March 4, 1947. D. E. GROVE 2,416,993

PROCESS OF MAKING CONTAINERS

Filed March 31, 1942

Fig. 2.

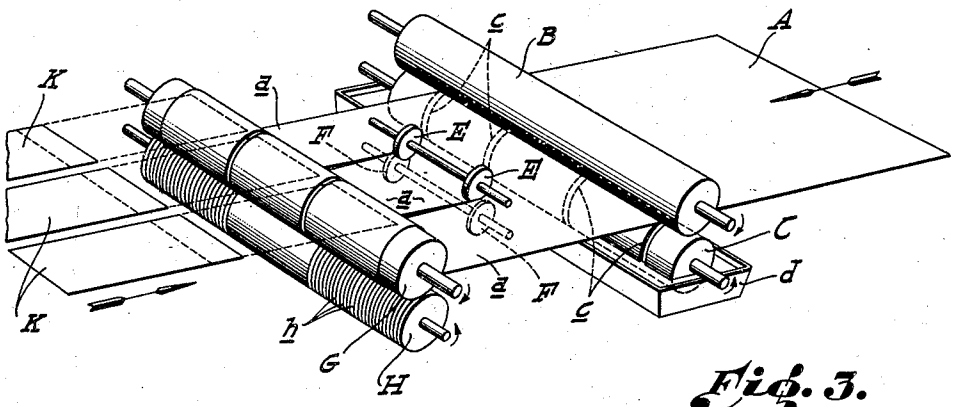


Fig. 1.

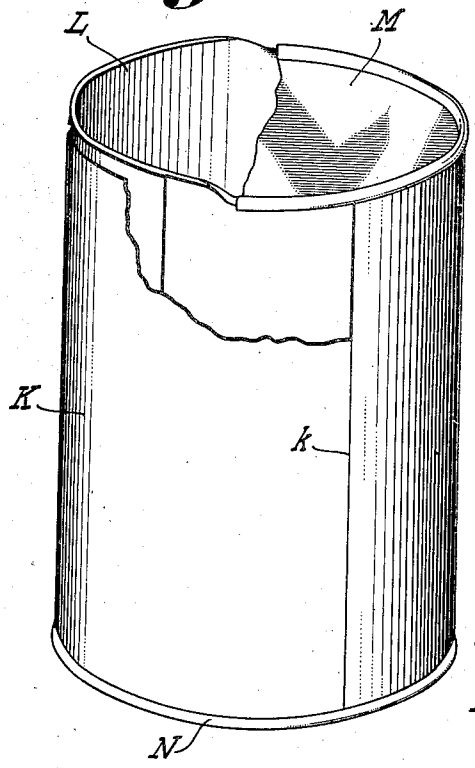


Fig. 3.

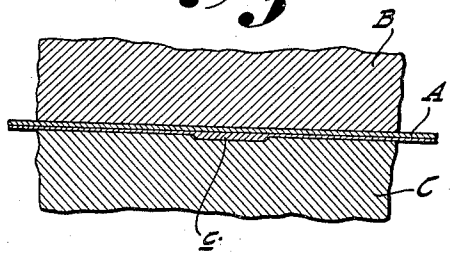


Fig. 4.

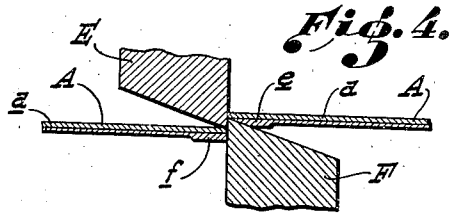
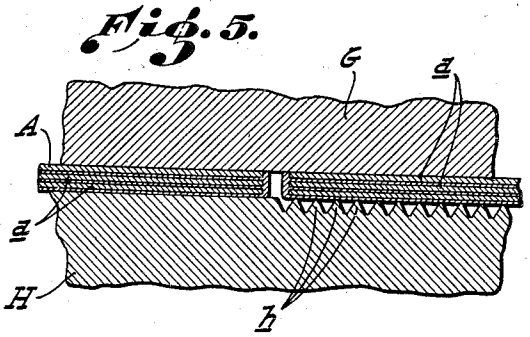


Fig. 5.



DONALD E. GROVE,
INVENTOR

BY Joseph F. Westall

ATTORNEY.

