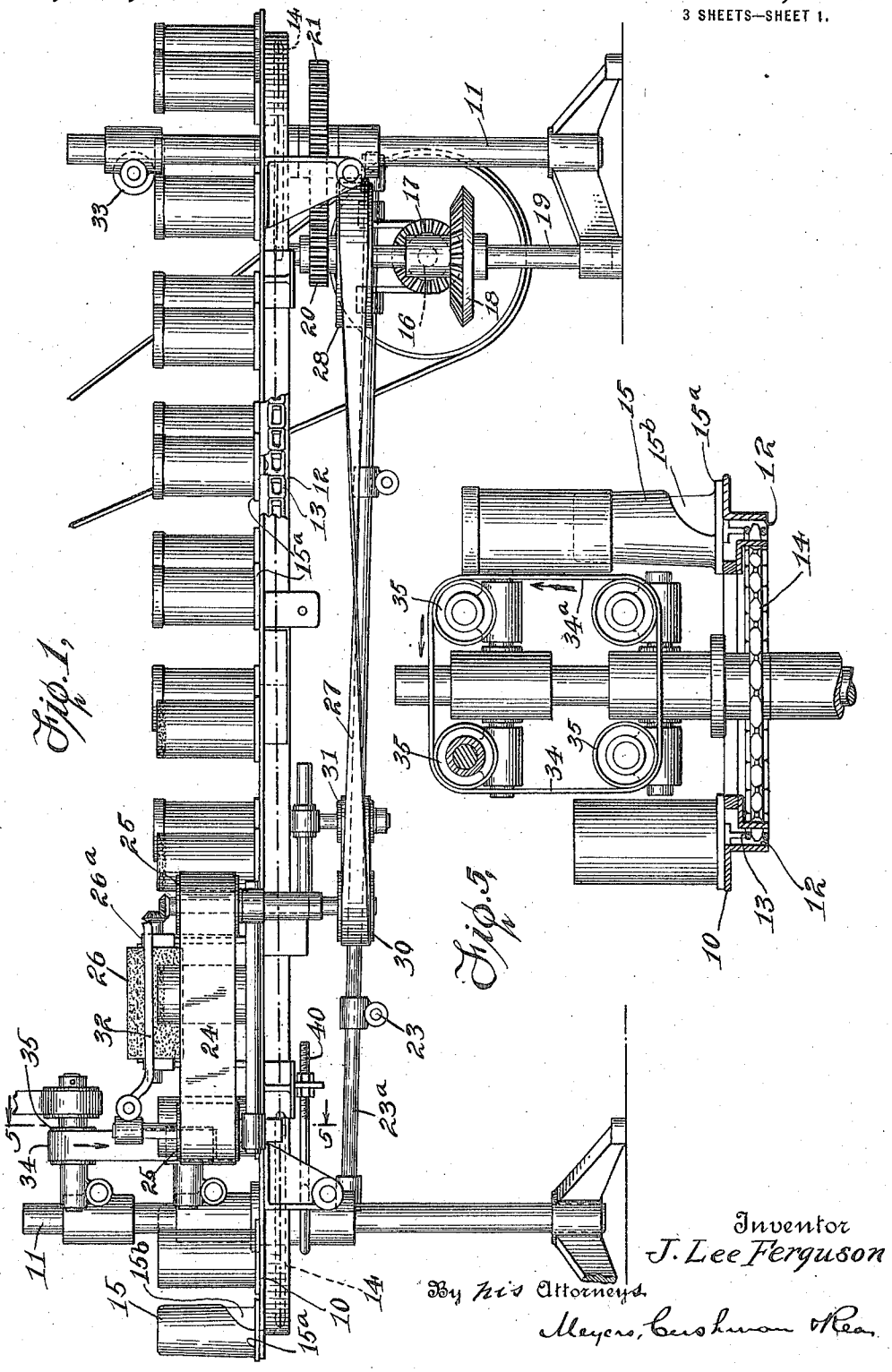
J. L. FERGUSON.

ART OF FORMING CONTAINERS.

APPLICATION FILED JULY 16, 1919.

1,393,274. Patented Oct. 11, 1921.

