly under the action of the spring to engage the next succeeding pin and thus stops the turntable and limits its movement to the desired amount, which, in this instance, is one-eighth of a revolution since there are eight of the pins 101 and eight of the article receiving pins 93. This, of course, may be varied as found convenient. Additionally, a second spring-pressed pawl 105 is mounted on the platform 91 and has a notch which engages the pin beyond that which is normally engaged by the end of the stop pawl 104 so as to hold the turntable steady, especially during the period that the stop pawl 104 is being cammed outwardly and when the lever 99 and the finger 103 are being positioned to impart the indexing movement to the turntable.

It will be apparent that it is not essential that the articles which are produced by this machine be received on pins, such as the pins 93, as other receiving members or receptacles, such as conical or cup-shaped receptacles 93a, shown in Figs. 1 and 3, may be employed. Obviously, closed articles, such as cones, could not be received on pins. In such cases, other receiving and nesting means would be required. Furthermore, it is not necessary that the receiving pins or other members be mounted on a platform as they could be mounted on a belt or chain which would extend out to any point at which the articles could be conveniently removed from the receiving members.

In brief, the machine so far described operates as follows:

The rotation of the vertical shaft 25 causes the unit at the lower end of the shaft to be revolved rapidly, the revolution of the unit causing the former and the adhesive applying fingers to be

rotated while they are being revolved. Just before the former engages the uppermost strip of the stack carried by the platform 39, the adhesive is applied by the fingers 69 onto the end portion of the uppermost strip remote from the end over which the former first rotates, and, due to the suction exerted through the ports of the die plate 81, the strip is wrapped around the former and its ends united by the adhesive. Then, as the strip is rolled over the punch plate, the tabs are punched in the overlapping ends of the strip, completing the formation of the article. Thereupon the suction exerted upon the article is relieved and the stripper causes the article to be slid off the former onto the delivery member 90, these operations occurring during one cycle of the revolving movement. Additionally, during the cycle, the gum roller 58 is indexed, and the curved surface of the yielding dog carried by the roller 60 receives a quantity of adhesive which is then transferred to the gum applying fingers 69 and thence to the uppermost strip of the stack. Additionally, the articles pass down the delivery member 90 and are received in nested relation successively on the different pins 93, the receiving unit including the pins 93 being indexed after a predetermined number of articles have been received on a pin.

The machine and the sequence of operations described above require that the platform 39 be elevated not necessarily constantly but at least in a manner such that it will be moved upwardly short distances at frequent intervals. In practice, an elevating movement is given to the platform after each three or four revolutions of the forming head, as this is sufficient, in view of the thinness of the stock, to always keep the uppermost strip at the right height to be picked up by the former 30 with the assistance of the suction exerted through the former on the strip. As a part of the elevating mechanism, I employ an elevating chain 106 one end of which is connected at 107 to a guide sleeve formed on one end of the platform 39 and slidable along one of the guides 40. Then the chain passes upwardly around a sprocket 108, then downwardly and horizontally around two lower sprockets 109 and 110, and then upwardly around a fourth sprocket 111. Below the sprocket 111 the chain is attached at 112 to a guide sleeve at the opposite end of the platform 39, which sleeve also slides up and down on one of the guides 40. Below the sprocket 111 the chain is attached to a weight 113 to which is attached a spring 114, the weight and the spring tending to lift the platform and the spring being placed under increased tension when the elevator is pushed down when receiving a fresh stack of strips from which the articles are to be formed.

Secured to the bed inwardly of the ring gear 32 is a framework including two angle members 20a (see Fig. 2) which angle members are disposed vertically and normally lie just beyond the ends of the stack of strips 34 on the platform. Rotatably supported on one of these angle members 20a adjacent the sprocket 111 is a ratchet wheel 115 connected to the sprocket 111 by two pinions 116 and 116a one on the axis of the ratchet wheel and the other on the axis of the sprocket 111 (see Figs. 1 and 6). To actuate the ratchet and therefore to turn the sprocket 111 and elevate the platform through the sprocket chain 106, there is supported on the adjacent angle 20a inside the ring gear, in the position shown in Fig. 2, a roller 117 on a lever 118 which is fixed to one end of a small rock shaft 119 on

the opposite end of which is fixed a second lever 120 to which is connected a pawl 121 which extends downwardly and at its lower end is adapted to engage the teeth of the ratchet wheel 115.

