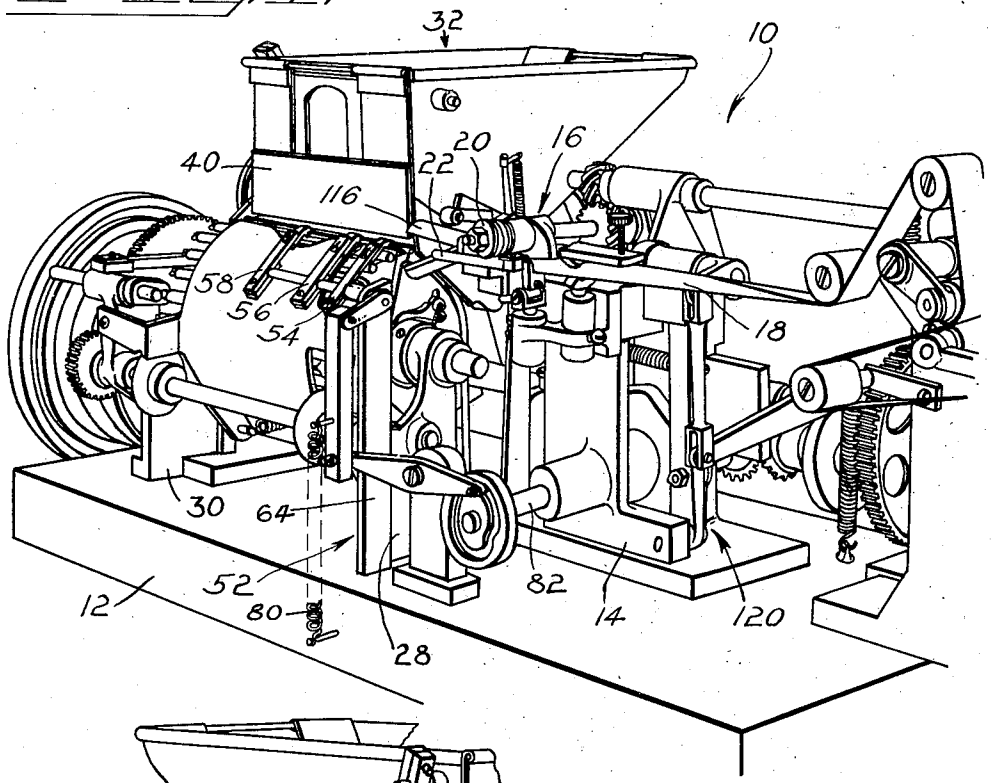
March 30, 1937. A. M. GOLDSTEIN ET AL 2,075,392

PROCESS OF PACKAGING STRAWS AND APPARATUS THEREFOR

Filed Oct. 7, 1933 2 Sheets-Sheet 1

Fig. 1.



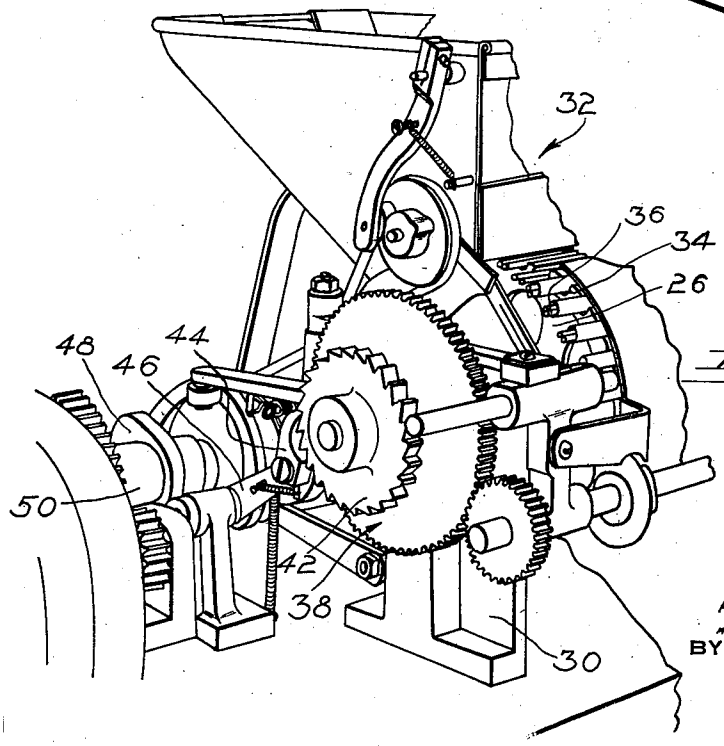


Fig. 2.