3 SHEETS—SHEET 1.



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By his Attorneys.
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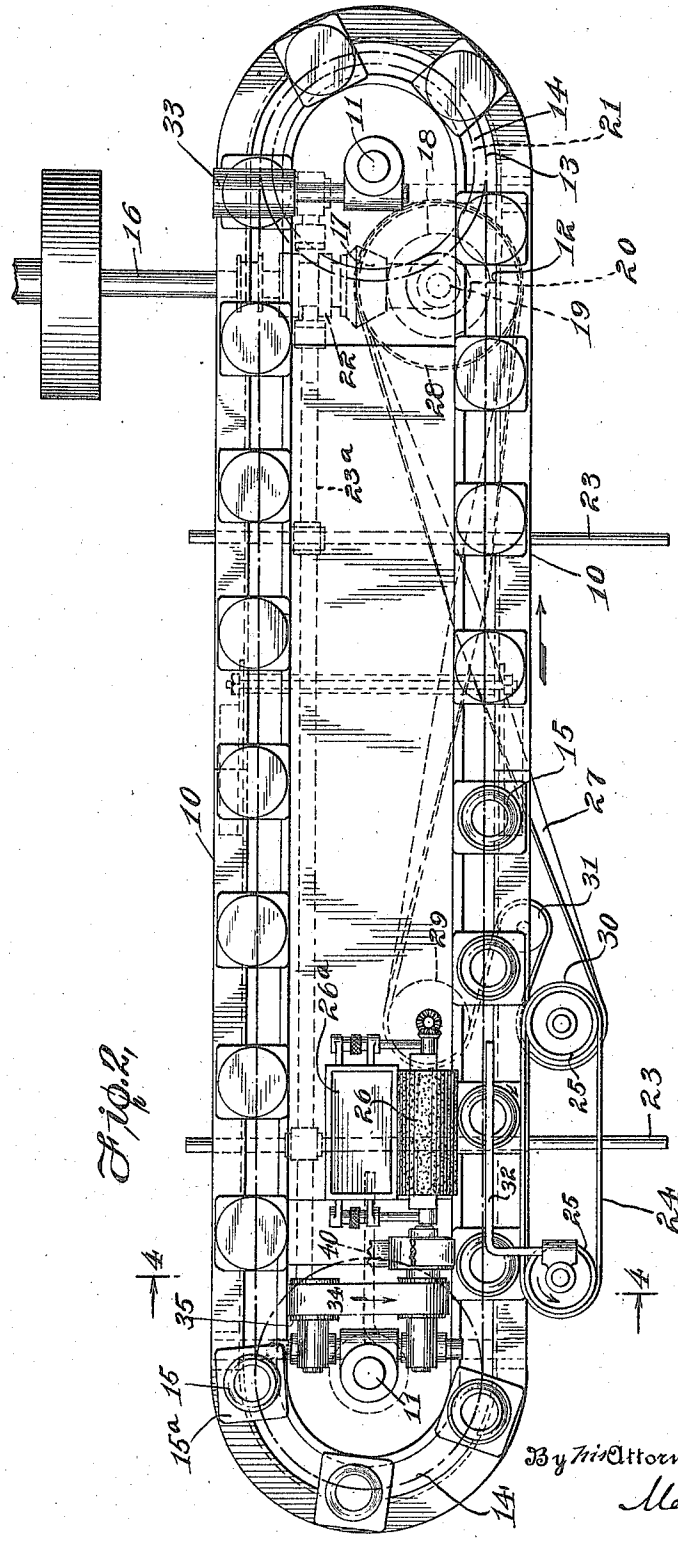


Fig. 2.

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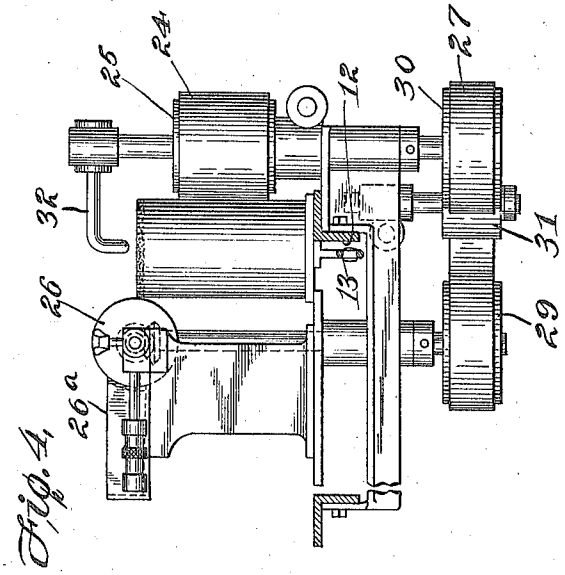


Fig. 4.

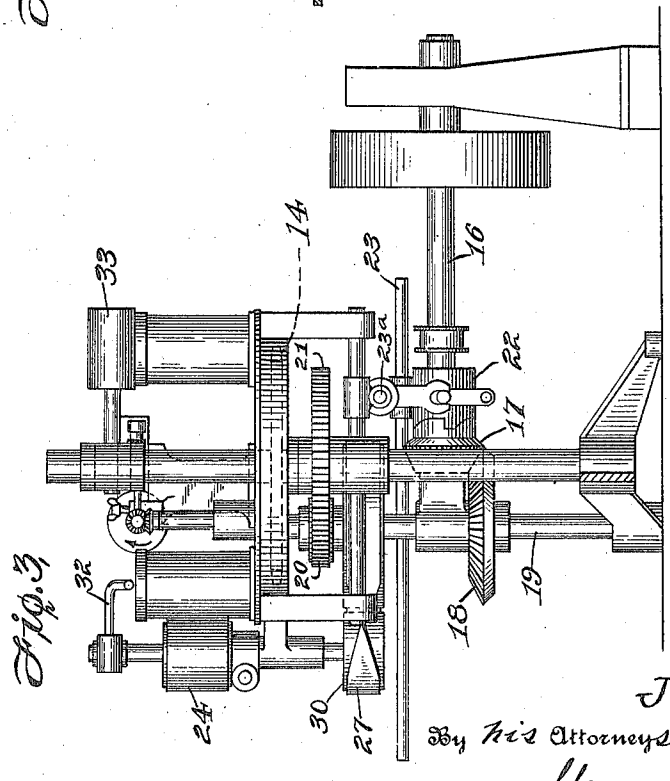


Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN LEE FERGUSON, OF JOLIET, ILLINOIS.

ART OF FORMING CONTAINERS.

1,393,274. Specification of Letters Patent. Patented Oct. 11, 1921.

Application filed July 16, 1919. Serial No. 311,247.

To all whom it may concern:

Be it known that I, JOHN LEE FERGUSON, a citizen of the United States, residing at Joliet, in the county of Will and State of Illinois, have invented new and useful Improvements in the Art of Forming Containers, of which the following is a specification.

My invention relates to the art of forming containers, pertaining more particularly to means for securing container elements together to produce a container shell.