5 The roller 117 is so positioned that it is engaged and depressed by the inner or smaller end of the former 30 at each revolution of the latter, and, accordingly, each time the former travels around the ring gear, the lever 118, the lever 120, and the pawl 121 are depressed. As soon as the

10 former 30 passes beyond the roller 117, the parts just mentioned, i. e., the levers 118 and 120 and the pawl 121, are restored to their former positions by a spring 122 one end of which is connected to the pawl as shown in Fig. 6. A second

15 spring 122a is also connected to the pawl 121 so that it will be pulled yieldingly toward the ratchet wheel 115. However, it is not desired that the ratchet wheel 115 be turned on each stroke of the pawl 121, and I therefore provide on the ad-

20 jacent angle 20a a pivoted guard 123 one end of which projects between the lower portion of the pawl 121 and the teeth of the ratchet wheel 115, as indicated in Figs. 6 and 8. The other end of the

25 pivoted guard 123 is weighted and rests upon the lower laterally turned end 124a of a feeler 124 in the form of a vertically movable pin at the top of which is a laterally extending finger 124b which rests upon the uppermost strip 34 at the

30 end of the stack which is supported on the platform 39. The arrangement is such that when the feeler is at a given height the end of the guard 123 prevents the pawl 121 from engaging the tooth of the ratchet 115 on the downward stroke

35 of the pawl, but as the strips are removed one at a time from the top of the stack, the feeler gradually lowers by gravity, and, as it does so, the weighted end of the lever 123 which rests on the lower horizontally extending portion of the feeler is lowered, and, after one or more of the strips

40 have been removed from the top of the stack, the opposite end of the guard 123 is elevated far enough so that the pawl 121 engages the tooth of the ratchet and turns it a predetermined amount, and this movement, through the elevating mechanism described, results in the elevator being moved

45 upwardly one step. When the pawl 121 is disengaged from the ratchet 115, a second pawl 125, which is spring-pressed inwardly, prevents the ratchet from being turned by the weight 113 and spring 114. It will be understood that the number of idle strokes of the pawl 121 between feeding

50 strokes, i. e., how frequently the actual feeding strokes occur in a given number of cycles of the machine, will depend upon the thickness of the strips, and if the strips are of unequal thickness, or if the corner of the uppermost strip should not lie flat, the feeding strokes would be likely to occur at irregular intervals since the position of

55 the feeler as it rests upon one corner of the upper strip of the stack determines whether the stroke of the pawl shall be an idle stroke or a feeding stroke. It might be mentioned at this point that when the stack of strips is placed on the elevator the latter is pushed down until the uppermost

60 strip is in proper position. Suitable guides 126 are provided along the inner and outer sides of the stack to hold the strips in position, as best shown in Fig. 2. If necessary, the former 30 may

65 have openings or depressions formed in its conical surface to provide clearance for the upper ends of these guides.

Thus it will be seen that the objects stated at the beginning of the specification are attained very effectively by the machine of the

present invention. While I have shown only the preferred construction, various changes may be made without departing from the spirit and scope of the invention. For example, as was previously pointed out, the shape of the former may be modified in accordance with the shape

5 of the article to be produced and in other respects the machine may be modified as desired. Furthermore, the machine here illustrated is provided with a single former, that is to say, I here illustrate a single unit machine, but it is obvious that all or the necessary features of the machine illustrated may be embodied in a machine of the multiple unit type, in which event

10 the machine would have two or more forming heads so that a corresponding number of articles would be produced during each cycle of operation instead of a single article. Finally, it might be stated that stock other than paper may be used in forming the articles, and, of course, different thicknesses of stock may be employed, depending upon the type and purpose of the article being produced.

While I have shown the preferred embodiment of the invention, I aim in my claims to cover all modifications which do not involve a departure from the spirit and scope of the invention.

Having thus described my invention, I claim:

1. The process of making articles such as described from a strip of flexible material which comprises bending the strip to substantially the shape of the completed article with the ends of the strip overlapping, and with a rolling action forming and laterally displacing tabs in the overlapping portions.

2. The process of making articles such as described comprising wrapping a strip of flexible material about a rotating former with the ends of the strip overlapping, and during the rolling motion punching and laterally displacing tabs in the overlapping ends.

3. The process of making articles such as described from a strip of flexible material which comprises applying adhesive to one end of the strip, bending the strip around a former to substantially the shape of the completed article with the ends of the strip in overlapping engagement and with the adhesive between the overlapping ends, and then punching and laterally displacing portions of the overlapping ends while on the

4. In a machine of the character described, a bed, a former, means for revolving the former over a portion of the bed and for causing it to rotate about its own axis while being revolved, means whereby as the former revolves and rotates a strip of material is caused to be wrapped about the surface of the former with the ends of the strip overlapping, and means for causing one or more tabs to be punched in the overlapping ends of the strip during the movement of the former.

5. In a machine of the character described, a rotatable shaft, an arm secured to the shaft, a former rotatably supported by the arm whereby the former is revolved about the axis of the shaft, means for causing the former to be rotated while being revolved, means for supporting a stack of strips in position such that the former during each revolving movement is rolled over the uppermost strip of the stack, means for causing a strip to be wrapped around the former during each revolving movement, and means for mechanically uniting the ends of the strip on

the former during the rolling motion of the latter.

6. In a machine of the character described, a rotatable shaft, an arm secured to the shaft, a former rotatably supported by the arm whereby the former is revolved about the axis of the shaft, means for causing the former to be rotated while being revolved, means for supporting a stack of strips in position such that the former during each revolving movement is rolled over the uppermost strip of the stack, means for causing a strip to be wrapped around the former during each revolving movement, and means for causing one or more tabs to be punched in the overlapping portions of the strip on the former.