INVENTOR
ALBERT M. GOLDSTEIN
AND MAYER GARFINKEL.
BY Larson Leis & Co
ATTORNEY

March 30, 1937. A. M. GOLDSTEIN ET AL 2,075,392

PROCESS OF PACKAGING STRAWS AND APPARATUS THEREFOR

Filed Oct. 7, 1933 2 Sheets-Sheet 2

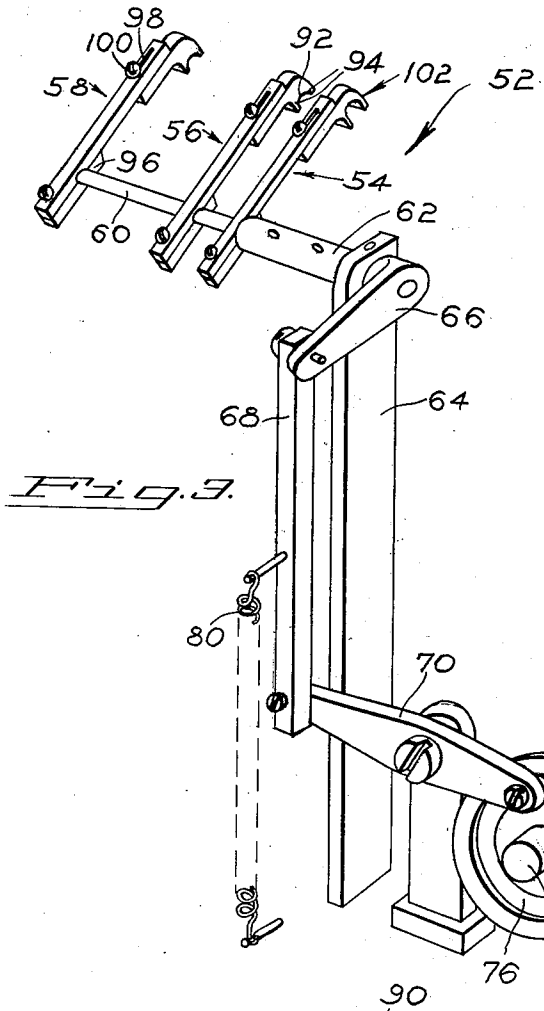


Fig. 3.

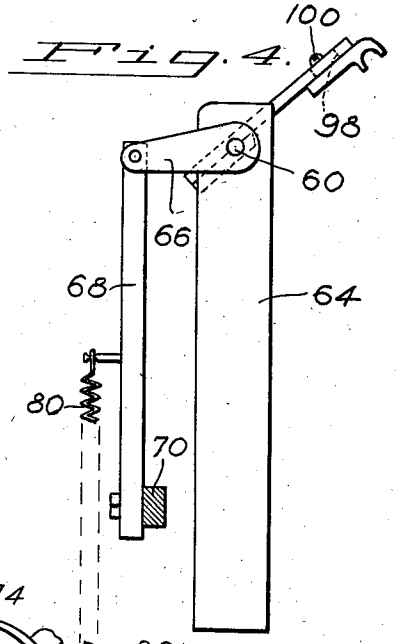


Fig. 4.

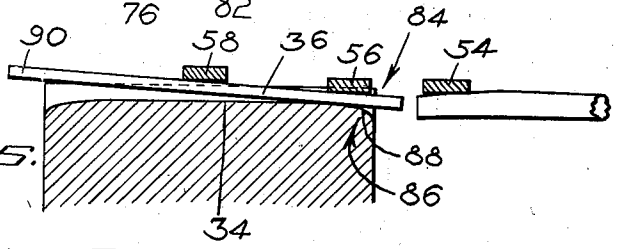


Fig. 5.

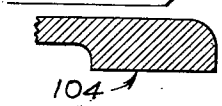


Fig. 6.

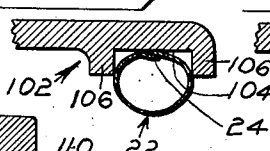


Fig. 7.



Fig. 8.

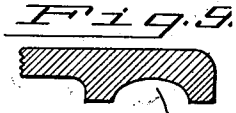


Fig. 9.

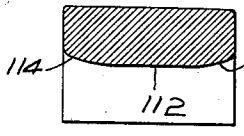


Fig. 10.

INVENTOR
ALBERT M. GOLDSTEIN
AND MAYER GARFINKEL.
BY Edwin Leisorbe
ATTORNEY

Patented Mar. 30, 1937

2,075,392

UNITED STATES PATENT OFFICE

2,075,392

PROCESS OF PACKAGING STRAWS AND APPARATUS THEREFOR

Albert M. Goldstein, Far Rockaway, and Mayer Garfinkel, Brooklyn, N. Y., assignors to Sanita Wrapped Products Corporation, Brooklyn, N. Y.

Application October 7, 1933, Serial No. 692,640

50 Claims. (Cl. 93—5)

This invention relates to a process of packaging straws, and to apparatus therefor.

Herein will be considered, particularly, the operation of apparatus for forming packages to contain, and the housing therein of, a plurality of articles such as straws. In the case to be described specifically, the number of two to a package is considered. The invention relates, in one of its specific aspects, to a method in, and to that type of apparatus by, which a container for straws is manufactured as a part of the packaging operation, and by the apparatus itself as it operates continuously. In some phases, the invention may find application in the filling of tubes which have been formed and cut to proper dimensions, and are ready to be filled, when they are brought into association within the apparatus.

The problem presented in the past has been to satisfy the requirement for the production of a package neat and trim in appearance and having instantaneous appeal to customers for the particular article in association with which the straws are to be supplied. For such purposes, one detail of design has been found to reside in a reduction in the transverse cross-sectional dimensions of the package. Also a part o fthe problem is to increase the speed of registry of straws and container to form the package, and thus reduce the time necessary for completing production of each finished article. A sharp competitor to articles machine-produced is the hand-package article. The labor for hand-packaging is very low-priced, making the cost of such production an item necessary for computation where the cost of production by machine is concerned. Packaging by machine, on the other hand, is more desirable in view of the greater sanitary conditions under which the package is produced.

In apparatus previously used for automatically and mechanically packaging straws, it has been found to be essential first to bring both container and straws to a complete halt before there could be effected any subsequent movement of the two bodies, one over the other, to accomplish the proper encompassing of the straws by the container. Furthermore, in such cases, the straws, not the container, necessarily are moved. This condition rose out of the fact that the straws are bodies of greater rigidity than the container, and can be manipulated with facility by a pusher which is an essential element of such apparatus. There probably also was involved in the application of such a method, the step from the customary method of filling a container, that is, the process would be to move the material to be housed into the housing means. The next stage was the application of a funnel for guiding the moving material into its container. Such a latter arrangement required that the container remain stationary. It has been found that, when this method of packaging is used for straws, the movement of the straws, which are coated with substances to make them water-impervious, causes a considerable quantity of this coating, scraped off from the straws, to be deposited in the apparatus. This scraped deposit, after a time, clogs the machine, even to the extent of preventing proper operation of the apparatus. Furthermore, in such apparatus, the mechanism necessary for separating the bulk straws into charges of the proper number, for separating the containers and retaining them in position before and during the assembly of the straws within the container, and for bringing the charges of straws into proper alignment with and for moving them into the containers, is extremely cumbersome.

