

June 15 , 1926.

1,588,933

R. S. BOLGER

CONTAINER

Filed March 5, 1925

3 Sheets-Sheet 1

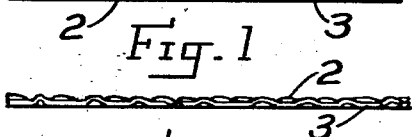
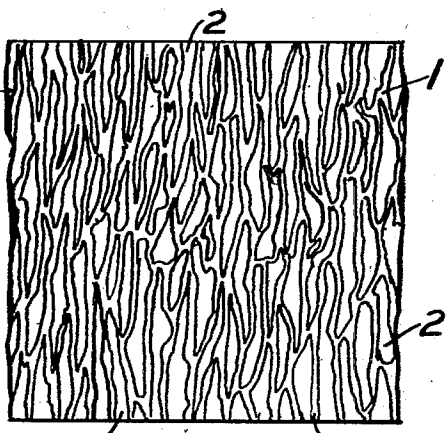


Fig. 5



Fig. 6

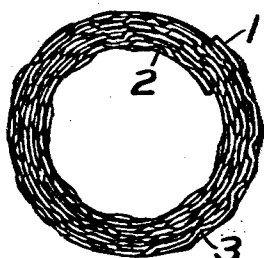


Fig. 3

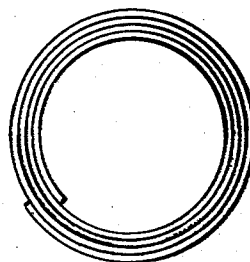


Fig. 7

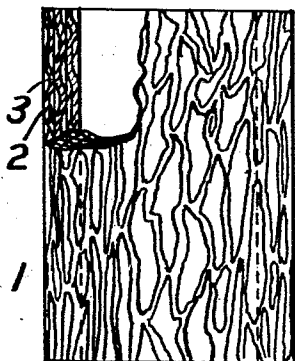


Fig. 4

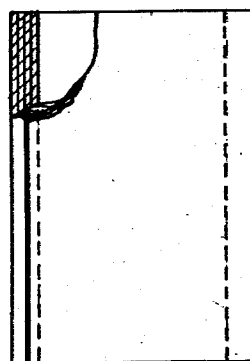


Fig. 8

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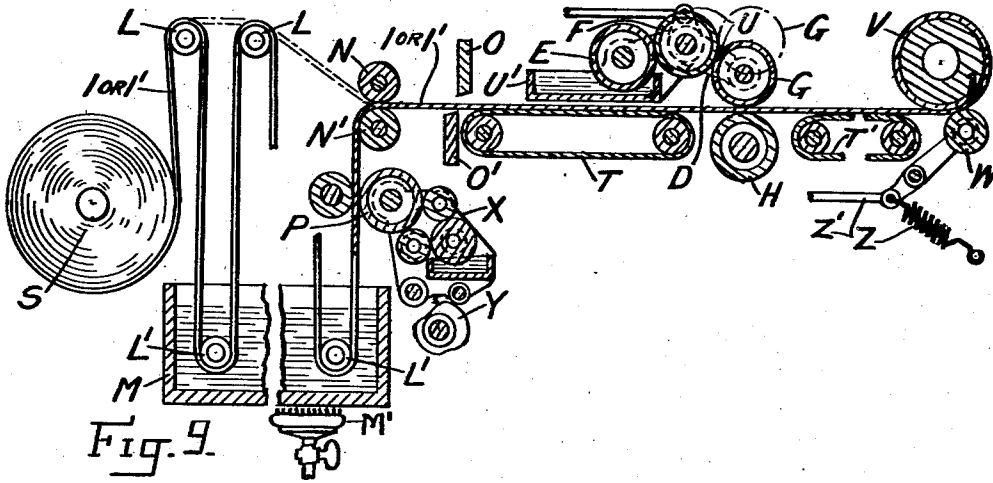
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3 Sheets-Sheet 2



