March 15, 1932. R. S. BOLGER 1,849,270

CONTAINER

Original Filed Sept. 5, 1924 7 Sheets-Sheet 1

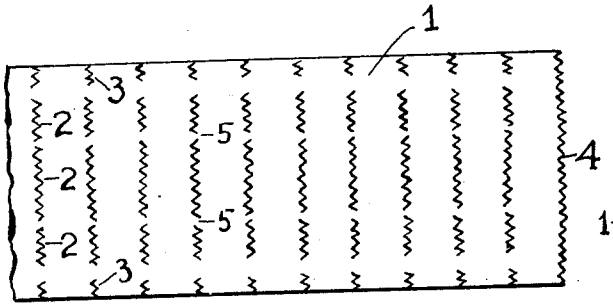


Fig. 1

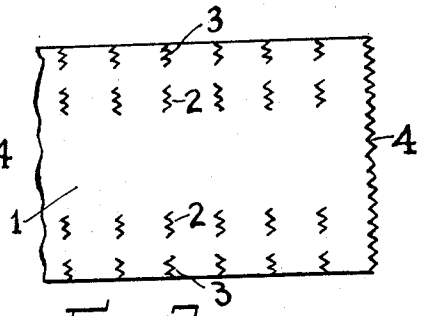


Fig. 2

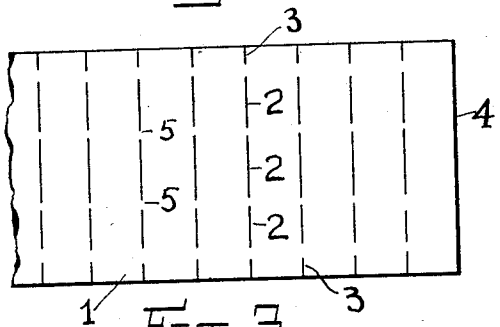


Fig. 3

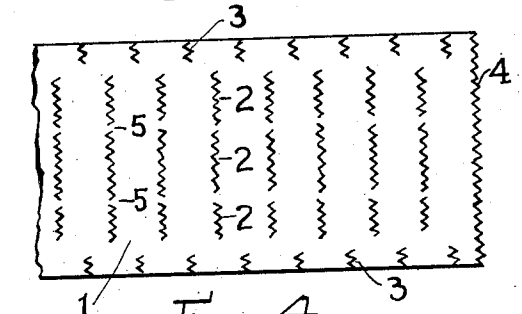


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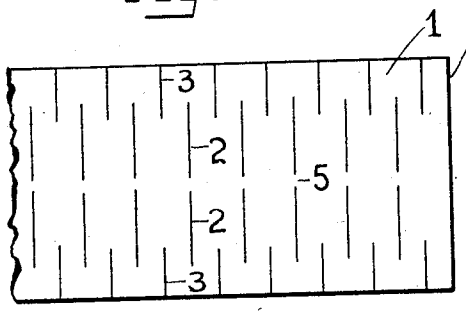


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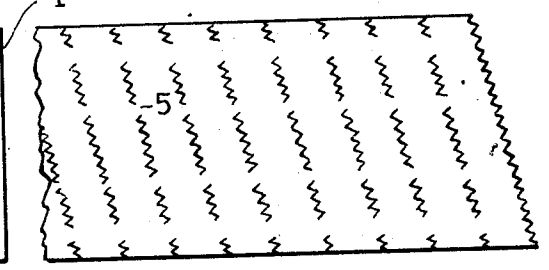


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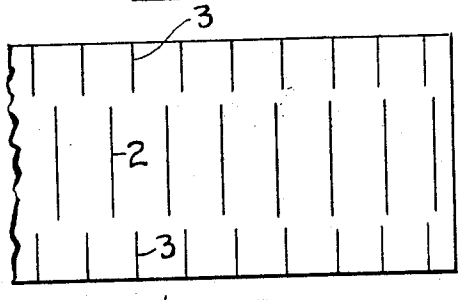


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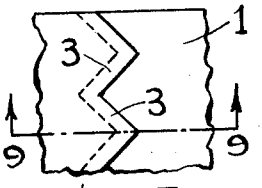


Fig. 8

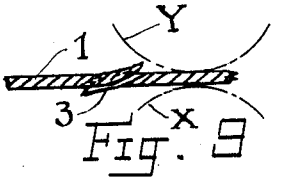


Fig. 9

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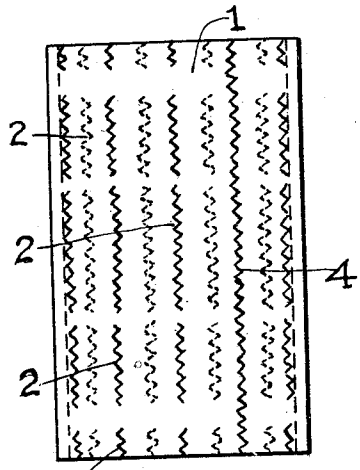