It is an object of the invention to provide a method of packaging, and apparatus for effectuating that method, which successfully eliminates the necessity for the cumbersome apparatus now required for charge-forming and for effecting alignment of charge and container, and, furthermore, avoids entirely the necessity for driving straws into containers in the manner stated. In fact, in one of its specific forms, the invention contemplates the insertion of the straws into a container by the movement of the container rather than the movement of the straws, even to the extent of producing that result while the container is in the process of being formed, and, by the very manner of forming the tube and of feeding it away from the forming means, to complete that encompassing operation.

For the separation of the charges of straws, a suitable charge-forming member may be comprised in a drum having a plurality of grooves formed in its outer surface. These grooves are dimensioned so that only a proper quantity of straws will be deposited and retained in each groove as it passes beneath a hopper properly disposed for that purpose. Then the filled grooves consecutively move to a position to meet the container.

The container, by suitable means, has imparted to it movement toward a properly positioned groove and substantially in exact alignment with straws retained within that particular groove. While the container is thus being fed to the groove, and more especially at the moment the container end and the straw ends are almost im-

mediately in abutment, it has been found, for efficient, clean-cut operation container and straws be completely stabilized.

The container, up to that moment, may have been left free to vibrate in the manner of a flexible body, fixed at one end. This is true especially where the container here considered is the rapidly travelling end of a tubular container moving, as it is being formed, away from the forming crimp wheels, that end having no other support than the wheels. That end is, therefore, a free end substantially unrestrained in its movement except for that restraint exercised by the natural rigidity of the material. If stabilization were not effected, thus to enclose straws within containers would require that the cross-section of the container should be disproportionately greater than the cross-section of the charge to be assembled in the container. Such a relationship would produce a final product of considerable bulk, in which the straws would be retained loosely, and otherwise would be deficient in sales qualities. To permit the use of a container but slightly larger in cross-section than the cross-section of a straw charge, accurate registry is required; in fact, a condition in which the tube end is brought, at least for that instant, to a completely stabilized condition, is ideal.

For the purposes of this invention, in the embodiment disclosed, at the instant when registry of the container with the straw ends is about to take place, the container end, even as it moves, is encompassed by a member so that, although the engagement of member and container end is of but short duration, still, in that instant, tube and straws will completely and accurately register. Thereafter, even if the tube of the advancing container be released, the container, by its continued onward movement, under the propulsion of a suitable external force, whether the original or some new force, would complete the encompassment of the straws.

It has been found desirable to assure that the straws, at the moment of registry, also should be definitely, and preferably rigidly, located, or at least that the ends of the straws should be brought into such a proper relationship for that purpose. Means may be provided to act simultaneously with the means to engage the container tube end for engaging the straw ends, fixing their position for that instant.

In the particular embodiment dealt with herein, the straws, retained in a flat-bottomed groove on the outside surface of a drum, are located properly with relation to an oncoming formed tube into which the straws are to be received for the packaging operation. The end of the groove, in the direction of the oncoming tube, is belled out. The ends of the straws extend over the belled-out portion, out of contact with the walls of the groove. When the straws are about to be encased by the tube, a pair of fingers act to fix the relative relations of these elements. One of the fingers bears down upon the ends of the straws extending over the belled end; another finger moves into position to limit upward movement of the straws caused by the first finger. In this manner, the straw ends are located stationarily, and for an instant of contact by the fingers, in such position that the oncoming tube may be aimed positively to effectuate the desired cooperation on continued movement of the tube.

Practically instantaneously upon registration of tube and straw ends, the fingers retaining the ends are released. The tube continues, without a halt, in its onward movement. Owing, however, to the engaged relation of tube and straws, with such continued movement, there results the positive and progressive encasing of the straws within the tube. It matters not what may be the disposition of the tube after the critical point of registry has been consummated. In that functioning of the invention where the tube, thus engaging over the straws, also is being formed continuously during the engaging stage, that tube may be severed at a length previously calculated to encase the straws properly and leave sufficient for the sealing of the ends of the container thus formed. Then some secondary means or the severing means itself may operate to move the severed portion over the straws now partially encompassed. Such means may operate to drive the ends relatively apart with sufficient speed so that the severed portion may then be removed from the path of the oncoming, continuously forming tube without affecting or interfering with the next registry of tube and straws. During the operations after registration was effected, the fingers are maintained in a position removed from any possible interference with the tube or the straws.

Where two articles such as the straws are to be laid side by side, and then encased within a single tubular container, if that container is capable of being collapsed, at least to some degree, as in the case of the specific tubular container discussed here, made of paper of considerable elasticity, its collapse from a substantially round, to an elliptical or similar, cross-section, closely approaching the structure formed by the bounds of the two straws, laid side by side, will make registry even more assured, and thereby permit the production of a package from a tube of lesser diameter, so that the final package will be less bulky and loose, presenting a smooth, external appearance. For that purpose, the finger which contacts the tube at the moment of registry may be provided with a recess for receiving the tube. The walls of this recess may be contoured so that the tube will be caused to yield to a desired formation. At least, in such case, the portions contacted by the walls of the recess would so shape themselves; the rest of the tube, in attempting to compensate for this distorting force, would, at least in part, assume a formation associated with that of the deformed portion of the tube.