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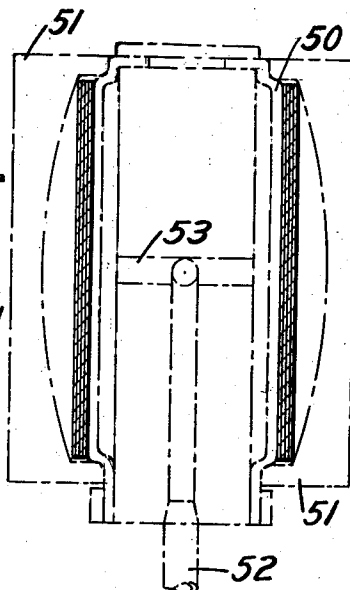
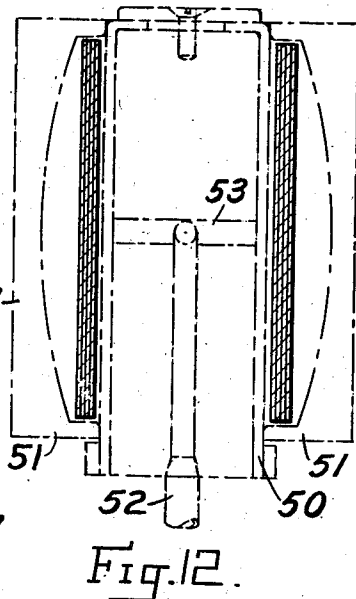
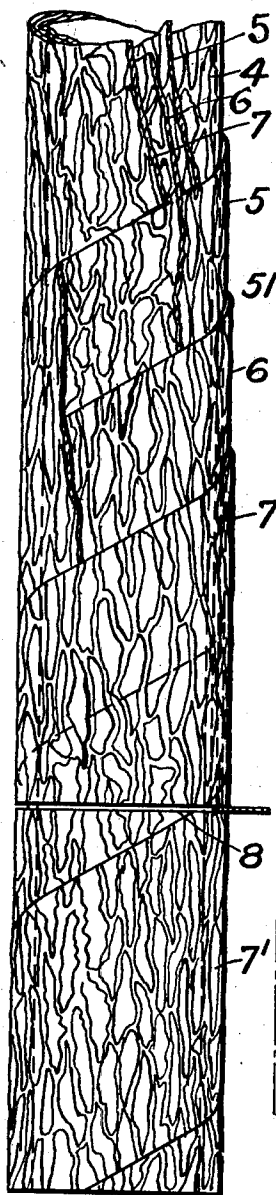
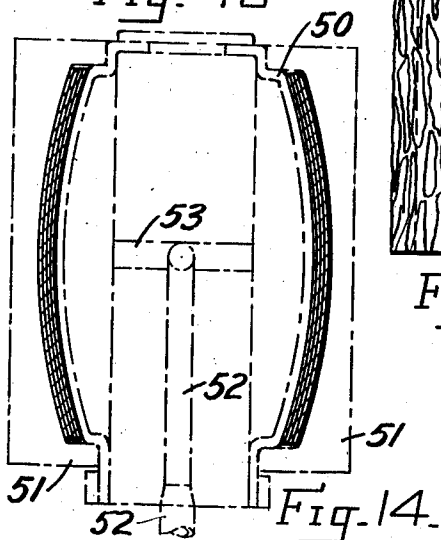
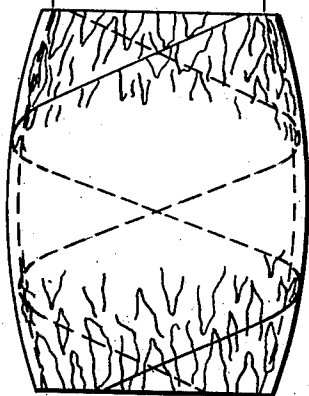
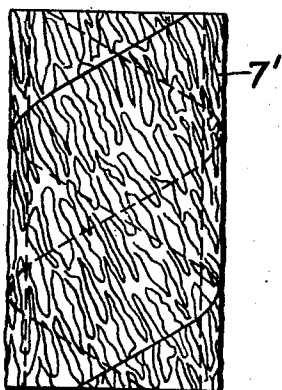
R. S. BOLGER

1,588,933

CONTAINER

Filed March 5, 1925.

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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

CONTAINER.

Application filed March 5, 1925. Serial No. 13,302.

This application is a continuation in part of application Serial Number 736,110 filed September 5th, 1924.

It is well known that ordinary fibrous materials are comparatively non-elastic, that is, non-stretchable. However, I have found that a certain amount of stretch can be imparted to such fibrous materials if these materials are treated to soften them so as to allow for the re-arrangement of the fibers when a stretch is imparted to the sheet material. This stretchability can also be obtained by "crinkling" sheet material. By utilizing this property I have been able to form a container from an imperforate blank of sheet material such that the blank is stretched at certain parts and less so at others. Another method of obtaining the analogous stretchability of the blank and expandibility of the tube is disclosed in application, Serial Number 736,110, of which this application is a continuation in part.