Fig. 10

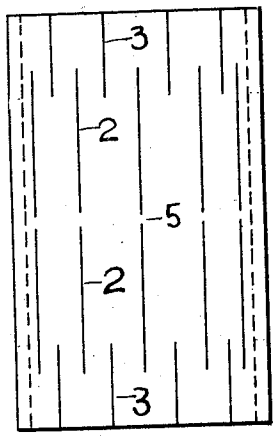


Fig. 11

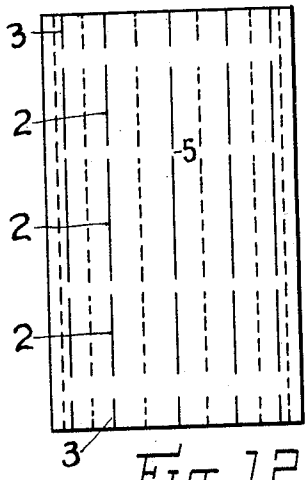


Fig. 12

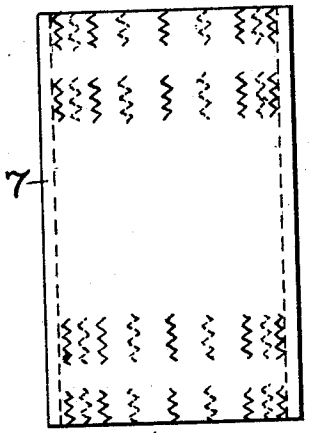


Fig. 13

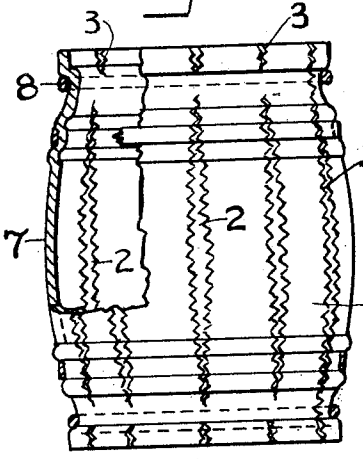


Fig. 14

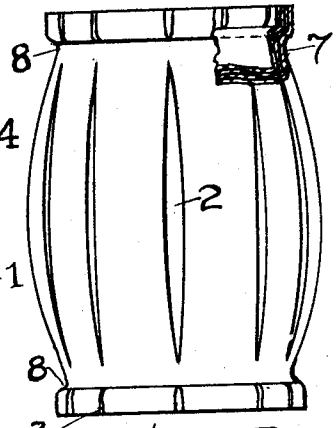


Fig. 15

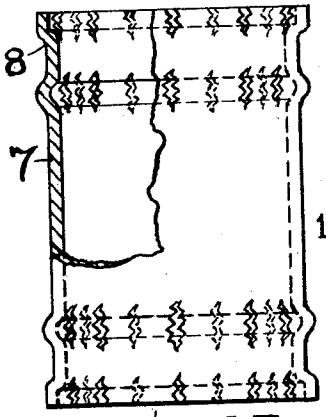


Fig. 16

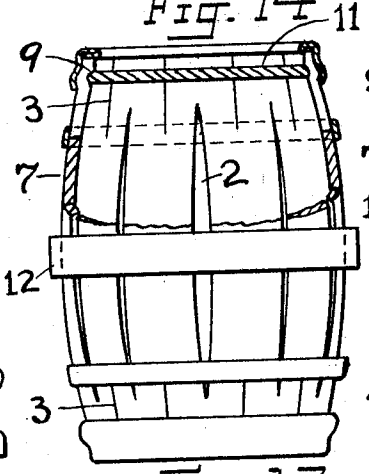


Fig. 17

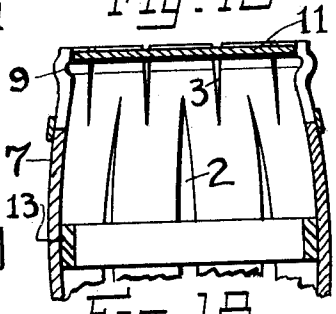


Fig. 18

Inventor

Robert S. Bolger

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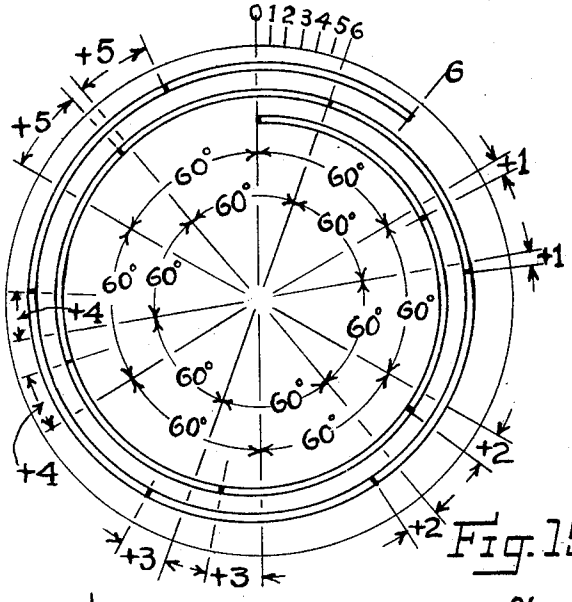


Fig. 19

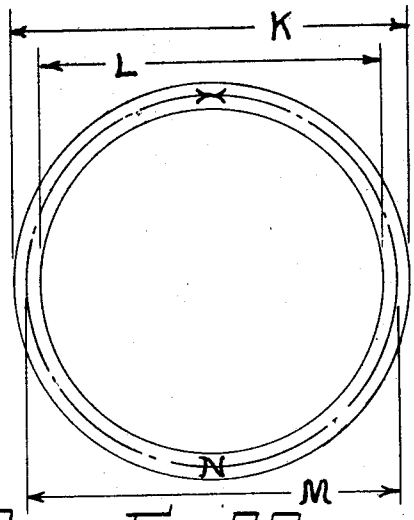


Fig. 20

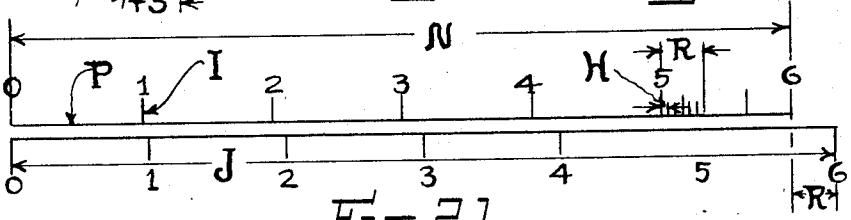


Fig. 21

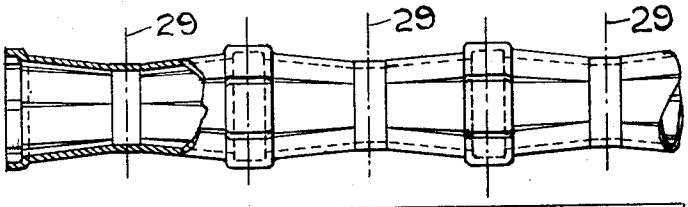


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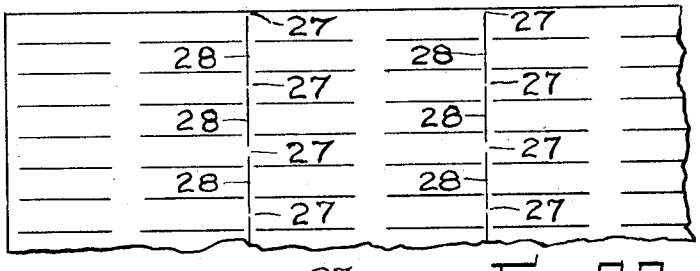


Fig 23

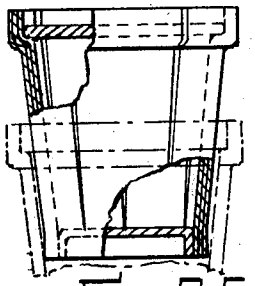


Fig. 25

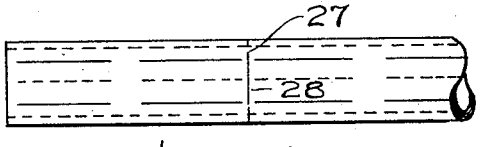


Fig 24

Inventor

Robert S. Bolger

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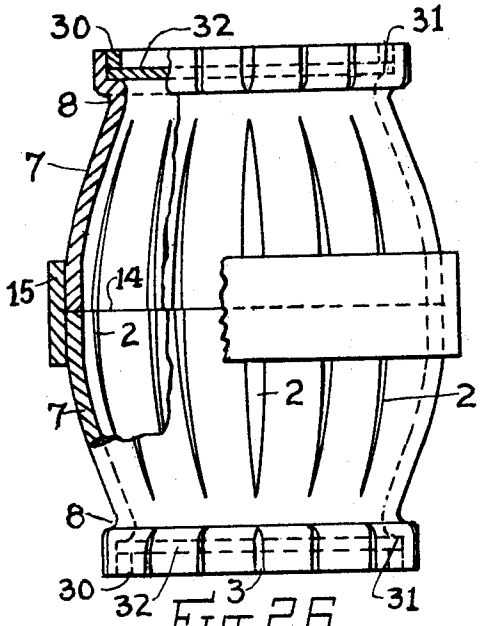


