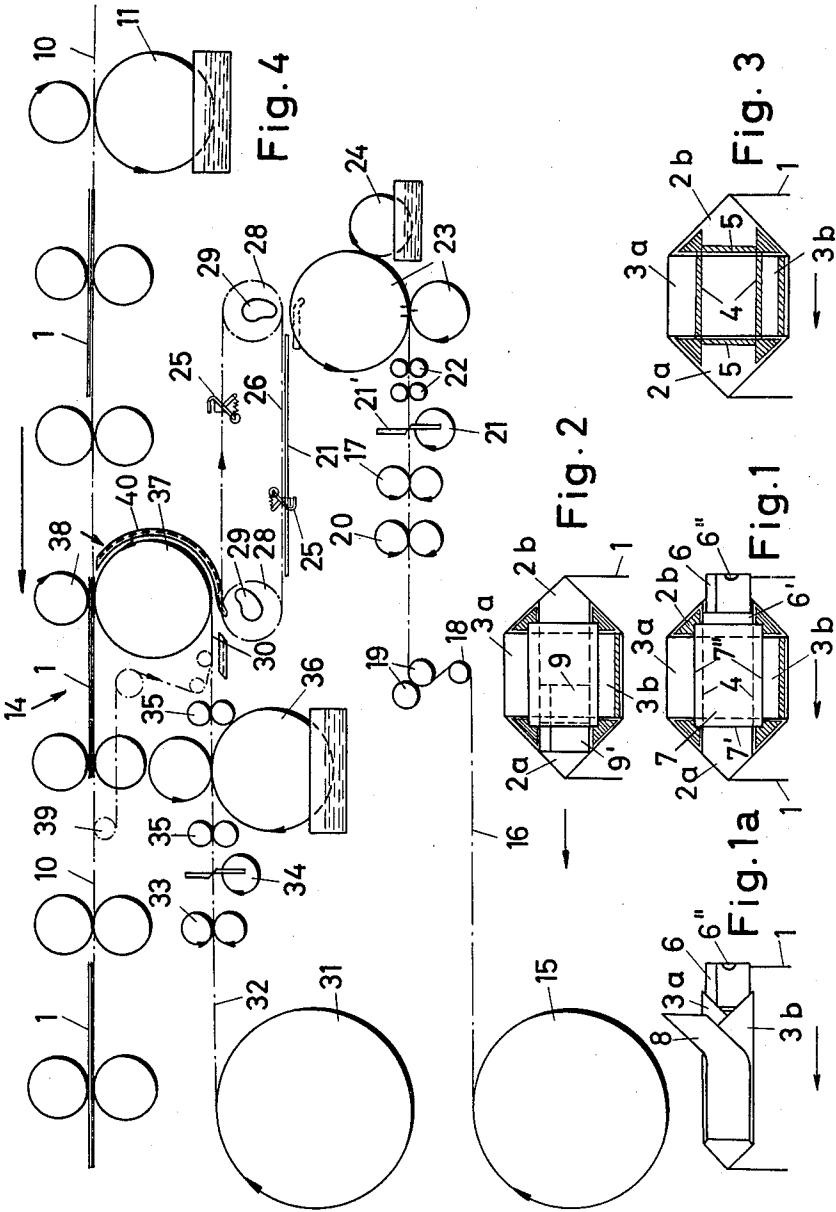


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PROCESS AND APPARATUS FOR MANUFACTURING
A FLEXIBLE CONTAINER
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PROCESS AND APPARATUS FOR MANUFACTURING A FLEXIBLE CONTAINER

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Original application Apr. 24, 1961, Ser. No. 105,225. Divided and this application Feb. 1, 1962, Ser. No. 170,464

Claims priority, application Germany Apr. 23, 1960 6 Claims. (Cl. 93-8)

The present invention relates to a process and apparatus for manufacturing a flexible container and is a division of our copending application Serial No. 105,225, filed April 24, 1961, entitled, "Flexible Container and Process and Apparatus for Manufacturing the Same," now abandoned.