In packaging different commodities it is the practice to employ containers formed of paper board, these containers being generally formed of a tubular body portion, a cap permanently secured at one end thereof—the assembly forming a receptacle into which the commodity is received—and a removable cap applied to the filled receptacle. As the several elements can be manufactured in a comparatively simple manner and at a relatively low cost, this particular type of container is being utilized in the packaging of commodities with a rapidly increasing extent of use.

A considerable portion of the cost of the finished container is involved in the construction of the receptacle—in securing together the tubular body and the cap which forms the bottom of the complete container. These two elements must not only fit closely in order to prevent shifting, etc., but must also be secured together since it is undesirable that the bottom be loose and therefore capable of dropping off under the weight of the commodity. This securing is generally by means of an adhesive which when properly applied and set, provides a structure in which the bottom is held firmly to position and capable of withstanding the handling generally applied to packages of this type.

As will be understood, the assembling of these two elements requires the meeting of certain conditions. The cap must fit comparatively close, not only to prevent shifting, but to insure the proper adhesive connection of the cap and body; adhesive must be applied to one or the other element in advance of assembly and the assembly must be made before the adhesive is set, and the cap must be properly seated in order that when the adhesive is set a proper form of receptacle is produced. Operations required to produce these results are not difficult to provide manually, but the care required is such as to practically limit the capacity per unit of time which any operator can produce, this capacity varying, of course, with the skill of the operator.

It is to this particular field of operations that the present invention applies, and the general purpose of the invention is to provide an apparatus capable of producing these results in a satisfactory manner under large capacity conditions, and at a low cost of labor. This latter result is obtained by limiting the labor requirements to operations of a simple character requiring no particular skill and involving no material time factor. By this arrangement high capacity conditions are provided—an apparatus of the type of the present invention in service has a producing capacity of sixty containers per minute—the apparatus being semi-automatic in character in that a portion of the operation is manual. While it is possible to render the apparatus entirely automatic by an addition of suitable feed and assembling mechanism for the caps, the flexibility of action inherent to manual operation at this particular stage becomes slightly restricted with the resultant tendency to reduce the capacity, and since low-priced labor can be utilized, the presence of the labor factor in the complete operation does not materially add to the cost.

To these and other things, therefore, the nature of which will be readily understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views,—

Figure 1 is a side elevation of a simple form of apparatus for carrying out the general principles of the invention, parts being broken away.

Fig. 2 is a top plan view of the same.

Fig. 3 is an end view looking toward the left in Fig. 1.

Fig. 4 is a detail view, partly in elevation and partly in section.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 1.

Before giving a detailed description of parts of the apparatus, a brief statement is

made of the general operation of the machine.

An endless carrier traveling in a horizontal plane and carrying a plurality of upstanding supports provides the support during the assembly operation.

The tubular blanks are positioned on the upstanding support at what may be termed a receiving station—either by hand or automatically, the latter arrangement being employed in service but not specifically disclosed herein. The support during its advance, passes an adhesive-applying station within which a stripe of adhesive is applied on the upper end of the positioned blank during the travel of the support. This applying action is provided automatically by carrying the blank past a rotating adhesive-applying roll and at the same time rotating the blank on its support, the three several movements—the advancing movement of the support, the rotation of the blank on the support and the rotation of the adhesive-applying roll—coöperating to produce a continuous adhesive stripe to the blank while the latter is advancing at a uniformly and fairly rapid speed and without requiring a rapid rotation of the adhesive applying roll. During this operation the blank is held against material longitudinally-shifting movements in order that the proper positioning of the stripe will be had.

The advance of the blank then carries it through a cap-applying station at which the operator is located, and whose duty is to slip the cap on to the upper end of the blank over the adhesive stripe. No accuracy in positioning is required at this station, so that the attention of the operator is centered only on placing the cap on to the tubular blank as the latter is passing, permitting comparatively rapid travel of the carrier.

Further advance of the carrier brings the assembly beneath a roll which operates to correct any inaccuracies of position of the seated cap. This takes place in advance of setting of the adhesive and preferably while the adhesive is "tacky," so that relative movement of the cap and tubular blank in the direction of length of the blank is permitted, no rotating movement of the cap being required, since the opposed surfaces of contact are provided by the adhesive coat which, at this stage, has not reached a set condition.

Further operation on the traveling assembly is then deferred for a time sufficient to permit the adhesive to set, this time element being obtained by locating a succeeding station—the stripping or removing station—at a sufficiently distant point as to provide the desired time during travel of the carrier.

At the stripping station the assembly is brought into contact with an upwardly-traveling belt which, through the combined action of the advancing movement of the carrier and the upward movement of the belt acts to strip the assembly from its form by raising the assembly above the support and permitting it to drop away from the support or be received by a suitable mechanism. The effect of these two movements—in directions at right angles to each other—insures proper stripping action, since should any sticking occur to affect the ability of the upward traveling belt to raise the assembly, the friction produced between the belt and the assembly on the support would, under the carrier advancing action, tend to set up a rotative effect on the seated assembly and thereby break the frictional engagement of assembly and support to an extent sufficient to permit the upward travel of the belt to be operative to remove the assembly.

Various forms of apparatus may be employed to carry out this general cycle of operation, that shown in the drawings indicating one embodiment which may be utilized for the purpose, it being understood that the invention is not limited to this special form.

Referring to the drawings, 10 designates a table of suitable configuration and which is shown as supported on pedestals 11 located at opposite ends of the table, the latter being preferably of a length sufficient to provide for carrying out the general principles of the invention.