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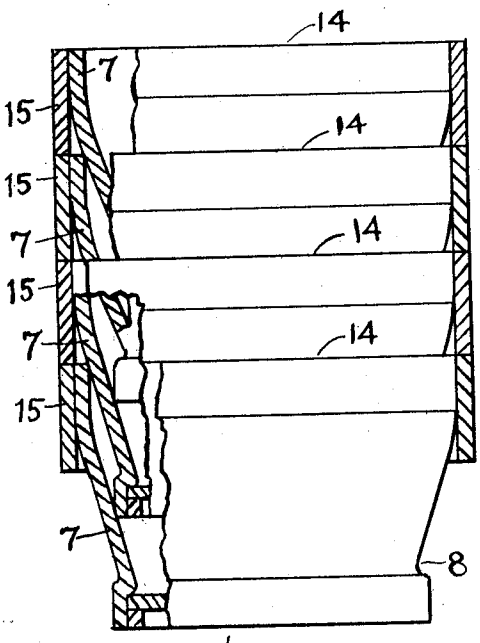


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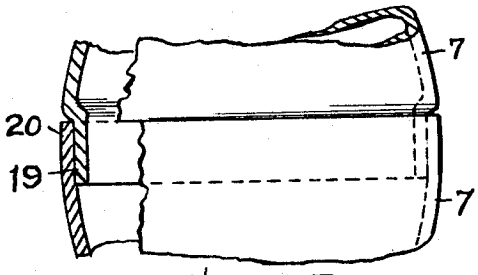


Fig. 28

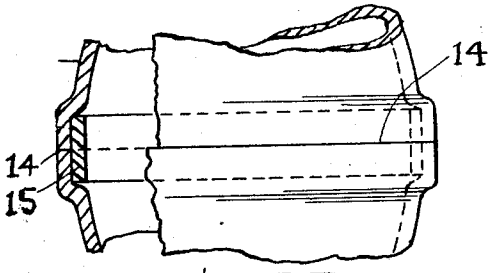


Fig. 29

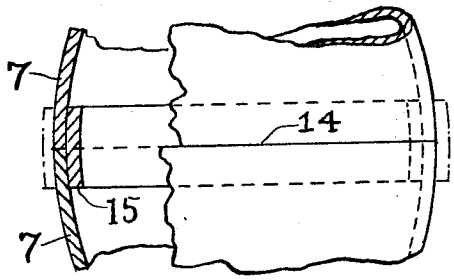


Fig. 30

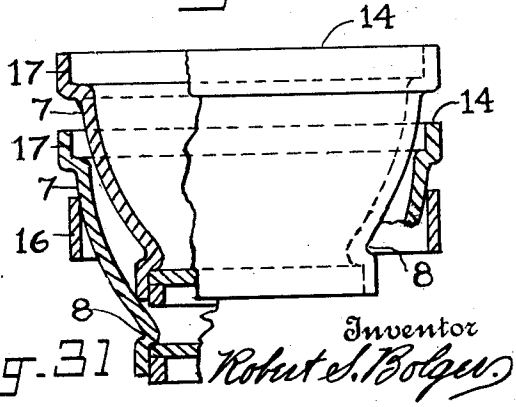


Fig. 31

Inventor
Robert S. Bolger

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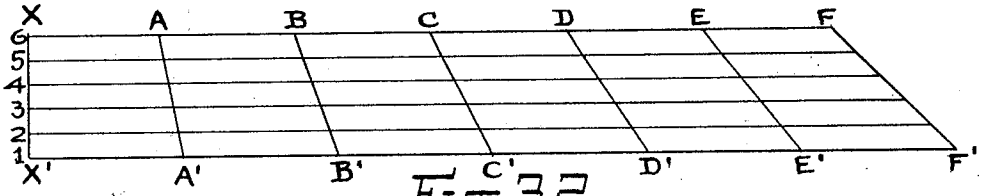


Fig. 32

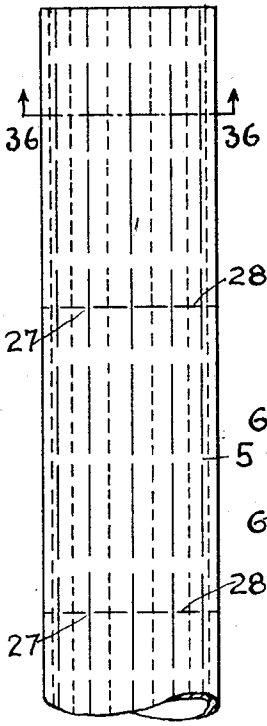


Fig. 34

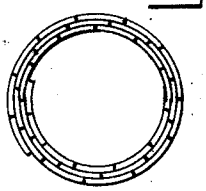


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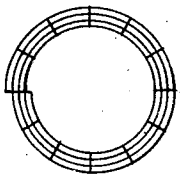


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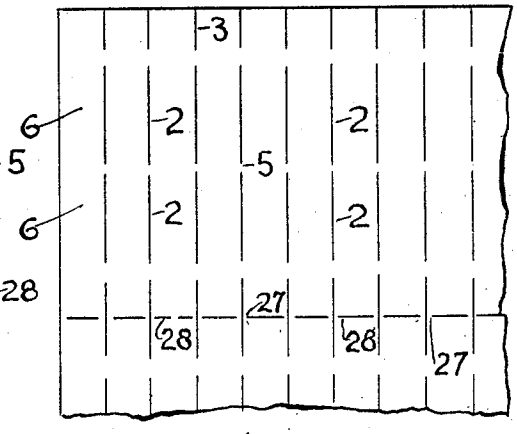


Fig. 33

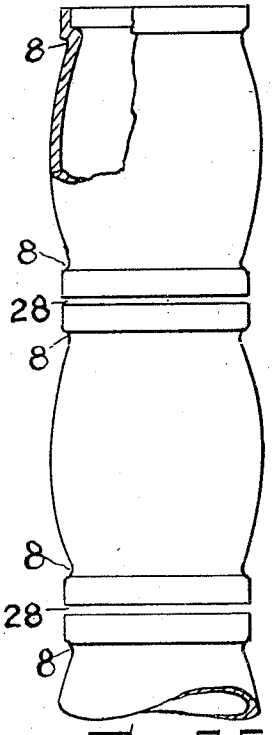


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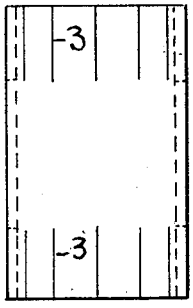