Our application Serial No. 105,225, filed April 24, 1961, relates to flexible containers of the type which are used to contain foodstuffs particularly in granular form such as ground coffee and the like.

Containers of this type include a tubular member which gives access to the interior of the container, and considerable problems have long been encountered in so joining the tubular member to the container that when the container is folded into its final form there are no passages through which the contents of the container can escape. Moreover, in conventional containers of this type the tubular member is first joined as a flat, unfolded sheet to the partly finished container, and during the finishing of the container parts thereof are folded so as to also fold the flat sheet to form a tubular member therefrom, and thereafter a cover sheet is joined to the container. This conventional arrangement is disadvantageous because of the separate steps required for providing the container with the tubular member and with the cover sheet.

One of the objects of the invention disclosed in application Serial No. 105,225, filed April 24, 1961, is to overcome the above drawbacks by providing a container which includes a tubular member of the above type as well as a cover sheet and which cannot possibly have any passages in the finished container through which the contents thereof can escape.

It is an object of the present invention to provide an apparatus for manufacturing a container of the type described in application Serial No. 105,225, filed April 24, 1961, and made up of simple elements which are easy to assemble and which can conveniently be operated with a predetermined synchronism so as to automatically provide the container of the invention.

Still another object of the present invention is to provide a process for manufacturing a container of the above type and for enabling the parts to be assembled in a position with respect to each other which will give through the tubular member an access to the interior of the container either through a reinforced portion of the tubular member or through a non-reinforced portion thereof.

It is furthermore an object of the present invention to provide a tubular member of the above type which has a reinforcing portion and which at the same time can be applied simultaneously with the cover sheet to the flat tube which forms the container for the particulate material or the like.

It is furthermore an object of the present invention to provide a compact assembly of elements which will operate reliably to produce the container of the invention.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both

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as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a fragmentary illustration of an end portion of a flexible container according to the present invention showing the manner in which a cover sheet and tubular member are joined to the flexible container before final folding of the flexible container at the end portion thereof of which is visible in FIG. 1;

FIG. 2 shows a different embodiment of the structure of FIG. 1;

FIG. 3 shows the container of FIGS. 1 and 2 before the tubular member and cover sheet are joined thereto but after glue has been applied to the flat tube which is fragmentarily shown in FIG. 3;

FIG. 1a illustrates the container of FIG. 1 after it has been folded into its final configuration at the end portion which is fragmentarily shown in FIG. 1a, FIG. 1a also showing an outer cover sheet being applied to the container; and

FIG. 4 diagrammatically illustrates a process and apparatus for manufacturing a container according to the present invention.

Referring to FIG. 3, the flexible container of the invention which is fragmentarily illustrated therein is folded in a known way with a known structure at the end portion shown in FIG. 3 to provide the structure shown in FIG. 3. The flexible container 1 is in the form of a flat tube, and this flat tube 1 has a pair of walls the upper one of which, which is visible in FIG. 1, is being folded back upon itself at the end shown in FIG. 3 so as to form from the pair of walls of the flat tube 1 a pair of trapezoidal portions and a pair of triangular portions 2a and 2b which respectively overlie the trapezoidal portions in the manner shown in FIG. 3 so that these triangular portions 2a and 2b are superimposed on the trapezoidal portions of the walls of the flat tube 1, and these trapezoidal portions have a pair of rectangular sections 3a and 3b respectively exposed between the pair of triangular portions 2a and 2b. A structure which is capable of folding a flat tube 1 at one end thereof so as to provide the tube with the portions shown in FIG. 3 is shown, for example, in U.S. patent application 702,482, filed December 12, 1957.