Patented Mar. 4, 1947

2,416,993

UNITED STATES PATENT OFFICE

2,416,993

PROCESS OF MAKING CONTAINERS

Donald E. Grove, West Los Angeles, Calif., assignor of one-sixth to Vincent C. Hickson, Los Angeles, Calif.

Application March 31, 1942, Serial No. 436,925

1 Claim. (Cl. 93—81)

1

This invention relates to containers, and more particularly to rigid containers having varying body cross sections and enclosures, within which general classification or category, of course, fall more particularly cans and the like. Such cans and containers of like kind have ordinarily been formed with metallic bodies and metallic end closures, and the same long have been and are used very extensively for packaging, storing and vending both liquid and dry and semi-liquid materials and substances, very largely vegetables and meats and other aliments. Of course, also, many other materials and substances are similarly packaged, including chemicals, greases, oils and a wide range of materials and substances. Close sealing or end closing is indispensable to prevent both leakage and likewise deterioration of contents, and this is more particularly so with respect to liquids, as in the particular of leakage. Perfect sealing is required to insure long preservation of contents, and it is entirely indispensable that such sealing be complete and perfect in the use of containers for packaging foods, inasmuch as access of oxygen or air to the interiors of metallic containers tends to set up reactions rendering the contents either inedible or poisonous. Such containers have been formed principally of metal as recited, in order to obtain the qualities hereinabove mentioned and the further qualities of inherent rigidity enabling such containers and contents to be shipped and handled without damage and likewise to be piled and stacked in storage and for purposes of display for sale.

I am not aware of the established commercial utilization of any material other than metallic material for the body portions of such containers or receptacles. Such containers or receptacles with non-metallic bodies have been, to a limited extent, placed upon the market, but I know of none which has held its place there and is now commercially supplied.

It is obvious that in selecting materials for and fabricating such a non-metallic container body, recourse must be had to materials which will meet all the requirements of which a number have been heretofore set down, and particularly inherent stability and resistance to crushing stress as well as imperviousness to leakage of either gaseous and fluid materials. Likewise such materials must permit closing at the ends of the receptacle by the application to the bodies of metallic closures. It is an object of this invention to provide such a container or receptacle with a non-metallic body and metallic end closures which will be durable, gas- and fluid-tight, and sufficiently resistant to crushing stresses or stresses tending to deformation, which will be relatively light in weight, and generally superior from the standpoint of efficiency, serviceability, inexpensiveness and adaptability to varying conditions of use and service.

2

With the above and other objects in view, the invention consists in the novel and useful provision, formation, constitution, association, interrelation and combination and relative arrangement of parts, members, ingredients, features and steps or sequencies of steps, all as hereinafter described, shown or indicated in part in the drawing, and finally pointed out in the claim.

In the drawing:

Fig. 1 is a perspective view of a container or receptacle formed, constructed and organized in accordance with and as one embodiment of the invention, the same being partly broken away with respect to the upper closure;

Fig. 2 is a perspective view of means or apparatus for producing or assembling or fabricating the body of the receptacle or container illustrated in Fig. 1, and for applying to such fabricated bodies labels as may be desired;

Fig. 3 is an enlarged detail sectional view taken through upper or presser and nether or adhesive roll, both of same shown at the right-hand side of Fig. 2, or operating upon the body material which is fed to said rolls from a suitable source;

Fig. 4 is an enlarged detail sectional view taken through severing or cutting rolls shown spaced between presser roll B with its companion adhesive roll C and presser roller H and its companion mandrel roller G in Fig. 2 and for subdividing the body material or stock into a plurality of body-forming units; and

Fig. 5 is a similarly enlarged sectional view through an upper mandrel and lower presser roll shown at the left-hand side of Fig. 2, upon which mandrel the severed body-forming portions of the stock supplied and suitably coated with adhesive material are wound or rolled, the presser roll having its periphery formed with tool markings which score or crease or groove or channel, to a limited depth, the exterior surface of the body-forming material in threaded conformation, there being oppositely wound threadings of this sort at the opposite ends of the presser roller whereby the two lateral body-forming strips or ribbons of stock are subjected to a tendency to separate from the intermediate one so as to permit the invasion between the edges of the intermediate one and the adjacent edges of the lateral ones of adhesive sealing material for purposes of

sealing such marginal portions. The tool marks shown in Fig. 5 are, of course, upon an enlarged scale, or magnified, for purposes of clarification.