Another object of my invention is to provide certain methods of forming containers from stretchable blanks.

Another object of my invention is to provide certain means for carrying out the aforementioned process.

Another object of my invention is to form containers from one or more imperforate blanks.

Another object is to provide a method for forming expandible tubes from a plurality of imperforate blanks.

Another object of my invention is to provide novel end closures for containers.

Another object of my invention is to form containers having stretchable walls which conform substantially to articles placed within said containers.

Brief description of drawings.

In the accompanying drawings:

Fig. 1 is a plan view of part of a blank of a crinkled sheet material.

Fig. 2 is an edge view of the blank shown in Fig. 1.

Fig. 3 is an end view of a tube wound from a blank of crinkled material similar to that shown in Fig. 1.

Fig. 4 is a side view partly in section of the tube shown in Fig. 3.

Fig. 5 is a plan view of part of a blank of plain sheet material.

Fig. 6 is an edge view of the blank shown in Fig. 5.

Fig. 7 is an end view of a tube wound from a blank of plain material similar to that shown in Fig. 5.

Fig. 8 is a side elevation, partly in section, of the tube shown in Fig. 7.

Fig. 9 is a side elevation illustrating the method of dampening, printing, cutting, feeding, pasting, winding and compacting used in making tubes from a blank of sheet material.

Fig. 10 is a view illustrating a tube wound in spiral formation showing one body forming section partly detached.

Fig. 11 is a view of the body forming tube.

Fig. 12 is a view of the tube illustrated in Fig. 11 after placing the same over the expanding tube and surrounded by the outer form.

Fig. 13 is a view similar to Fig. 12 showing the body forming tube partly expanded.

Fig. 14 is a view similar to Fig. 13 showing the body forming tube fully expanded against the outer form.

Fig. 15 is a view showing the tube after it is expanded and removed from the expanding and forming means.

Detail description.

One of the types of the sheet material employed in this invention is a crinkled paper commonly known in the trade as "kraft" paper, shown at 1 in Fig. 1.

This paper is characterized by the fact that it has been "creeped" or crowded in one direction, forming crinkles with raised portions 2 above the base portions 3. See Figs. 1 and 2.

This type of paper has considerable stretchability and can be stretched in a direction transverse to the crinkles as far as its original length without rupture of the material.

The stretchability resides, in this type, not in the material itself, but rather the blank cut from this material is stretchable because of the crinkling of the material.

Another type of sheet material that is amenable to this process is long fibered paper, the general direction of the fibers being substantially in the direction of the blank employed, such as is shown at 1' in

Figs. 5 and 6. Such a paper in its normal condition is practically non-stretchable.

However, if it be treated to soften it or to loosen its fibers, thus allowing the fibers to take a new relation to each other, the paper becomes stretchable.

In this type of blank, the material is made stretchable, and the blank is stretchable by virtue of the stretchability of the material per se.

One method of forming a container from blanks of sheet material such as described above is to roll a blank of such sheet material of desired width and length into tubular formation shown in Figs. 3, 4, 7 and 8 by the method shown in Fig. 9, and to expand said tube by the method shown at Figs. 12, 13 and 14 into a desired shape for instance, a barrel shape.

It is to be observed that by a tube I do not mean, necessarily a cylindrical tube, I mean a tube-like structure of any desired cross-sectional shape. However, I find a cylindrical tube to be the preferred type.

In Fig. 9 is shown the tube winding mechanism.

S is a roll of sheet material, 1 or 1'. When material 1 is used it passes over the idler rolls L and between the rolls N, N'.

Then it passes between the knives O and O' and is carried by the conveyer T between the roll G and H and over the conveyer belt T' and is wound on the mandrel V. The gumming device is composed of a fountain U' containing the adhesive employed, the fountain roll E, the intermediate roll F and the gumming roll G. H is a roll employed to back up the sheet material against the gumming roll G. D is a lever operated by a mechanism not shown which brings the roll G into contact with the sheet material for a predetermined length of time.

As the sheet material is wound on the mandrel V it is compacted by the compacting roll W under tension of the spring Z, and is swung out of the compacting position by the rod Z'.

The blank is cut off at a predetermined point by the knives O and O'.

The mandrel V continues to turn until the blank is completely wound, whereupon the tube is slipped from the mandrel V in any desired fashion.