The table may have any desired general formation, but includes a continuous channel 12 of suitable cross section and formed within the table below the top plane of the latter, this channel being shown in the particular embodiment illustrated, as extending in parallelism at opposite sides of the table—the latter being elongated—the ends of these parallel stretches being connected by curved portions. The channel is adapted to receive an endless carrier 13 which is shown as in the form of a sprocket chain, this chain coöperating with a pair of sprocket wheels 14 mounted at the opposite ends of the table and with the wheel axes coincident with the axes of the curved portions of the channel; the sprocket wheels are supported in suitable manner, a simple arrangement being to mount them for rotation on pedestals 11.

As shown in Fig. 5 channel 12 is open on the top plane of the table, so that connection between the chain and one or more supports 15—adapted to project upwardly from the top surface of the table over the channel—can be provided, this connection being of suitable type, as by connecting a form with a special link of the chain, as indicated in Fig. 1.

As shown in the drawings, it is preferred to employ a plurality of these supports, preferably spaced equi-distant, each support

having an enlarged base 15[a] which rests upon the table and overlies the channel, so that as the chain travels, the several supports will be carried along in the direction of length of the general runway corresponding to the path of travel of the chain.

The supports may be of any desired contour, a preferred form being shown in the drawings wherein the body portion is shown as extending upwardly from the base 15[a] and having a substantially circular cross section with the diameter gradually decreasing from the base toward the top of the body portion, thus providing a succession of decreasing diameters toward the top. For purposes presently pointed out, the face of the body portion is preferably cut away or recessed, as at 15[b], on a side of the body portion adjacent to the base. It is to be understood, of course, that the connections between the chain and the support are such as to maintain the latter against rotative movements on its own axis, the support, however, traveling bodily in the direction of advance of the chain.

Carrier 13 is given a continuously advancing movement through any suitable connections with a power supply, the particular form shown in the drawings being through connections indicated as follows:

16 indicates a drive shaft, driven in suitable manner from any source of power, this shaft carrying a bevel pinion 17 engaging a bevel gear 18 mounted on a vertical shaft 19, the latter carrying a pinion 20 engaging a gear 21 on the shaft or hub of one of the sprocket wheels 14, it being understood that rotation of shaft 16 will thus serve to drive this particular sprocket wheel and hence operate the entire carrier, the wheel at the opposite end being in the nature of an idler. For the purpose of control, these connections may include a suitable coupling structure, indicated generally at 22, by means of which the drive can be made active or inactive at will, the coupling being shown as under the control of a plurality of arms or shippers 23 located at various points and mounted on a rod or shaft 23[a] which carries an element of the coupling capable of providing the make and break engagement of the coupling members. Obviously, the particular mechanism employed may be any of those well known for the purpose.

As referred to in the above summary of the general operation, the tubular blanks are positioned on the supports at what may be termed a receiving station, this particular station being shown, in the present arrangement, as that portion of the runway included within the curved travel path at the left in Fig. 2, the particular point where the tubular element may be placed in position being more or less immaterial, the supports elsewhere carrying positioned elements which are stripped from the supports just before the latter enter this arcuate travel path.

The tubular element may be placed upon a support manually or by a suitable feed mechanism, it being readily understood that no particular care need be provided in positioning the elements, since the upper ends of the supports are of less diameter than the inner diameter of the elements and an element dropped on to the support will simply pass downward on the latter until its lower end reaches a point on the support of corresponding diameter with the inner diameter of the element, the engagement of the element and support thus being placed at the lower end of the latter and of a comparatively small zone or area of contact, an arrangement which will permit a sufficient friction to maintain the element in its position, without, however, preventing an actual rotation of the tubular element when such rotation is desired. And in this particular the presence of the cut away portion 15[b] becomes of advantage in that the annular length of this zone of contact is restricted to but a portion of the periphery of the tubular element, decreasing the amount of power required to rotate the element on the support.

The travel of the carrier is in the direction shown in the arrow of Fig. 2, and as the support advances from the receiving station—carrying a tubular element thereon—it enters the sphere of operation of an endless belt 24 mounted on pulleys 25, one of which is driven in suitable manner, the drive in the structure illustrated, being in a direction to cause the belt to travel so as to have its inner flight moving in a direction opposite the direction in which the element is being bodily transported. This direction is indicated by the arrow in Fig. 2. The inner flight of the belt is shown positioned so as to insure contact with each tubular element as the latter is advanced by the carrier, the result being that the friction between the tubular element and the belt will cause the tubular element to be rotated on the support as the latter carries the element along the flight, the rotation being clockwise in Fig. 2. As will be understood, the effect of the two motions—the advancing movement of the support and the reverse travel of the belt serves to provide a fairly rapid rotative movement of the element on the support, so that a complete revolution of the element will be had while the form is traveling through a comparatively short distance, this latter distance being utilized to apply an adhesive stripe or zone along the upper edge of the positioned element.

Any suitable adhesive applying mechanism may be employed, such mechanism, however, preferably including a roller 26 supported to rotate on a horizontal axis with

the roller positioned so as to present a face operative adjacent to the path of travel of the advancing element, the roller being shown as positioned on the opposite side of this path of travel from that on which the belt 24 is located, said belt and the roller being on opposite sides of this path.

Since the axis of the roller is horizontal, the curvature of the periphery will be such that but a relatively small portion of the roller will contact with the element as the latter travels, thus limiting the vertical length of the zone of adhesive being applied to the element. Inasmuch as the surface of the roller is being constantly shifted by the rotation of the roller itself, it will be readily understood that through the resultant of the three motions operative at this time—bodily advancing movement of the support, the movement in the reverse direction of belt 24, and the movement of roller 26 in a direction transverse to the other motions—the increased peripheral speed of the tubular element will not tend to affect the application of a required amount of adhesive to the elements, since there is the combined effect of the bodily advance of the form and the rotation of roller 26 to present the proper amount of adhesive to offset the increase in speed provided by the travel of belt 24.