Subsequently the trapezoidal portions are folded at their free end portions toward each other along a pair of grooved fold lines 4, so that the folded end portions overlap each other as indicated in FIG. 1a, to provide a finished end for the container. During the manufacture of the container it moves to the left in the direction of the arrows shown in the several figures, and thus the triangular portion 2a leads while the triangular portion 2b trails. Glue is applied to the container end portion in the manner indicated in FIG. 3 so that the glue extends along the fold lines 4 as well as along the lines 5, the glue thus extending along the periphery of the rectangle which extends across the exposed triangular sections 3a and 3b and which overlap the triangular portions 2a and 2b, and the glue is also applied to the additional areas indicated in FIG. 3, so as to facilitate the finishing of the container.

In the embodiment of the invention which is illustrated in FIGS. 1 and 1a, the trailing triangular portion 2b has joined thereto an elongated tubular member 6 which gives access to the interior of the container, this elongated tubular member 6 communicating with the interior as well as the exterior of the container. The tubular member 6 is joined by glue to the triangular portion 2b, and the tubular member 6 has a reinforcing portion 6' extending all around the tubular member 6 in a man-

ner described below. At its outer free end the tubular member 6 has a portion 6' adapted to be removed with the thumb of the operator so as to facilitate the opening of the tubular member 6. The rectangular cover sheet 7 overlaps the tubular member 6 which extends outwardly beyond the cover sheet 7, and it will be seen that the cover sheet 7 is aligned with and extends slightly beyond the periphery of the rectangle which receives the glue along the lines 4 and 5 shown most clearly in FIG. 3. The cover sheet 7 is glued to the tubular member 6 and overlaps with its leading edge 7' the leading triangular portion 2a and is joined to the latter by one of the elongated glue portions 5. The opposed side edges 7'' of the cover sheet 7 extend across and beyond the fold lines 4 to which glue has previously been applied, as described above, and with this glue the cover sheet 7 is joined to the exposed rectangular sections 3a and 3b of the trapezoidal portions of the walls of the flat tube 1. The cover sheet 7 can be made out of coated or uncoated paper, and it is preferred to use a paraffin-coated paper for this purpose. In any event the cover sheet 7 is very pliable so that a fluid-tight endless seal all along the entire periphery of the cover sheet 7 is guaranteed. It will be noted that the fold lines or grooves 4 are located between the opposed side edges 7' on the cover sheet 7, so that when the trapezoidal portions are folded toward each other along the fold lines 4 the cover sheet 7 itself will be folded also so that in this way, in accordance with the present invention, there cannot possibly be any place where the material in the interior of the container 10 escape and there are absolutely no unsealed folds or the like. As is illustrated in FIG. 1a, if desired, after the trapezoidal portions are folded toward each other and overlap each other an outer cover sheet 8 may be glued to the end of the container to provide a final finishing thereof.

With the embodiment which is illustrated in FIG. 2 a tubular member 9 is used instead of a tubular member 6, this tubular member 9 having a reinforcing portion 9' which is joined to the leading triangular portion 2a by being glued thereto, while the cover sheet 7 is joined at its trailing end to the trailing triangular portion 2b, is joined in the manner described above to the exposed rectangular sections 3a and 3b of the trapezoidal portions, and extends across and is glued to the tubular member 9 in the manner shown in FIG. 2. Thus, with this embodiment the reinforced end of the tubular member is exposed and the non-reinforced end is located at the interior of the container. As will be apparent from the description which follows, the tubular member 6 as well as the tubular member 9 is made from a simple rectangular sheet which is folded back upon itself so as to have the reinforcing portion 6' or 9'. After being thus folded upon itself the side edges of the tubular sheet are joined to each other by glue so as to form a tubular member, and the side edges are joined in such a way that the reinforcing portion 6' or 9' is located at the exterior of the tubular member. As a result there will be a space between the outer reinforcing portion 6' or 9' and the inner wall of the tubular member which is surrounded by the reinforcing portion, and in the embodiment of FIG. 2 this space communicates with the interior of the container while in the embodiment of FIG. 1 this space communicates with the exterior of the container.