Still further along similar lines of the invention, the recess in the finger contacting the tube may be shaped to dispose a substantially flat portion to contact the top portion of the tube, or, at least, such flat portion may have a contour different from the round of the normal tube. In fact, for certain purposes of the invention, it was found possible to effect desired results with a perfectly flat surface, brought into contact with the top wall of the moving tube at the instant of registry. Greater speed of loading was made possible with the increase of the degree of encompassment of the tube, where the shaping of the tube was made to approach more closely the oval or elliptical contour.

Other objects of this invention will hereinafter be set forth, or will be apparent from the description and the drawings, in which is illustrated an embodiment of apparatus carrying out the invention.

The invention, however, is not intended to be restricted to any particular construction or arrangement of parts, or to any particular application of such construction, or to any specific

manner of use or method of operation, or to any of various details thereof herein shown and described, as the same may be modified in various particulars or be applied in many varied relations without departing from the spirit and scope of the claimed invention, the practical embodiment herein illustrated and described merely being one of various forms and modifications in which the invention might be embodied.

On the drawings, in which the same reference characters refer to the same parts throughout, and in which is disclosed the embodiment referred to:

Fig. 1 is a frontal perspective view of apparatus embodying the invention.

Fig. 2 is a similar perspective view, directed at the front part of the machine from another angle;

Fig. 3 is a view of a detail of the construction, illustrating the finger operating mechanism only;

Fig. 4 is a side elevational view of said mechanism;

Fig. 5 is a view, to an enlarged scale, illustrating the relationship of the fingers, the straws and the tube at the moment of registry;

Fig. 6 is a transverse, cross-sectional view of one form of tube-engaging finger;

Fig. 7 is a similar cross-sectional view of another modified form of tube-engaging finger;

Fig. 8 is a similar cross-sectional view of another form of tube-engaging finger;

Fig. 9 is a cross-sectional view of a further form of tube-engaging finger; and

Fig. 10 is a longitudinal, cross-sectional view, medially of the mouth of the fingers shown in Figs. 7, 8 and 9.

The portion on the drawings marked 10 is intended to illustrate but a portion of an entire apparatus which, in its operation, effects the steps necessary for a complete packaging operation. For a full and clear description of the construction and operation of a machine of this type, reference is made to the application of Albert M. Goldstein and Mayer Garfinkel, Serial No. 338,744, filed the 9th day of February, 1929. In that machine, there are involved certain elements of construction and operation which adapt it for ready incorporation of the invention disclosed herein. Such a machine may include a bed 12, up from which extends a bearing column 14, preferably secured to bed 12. Carried at the upper end of column 14 is a paper-twisting and tube-forming means 16. To means 16 is fed a paper strip 18; then, by well-known means, such as means including a power-driven knurling wheel 20, and not otherwise necessary of specific description here, the paper strip is formed into a tube 22, the edges of the strip being knurled together to form a seam 24. Under the force exerted by wheel 20, tube 22 feeds away from means 16.

In the path of movement of tube 22, may be presented a drum 26. This drum may also be carried upon bed 12, as by suitable bearing supports 28 and 30. Positioned immediately over the drum may be a supply hopper 32. In the arrangement here shown, the upwardly presented portion of the drum surface passes directly beneath the hopper. The hopper and drum are so related that grooves 34, cut in the surface of the drum, receive, as they are fed by gravity from the hopper, a plurality of the articles, such as straws 36, which are properly arranged in the hopper for that purpose.

The drum is given a step-by-step movement by mechanism 38 so that grooves 34 are disposed alternately for the reception of straws so fed from the hopper. As described in our copending application, the grooves are of a depth greater than necessary to receive the predetermined charges of straws, in this case, two. Mechanism operating in conjunction with drum and hopper, as described in the copending application, effectually limits the charge to a pair of straws, the straws, at the time they are presented to be encompassed, as shown in Fig. 5, resting upon the bottom of the groove. When the grooves move beyond the hopper, a plate 40, at the front of the hopper, clears other straws from the grooves, and guards against excess straws being carried along beyond the hopper. When each groove moves beyond plate 40, the straws drop to the bottom of the grooves. The drum may be made less in width than the straws fed to it from the hopper and retained in its grooves. Thus, when the drum moves beyond the hopper, the straws will extend beyond the grooves at least at one side.

Mechanism 38, more specifically described in our copending application, may include a ratchet wheel 42 mounted to rotate with the drum. A pawl 44 carried by an arm 46, which in turn is actuated at predetermined intervals by a cam 48 carried by the driven shaft 50 of the apparatus, functions to rotate ratchet wheel 42 at predetermined intervals to effect the step-by-step movement of the drum. At each such movement of the drum, a new groove is brought to the position where the straws on its bottom will be in alignment with tube 22 as it moves off means 16. The groove is so maintained for a predetermined time period in relation to the moving tube in the manner to be described.

The product of means 16 will be substantially a round member; owing to the twisting and crimping action of wheel 20 and the seam 24, a certain degree of flattening of that tube may appear at the seam. The tube, moving from the forming means, is being affected along its entire length by forces tending to vibrate the tube and give to it an unsteady character. The straws, deposited in the groove, when side by side within the groove, together form a geometrical figure, in cross-section practically oblong except that the ends are curved. The relation of this figure to the axis of the groove is not definitely defined when the straws are so located.

These conditions do not favorably dispose the apparatus for rapid operation. The open end of the tube must, at a particular instant, be in exact registry with the geometrical figure formed by the two adjacent ends of the straws. To assure this positive registry, a device such as positioning means 52 is associated with the apparatus. The means operates upon the principle that, if, but for a minute period of time, tube and straw ends be brought in registry, thereafter tube and straw ends will properly telescope merely by continuing the telescoping pressure upon either one, or both, to effectuate complete envelopment of the straws by the tube.