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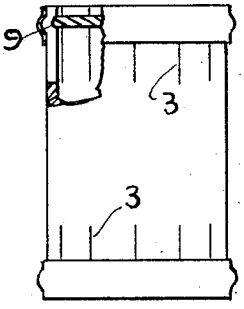


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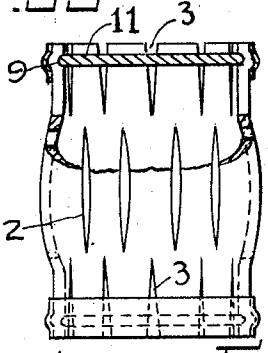


Fig. 38

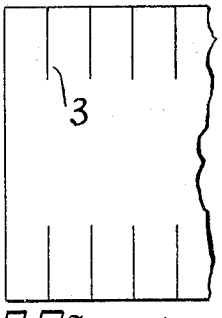


Fig. 39

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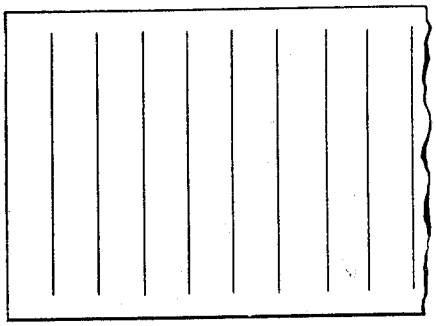


Fig. 42

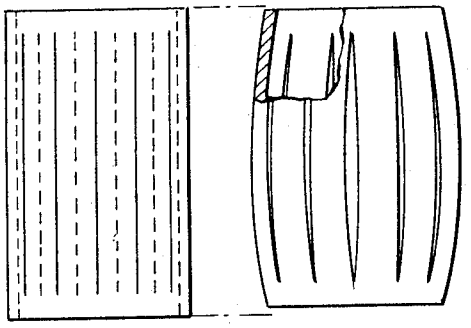


Fig. 43 Fig. 44

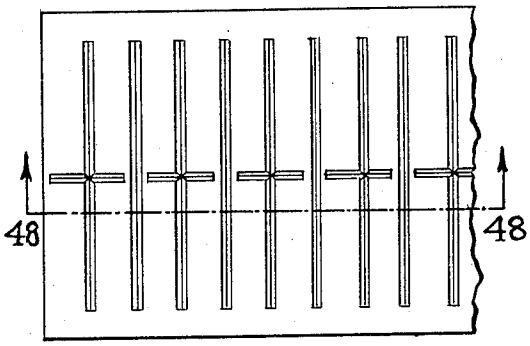


Fig. 45

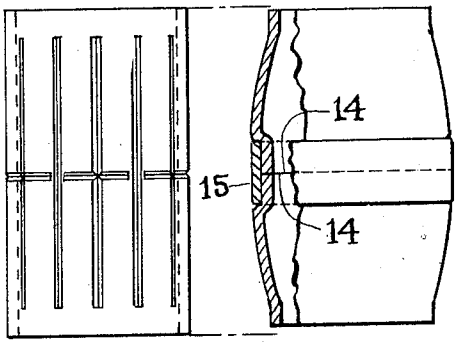


Fig. 46 Fig. 47



Fig. 48

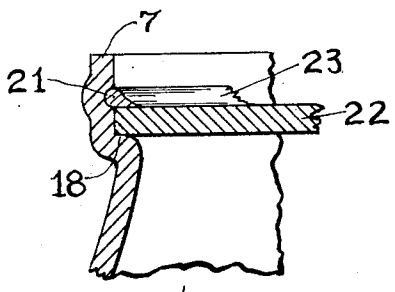


Fig. 49

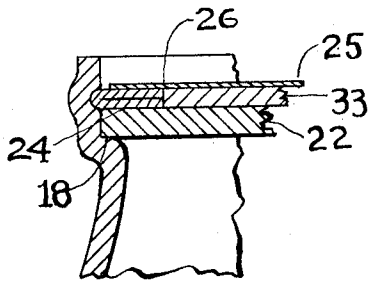


Fig. 50

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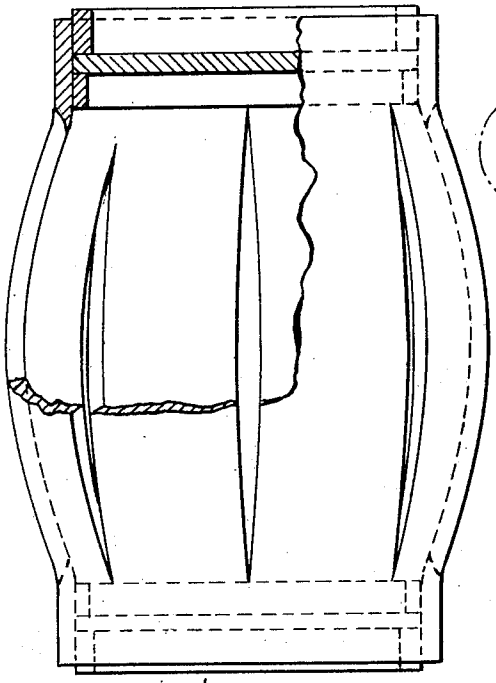


Fig. 51

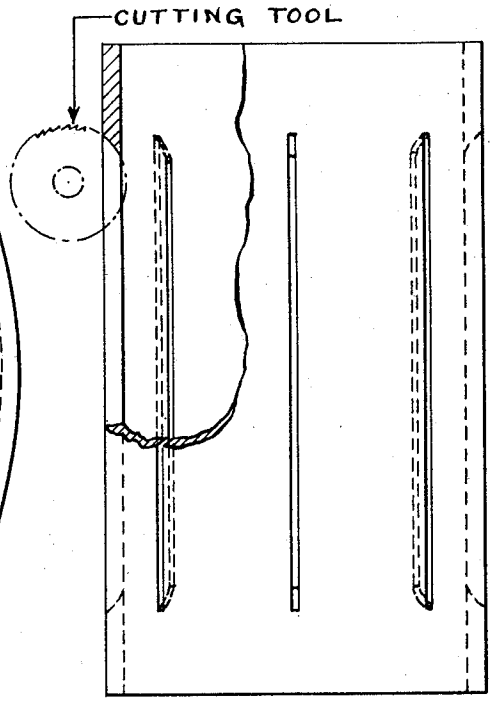


Fig. 52

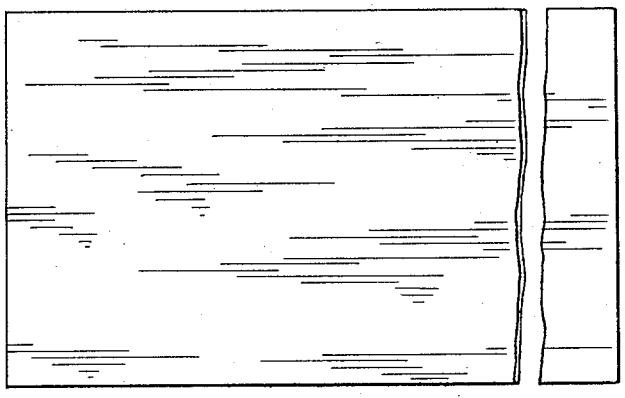


Fig. 53

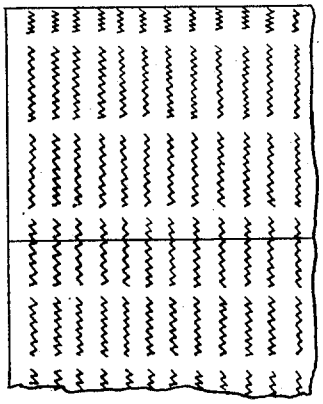


Fig. 33a

Inventor

Robert S. Bolger

Patented Mar. 15, 1932 1,849,270

UNITED STATES PATENT OFFICE

ROBERT S. BOLGER, OF NEW YORK, N. Y.