Corresponding parts in all the figures are designated by the same reference characters.

Referring with particularity to the drawing, I have shown therein at Fig. 2 at A, material or stock which may be fed in a continuous ribbon or in successive sheets to the means above referred to, to the action of which it is progressively subjected, and this material or stock A may be of a variety of forms or variety of formulae. These so-called "furnishes" may preferably, from the standpoint of availability and cheapness and both chemical and mechanical adaptability, be selected from quite a range of substances, but preferably those containing a material amount of lignin or undigested pulp, and to such ends kraft or sulphite screenings may be employed, or cane pulp, or corrugated cuttings, or also any long fiber stock having a lining over a cheaper and softer center or core. The advantages of the materials mentioned above, or examples of materials, over other paper stock, such as paper stock formed of "chip" or redigested newspapers or rags, lies in the superior inherent strength and stability of the selected materials and imperviousness of same to permeation by moiture or gas, and to such ends the presence of the lignin contributes materially.

The paper or stock A so selected is preferably sized with a sizing which will contribute to or augment the imperviousness of the stock, and among such sizings I have found resin and aluminum stearate to be acceptable or preferable.

In forming the can body from the material or materials above mentioned, which materials, of course, may be used separately or may be commingled as desired, it is preferable that the fabrication of the body upon the forming mandrel be produced with the stock A so fed that the fibers thereof lie transverse of such stock which will provide for their extending or lying lengthwise of the completed or fabricated body and in angular relation to the seams of the closures of the body. This arrangement provides a seam of increased strength.

The stock A in passing between the presser roll B and the adhesive or glue roll C, is provided with adhesive or glue which may be applied at four separated zones, as by adhesive channels or grooves *c*, and, of course, the number of these channels or grooves may be varied in accordance with the particular method of formation of the container body and as preference or requirements may dictate. This adhesive or glue is supplied from a trough or container *d* mounted beneath the adhesive roll C into which former such roller dips. This arrangement is made inasmuch as the paper stock A is subdivided after it passes the rollers B and C into a plurality, three as shown, of ribbons *a*, and this may be done as indicated in the drawing by two or more cooperating pairs of cutting rolls or other cutting means, upper rolls E and lower rolls F, respectively, in the main above and beneath the stock ribbon A, and at the edges of the subdivided stock so slitted, adhesive sealing material is spread over the opposed edges of the slitted stock, as more particularly illustrated in Fig. 4 at *e* and *f*, in order to seal such edge portions. The edges of the subdivided stock at the portions thereof so slitted are provided with adhesive by the two intermediate grooves or channels c in the roller C, and the outside or lateral edges of the subdivisions are so applied by the outer channels or grooves c. Of course, many variations may be made in the make-up and method employed for so sealing the said edge portions. The subdivided stock in its three subdivisions as shown, *a*, pass thence to a mandrel roller G, which is opposed to and mated with a presser roller H, the subdivided stock portion *a* passing between such rollers and being picked up by the mandrel roller and wound thereon convolutely, with the faces or superficial portions of the subdivisions *a* to which the adhesive material has been applied, providing adhesive or glue deposits between the convolutions. The application of the adhesive or glue to the edge portions of the subdivisions *a* as above recited is brought about by the squeezing action of the mandrel roller and presser roller G and H respectively; and it will be understood that the adhesive roll C applies the adhesive continuously across the stock so that one surface of the stock is spread completely with such adhesive for entering into the adhesively formed body.

As the stock is formed upon the mandrel roller G, it is likewise subjected to the action of creasing or grooving in thread formation by such thread formation *h* upon the presser roller H. In this performance the lateral or outside subdivisions *a* are cammed or under threaded urge constrained to separate slightly from the intermediate subdivisions *a*, so that the adjacent or opposed and now adhesively coated edge portions are separated from each other and the plurality, or three, as shown, now formed container bodies may be separately removed from the mandrel roller, prior to which the added step of applying a suitable label to the fabricated body is carried on.