As will be seen, the length of roller 26 is less than the active portion of the flight of belt 24, the latter becoming active in advance of the time when the element reaches roller 26; this brings about a condition where certainty is had that no sticking of the element on its support will be present—the support afforded to the belt by the pulley when the element is brought into contact with the belt insuring the release of any sticking which might have occurred—so that as the positioned element approaches the point of activity of roller 26 the element will be rotating, and in addition, will be opposite the unsupported flight portion of belt 24, so that while a sufficient frictional engagement between belt and element will be provided to insure proper rotation—especially since the friction of the roller is materially decreased by reason of the fluid surface thereon provided by the adhesive—the arrangement is not such as to provide excessive pressure on the opposite sides of the element in traveling between the two surfaces.

For purposes of illustration, I have shown the adhesive being applied as supplied from a tank 26^a, it being understood that this showing is more or less illustrative only, any suitable specific structure or means for applying adhesive to roller 26 being applicable for use.

The adhesive applying mechanism and the element rotating mechanism—belt 24—can be driven in any suitable manner, either individually or from the same source, the drawings illustrating a simple way in which this result can be obtained by the use of a belt 27, the latter being mounted on a pulley 28 movable with shaft 19, and being shown as of the crossed type, leading over a pulley 29 operatively connected to roller 26, and a pulley 30 operatively connected to one of the pulleys 25, an idler 31 being shown as located to operate on a stretch of the belt intermediate pulleys 29 and 30; idler 31 may be, and preferably is, adjustable to maintain the belt taut.

For the purpose of maintaining the element at a proper position on the form so as to insure the application of the stripe or zone of adhesive at the proper point, I preferably employ an arm or finger 32 which extends above the path of travel of the upper end of the element in passing roll 26, so that the several motions provided to the element will not materially shift it in a vertical direction, it being understood that there may be a tendency of the element to move upwardly as it is being rotated, owing to the particular shape of the body portion of the element support; finger 32 will serve to limit this movement and practically insure that each element will pass roller 26 in proper position to receive the stripe at the desired point, the finger being of such form as to not materially affect the movements of the element while it is moving beneath the finger. As will be understood, the finger may also serve to insure that a positioned element will have moved downwardly on its support a proper distance to insure its being in proper position, even though the element may have been improperly positioned at the receiving station, thus eliminating the necessity for any careful positioning at this station and permitting use of low priced labor by reason of the non-requirement of accuracy in positioning.

After the support and its positioned element passes beyond belt 24, the element comes to rest on the support and is simply advanced bodily with the latter, this advance being by movement on a straight stretch of the path of travel, and it is while within this stretch that the capping takes place, this being preferably provided manually by the operator simply slipping a cap on to the upper end of the tubular element as the latter passes. As will be understood, the presence of the adhesive stripe or zone on the periphery over which the cap is applied permits a comparatively rapid movement of the cap downwardly when the cap is properly located, so that the time required in positioning the cap is comparatively short, the major portion of the time being that required to bring the cap and tubular element into alinement. As it is the purpose of the invention to provide for continuous movement of the element, the use of hand

labor at this point is of some advantage in that the hand of the operator can travel with the advancing support in bringing about this alinement, a result which would be more difficult with an automatic feed, since the application of the cap is dependent upon proper alinement being made. While, in practice, it is found that one operator can properly apply all of the caps to the elements as they advance even under the capacity conditions heretofore pointed out, it will be understood that an additional operator may be employed, if desired, these being located side by side and taking care of alternate elements, thus permitting increase in the speed of operation of the entire apparatus.

The presence of the shippers 23 permits of the stoppage of the machine at any time, so that the operation is entirely under control of the operators.

As the element continues its advance from the capping station it traverses the curved end at the right of Fig. 2 and passes beneath a roller 33 suitably supported and preferably freely rotatable on its axis, the roller being so positioned that its under face is on a plane which corresponds with the proper plane of the top face of the cap when the cap is properly positioned on the tubular element. Hence, should the operator not move the cap downwardly a sufficient distance or position the cap in other than its proper seated position, the travel of the mispositioned cap at the point of operation of roller 33, will cause the latter to shift the cap to its proper seated position, there being no requirement of cap rotation to provide this result, since the cap application by the operator will have placed the cap in an approximate position which needs correction only by movement in a direction longitudinally of the element.

As a result, there is no particular accuracy required on the part of the operators in the capping operation, roller 33 correcting any inaccuracies so that unskilled labor may be employed for capping.

While roller 33 may be located at any desired point, the particular position shown is of advantage in that it becomes operative at a time sufficiently later than the application of the cap as to permit the adhesive to reach a "tacky" condition, so that there is less likelihood of the cap changing its position after being located by the roller.

This completes the bringing of the two elements—the tubular element and the cap—into proper correlation with the adhesive between the surfaces which are to be united thereby. It then becomes only a question of the length of time required for the adhesive to set, and this time is provided by the travel of the support through the opposite stretch, so that by the time the support approaches the curved end at the left of Fig. 2, the adhesive will be set and the cap firmly held on to the end of the tubular element. It is at this point that removal of a completed element from its support is had, this being provided manually if desired, although I prefer to employ an automatic removal or delivery device for the purpose. This device may be of different types, a simple and preferred form being shown in the drawings and which will now be described:

As shown more particularly in Fig. 5, 34 indicates an endless belt traveling over pulleys 35 properly positioned to provide a vertical flight 34^a to the belt, the belt being driven from any suitable source. Flight 34^a is so positioned that its outer face will contact with the cap and tubular portion of the assembly when the latter is advanced to the location of the belt.