Such positioning means may include a plurality of fingers 54, 56 and 58. These fingers may have provided therefor individual actuating means; in one embodiment, all the fingers are securely fastened to a single shaft 60 carried in a bearing 62 on an upright 64 which may be mounted upon bed 12. The shaft is rotated by means of a crank 66. A link 68, pivotally connected to the crank, transmits power to the crank from a lever 70, piv-

oted intermediately thereof upon the frame and engaged by a cam 72 at one end. At this end, a roller 74 is mounted, this roller being received within the cam groove 76. The groove is shaped so that normally no movement of the fingers will occur. Only a sharply divergent section 78 is found in the groove to effectuate a sharp, and very short-timed depression of the fingers. A spring 80, engaged between link 68 and the bed, causes the fingers normally to assume a position in which they are raised out of interfering relation to the straws and tube.

Cam 72 is driven by a cross-shaft 82 from the main shaft of the apparatus from which shaft is also derived the power for driving the other portions of the apparatus in properly synchronized relation. This cam, and the operation of the several other relatively operated portions of the apparatus, are timed so that, for each pair of straws fed into position by the drum, the fingers, at a proper time, will be actuated once to a position to be described, and then will be quickly moved out of that position and to their normal, ineffective position, under the action of spring 80.

As shown in Fig. 5, end 84 of each groove, that is, the end toward which the tube is to be projected, may be belled outwardly, as shown at 86. Then finger 56, striking against the ends of the straws extending beyond the drum or over the belled-out portion of the groove, will cause the straws to move downwardly. Finger 56 may be located, as shown in Fig. 5, just beyond the drum limits, or even immediately over the belled-out portion. Thus, when this finger descends and strikes the straw-ends at that location, the straws will be caused to rock along the downwardly rounded face 88 of the groove and belled-out portion as a fulcrum, the other ends 90 of the straws being lifted completely off the bottom of the groove. In order that, at the same time as the straw-ends are thus lowered and brought into a definite vertical position with relation to the oncoming tube, the ends should also be retained in position against lateral movement, finger 58 may have its straw-contacting surface 92 provided with boundary walls 94. The surface which comes into contact with the straws may have a slight curvature, or it may be substantially flat.

Finger 58, moving with finger 56, is adjusted to limit upward movement of the upwardly driven ends 90 of the straws as the straws fulcrum around the belled-out portions of the groove under the action of finger 56. Such movement of the straw ends may be controlled by an adjustment of the relative radial positioning on shaft 60 of the fingers, the frictional clamping means 96 on each finger making provision for such adjustment. Likewise, longitudinal adjustment of each finger is permitted by means such as a slot 98 and a set-screw 100.

The jaw 102 of finger 54, in accordance with the shaping of its contacting surface, may be caused to effect different ultimate results. For instance, the jaw may have entirely a flat contacting surface 104, as shown in Fig. 6. The flat face of such a finger, when brought downwardly, engages approximately against the top of moving tube 22. The tube, up to means 16, is subjected to sharply biasing forces of compression and tension, with the ultimate result that the tube no longer vibrates but, as it continues in its movement, attains a very definite direction. By proper adjustment of the positional relationship of finger 54, this direction may be controlled so that the open end of the tube travels directly, and into encompassing relation, to the free ends of the straws, which have been positioned and are, at that time, retained by fingers 56 and 58.

Such a jaw, to some extent, restrains the tube against lateral vibration, due to its frictional contact therewith. Although substantially unimportant at times because of this frictional contact of tube and jaw, still increased speed of operation may make possible that lateral vibration become a factor of some importance. In such event, the jaw may be provided with downwardly extending walls 106, as shown in Fig. 7. The speed of operation may now definitely be increased, yet the tube will be guided effectively into proper relationship to the straw ends.

In the particular case just discussed, walls 106 may be disposed substantially at right angles to the extent of surface 104. To conform more closely to the resultant cross-section of the tube, mouth 108 between walls 106 may be constructed to be substantially semi-circular in cross-sectional effect, as shown in Fig. 8. A tube, acted upon by such a jaw, will assume and retain a shape substantially identical with that of the mouth, as the jaw bears upon the flattened top. This condition, in which a large portion of the tube is in contact with the walls of the mouth, results in a highly desirable condition of stability and certainty for the moving mouth of the tube.

A further increase in the speed of manufacture may be effected by moving walls 106 sufficiently apart so that, on contact of the finger, the mouth of the tube will be widened from a true circular cross-section. Such widening, as discussed, facilitates the insertion of material into the tube, and especially in this case where, as here, the effective cross-section of the material to be inserted, the two straws, is not circular, but approximately elliptical. Mouth 108 may, therefore, be deformed somewhat from the true semi-circular cross-section, and given a cross-section substantially semi-elliptical as shown in Fig. 9.

In such case, when the finger brings pressure to bear upon the top surface of the tube, the resultant deformation of the top portion of the tube will tend toward the contouring of an ellipse. The bottom portion, otherwise free, will tend, owing to the resilience of the material forming the tube, to shape itself in a similar manner. Thus the tube will present an opening, wider than the normal diametrical cross-section, at the moment the tube registers with the straw ends. A more compact package may thus be produced, as the tube initially formed need but be of a lesser diameter.

In the case of a jaw 102 including walls 106, the mouth, in cross-section along the line of the tube, may have a contouring such as shown in Fig. 10. The mouth then may include a downwardly deflected, entering surface 110, and a contact surface 112, from which another surface 114 leads away upwardly. Contact surface 112 is intended to function as the positively effective surface brought to bear against the tube. The other surfaces 110 and 114 serve as guides for the tube to that surface, or to eliminate any obstructing edges from the path of the tube. Surface 114 permits the entry of the straws into the tube without possible interference, and surface 110 operates to bring the tube, as it advances, into proper registry with surface 112.

As noted above, the action of cam 72 is very sharp, bringing the fingers into contact with their respective portions of tube or straws for a very

small period of time, at the moment of registry. At that moment, the members must move into telescopic relationship. If they do not, the oncoming tube will become crushed against the straws or against the walls of the drum. The machine must then be stopped, and readjusted before further operation. Once registry has been effected, the fingers move quickly away. Especially must this be true of fingers 56 and 58, as the tube otherwise might strike either of these fingers and crush against it.