FIG. 4 diagrammatically illustrates a machine according to the present invention for manufacturing the container of the invention according to the process of the invention. The container which is at the stage where it has the configuration shown in FIG. 3 without the glue applied thereto is advanced from the right toward the left as viewed in FIG. 4 and as is shown by the arrow at the upper portion of FIG. 4, suitable transporting rolls being provided for this purpose. In this way the flat tube 1 is advanced along the path 10 and is located in a plane normal to that of FIG. 4 and including the path 10.

When the flat tube has been provided with the construction shown in FIG. 3, it reaches the glue-applying roll 11 with the triangular portions 2a and 2b as well as the exposed rectangular sections 3a and 3b directed downwardly toward the roll 11. This roll turns in a bath of glue and has raised portions having the configuration of the shaded areas shown in FIG. 3 where the glue has been applied, and the movement of the flat tube 1 is so synchronized with the rotary movement of the roll 11 that when the flat tube 1 passes between the roll 11 and the counter-pressure roll located thereover glue will be applied to the triangular portions 2a and 2b and to the exposed rectangular sections 3a and 3b in the manner shown in FIG. 3. It will be noted that an additional layer or strip of glue is applied to the section 3b adjacent its outer edge, and this is for the purpose of joining this section to the section 3a when the end portions of the parts 3a and 3b are folded toward and joined to each other. Thus, as is shown in FIG. 1a, the section 3b overlaps and is located outside of the section 3a, so that this additional layer of glue applied to the section 3b serves to join these sections to each other after they are folded along the lines 4 in the manner described above. After the glue has been thus applied to the flat tube 1 it continues to be transported along the path 10 by the pairs of advancing or transporting rolls 12 and 13, and thus the flat tube 1 reaches the working station 14.

From a supply band 15 shown at the lower left of FIG. 4 a band of paper 16 is withdrawn by the pair of rolls 17 which turn in the directions indicated in FIG. 4. The band 16 is guided around a roll 18 and between a pair of grooving rolls 19 which provide the band inwardly of its side edges with a pair of longitudinal grooves which are spaced from each other by a distance equal to the width of the tubular member 6 or the tubular member 9, the side edges of the finished tubular member 6 or 9 being located along these grooves. The band 16 which has been grooved in this way then passes between a pair of rolls 20 which cooperate in a known way to provide the band with a semicircular perforated portion to provide the section 6' which is to be removed by the thumb of the operator to facilitate opening of the tubular member. The band 16 which has been pretreated in this way then passes through a cutting means which includes the rotary cutter 21 which cooperates with a stationary cutter 21' in the well known manner so as to automatically cut sections of predetermined length from the continuously advancing band 16, and before the section has been completely severed from the band 16 it is received by the advancing rolls 22 which continue to transport the section even after it has been severed. The new leading end of the band 16 is guided through any suitable guides through the cutting means which now has its blades spaced from each other to be received by the advancing rolls 22 before the rotary cutting blade again reaches the stationary cutting blade to cut off the next section. The section of the band 16 is delivered by the transporting rolls 22 to a folding means 23 which includes a pair of rolls diagrammatically shown in FIG. 4 and cooperating in a well known manner to transversely fold the section between its ends so as to provide the section of the band 16 with a transversely extending reinforcing portion which will form the above-described reinforcing portion 6' or 9'. The upper roll 23 of FIG. 4 also cooperates with a glue-applying roll 24 which applies glue to the side edges of the section which has already been transversely folded so as to have the reinforcing portion.

The upper roll 23 of FIG. 4 also delivers the section which has thus been folded and has had glue applied to its side edges to one of the several gripping devices 25 carried by an endless chain or the like 26. The section which is thus carried by one of the gripping devices 25 is delivered thereby to a second folding means 27 and is transported along this folding means by the gripping device and the endless chain 26. The folding means 27