CONTAINER

Application filed September 5, 1924, Serial No. 736,110. Renewed June 8, 1931.

My invention consists in part in the manner of slitting a blank, coating at least a part of said blank with adhesive material, forming a tube from said blank and expanding the tube into a desired formation before the adhesive has set, for the purpose of forming containers of any desired shape.

Another object of my invention is to provide a tube made from the suitable blank, which tube on expansion will yield a plurality of desired shapes.

A further object of the invention is to provide a unitary structure made of a plurality of nestable parts.

A further object of my invention is to provide a blank having slits the spacing of which will accomplish a predetermined result when the blank is formed into tubular formation and the tube expanded.

A further object of my invention is to produce a slit blank to be wound into a tube which, upon the application of internal pressure, will expand at the desired portions to a greater diameter than the normal diameter of the tube, increase circumferential length being compensated for by the separating of the material at the slits.

Another object is to provide a blank for a tube to be expanded into any desired form, said blank having saw-tooth or serrated slits, the edges of said slits overlapping each other to prevent the adhesive from being forced through the slits as the blank is passed between the adhesive and contacting rolls of a gumming device.

Another object is to provide a slit blank for a tube to be expanded into a container, the end portions of which may be expanded to receive the end closing means.

Another object is to provide a slit blank for a tube to be expanded into desired form, the slits of the blank for each circumferential length of said tube being equally spaced but the spacing of the slits in the several layers being different to provide for the staggering of the slits to give an imperforate tube and container.

Another object is to provide a slit blank to be wound into a tube, the slits of which are at a predetermined distance apart, so that when the blank is wound the slits do not register.

Another object is to provide a slit blank for a tube to be expanded into a multiple number of formed articles, the blank being provided with slits crosswise of the blank to provide for expansion under pressure and the blank having spaced slits longitudinally thereof to cause separation of the articles upon expansion of the tube.

Another object is to provide an improvement on the method disclosed and claimed in Patent No. 1,428,469, granted to me Sept. 5, 1922, and contemplates a provision of means for connecting the strips to facilitate forming them into tube formation.

Another object of my invention is to provide a slit blank for a tube to be expanded at certain portions of its length, some of said slits being provided with short connecting tabs or interruptions to the slits for the purpose of holding the slits in closed formation during the adhesive-coating and tube-winding operations, these tabs or interruptions breaking upon application of the expanding pressure.

Another object of my invention is to provide an article of container shape that has fabricated in multiple of its component parts and after separating said parts, the parts needed to make up the finished structure are nestable one within the other for the purpose of conserving space in shipping.

Another object is to provide a container made up of nestable parts that may be readily assembled and held as a unitary structure by the application of adhesive to the assembled parts or by other equivalent mechanical binding means.

A further object is to provide a tubular structure expandable at certain portions and substantially non-expandable at other portions.

A further object is to provide a slit blank which is coated with adhesive and wound into a tube, said tube then being expanded at the slit portions to form a container body or a plural number of container bodies.

A further object is to provide a blank with an imperforate side to which adhesive

is applied, said blank comprising weakened portions which, upon winding of said blank into a tube and upon application of internal pressure to the latter, will give way to allow said tube to take a desired shape.

Another object is to provide a container body that may be used as a closed type of container for one class of material and as a ventilated type, that is, a container having air circulating openings, for other kinds of material, such as vegetables or fruits, by changing the size of the enclosure.

Another object is to provide a new method of holding an enclosure to a container by means of a fillet of adhesive material.

Another object is to provide new enclosure structures.

Other objects will be apparent from the disclosure which follows and in the drawings of which

Fig. 1 is a plan view of a blank made from a web of sheet material and provided with saw-tooth slits to allow it, after winding into tube formation, to be expanded into the form shown in Fig. 14.

Fig. 2 is a plan view of a blank as used in forming the tube shown in Fig. 13 and the container shown in Fig. 16.

Fig. 3 is a plan view similar to Fig. 1 of a blank with straight knife cuts.

Fig. 4 is a plan view similar to Fig. 1 in which the edge slits are not in line with the slits located between the side edges, i. e. the medial slits.

Fig. 5 is a plan view similar to Fig. 3 in which the edge slits are intermediate the medial slits, the end of each medial slit overlapping the ends of the edge slits.

Fig. 6 is a plan view similar to Fig. 1 in which the saw cut slits are not perpendicular to the side edges of the blank.

Fig. 7 is a plan view of a blank similar to Fig. 5 in which the edge slits are of one spacing and the slits between the side edges i. e., the medial slits are of a different spacing.

Fig. 8 is an enlarged view of a serrated slit shown on the blanks illustrated in Figs. 1, 2, 4 and 6.

Fig. 9 is a section taken on the line 9—9 of Fig. 8 showing the overlapping feature of a cut of this type.

Fig. 10 is a vertical elevation of the blank shown in Fig. 1 as wound into a tube with the slits of each succeeding layer staggered.

Fig. 11 is a vertical elevation similar to Fig. 10 showing the blank, shown in Fig. 5 wound into tube formation with the edge slits and the slits between the side edges all in register throughout all of the convolutions forming the tube.

Fig. 12 is a vertical elevation similar to Fig. 10 in which the blank shown in Fig. 3 is wound into tube formation with the slits in adjoining layers in non-registering sequence.

Fig. 13 is a vertical elevation of a tube made from a blank similar to that shown in Fig. 2.

Fig. 14 is a vertical elevation of the tube shown in Fig. 10 after it is expanded into barrel formation.

Fig. 15 is a vertical elevation similar to Fig. 14 showing the tube illustrated in Fig. 12 after it is expanded into barrel formation.

Fig. 16 is a vertical elevation showing the tube illustrated in Fig. 13 after it has had portions expanded into the desired formation.

Fig. 17 is a vertical elevation, partly in section, showing the tube illustrated in Fig. 11 after it has been expanded into a ventilated type of barrel, with the heads and desirable hoops in place.

Fig. 18 is a partial vertical section similar to Fig. 17 showing the manner of entering the head and having the hoop at the center of the bilge located on the inside instead of the outside as shown in Fig. 17.