The tube will be of a length substantially equal to the width of the roll of sheet material S. This width may be equal to the length of the tube which it is desired to expand or may be greater than that length, in which case the tube is severed into the desired lengths.

The gumming device is lifted. The second blank then progresses to the mandrel to which it is secured and part of one turn of the mandrel is made, whereupon the gumming device is brought into play when a

length equal to the circumference of the mandrel has passed over roll H. This is done to prevent adhesive being applied to the inner surface of the tube.

If it be desired to print any matter on the outside of the tube the roll P may be part of a printing device X which is brought into contact at the desired time and for the desired length of time by the cam Y or by any other suitable mechanism.

It is obvious that where it be advisable the printing can be done by some other mechanism suitable other than that illustrated.

The method above described is suitable for the crinkled type of paper since it forms a tube which is expandible. However, the same method may be used for the non-crinkled paper by softening the paper. This may be done by passing the paper through a water or chemical bath M, maintained at the requisite temperature by M' or other device, the paper passing over rolls L'. The process from then on is the same as that previously described. Instead of softening the material before winding, the tube after winding may be softened before expanding the said tube. The softening of the tube may also be done in addition to that of the blank.

Instead of spirally winding the tube it may be helically wound as shown in Fig. 10 and as is well known in the art. In such case the blank is not severed and a continuous tube is formed as is shown in Fig. 10. This tube is formed by the overlapping strips 4, 5, 6 and 7. The tube is severed as at 8 to form desired lengths as shown at 7' in Figs. 10 and 11.

The tube formed by any of the above methods is expanded into any desired container form by the method illustrated in Figs. 12, 13 and 14, and patented to me in Patent No. 1,428,469 on September 5th, 1922. This method consists in placing the tube over an expandible form 50, such as a rubber diaphragm, before the adhesive has set.

The tube is encased by a form 51 of any desired shape, shown in this shape as bilge shape. A fluid is then introduced under pressure through the pipe 52 into the ports 53 on the inner side of the expandible diaphragm 50. The expansion of the diaphragm causes the tube to be expanded first to the position shown in Fig. 13 and then to that shown in Fig. 14 where the tube is expanded against the form 51.

The tube conforms to the shape of the form 51 and the several layers of the tube are compacted under pressure. The adhesive then sets, forming a rigid structure of the desired shape.

It is to be understood that by the term "expanding" is meant desired expansion, and as used in the claims means expanding to

form the tube into some shape that is desired, wherein the tube is expanded at such parts as is desired. The specific method of deforming the tube as explained above is but one illustration of means that may be employed. Other methods of altering the dimensions of the tube such as constricting parts of the tube, are applicable as will be well understood by those skilled in the art. The peculiar utility of the stretchable feature wherever the total surface area of the tube is altered to get a desired body shape is apparent. The tube being deformed without a material weakening of the body or danger of rupture.

The forms illustrated in Figs. 12, 13, 14 will yield the container shown in Fig. 15 when a helically wound tube of sheet material is employed which in the container in Fig. 15 is illustrated as crinkled. If the proper form is employed any desired shape corresponding to the form will be obtained, for example, a container of barrel shape.

The preferred sheet material in this invention is paper. However, any sheet material which is stretchable or which may be stretchable under some conditions may be used, such as fibrous sheet material including wood veneer.

The container may be given additional rigidity by conventional means such as hoops, rings, surface coating, chemical treatment where suitable, etc. It is also contemplated to water-proof the container by coating or other treatment as is well known in the art.

The specific embodiment of the invention is to be taken as illustrating the invention and not as limiting it, except as recited in the claims.

I claim as my invention:

1. The method of forming a body of desired formation, comprising adhesively coating a blank of sheet material, winding said blank upon itself to form a tube and expanding said tube under compacting pressure before said adhesive has set to form a body of desired formation.

2. The method of forming a container body of desired formation comprising adhesively coating a stretchable blank of sheet material, winding said blank in a tubular formation and then before said adhesive has set stretching portions thereof to form the container body.

3. The method of forming a container body of desired formation comprising adhesively coating a stretchable imperforate blank of sheet material, winding said blank into tubular formation and then stretching portions thereof before said adhesive has set to form the container body.

4. The method of forming a body of desired formation comprising adhesively coating a stretchable blank of sheet material,

winding said blank to form a tube, and expanding said tube before said adhesive has set to form a body of desired formation.