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includes a pair of rails spaced apart from each other by a distance equal to the width of the finished tubular member 6 or 9, and these rails serve in a well known manner to fold the section along the fold lines provided by the grooving rolls 19 so that the glued edges now overlap each other and become glued to each other so as to form the finished tubular member 6 or 9, and the folding at the device 27 is done in that direction which locates the reinforcing portion 6' or 9' at the exterior of the tubular member 6 or 9, respectively. The endless chain 26 is carried by a pair of rolls 28 which serve to advance the chain and these rolls carry cams 29 which automatically actuate the gripping devices 25 in a well known manner so that these devices will automatically grip a section leaving the glue-applying means 24 and will release the section after it leaves the folding means 27. Just before release of the tubular member from a gripping device 25, the tubular member is received by the sharp pins or needles which are carried by an endless conveyor band 30 so that these pins or needles engage and continue the transportation of the finished tubular member. The transporting means formed by the endless chain or band 30 and the needles thereof transports the tubular member to the flat tube 1 and delivers it to the flat tube 1 at the working station 14.

Simultaneously with the above-described manufacture of the tubular members 6 or 9, a band 32 of paper is also withdrawn from a supply band or roll 31 and the rolls 33 serve to withdraw the band 32 from the supply band 31 and to deliver the band 32 to the cutting means 34 which has the same structure as the cutting means 21, 21' and thus the cutting means 34 cuts from the band 32 sections which form the cover sheets 7. Of course, the parts are operated at such a speed and are synchronized in such a way that the cover sheets 7 will have the desired dimensions, and from the cutting means 34 each cover sheet 7 is received by the forwarding rolls 35. As may be seen from FIG. 4, just to the right of the cutting means 34 is located one pair of advancing rolls 35, and this pair of advancing rolls delivers the cover sheet to the glue-applying means 36. Then the cover sheet with the glue applied thereto is received by the pair of advancing rolls 35 shown to the right of the glue-applying means 36 in FIG. 4, and this latter pair of transporting rolls delivers the cover sheet also to the endless band or chain 30. Thus, the means 30 forms the sole or single means for simultaneously applying both the tubular member 6 or 9 and the cover sheet 7 to the flat tube 1 in the manner described above. The needles of the transporting means 30 engage the cover sheet 7 to the flat tube 1 in the manner described above. The needles of the transporting means 30 engage the cover sheet 7 as well as the tubular member to simultaneously deliver both of these elements to the flat tube 1.

The driving roll 37 which drives this endless needle-carrying chain 30 is coaxial with the lower roll of a pair of moving rolls 38 which form the pair of folding grooves 4 described above. A roll 39 maintains the upper run of the endless means 30 along the path 10 of the flat tube 1. Thus, with proper synchronization of the parts the tubular member 6 or 9 together with the cover sheet 7 which is already glued thereto are simultaneously applied to the flat tube 1 at the station 14 of the machine, so that the sheet 7 together with the tubular member 6 or 9 are joined in the above-described manner to the triangular portions 2a and 2b and the rectangular sections 3a and 3b. A substantially semicircular guide rail 40 extends along the right portion of the drive roll 37, as viewed in FIG. 1, to guarantee that the tubular member 6 or 9 and the cover sheet 7 will not fall from the needle-chain 30 during movement around the roll 37 where the chain 30 is convexly curved.

The structure which manufactures the tubular member 6 or 9 is so arranged that the reinforcing portion of the tubular member always leads the non-reinforcing portion

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thereof. Also, the transporting means 22 and 35 are so synchronized that the sections which are cut from the supply bands 15 and 31 have a speed which corresponds to the transporting speed of the flat tube 1 so that all the parts will be joined to each other in the desired manner.