Fig. 19 is a diagrammatic view illustrating the manner of determining the location of the slits in a blank which on winding into tube formation will cause the slits to be staggered i. e., not to register.

Fig. 20 is an auxiliary view to Figs. 19 and 21 showing the manner of obtaining the base line used in Fig. 21.

Fig. 21 is a diagrammatic view showing the manner of obtaining the proper spacing for the slits in a blank as in Fig. 19.

Fig. 22 is a view showing the tube illustrated in Fig. 24 after it has been expanded into a multiple number of desired forms.

Fig. 23 is a plan view of the blank from which the tube shown in Fig. 24 is wound.

Fig. 24 is a partial view of a tube as wound from the blank shown in Fig. 23.

Fig. 25 is an elevation partly in section, showing one of the containers shown in multiple in Fig. 22, after it is separated from the adjoining one, and having a bottom and cover in place.

Fig. 26 is a side elevation of a barrel, partly in section, similar to that shown in Fig. 15, that has been separated at the medium portion to facilitate nesting.

Fig. 27 is a side elevation, partly in section, showing the manner of nesting four halves of two barrels.

Fig. 28 is a partial view, one side of which is in section, showing one half of the barrel joined to the other half by necking one part within the adjoining one.

Fig. 29 is a partial view, one side of which is in section, showing the adjoining ends expanded to receive the connecting interior section.

Fig. 30 is a fragmentary view, one side of which is in section, in which the interior connecting unit conforms to the uninterrupted bilge formation.

Fig. 31 is a side elevation showing the two halves of the container illustrated in Fig. 29 nested one within the other with the component parts to make one complete container.

Fig. 32 is a diagrammatic view showing the manner in which the spacings are determined to create registering of the slits on winding of the blanks into tube formation.

Fig. 33 is a plan view of a blank of sheet material provided with the necessary slits to allow a tube wound from same to be expanded into a series of container bodies as shown in Fig. 35.

Fig. 33[a] is a figure identical with Fig. 33 showing the use of serrated slits.

Fig. 34 is a side elevation of a tube formed from the blank shown in Fig. 33.

Fig. 35 is a side elevation, partly in section, showing a series of containers formed in the one expanding operation from a tube shown in Fig. 34 which has been wound from the blank shown in Fig. 33, the articles having separated under expansion at the slits 27.

Fig. 36 is a section view on the line 36—36 of the tube shown in Fig. 34.

Fig. 37 is an end view of the tube shown in Fig. 40.

Fig. 38 is a side elevation of a barrel-shaped container expanded from a tube made from the blank shown in Fig. 5, with a head holding the end staves in expanded formation for ventilation of the contents.

Fig. 39 is a plan view of a blank for a tube shown in Fig. 40.

Fig. 40 is a side elevation of a tube, the end portions of which are slit and register and are expandable to receive enclosures.

Fig. 41 is a side elevation, partly in section, of a finished container with the end closures in place.

Fig. 42 is a plan view of a blank made from a web of sheet material in which no edge slits are provided, all of the slits being located between the side edges of the blank.

Fig. 43 is a side elevation of a tube wound from the blank shown in Fig. 42.

Fig. 44 is a side elevation, partly in section, of a container body made from the tube shown in Fig. 43.

Fig. 45 is a plan view of a blank in which the blank is scored, the slits not passing entirely through the blank.

Fig. 46 is a tube wound from the blank shown in Fig. 45.

Fig. 47 is a side elevation, partly in section, of two half container bodies similar to the upper or male half of the container shown in Fig. 28.

Fig. 48 is a section view on the line 48—48 of the blank shown in Fig. 45.

Fig. 49 is a fragmentary view in section of the side wall and end closure of a container and one method of holding the end closure.

Fig. 50 is a view similar to Fig. 49, showing another method of holding the end closing means.

Fig. 51 is a barrel formed from a tube which is slit after it is wound as in Fig. 52.

Fig. 52 shows a tube and a method of slitting same.

Fig. 53 shows a blank which is wound to form the tube shown in Fig. 52.

In Patent Nos. 1,428,469 and 1,436,643 granted to me Sept. 5, 1922, and Nov. 28, 1922, respectively, a method for forming a container by expanding a tube and a container made by this method are disclosed and claimed. The invention disclosed in this application is an improvement on the inventions disclosed in the above mentioned patents and discloses an improved blank for a tube to be expanded into any desired form, the blank being slit to produce a desired shape when the tube formed from the blank is expanded. Several different shapes and results are obtainable depending on the form and blank used.

In producing a bilged barrel or other form in accordance with the present invention a blank is first provided with slits at predetermined spacings. The blank is then coated on one side for most of its length with an adhesive. It is then wound into a tube of the desired diameter and thickness of wall with the slits either in or out of register as predetermined, and this tube is then expanded by internal pressure before the adhesive has set, until the side walls of the tube conformed to the shape of an outer separable form of the required contour, to form a container.

The blank 1 for a tube, shown in Fig. 1 is provided at equally spaced distances with saw tooth slits 2 between the side edges of the blank, the spacing of these slits in relation to the length of the sheet is such that a predetermined number of spaces and slits will equal one turn and a fraction of the next turn on the tube. When wound as shown diagrammatically in Figs. 19, 20 and 21, this will provide a tube in which the slits will not fall one over the other before a certain number of layers have been wound, thus providing a tube in which the strips or panels overlap one another for a predetermined number of turns (see Fig. 10) and this type of tube is expandable into a container having imperforate side walls (see Fig. 14).

Altho I do not limit myself to the serrated edge type of cut as I show by the straight cuts shown in the blanks illustrated in Figs. 3, 5 and 42, the serrated or saw tooth cut has several distinct advantages (see Figs. 8 and 9). As the saw teeth cut or tear thru the paper 1, in forming this slit at an angle to the plane of the paper, the paper is torn so as to form a slit with two overlapping edges. The angle at which the saw or cutter is set determines the angularity of the cut; that is,

the angle which the edges of the slit make with the plane of the paper. As the cutter passes thru the paper it has a tendency to tear the paper apart so as to give a serrated cut with two overlapping edges. As the blank with this type of slits passes between the adhesive coating roll X and the roll Y which holds the paper in contact with the adhesive applying roll X, the overlapping edges, of the saw tooth or other form of serrated slit close one upon the other and prevent the adhesive being forced through the slit onto the other side of the blank.

Another advantage of the serrated edges is that when the tube is expanded into shape and the slits are in open formation, the edges of the slits do not tend to lift away from the surface to which it is intended they shall adhere as each of the serrations constitutes a separate tab having thin edges with very little spring of the material tending to lift it away from contact, whereas with the straight cut the tendency is to spring back at the edges if an adhesive of the same degree of tackiness is used as is used with the serrated cut.

In Figs. 4 and 5 is shown a blank in which the end cuts 3 are in staggered relation to the medial cuts 2. The object of this is to increase the amount of sheet material between the end and medial cuts so as to prevent any tearing across the material between these cuts when the tubes, formed from these blanks, are expanded into the desired form.