The tube, for a definite period after registry, continues telescoping movement as it continues attached to the portion being continuously formed. At a predetermined moment, scissors 116, which are supported on a sliding carriage (not shown), are moved by that carriage to a position where they are operated by suitable mechanism 120 to cut off a length of the moving tube. Then the carriage is continuously moved at a rate faster than the tube, and the scissors preferably kept closed. The severed length, against which the scissors press, is moved free of the moving free end and substantially completely into the groove. The drum may then be moved to remove the encompassed set of straws from the path of the moving tube, and to position a new set of straws for the encompassing action. This movement of the scissors was described and is claimed in the previous application.

Many other changes could be effected in the particular apparatus designed, and in the methods of operation set forth, and in specific details thereof, without substantially departing from the invention intended to be defined in the claims, the specific description herein being to illustrate an operative embodiment carrying out the spirit of the invention.

What is claimed as new and useful is:—

1. In apparatus for packaging straws, which includes: means for feeding a tubular container longitudinally of its axis, straw supplying means, means for separating a charge of straws from said supplying means and for thereafter moving the charge into the line of movement of the container, and means additional to said container feeding means and said straw supporting means for guiding the container into position so that it will, as it continues in its movement, completely envelop the straws.

2. In apparatus for packaging straws, which includes: means for continuously forming a tubular container from a strip of suitable material and for feeding said tubular container longitudinally of its axis, means for forming a plurality of segregated charges of straws and for thereafter and at predetermined intervals moving successive charges into the line of movement of the container, and means additional to said container feeding means and said straw supporting means for guiding the container into position so that it will, as it continues in its movement, completely envelop the straw charges.

3. In apparatus for packaging straws, which includes: means for continuously forming a tubular container from a strip of suitable material and for feeding said tubular container longitudinally of its axis, means for forming a plurality of segregated charges of straws and for thereafter and at predetermined intervals moving successive charges into the line of movement of the container, and means additional to said container feeding means and said straw supporting means operating simultaneously to locate the ends of the straws of a single charge and to guide the travelling container so that it will engage over the positioned straw ends, the tube thereafter, as it continues in its movement, completely enveloping the straw charges.

4. In apparatus for packaging straws, which includes: means for feeding a tubular container longitudinally of its axis, means for forming a plurality of segregated charges of straws and for thereafter and at predetermined intervals moving successive charges into the line of movement of the container, and means operating simultaneously for locating the ends of the straws of a single charge and for encompassing a portion of the travelling tube to force the travelling end of the tube to engage over the positioned straw ends, the tube thereafter, as it continues in its movement, completely enveloping the straw charges.

5. The method of packaging charges of a plurality of straws in tubular paper containers, wherein the paper container is continuously formed from a paper strip, by continuously bending the paper strip to bring its edges together and sealing the edges one to the other, producing a continuous tube which moves continuously away from the forming means substantially axially of the tubular container, including the steps of: segregating and positioning a charge of straws for arrangement within the container, and then for a single instant clamping the charge of straws in a fixed position while the tubular container is forced into a position where its free end will move over the clamped straws to encompass them.

6. The method of packaging charges of a plurality of straws in tubular paper containers, wherein the paper container is continuously formed from a paper strip, by continuously bending the paper strip to bring its edges together and sealing the edges one to the other, producing a continuous tube which moves continuously away from the forming means substantially axially of the tubular container, including the steps of: segregating and positioning a charge of straws for arrangement within the container, and then for a single instant clamping the charge of straws adjacent their ends in a fixed position while the tubular container is forced to move in a line such that its free end will move over the clamped straws to encompass them.

7. The process of packaging a plurality of tubular members within another tubular member, wherein the encasing movement takes place on the part of the encasing tubular member, including the steps of: separating and positioning charges of a plurality of tubular members to be encased, effecting movement of the encasing tubular member toward one of the positioned charges, and simultaneously bearing against the tubular members adjacent their ends when the ends are about to be brought into encompassing and encompassed relationship.

8. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; then immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encom-

passing, on the part of the container, of the members; and immediately after such registry, severing the requisite length of tubular container from the single, continuous unit and driving the severed length quickly away from the new free end of the unit to complete the encompassing effect before the new end can reach the charge so encompassed.

9. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; and immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the position of the ends of the members and biasing the oncoming end of the tubular member out of the normal line of its movement to effectuate positive registry of the related ends and encompassing, on the part of the container, of the members.

10. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; and immediately that the container and member ends are about to be brought together by continued movement of the container and for a single instant, fixing the position of the ends of the members and biasing the oncoming end of the tubular member out of the normal line of its movement to effectuate positive registry of the related ends and encompassing, on the part of the container, of the members.

11. In a process of packaging a plurality of members within a single tubular container of requisite length for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; and immediately that the container and member ends are about to be brought together by continued movement of the container and while movement of the container continues, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members.

12. In a process of packaging a plurality of members within a single tubular container of requisite length for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; and immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members.

13. In combination, in a straw-packaging machine, means for retaining a charge of straws in a predetermined positional relationship, means for feeding a tubular container toward the retained charge, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so retained.

14. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove, and means for engaging the ends of the straws and depressing them and for downwardly biasing the container to retain them in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so retained.

15. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove, and a plurality of fingers actuated simultaneously for engaging the ends of the straws and depressing them and for downwardly biasing the container to retain them in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so retained.