It will be noted that the tubular member will be received by the means 30 just to the right of the cover sheet 7, as viewed in FIG. 4, so that at the lower part of the roll 37 the tubular member will be just beneath the cover sheet. When these parts reach the top of the roll 37 to be joined to the flat tube 1, their positions are reversed so that the tubular member is now above the cover sheet to be located between the latter and the flat tube 1 in the manner described above. The synchronization may be such that the cover sheet 7 reaches the roll 37 just ahead of the tubular member 6 or 9 so that the leading edge 7' is located in advance of the tubular member, and in this way the structure which is shown in FIG. 1 will be provided since the leading edge 7' will be located in advance of the leading end of the tubular member 6. On the other hand, it is possible to synchronize the parts so that the leading end 9' of the tubular member 9 reaches the roll 7 just ahead of the leading edge of the sheet 7, and in this case the embodiment of FIG. 2 will be provided. Thus, where the synchronization is such that the leading edge of the cover sheet is in advance of the tubular member, the synchronization is so arranged that the tubular member 6 will be joined to the trailing triangular portion 2b, while when the synchronization is such that the leading end of the tubular member is in advance of the cover sheet 7, the synchronization is also so arranged that the tubular member will be joined to the leading triangular portion 2a.

The folding over of the free ends of the trapezoidal portions along the lines 4 and the application of the outer cover sheet 8 takes place in a conventional manner with known structure and forms no part of the invention, and therefore the structure for performing these final steps is not shown.

The applying of the tubular member 6 or 9 and the cover sheet 7 to the flat tube 1 need not necessarily take place at the work station 14 where the grooves which form the fold lines 4 are provided by the grooving rolls 38. It is, of course, also possible to provide a special work station before or after the grooving station 14 for receiving the tubular member and cover sheet to be applied to the flat tube.

Of course, while it is preferred to practice the invention as described above, it is also possible to first join the tubular member 6 or 9 to the flat tube and then join the cover sheet thereto at a special work station with a separate device provided for this purpose. However, the above-described structure is preferred.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of flexible containers differing from the types described above.

While the invention has been illustrated and described as embodied in process and apparatus for making flexible containers, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a process for manufacturing a flexible container

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which includes a flat tube of flexible material having opposed side edges and a pair of walls one of which is folded back upon itself adjacent one end of the flat tube to form a pair of trapezoidal portions respectively forming parts of said walls and a pair of oppositely directed triangular portions superimposed on said trapezoidal portions and respectively having apexes located at said side edges with said trapezoidal portions respectively having rectangular sections exposed between said triangular portions, the steps of applying glue to said flat tube along the periphery of a rectangle which extends across said rectangular sections and overlaps said tubular portions; manufacturing a flexible flat tubular member from a first supply band; manufacturing a rectangular cover sheet at least as great as said rectangle from a second supply band; and simultaneously applying said tubular member and said cover sheet to said glue in a position where said tubular member extends between said cover sheet and one of said triangular portions and said rectangular cover sheet is joined to said flat tube along the periphery of said rectangle by said glue.

2. In a process for manufacturing a flexible container which includes a flat tube of flexible material having opposed side edges and a pair of walls one of which is folded back upon itself adjacent one end of the flat tube to form a pair of trapezoidal portions respectively forming parts of said walls and a pair of oppositely directed triangular portions superimposed on said trapezoidal portions and respectively having apexes located at said side edges with said trapezoidal portions respectively having rectangular sections exposed between said triangular portions, the steps of applying glue to said flat tube along the periphery of a rectangle which extends across said rectangular sections and overlaps said tubular portions; cutting from a first flexible supply band a section of flexible material; folding the flexible material transversely upon itself to provide the material with a reinforcing portion; applying glue along an edge of the thus folded flexible material; then longitudinally folding the flexible material along a pair of longitudinal lines and joining the side edges of the flexible material to each other where the glue has been applied thereto so as to form a flexible tubular member having a reinforcing portion; cutting from a second flexible supply band a cover sheet at least as great as said rectangle; and simultaneously applying the cover sheet and the tubular member to said flat tube in the position where said cover sheet is aligned with said rectangle and is joined to said flat tube by the glue which extends along the periphery of said rectangle and with the flexible tubular member located between said cover sheet and one of said triangular portions and extending beyond said cover sheet so as to give access to the interior of a container.