As will be readily understood, the frictional engagement which is had between the belt and the positioned assembly will provide for a removal of the assembly on the support. With no material frictional engagement between the assembly and its support, the superior friction between belt and assembly will cause the latter to be moved upwardly and practically flipped off of its support, especially where the belt 34 is traveling at a comparatively high speed, the upward movement tending to produce this effect, the movement tending to throw the assembly to one side by reason of the frictional engagement being on only one side of the assembly. Should, however, there be a friction between the assembly and its support sufficient to prevent this, the advance of the assembly relative to a surface with which the element is frictionally engaged, will tend to provide a rotation of the element on its support and thereby break the frictional engagement between the support and assembly, thus producing an effect which is readily taken care of by belt 34, so that under either condition, the upward movement of the assembly will be provided before the latter has passed from the influence of the belt, bringing about the desired discharge of the assembly from the support.

No means are shown for receiving the discharged assembly, it being obvious that any suitable receptacle may be provided, or the delivery may be to a conveyer system which would have no particular connection with the present invention.

As shown, the table is so formed as to permit an adjustment with respect to carrier 13, this being had by adjusting the pedestal at the left of Fig. 1, the pedestal being held in proper position by means of a suitable adjustable connection 40.

From the above description it will be seen that I have provided, by the use of simple instrumentalities an apparatus capable of

meeting the particular problems present in producing the assembly of the tubular element and its permanently affixed cap. No material accuracy is required in positioning the tubular element or the cap, thus permitting high capacity conditions by the use of low-priced and unskilled labor and yet provide for continuous movement of the carrier in its endless path; the successive operations are so arranged as to meet the conditions of unskilled labor working under high capacity conditions, and yet provide an assurance that the final result will be the same in successive assemblies. The desired results are mainly due to the combination of motions which are provided and made effective on the parts at critical points, these combinations permitting the use of simple constructions and mechanisms not liable to get out of order and requiring no particular delicacy of manufacture so that the apparatus itself is strong and substantial and capable of withstanding the usage to which an apparatus of this type may be put under high capacity conditions.

While I have herein shown and described a preferred form of apparatus for carrying out the general principles of my invention, it will be readily understood that changes or modifications may be found desirable or essential in meeting the various exigencies of use, and I desire to be understood as reserving the right to make any and all such changes or modifications as may be found desirable or essential in so far as the same may fall within the spirit and scope of the invention as expressed in the accompanying claims, when broadly construed.

Having thus described my invention, what I claim as new is:

1. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, a continuously traveling support for the member, means for supplying the adhesive to the traveling member, means for rotating the member during application of adhesive, a cap-supplying station through which the member travels and wherein the cap is located on the member, and means for rectifying the position of a mispositioned cap prior to setting of the adhesive.

2. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, a continuously traveling support for the member, means for supplying the adhesive to the traveling member means for rotating the member during application of adhesive, a cap-supplying station through which the member travels and wherein the cap is located on the member, and means for rectifying the position of a mispositioned cap prior to setting of the adhesive and during travel of the member.

3. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, a traveling support for the member, means for supplying the adhesive to the traveling member, a cap-supplying station through which the member travels and wherein the cap is located on the member, and a roller movably positioned in the path of travel of a located cap for rectifying the position of a mispositioned cap prior to setting of the adhesive.

4. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, a traveling support for the member, means for supplying the adhesive to the traveling member, a cap-supplying station through which the member travels and wherein the cap is located on the member, and a roller movably positioned in the path of travel of a located cap for rectifying the position of a mispositioned cap prior to setting of the adhesive, said roller being positioned beyond the cap supplying station a distance sufficient to permit the adhesive to become "tacky."

5. In apparatus for producing an assembly of container forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, an endless support for the member, said support traveling in a substantially horizontal plane, means for applying adhesive to the periphery of the upper end of a traveling member, a cap-supplying station through which the member passes and wherein the cap is located on the member, means in the path of travel of the embryo assembly for rectifying the position of a mispositioned cap prior to the setting of the adhesive, and means in the path of travel of the completed assembly for removing the latter from its support.

6. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, an endless support for the member, said support traveling in a horizontal plane, means for applying adhesive to the periphery of the upper end of a traveling member, a cap-applying station through which the member passes and wherein the cap is located on the member, means in the path of travel of the embryo assembly for rectifying the position of a mispositioned cap prior to the setting of the adhesive, and

means in the path of travel of the completed assembly for removing the latter from its support during travel of the member.

7. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, an endless support for the member, said support traveling in horizontal plane, means for applying adhesive to the periphery of the upper end of a traveling member, a cap-supplying station through which the member passes and wherein the cap is located on the member, means in the path of travel of the embryo assembly for rectifying the position of a mispositioned cap prior to the setting of the adhesive, and means in the path of travel of the completed assembly for removing the latter from its support, said latter means being positioned to be operative on the assembly after the adhesive has set.

8. In apparatus for producing an assembly of container-forming elements and wherein a cap is adhesively secured to one of the open ends of a tubular body portion member, an endless support for the member, said support traveling in horizontal plane, means for applying adhesive to the periphery of the upper end of a traveling member, a cap-supplying station through which the member passes and wherein the cap is located on the member, means in the path of travel of the embryo assembly for rectifying the position of a mispositioned cap prior to the setting of the adhesive, and means in the path of travel of the completed assembly for removing the latter from its support, said latter means being positioned to be operative on the assembly after the adhesive has set and in advance of the support position for receiving a succeeding member.

9. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member.

10. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means being movable relative to the traveling support.

11. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during continuous travel of the element past the adhesive-applying member, said latter means being movable relative to the traveling support, the speed of element movement being the resultant of the combined movements of the support and said latter means.

12. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means including a traveling face movable relative to the traveling support.

13. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means including a traveling face movable in a direction opposite that of the support.

14. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive

connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means, being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means including an endless member having a flight positioned in the path of travel of an element positioned on the support, said endless member being movable relative to the support, whereby said flight will be made active in the rotation of the positioned element.

15. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means including an endless member having a flight positioned on the support, said endless member being movable in a direction to cause said flight to move opposite to the direction of movement of the support, whereby the speed of rotative movement of the positioned element will be the resultant of the movements of the support and the endless member.

16. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions, of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said member rotatable in a direction transverse to the direction of travel of the support, and means for rotating the traveling element on its support during travel of the element past said member.

17. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said member rotatable in a direction transverse to the direction of travel of the support, and means for rotating the traveling element on its support during travel of the element past said member, said latter means being movable relative to the traveling support.

18. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said member rotatable in a direction transverse to the direction of travel of the support, and means for rotating the traveling element on its support during travel of the element past said member, said latter means including a traveling face movable relative to the traveling support.

19. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive applying member located in the path of travel of the element, said member rotatable in a direction transverse to the direction of travel of the support, and means for rotating the traveling element on its support during travel of the element past said member, said latter means including a traveling face movable in a direction opposite that of the support.

20. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said member rotatable in a direction transverse to the direction of travel of the support, and means for rotating the traveling element on its support during travel of the element past said member, said latter means including an endless member having a flight positioned in the path of travel of an element positioned on the support, said end-

less member being movable relative to the support.

21. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said member rotatable in a direction transverse to the direction of travel of the support, and means for rotating the traveling element on its support during travel of the element past said member, said latter means including an endless member having a flight positioned in the path of travel of an element positioned on the support, said endless member being movable in a direction to cause said flight to move opposite to the direction of movement of the support.

22. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said support being movable in a horizontal plane, said member being rotatable on a horizontal axis, and means for rotating the traveling element on its support during travel of the element past said member.

23. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said support being movable in a horizontal plane, said member being rotatable on a horizontal axis, and means for rotating the traveling element on its support during travel of the element past said member, said member having a length to provide contact of the rotating elements and member during a period of time sufficient to apply the adhesive throughout said predetermined portion during the support advance.

24. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, said support having its travel movements in a horizontal plane, said member being rotatable on a horizontal axis, and means for rotating the traveling element on its support during travel of the element past said member, said latter means including a traveling face movable in a direction opposite that of the support, whereby the speed of rotative movement of the positioned element will be the resultant of the movements of the support and endless member, said adhesive-applying member having a length sufficient to provide contact of rotative element and applying member to cause adhesive application to the element throughout its predetermined portion during travel of the element past the member.

25. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means including a traveling face movable relative to the traveling support, and positioned to be operative on the traveling element in advance of adhesive application.

26. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said means being located relative to the adhesive-applying member to cause element rotative action in advance of adhesive application.

27. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions,

means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, an adhesive-applying member located in the path of travel of the element, and means for rotating the traveling element on its support during travel of the element past the adhesive-applying member, said latter means including a traveling face movable relative to the traveling support.

28. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, said support including an upstanding structure on which the element is positioned, and an adhesive-applying member located in the path of travel of the seated element, means for rotating the traveling element on said structure during travel of the element past the adhesive applying member, and means for maintaining the approximate position of the element on said structure during such rotative movement.

29. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, means for applying adhesive to predetermined portions of a periphery of the inner element, said means being located in advance of the outer-element applying station and including a traveling support for the inner element, said support including an upstanding structure on which the element is positioned, and an adhesive-applying member located in the path of travel of the seated element, means for rotating the traveling element on said structure during travel of the element past the adhesive applying member and an arm extending over that portion of the path of travel of the element in which rotative movement of the element by said rotating means is had.

30. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the outer element to its concentric position, means for supporting and advancing the inner element during the adhesive-applying and outer-element positioning operations, and means for rotating the traveling element during the adhesive-applying action, said advancing means including a constantly-advancing carrier having a member projecting laterally of the carrier path of travel and over which said inner element is positioned, said member having a configuration to provide a limited frictional engagement with the element during normal travel of the element, said rotating means being operative to overcome this engagement during the adhesive application.

31. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the outer element to its concentric position, means for supporting and advancing the inner element during the adhesive-applying and outer-element positioning operations, and means for rotating the traveling element during the adhesive-applying action, said advancing means including a constantly-advancing carrier having a member projecting laterally of the carrier path of travel and over which said inner element is positioned, said member having its face of increasing diameter in the direction of projection from the carrier to provide a limited area of frictional engagement between the element and member, said rotating means being operative to overcome said frictional engagement.

32. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the outer element to its concentric position, means for supporting and advancing the inner element during the adhesive-applying and outer-element positioning operations, and means for rotating the traveling element during the adhesive-applying action, said advancing means including a constantly-advancing carrier having a member projecting laterally of the carrier path of travel and over which said inner element is positioned, said member having its face of increasing diameter in the direction of projection from the carrier and having a recessed portion at the point of greater diameter to provide a limited area of frictional engagement between the element and member, said rotating means being operative to overcome such frictional engagement.

33. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the

outer element to its concentric position, means for supporting and advancing the inner element during the adhesive-applying and outer-element positioning operations, and means for rotating the traveling element during the adhesive-applying action, said advancing means including an endless carrier adapted for constant movement in the direction of advance and having a succession of members projecting laterally of the carrier path of travel, said members being spaced apart and each having a configuration over which one of such inner elements may be positioned, the configuration of each member being such as to provide a limited frictional engagement between the element and member during normal travel of the element, said rotating means being active to overcome this engagement during the adhesive application.

34. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the outer element to its concentric portion, means for supporting and advancing the inner element during the adhesive applying, the outer-element positioning, and adhesive setting operations, and means for removing the assembly upon completion of the adhesive setting, said advancing means including a constantly-advancing carrier having a member projecting laterally of the carrier path of travel and over which said inner element is positioned, said member having a configuration to permit a limited frictional engagement between the element and member during normal travel of the element, said rotating means being operative to remove a completed assembly from its member during carrier advance and having its movements coöperative with the carrier movements to break such frictional engagement to permit free removal of the assembly.

35. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the outer element to its concentric position, means for supporting and advancing the inner element during the adhesive-applying, the outer-element positioning and adhesive setting operations, and means for removing the assembly upon completion of the adhesive setting, said advancing means including a constantly-advancing carrier having a member projecting laterally of the carrier path of travel and over which said inner element is positioned, said member having a configuration to permit a limited frictional engagement between the element and member during normal travel of the element, said rotating means being operative to remove a completed assembly from its member during carrier advance and having its movements coöperative with the carrier movements to break such frictional engagement to permit free removal of the assembly, said removing means including a traveling face positioned in the path of travel of the assembly and having its movements in a direction corresponding to the direction of projection of the member from its carrier.

36. In apparatus for producing an assembly of elements wherein the elements have a concentric arrangement with an adhesive connection between the concentric portions, and wherein the adhesive is applied to predetermined portions of a periphery of the inner element in advance of applying the outer element to its concentric position, means for supporting and advancing the inner element during the adhesive applying, the outer-element positioning, and adhesive setting operations, and means for removing the assembly upon completion of the adhesive setting, said advancing means including a constantly-advancing carrier having a member projecting laterally of the carrier path of travel and over which said inner element is positioned, said member having a configuration to permit a limited frictional engagement between the element and member during normal travel of the element, said rotating means being operative to remove a completed assembly from its member during carrier advance and having the movements coöperative with the carrier movements to break such frictional engagement to permit free removal of the assembly, said removing means including an endless structure having a flight located in the path of travel of an assembly with the direction of movement of such flight corresponding to the direction of projection of the member from its carrier.

37. In assembly apparatus of the class described, a conveyer comprising a support for a tubular article, means for applying adhesive to an annular portion of the article surface, and a moving stripper acting on the article in a direction transverse to the conveyer movement, the stripper being located sufficiently far from the adhesive applying means to provide an intermediate capping station.

38. In assembly apparatus of the class described, a conveyer comprising a plurality of article supports non-rotatably secured on the conveyer, means for applying adhesive to articles located on the supports and for rotating the articles upon their supports during adhesive application, and means for stripping the articles from their supports

after application of complemental parts to the adhesive coated portions of the articles.

39. In assembly apparatus of the class described, a continuous horizontal conveyer, a plurality of spaced supports for tubular box bodies irrevolubly fixed on the conveyer, means for applying adhesive to portions of the bodies, and means for rotating the bodies on their supports during adhesive application.

40. In assembly apparatus of the class described, a continuous horizontal conveyer, a plurality of spaced supports for tubular box bodies irrevolubly fixed on the conveyer, means for applying adhesive to portions of the bodies, means for rotating the bodies on their supports during adhesive application, and a continuously moving stripper acting on the bodies in a direction substantially parallel to their axis to discharge them from their supports, the stripper being located at a point in the travel of the conveyer considerably removed from the point of adhesive application.

41. In assembly apparatus of the class described, a substantially horizontal conveyer, a plurality of spaced supports arranged to hold tubular box bodies in upright position thereon, means for rotating the box bodies at a certain part of the conveyer travel, a glue applying roll having a rotative axis substantially parallel to the direction of conveyer travel, for applying adhesive to upper marginal portions of the bodies during rotation, and a longitudinal guide overlying the bodies for retaining the bodies upon their supports throughout the extent of the adhesive applying roll.

42. In assembly apparatus of the class described, a continuous conveyer arranged to move continuously in a substantially horizontal plane, a plurality of spaced article supports located on the conveyer and secured against rotation in respect thereto, means for applying adhesive to annular portions of the article surfaces, means for rotating the articles upon their supports during adhesive application, and means for stripping the articles from the supports located at a point sufficiently removed from the adhesive applying location to permit operations to be performed upon the articles between the two locations.

43. In assembly apparatus of the class described, a conveyer, a plurality of spindles thereon to receive tubular articles, means for applying adhesive to portions of the articles, and a stripper for removing the articles from the spindles after caps have been applied to the articles, the stripper comprising a continuously moving belt having one flight arranged to move substantially parallel to the spindle axis and arranged to contact with portions of the articles as they are moved past the stripper by the conveyer.

44. In box assembly apparatus of the class described comprising a conveyer, box-part rotating means and adhesive applying means, a box-part support consisting of a substantially conical member located on the conveyer and provided with a recess near its base to reduce the area of contact with the box part.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN LEE FERGUSON.

Witnesses:

WILLIAM RUSSELL TRIPPLE,

HARRY A. GOLDBERG.