16. In combination, in a straw-packaging machine, means for retaining a charge of straws in a predetermined positional relationship, means for continuously forming and feeding a tubular container toward the retained charge, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

17. In combination, in a straw-packaging machine, a drum, the drum having a plurality of flat-bottomed grooves for segregating and retaining charges of a plurality of straws, means for actuating the drum at predetermined intervals to position a new charge-retaining groove in a predetermined positional relationship, means for continuously forming and feeding a tubular container toward the positioned groove, the grooves, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the flat bottom of the groove, and a plurality of fingers actuated simultaneously for engaging the ends of the straw charge in such groove and depressing them and for downwardly biasing the container to retain it in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so engaged, one of the fingers engaging the straw ends immediately over the enlarged end of the groove, another finger limiting the downward tilting of the straw ends under the action of the first finger,

and still another finger being brought to bear against the free end of the advancing tubular container.

18. The method of packaging straws in tubular paper containers, wherein the paper container is continuously formed from a paper strip, by forming the paper strip continuously into a tube which moves continuously away from the forming means substantially axially of the tubular container, including the steps of: segregating and positioning a charge of straws for arrangement within the container, and simultaneously clamping the straw charge in a fixed position while the tubular container is forced into a position where its free end will move over the clamped straws to encompass them.

19. The method of packaging charges of a plurality of straws in tubular paper containers, wherein the paper container is continuously formed from a paper strip, by continuously bending the paper strip to bring its edges together and sealing the edges one to the other, producing a continuous tube which moves continuously away from the forming means substantially axially of the tubular container, including the steps of: segregating and positioning a charge of straws for arrangement within the container, and simultaneously clamping the straw charge in a fixed position while the tubular container is forced into a position where its free end will move over the clamped straws to encompass them.

20. The method of packaging charges of a plurality of straws in tubular paper containers, wherein the paper container is continuously formed from a paper strip, by continuously bending the paper strip to bring its edges together and sealing the edges one to the other, producing a continuous tube which moves continuously away from the forming means substantially axially of the tubular container, including the steps of: segregating and positioning a charge of straws for arrangement within the container, and then for a single instant clamping the charge of straws adjacent their ends in a fixed position while the tubular container is forced into a position where its free end will move over the clamped straws to encompass them.

21. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship, then feeding the tubular container to bring its freen end into a position adjacent the free ends of the members, and immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members.

22. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; then immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members; and immediately after such registry, severing the requisite length of tubular container from the single, continuous unit.

23. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; then immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members; and immediately after such registry, severing the requisite length of tubular container from the single, continuous unit and driving the severed length quickly away from the new free end of the unit.

24. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; then immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members; immediately after such registry, severing the requisite length of tubular container from the single, continuous unit and driving the severed length quickly away from the new free end of the unit to complete the encompassing effect before the new end can reach the charge so encompassed, and moving the encompassed charge out of, and a new charge into, the line of movement of the oncoming free end.

25. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; and immediately that the container and member ends are about to be brought together by continued movement of the container and for a single instant, simultaneously fixing the position of the ends of the members and biasing the oncoming end of the tubular member out of the normal line of its movement to effectuate positive registry of the related ends and encompassing, on the part of the container, of the members.

26. In a process of packaging a plurality of members within a single tubular container, in

which the tubular container is supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members, which includes the steps of: separating a charge of the members and positioning the charge in a predetermined positional relationship; then feeding the tubular container to bring its free end into a position adjacent the free ends of the members; then immediately that the container and member ends are about to be brought together by continued movement of the container and for a single instant, simultaneously fixing the position of the ends of the members and biasing the oncoming end of the tubular member out of the normal line of its movement to effectuate positive registry of the related ends and encompassing, on the part of the container, of the members; and immediately after such registry, severing the requisite length of tubular container from the single, continuous unit and driving the severed length quickly away from the new free end of the unit to complete the encompassing effect before the new end can reach the charge so encompassed.

27. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is being continuously formed and supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members and in which the tubular container, by the forces acting to form it, moves continuously, which includes the steps of: separating charges of the members and positioning each charge consecutively in a predetermined positional relationship while the tubular container continuously moves to bring its free end into a position adjacent the free ends of the members of the charge in the positional relationship; and immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members.

28. In a process of packaging a plurality of members within a single tubular container, in which the tubular container is being continuously formed and supplied in the form of a single, continuous unit to be severed into requisite lengths for properly encompassing the members and in which the tubular container, by the forces acting to form it, moves continuously, which includes the steps of: separating charges of the members and positioning each charge consecutively in a predetermined positional relationship while the tubular container continuously moves to bring its free end into a position adacent the free ends of the members of the charge in the positional relationship; then immediately that the container and member ends are about to be brought together by continued movement of the container, fixing the relative positions of the ends to effectuate their positive registry and the encompassing, on the part of the container, of the members; and immediately after such registry, severing the requisite length of tubular container from the single, continuous unit and driving the severed length quickly away from the new free end of the unit to complete the encompassing effect before the new end can reach the charge so encompassed.

29. In combination, in a straw-packaging machine, a member having a groove for retaining a charge of straws in a predetermined positional relationship, means for feeding a tubular container toward the groove, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so retained.

30. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so retained.

31. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so retained.

32. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove, and a plurality of fingers actuated simultaneously for engaging the ends of the straws and depressing them and for downwardly biasing the container to retain them in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so retained, one of the fingers engaging the straw ends immediately over the enlarged end of the groove.

33. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove, and a plurality of fingers actuated simultaneously for engaging the ends of the straws and depressing them and for downwardly biasing the container to retain them in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so retained, one of the fingers engaging the straw ends immediately over the enlarged end of the groove while another finger limits the downward tilting of the straw ends under the action of the first finger.

34. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove,

and a plurality of fingers actuated simultaneously for engaging the ends of the straws and depressing them and for downwardly biasing the container to retain them in such realtionship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so retained, one of the fingers bearing against the container end immediately before the container and the straw ends are brought together.