7. In a machine of the character described, a revoluble arm, a former carried thereby, means for causing the former to rotate during each cycle of the revolving movement, means for supporting a stack of strips so that during each cycle the former rolls over the uppermost strip of the stack, means whereby suction is exerted upon the uppermost strip of the stack so as to cause the strip to be wrapped around the former, means operating during the rolling motion of the former for mechanically uniting the ends of the strip on the former, and means for controlling the suction so that it will be relieved after the article is completed on the former.

8. In a machine of the character described, a bed, a revoluble unit comprising a former rotatable about its own axis and comprising adhesive applying means, means for supporting a stack of strips so that the former will roll over the uppermost strip of the stack and cause it to be wrapped around the same during each cycle of revoluble movement, and means for revolving the unit so that adhesive will be applied to a part of the uppermost strip before it is rolled on the former, means for punching one or more tabs in the overlapping ends of the strip, and means for causing the article to be removed from the former.

9. In a machine of the character described, a bed or frame, a revolving unit adapted to be revolved thereover and including a rotating former, an elevator for supporting a stack of strips arranged so that the former will roll over the uppermost strip of the stack during each cycle of revolving movement, a punch plate located on the bed beyond the stack and carrying upwardly extending punches whereby the overlapped ends of the strip will be punched so as to form tabs, and means for removing the article from the former.

10. The process of making articles such as described, which comprises rolling up a strip of flexible material into a hollow article with the ends of the strip overlapping, and mechanically uniting said ends during the rolling motion.

11. The process of making articles such as described, which comprises rolling up a strip of flexible material into a hollow article with the ends of the strip overlapping, temporarily gripping the overlapped ends in juxtaposed position, forming and displacing tabs in the overlapped ends during the rolling motion, and thereafter releasing said temporary grip on the overlapped ends.

12. The process of making hollow articles from strips of flexible material, which comprises bending a strip to substantially the shape of the completed article with the ends of the strip in overlapped engagement, rotating the bent-up article about its axis and moving the said axis through a

closed path, and causing the overlapped ends to be mechanically united during said motions of rotation and translation.

13. In a machine of the character described, a revoluble unit, means associated with said unit for rolling up and forming hollow articles from strips of flexible material, and means for moving the completed articles one after another to substantially the center of revolution and delivering them downwardly along the axis of revolution of the unit.

14. In a machine of the character described, a revoluble unit, means associated with said unit for rolling up and forming hollow articles from strips of flexible material, means for delivering said articles one after another at the center of revolution of said unit, a series of article receivers, a carrier for said receivers adapted to position the receivers one after another beneath the center of revolution of the unit, and means automatically operating after a predetermined number of revolutions of the unit for advancing the carrier one step.

15. In a machine for making tapered hollow articles from flexible sheet material, a horizontally revoluble arm around which said articles are formed, said arm extending inwardly toward the axis of revolution, means for moving the completed articles inwardly along said arm and for directing them into a vertical course at the axis of revolution, and means at the axis of revolution for collecting the articles in nested relation.

16. In a machine for making articles from flexible sheet material, a revoluble arm around which said articles are formed, said arm extending inwardly toward the axis of revolution, means for moving the completed articles along the arm toward the axis of revolution, a series of article receivers, a carrier for said receivers adapted to locate the receivers one after another concentric with the said axis of revolution in position to take articles from said arm, and means automatically operable after a predetermined number of revolutions of the arm for advancing the carrier one step to bring a different receiver into operative position.

17. In a machine for making articles from flexible sheet material, a horizontally revoluble arm around which said articles are formed, said arm extending inwardly toward the axis of revolution, means for moving the completed articles inwardly along said arm toward the said axis of revolution, a series of article receivers, a turntable along the periphery of which said receivers are mounted at regularly spaced intervals, the center of said turntable being offset from the center of revolution of the arm sufficiently to bring the periphery of the turntable beneath the axis of revolution of the arm so that one of the receivers is in position to take articles from said arm, and means automatically operating after a predetermined number of revolutions of the arm for rotating the turntable one step to position a different receiver in line with the axis of revolution of the arm.

18. In a machine for making articles from flexible sheet material, a radially arranged horizontally revoluble arm supported at its outer end, a former rotatable upon said arm, means for forming an article upon said former, said arm extending inwardly toward the center of revolution thereof, means for stripping articles from said arm and moving them toward the center of revolution of the arm, a series of article receivers, a carrier for said receivers adapted to posi-

tion the receivers one after another beneath the center of revolution of the arm, and means automatically operable after a predetermined number of revolutions of the arm for advancing the carrier one step, whereby a predetermined number of articles are stacked upon each receiver. 5

19. In a machine of the class described, a series of punches, a former, means for rolling the

former over a strip of flexible material so as to wrap the strip thereon with its ends overlapping, the punches being in the path of movement of the former so that said former rolls the overlapping ends over said punches, thereby forming tabs in the overlapping ends and displacing the tabs inwardly. 5

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