5. The method of forming a body of desired formation comprising adhesively coating a stretchable imperforate blank of sheet material, winding said blank to form a tube, and expanding said tube before said adhesive has set to form a body of desired formation.

6. The method of forming a body of desired formation comprising adhesively coating a stretchable blank of sheet material, winding said blank to form a tube, and deforming said tube under compacting pressure before said adhesive has set to form a body of greater surface area than the tube.

7. The method of forming a body of desired formation, comprising treating a blank of sheet material to make the blank stretchable, winding said blank to form a tube and deforming said tube to form a substantially rigid body of greater surface area than the tube.

8. The method of forming a body of desired formation, comprising treating a blank of sheet material to make the blank stretchable, adhesively coating said blank, winding said blank to form a tube, and deforming said tube to form a body of greater surface area than the tube.

9. The method of forming a body of desired formation comprising treating a blank of sheet material to make the blank stretchable, winding said blank to form a tube, and deforming said tube under compacting pressure to form a body of greater surface area than the tube.

10. The method of forming a body of desired formation, comprising treating a blank of sheet material to make the blank stretchable, adhesively coating said blank, winding said blank to form a tube, and deforming said tube under compacting pressure to form a body of greater surface area than the tube.

11. The method of forming a container body comprising winding a blank of crinkled sheet material to form a tube and expanding said tube to form a substantially rigid container body.

12. The method of forming a body of desired formation, comprising adhesively coating a blank of crinkled sheet material, winding said blank to form a tube, and expanding said tube to form a body of desired formation.

13. The method of forming a body of desired formation, comprising adhesively coating a blank of crinkled sheet material, winding said blank to form a tube, and deforming said tube under compacting pressure to form a body of greater surface area than the tube.

14. The method of forming a body of de-

sired formation, comprising treating sheet material to make it stretchable, winding said sheet material to form a tube and deforming said tube to form a body of greater surface area than said tube. 50

15. The method of forming a body of desired formation, comprising treating sheet material to make it stretchable, adhesively coating said sheet material, winding said sheet material to form a tube, and deforming said tube to form a body of greater surface area than said tube. 55

16. The method of forming a body of desired formation comprising treating sheet material to make it stretchable, winding said sheet material to form a tube and deforming said tube under compacting pressure to form a body of greater surface area than said tube. 60

17. The method of forming a body of desired formation, comprising treating sheet material to make it stretchable, adhesively coating said sheet material, winding said sheet material to form a tube, and deforming said tube under compacting pressure to form a body of greater surface area than said tube. 65

18. The method of forming a body of desired formation comprising treating sheet material to make it stretchable, winding said sheet material to form a tube, and expanding said tube to form a body of desired formation. 70

19. The method of forming a body of desired formation, comprising treating sheet material to make it stretchable, adhesively coating said sheet material, winding said sheet material to form a tube, and expanding said tube to form a body of desired formation. 75

20. The method of forming a body of desired formation comprising coating sheet material with adhesive, winding said sheet material into a tube, and deforming said tube into the desired formation before said adhesive has set. 80

21. The method of forming a body of desired formation comprising coating sheet material with adhesive, winding said sheet material into a tube, and deforming said tube under compacting pressure into the desired formation before said adhesive has set. 85

22. The method of forming a body of desired formation comprising coating sheet material with adhesive, winding said sheet material into a tube, and expanding said tube into the desired formation before said adhesive has set. 90

23. The method of forming a body of desired formation comprising coating sheet material with adhesive, winding said sheet material into a tube, and expanding said tube under compacting pressure into the desired formation before said adhesive has set. 95

24. The method of forming a body of desired formation which comprises winding sheet material into a tube, said sheet material having been treated previous to said winding to make the tube expandible, and expanding said tube. 100

25. The method of forming a body of desired formation, which comprises winding sheet material into a tube, said sheet material having been treated previous to said winding to make the tube deformable without materially weakening of said sheet material, and deforming said tube to give a body in which the sheet material is not materially weakened by said distortion. 105

26. The method of forming a body of desired formation, which comprises winding said sheet material into a tube, said sheet material having been treated previous to said winding to make the tube expandible without materially weakening of said sheet material, and expanding said tube to give a body in which the sheet material is not materially weakened by said distortion. 110

27. The method of forming a body of desired formation which comprises treating sheet material to make it more stretchable at certain parts of the material and less stretchable at other parts of said material, and winding said material into a tube and expanding said tube to desired formation. 115

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