35. In combination, in a straw-packaging machine, a member having a substantially flat-bottomed groove for retaining a charge of straws in a predetermined positional relationship and substantially in side-by-side relationship, means for feeding a tubular container toward the groove, the groove, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the bottom of the groove, and a plurality of fingers actuated simultaneously for engaging the ends of the straws and depressing them and for downwardly biasing the container to retain them in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so retained, one of the fingers engaging the straw ends immediately over the enlarged end of the groove, another finger limiting the downward tilting of the straw ends under the action of the first finger, and still another finger being brought to bear against the free end of the advancing tubular container.

36. In combination, in a straw-packaging machine, a drum for segregating and retaining charges of a plurality of straws, means for actuating the drum at predetermined intervals to position a new charge in a predetermined positional relationship, means for feeding a tubular container toward the positioned charge, and means for engaging the ends of the straws in such charge and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

37. In combination, in a straw-packaging machine, a drum, the drum having a plurality of grooves for segregating and retaining charges of a plurality of straws, means for actuating the drum at predetermined intervals to position a new charge-retaining groove in a predetermined positional relationship, means for feeding a tubular container toward the positioned charge, and means for engaging the ends of the straws in such charge and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

38. In combination, in a straw-packaging machine, means for retaining a charge of straws in a predetermined positional relationship, means for forming and feeding a tubular container toward the retained charge, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

39. In combination, in a straw-packaging machine, means for retaining a charge of straws in a predetermined positional relationship, means for continuously feeding a tubular container toward the retained charge, and means for engaging the ends of the straws and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

40. In combination, in a straw-packaging machine, a drum for segregating and retaining charges of a plurality of straws, means for actuating the drum at predetermined intervals to position a new charge in a predetermined positional relationship, means for continuously forming and feeding a tubular container toward the retained charge, and means for engaging the ends of the straws in such charge and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

41. In combination, in a straw-packaging machine, a drum, the drum having a plurality of flat-bottomed grooves for segregating and retaining charges of a plurality of straws, means for actuating the drum at predetermined intervals to position a new charge-retaining groove in a predetermined positional relationship, means for continuously forming and feeding a tubular container toward the positioned groove, the grooves, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the flat bottom of the groove, and means for engaging the ends of the straw charge in such groove and the container to retain them in such relationship that movement of the container will cause it to encase the straw charge so engaged.

42. In combination, in a straw-packaging machine, a drum, the drum having a plurality of flat-bottomed grooves for segregating and retaining charges of a plurality of straws, means for actuating the drum at predetermined intervals to position a new charge-retaining groove in a predetermined positional relationship, means for continuously forming and feeding a tubular container toward the positioned groove, the grooves, at the end adjacent the approaching container, being enlarged to permit the straw ends to extend free of the flat bottom of the groove, and means for engaging the ends of the straw charge in such groove and depressing them and for downwardly biasing the container to retain it in such relationship that movement of the container will cause it to move into exact registry with the straw ends and thereafter encase the straw charge so engaged.

43. The method of packaging a member within a tubular container which comprises supporting said member in a predetermined position, feeding the tubular container to bring its free end into position adjacent the end of said member, and flexing the free end portion of said container with respect to said end of the member when said ends are close to each other to bring said ends of the member and container into registry so that continued feeding movement of said container causes the latter to envelop said member.

44. The method of packaging a member within a tubular container which comprises supporting said member in a predetermined position, feeding the tubular container to bring its free end into position adjacent the end of said member, tilting said member downwardly toward said free end of the container and simultaneously flexing the free end portion of the container when said ends of the member and container are close to each other to bring them into registry so that continued feeding movement of said container causes the latter to envelop said member.

45. In packaging apparatus of the class described, means for supporting a member to be packaged, means for feeding an open-end container in a direction longitudinally of the container axis substantially in line with said member

on its support and intermittently operated movable means for guiding the free end of said tubular container into registry with said member on its support so that said container will, as it continues its movement, completely envelop said member.

46. In packaging apparatus of the class described, means for supporting a member to be packaged, means for feeding an open-end container substantially in line with said member on on its support and intermittently operated movable means constructed and arranged to engage the free end of said tubular container for guiding the latter into registry with said member on its support so that said container will, as it continues its movement, completely envelop said member.

47. In packaging apparatus of the class described, means for supporting a member to be packaged, means for feeding an open-end container substantially in line with said member on its support and intermittently operated movable means constructed and arranged to engage the free end of said tubular container and the adjacent end of said member to bring said ends into registry so that said container will, as it continues its movement, completely envelop said member.

48. In apparatus for packaging straws, which includes: means for continuously forming a tubular container from a strip of suitable material and for feeding said tubular container longitudinally of its axis, means for supporting straws substantially horizontally and in the line of movement of the container, and means additional to said container feeding means and said straw supporting means for guiding the container into position so that it will, as it continues in its movement, completely envelop the horizontally supported straws.

49. In apparatus for packaging a plurality of straws in a single tubular container, which includes: means for continuously forming a tubular container from a strip of suitable material and for feeding said tubular container longitudinally of its axis, means for supporting a charge of a plurality of straws disposed substantially horizontally in the line of movement of the container, and means additional to said container feeding means and said straw supporting means for guiding the container into position so that it will, as it continues in its movement, completely envelop the entire straw charge.

50. In apparatus for packaging a plurality of straws in a single tubular container, which includes: means for feeding the tubular container longitudinally of its axis, straw supplying means, means for separating a charge of a plurality of straws from said supplying means, and for positioning said charge of straws in the line of movement of the container, and means additional to said container feeding means and said straw supporting means for engaging the travelling container immediately before its end meets the straw ends to position the open end of the tube to receive the straw ends, the tube thereafter, as it continues in its movement, completely enveloping the straws.

ALBERT M. GOLDSTEIN.
MAYER GARFINKEL.