3. In a process for manufacturing a flexible container which includes a flat tube of flexible material having opposed side edges and a pair of walls one of which is folded back upon itself adjacent one end of the flat tube to form a pair of trapezoidal portions respectively forming parts of said walls and a pair of oppositely directed triangular portions superimposed on said trapezoidal portions and respectively having apexes located at said side edges with said trapezoidal portions respectively having rectangular sections exposed between said triangular portions, the steps of applying glue to said flat tube along the periphery of a rectangle which extends across said rectangular sections and overlaps said tubular portions; manufacturing a flexible flat tubular member from a first supply band; manufacturing a rectangular cover sheet at least as great as said rectangle from a second supply band; and simultaneously applying said tubular member and cover sheet, with said tubular member overlapping and extending ahead of said

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cover sheet, to said flat tube in a position where said rectangular cover sheet is aligned with the glue extending along the periphery of said rectangle and joined thereby to said flat tube and with said tubular member located between one of said triangular portions and said cover sheet.

4. In a process for manufacturing a flexible container which includes a flat tube of flexible material having opposed side edges and a pair of walls one of which is folded back upon itself adjacent one end of the flat tube to form a pair of trapezoidal portions respectively forming parts of said walls and a pair of oppositely directed triangular portions superimposed on said trapezoidal portions and respectively having apexes located at said side edges with said trapezoidal portions respectively having rectangular sections exposed between said triangular portions, the steps of applying glue to said flat tube along the periphery of a rectangle which extends across said rectangular sections and overlaps said tubular portions; manufacturing a flexible flat tubular member from a first supply band; manufacturing a rectangular cover sheet at least as great as said rectangle from a second supply band; and simultaneously applying said tubular member and cover sheet, with said cover sheet overlapping and extending ahead of said tubular member, to said flat tube with said cover sheet aligned with and joined by said glue to said flat tube and with said tubular member located between said cover sheet and one of said triangular portions and extending beyond said cover sheet.

5. In a process for manufacturing a flexible container which includes a flat tube of flexible material having opposed side edges and a pair of walls one of which is folded back upon itself adjacent one end of the flat tube to form a pair of trapezoidal portions respectively forming parts of said walls and a pair of oppositely directed triangular portions superimposed on said trapezoidal portions and respectively having apexes located at said side edges with said trapezoidal portions respectively having rectangular sections exposed between said triangular portions, the steps of applying glue to said flat tube along the periphery of a rectangle which extends across said rectangular sections and overlaps said tubular portions; manufacturing a flexible flat tubular member from a first supply band; manufacturing a rectangular cover sheet at least as great as said rectangle from a second supply band; and simultaneously applying said tubular member and said cover sheet to said glue in a position where said tubular member extends between said cover sheet and one of said triangular portions and said rectangular cover sheet is joined to said flat tube along the periphery of said rectangle by said glue, said tubular member having a reinforcing portion and a free end portion located beyond said reinforcing portion and said tubular member being applied to said flat tube with said reinforcing portion located in advance of said free end portion of said tubular member.

6. In an apparatus for manufacturing a flexible container which includes a flat tube of flexible material having opposed side edges and a pair of walls one of which is folded back upon itself adjacent one end of the flat tube to form a pair of trapezoidal portions respectively forming parts of said walls and a pair of oppositely directed triangular portions superimposed on said trapezoidal portions and respectively having apexes located at said side edges with said trapezoidal portions respectively having rectangular sections exposed between said triangular portions, in combination, transporting means for transporting the flat tube along a given path; glue-applying means cooperating with said flat tube as it is transported along said path to apply to said flat tube glue along the periphery of a rectangle which extends across said rectangular portions and overlaps said triangular portions thereof; means for manufacturing an elongated flexible

flat tubular member; means for manufacturing a rectangular cover sheet; and a single means receiving said flat tubular member from the means which manufactures the same and said cover sheet from the means which manufactures the same and simultaneously applying both said tubular members and said cover sheet to said flat tube as it moves along said path at the glue which extends along said rectangle for joining said cover sheet to said flat tube and for joining said tubular member to said flat tube in a position extending between one of said triangular

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portions and said cover sheet so that said tubular member gives access to the interior of the container.

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