Another object of placing the end slits in staggered relation is to provide a blank in which the inner ends of the slits 3 extend beyond the outer ends of the center slits 2 as shown in Fig. 5; that is, to provide for overlapping of the slits.

In most cases as shown in Figs. 1, 3, 4, 5, 6, 7 and 33 the slits 2 are interrupted throughout their length by the connecting tabs 5. These are provided to prevent the slits from opening up during the coating and tube rolling operations. The blank, after slitting, passes to the coating rolls where an adhesive material is placed on one side of the blank. The blank is then wound into a tube. The blank will be difficult to handle if it does not have these tabs and if the cuts are sufficiently long, for the slits open up, and sagging and tearing will result. The tabs, however, placed at the required intervals, retain the edges of the slits together to allow for the manipulation of the blank. On expanding, the tabs give way, the edges then separate, and the tube takes the required shape.

When the medial slits 2 are short as in the blank shown in Fig. 2, these tabs are not necessary.

It is obvious that a number of blanks of desired length can be formed from one length of sheet material. The slits or cuts separating each blank from adjacent blanks can be, of course, either straight or saw-tooth cuts.

When it is desired to make a container having a continuous imperforate wall 7 (see Figs. 14, 15 and 16), the blanks shown in Figs. 1, 2, 4 and 6 are wound into a tube of the same diameter as the smallest diameter 8 of the article to be made, with the slits 2 and 3 in staggered relation to those of the under layers, as is shown on Figs. 10, 12 and 13. This tube is then placed in the expanding machine and while the adhesive is in an unset condition, the desired article is formed (see Figs. 14, 15, 16, 35, 38 and 41).

Fig. 38 shows one type of container where the medial portion is imperforate and the end portions are perforate. This is made by winding a blank similar to that shown in Fig. 7 into a tube so that the end slits of each lamina register, while the medial slits, being of a different spacing than the end slits, do not register. This tube is then expanded. Such a barrel can be used as a ventilated barrel by utilizing a head 11 of slightly larger diameter than the diameter of the end portions. The head will then force the end portions apart. In Fig. 38 such a head 11 is provided. This head is of greater diameter than the seat 9 formed to receive the said head. By forcing the head into the seat the slits 3 are spread apart to form ventilating openings. By using a head seat of the normal diameter a non-ventilated type barrel is formed.

It is apparent that by correctly spacing the end and medial slits, the end slits can be made not to register and the medial slits to register to form an additional type of ventilated barrel where the end slits allow for expansion to form the seats or beads as may be desired.

To make a container such as is shown in Figs. 17 and 18, the blank shown in Fig. 5 is rolled to form the tube illustrated in Fig. 11 and this tube with all of its slits 2 and 3 in each consecutive layer in register is expanded into bilge formation. Added strength may be given to the structure by the addition of either an interior 13 or exterior 12 hoop or hoops or the two used in conjunction, at the medial portion.

When it is desired to form the articles in multiples as is shown in Figs. 22 and 35, the blank is a series of connected blanks which are wound into a tube as illustrated in Figs. 24 and 34 and as the tube is expanded under pressure the blanks separate due to the tube shortening as it is expanded and the tabs or interruptions 27 to the longitudinal slits 28 separate. The slits may be serrated as shown in Fig. 33a. In an article such as is shown in Fig. 25 it is necessary to again sever the the tube at the lines 29 to obtain the article shown. When the article is expanded at the desired point of separation as is shown in

Fig. 35, no additional separating operation is necessary.

It is desirable, where the source of production and consumption is widely separated to ship and store empty containers in compact formation. With this object in view, a container such as is shown in Figs. 26, 28, 30 and 47 can be formed, divided at the medial portion and the separate halves nested one within the other as shown in Figs. 27 and 31. When it is desired to assemble the parts into a unitary structure the two halves are placed with the edges 14 of the side walls 7 in concentric contact. The ring 15 is then placed in position and the adhesive with which the contacting faces have been coated is allowed to set. One enclosure 32 is inserted until it rests on the seat 31 and the ring 30 is fastened in place to hold the end closure. The container is then filled with the desired material and the other end closure 32 is inserted and secured in place by the ring 30, thus making a complete container of the bilged type.

The ring or band 15 may be placed on the inside of the container as is shown in Figs. 29 and 30, if desired, or dispensed with altogether as shown in Fig. 28, where one half of the body portion is necked or constricted at 19 to fit within the body portion 20 of the other half.

Fig. 47 shows one type of dismountable type of container where the supporting ring 15 is placed on the outside. In this case the abutting portions of the container are necked so as to form a receiving seat for the ring 15. The advantage of this is that a smooth exterior surface for the barrel is maintained.

In the diagram shown in Figs. 19, 20 and 21 is illustrated one manner of obtaining a substantially correct spacing for the slits in a blank where it is desirable they shall not register when the blank is wound into a tube. In Fig. 20 "L" represents minimum diameter and "K" the maximum diameter while "M" is the mean diameter of the tube of several convolutions. Knowing these diameters the circumference "N" corresponding to the diameter "M" is readily obtainable. This is then taken as the length of the base line "P" in Fig. 21 and this line is evenly divided into any number of desired spacings, shown in the diagram as six and hereinafter spoken of as of that number. One of these spaces is then divided into an equal number of parts governed by the number of turns that the blank is to make when wound into tube shape before one of the slits will register or nearly so with one of the preceding slits in the next inner layers, in this case three. This subdivision "R" of the slit spacing is then again divided by the number of the major divisions "I", in this case six, and one of these divisions "H" is added on to each of the major divisions "I" and the total length "J" is obtained. In the case illustrated, when the division has been by six, an alignment of the slits will not be reached until three layers of the blank so formed have been wound into a tube of the predetermined size. In the circular diagram of Fig. 19 the same principle has been applied and illustrates clearly the manner in which the slits overlap in the consecutive layers forming the tube.

In the diagram in Fig. 32 is illustrated a method of obtaining graphically the spacing of the slits where it is desired to have them register one above the other in each succeeding layer as in the type of container shown in Figs. 17, 35, 38 and 41.

Instead of basing the divisions on the mean circumference of the tube, as in the previous case, the outside circumference is used for the base line "1" and the inside circumference is used for the peak line "6" and with both of these lines starting at X—X′ and running parallel to each other, the lines "1" and "6" are then each equally divided by the number of slits required.

The line X—X′ is then equally divided by the number of layers in the tube, in this case six, and cross lines are drawn parallel to the base line from these points. If the equally spaced points on the peak line indicated on the diagram as A, B, C, D, E, F are now connected by straight angular lines with the equal divisions A′, B′, C′, D′, E′, F′, on the base line, the divisions for slitting the complete blank and for each turn will be obtained, and these slits will register when the tube is wound. It will be seen that the first six slits of the blank are spaced as on line "6" and the next six as on line "5", etc., until thirty-six slits are made for the entire blank, the last slit being the end of the blank.

In some cases where it is desired to prevent the oozing of adhesive thru the slits, a blank with slits that do not penetrate the full depth of the blank is provided as illustrated in Figs. 45, 46 and 48. These slits remain closed while the adhesive is being applied, while the tube is being wound and until the expanding pressure is applied to form the container, whereupon they open allowing the tube to take the desired shape.

I slit the blank only at the portions where expansion of the tube, which is formed from said bank, is to take place. The tube when expanded in the machine increases in diameter at the points of expansion and the slits permit this expansion to take place. It is obvious that slits may be provided even at the points where no expansion is to occur as shown in Fig. 41. In most cases slitting, except where expansion is to take place, is not preferred, although it may be resorted to under some circumstances.

In cases where the container is not subjected to severe strains the end closures illustrated in Fig. 49, may be used. An annular groove or channel "21" is formed in the side

wall "7" of the container, the lower edge of the groove being in line with the top face of the head or end closure "22". The disk forming the end closure is placed in position, resting on the head seat "18", and a fillet of heavy liquid or paste material "23" having adhesive and hardening qualities is placed in contact with the head and the grooved side wall of the container, and when this has set it acts as a locking ring for the head or closure. Such an enclosure would hermetically seal the container.

In the container closing means shown in Fig. 50 the same type of head seat, side wall and groove is used as described for Fig. 49 and the end closure or head is made up of two concentric disks, the larger or bottom one "22" is placed on the seat "18" and a ring member "24" is entered into the groove and forced to lie flat on the upper face of the disk "22" with its inner edge resting against the upper disk "33", which is preferably adhesively attached to the head disk "22". The thin disk of sheet material "25", which may be in the form of a printed label, is then pasted to the disk "33" and to the head holding ring "24". To remove the head made up of the disks "22" and "33" it is only necessary to sever the label around the outer edge "26" of the disk "33" and remove the locking ring "24". The ring "24" is made easily from sheet material folded back on itself. The edge along the line of fold fits into "21".

An alternative way of forming a perforated barrel of a form analogous to that previously disclosed is to wind a strip of sheet material, as in Fig. 53, coated with adhesive, into a tube. The tube is then longitudinally slitted by means of a cutting tool. The tube is then expanded into shape as shown in Fig. 51.

The best sheet material for practical commercial purposes at the present time is paper or any other similar fibrous material. Obviously other sheet materials may be used, such as, for example, wood veneer, fabrics, or metal foil.

While the invention may be used for innumerable forms, some of which are illustrated, the form most useful is the bilged or barrel form.

Many ways of forming weakened lines at which places expansion is to take place will suggest themselves to those skilled in the art. Some of the preferred forms have been illustrated. Another form may be a line of perforations.

I do not limit myself to the particular type of slit except as is specified in the claims that follow.

Many changes in the specific methods and structures disclosed may be made without departing from the spirit of the invention and the specific embodiments disclosed are to be taken as illustrating rather than limiting the invention.

I claim as my invention:

1. The method of forming a tube to be expanded into desired formation which comprises forming a blank by slitting the body portion of a strip of sheet material at intervals and winding said blank to form a tube whose axis is substantially parallel to the slits introducing adhesive material between the laminæ of the said tube.

2. The method of forming a tube to be expanded into desired formation which comprises forming a blank by slitting the body portion of a strip of sheet material at intervals and winding said blank to form a tube wherein all the slits are substantially parallel to each other, introducing adhesive material between the laminæ of the said tube.

3. The method of forming a tube to be expanded into desired formation which comprises forming a blank by slitting a strip of sheet material at intervals and winding said blank to form an imperforate tube introducing adhesive material between the laminæ of the said tube.

4. The method of forming a tube to be expanded into desired formation which comprises forming a blank by slitting a strip of sheet material at intervals at the edges and between the edges and winding said blank to form an imperforate tube wherein the slits are substantially parallel, introducing adhesive material between the laminæ of the said tube.

5. The method of forming a tube to be expanded into desired formation which comprises forming a blank by slitting a strip of sheet material at intervals at the edges and between the edges and winding said blank to form a tube wherein the edge slits register and the slits intermediate the edge slits do not register.

6. The process of forming articles which comprises slitting the body portion of a blank, winding said blank into a tubular formation and deforming said tube under compacting pressure to form a container of the desired shape.

7. The process of forming articles which comprises slitting the body portion of a blank, winding said blank into a tubular formation and expanding said tube under compacting pressure into the desired formation.

8. The method of forming a container which comprises forming a tube by the method defined in claim 2 and expanding said tube at the slit portions.

9. The method of forming a container which comprises forming a tube by the method defined in claim 3 and expanding said tube at the slit portions.

10. The method of forming a container which comprises forming a tube by the meth-

od defined in claim 4 and expanding said tube at the slit portions.

11. The method of forming a container which comprises forming a tube by the method defined in claim 5 and expanding said tube at the slit portions.

12. A method of forming a tube to be expanded into desired formations, which comprises forming a blank by slitting a strip of sheet material at intervals, at the edges, and in the body portion between the edge slits, and winding said blank to form a tube wherein the edged slits do not register, and the slits intermediate the edge slits do register, and expanding said tube at the slit portion.

13. A method of forming a tube to be expanded into desired formations, which comprises forming a blank by slitting a strip of sheet material at intervals at the edges and forming slits in the body portion of said strip at intervals, between the edged slits and winding said blank to form a tube wherein both the edge slits and the slits intermediate the edge slits register, and expanding said tube at the slit portions.

14. The method of forming a barrel comprising slitting a blank of sheet material, coating the blank with adhesive material, winding the blank into a tube and expanding the tube into barrel formation before the adhesive material sets.

15. The method of forming a container comprising forming weakened lines in a continuous web of sheet material to allow expansion, adhesively coating the web, winding the web to form a tube and expanding said tube into desired formation under compacting pressure.

16. The method of forming a container comprising forming a continuous web of connected strips, adhesively coating said web and winding it to form a tube, and expanding the tube into desired formation under compacting pressure.

17. The method of forming an article of manufacture which comprises slitting a blank of sheet material, forming said blank into tubular formation, introducing adhesive material between the layers of the tube and deforming the tube while the adhesive is in an unset condition to form the desired shape.

18. The method of forming an article of manufacture which comprises slitting a blank of sheet material, forming said blank into tubular formation, introducing adhesive material between the layers of the tube and expanding the tube while the adhesive is in an unset condition to form the desired shape.

19. The method of forming an article of manufacture which comprises slitting a blank of sheet material, forming said blank into tubular formation, introducing adhesive material between the layers of the tube and deforming the tube at the slit portions while the adhesive is in an unset condition to form the desired shape.

20. The method of forming an article of manufacture which comprises slitting a blank of sheet material, forming said blank into a tube, introducing adhesive material between the layers of said tube and expanding the tube at the slit portions while the adhesive is in an unset condition to form the desired shape.

Signed at New York city, New York, the 3rd day of September, 1924.

ROBERT S. BOLGER.