K in each instance indicates a label member for application to one of the separate fabricated container bodies, and each of same may be fed in ribbon form, or in consecutive label sheets, to the respective fabricated container bodies while still upon the mandrel roller G, as clearly indicated in Fig. 2. Inasmuch as the fabricated or nearly fabricated body has been coated on its label-receiving surface with adhesive material, up to the line or zone where the rollers G and H would be tangent, the label is continuously over all its surface adhered with such adhesive material instead of being adhered in a spotty manner. After a final turn of the roller G has been given to bring the label into its applied position, the rollers G and H are brought to a stop, the mechanism shown in Fig. 2 is brought to a temporary stop, while the labeled bodies are discharged from the mandrel roller G in the form shown in Fig. 1. The formed body, of course, terminates in its convolutions with an interior and exterior overlap, but the label is so formed and dimensioned and applied as to be put in place with merely abutting opposed edge portions, as clearly shown at *k* in Fig. 1, giving a better finish, and also eliminating the operation of spot adhering, and this is because the body within the label is continuously coated with adhesive material. The label is so applied that the outside overlap of the convolutions is beyond the edge marginal portions, lengthwise of the body, of the label, which seals such overlap and likewise acts in an auxiliary sealing capacity.

Of course, the drawing indicates a generally cylindrical form of body shown in Fig. 1 at L, and this form of body doubtless would predominate in the major manufacture of such con-

tainers in substitution for the commercial item known as a tin can, but it is to be understood that the cross-sectional formation of the body may be varied widely within preference or requirement of service, and such bodies may be round, elliptical, half-round, flat with round ends, square, rectangular, diamond-shape or of various angular cross-sections.

The adhesive material herein referred to may, of course, be likewise widely varied, as may the make-up of the body structure, but I have found that adhesive material including approximately eight percent (8%) of ethyl cellulose, forty percent (40%) of hydrogenated resin, and fifty-two percent (52%) of plasticizing resin, is particularly satisfactory and serviceable, and this is so because of its resistance to permeation by fluid or gas and, therefore, its superior impervious character.

The sealing of the bodies at top and bottom by the adhesive mentioned prevents both intrusion and extrusion with respect to the laminae of the stock A, which, of course, is provided by a suitable paper mill; and it also enters into the tight sealing action of the closures at the ends of the body, indicated at M, as to the top closure with its seam, in fragment, and at N, in Fig. 1, indicating the seam of the lower closure.

As to coating which is applied to the interior of the body after it is removed from the mandrel G, many formulae may be employed, but I have found that the following formula is acceptable and in some respects superior: 1 part 20 centipoise ethyl cellulose; .15 part dibutyl phthalate; 1 part gum; and 8 parts of solvent composed as follows, to wit: 40% of toluol, 10% of proprietary solvent; 40% of high flash naphtha; and 10% butyl alcohol.

This coating may be applied to the inner surface of the otherwise completed body L by spraying, brushing, flushing or extrusion, and when it is dried the container is ready to receive its one metal closure, as N, then its contents, and finally its other metal closure, as M.

The nature of the union between the body L and the said closures and the method of effecting such union, is not directly involved in the present invention, but constitutes the subject-matter of a further application for Letters Patent executed the same day as the present application and to be filed herewith.

It will be noted from the foregoing recitals that the adhesive material is not only continuously spread across one surface of the stock A, but in the pressing action exerted between the mandrel and its mating presser roll this adhesive material in part is extruded or exuded under such pressure from between the laminae of the forming body, and over the marginal portions of the stock, which spreading is also augmented and added to by the adhesive material directly applied to such marginal portions from the end channels or grooves in the adhesive roller.

In its broader aspects, the invention relates to union, by seaming, of various objects, parts and members with tightness and imperviousness, and is not limited to containers and closures.

The mode of operation and method of procedure and make-up of materials and substances entering into one preferred form of practice of the invention will be readily understood from the foregoing description and recitation in conjunction with reference to the drawing without a recapitulation, for the various materia have been separately defined in one make-up and the steps taken in fabricating the container body have been set down in sequence. It will be understood that many changes and variations and substitutions from the foregoing description and recitation and the specific illustration of the drawing may be made, in adapting the invention to carrying conditions of use and service, and to preference, without departing from the true spirit of the invention.

Having thus disclosed my invention, I claim and desire to secure by Letters Patent:

The method of fabricating container bodies, comprising the steps of: Applying an adhesive to one entire surface of body stock, cutting the stock into a pair of strips, feeding said strips to a mandrel, rolling said strips on said mandrel, and, coincidentally with the rolling operation, shifting one of said strips laterally with respect to the other to space the rolled strips from one another on the mandrel.

DONALD E. GROVE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
83,770	Fitzgibbons	Nov. 4, 1868
61,969	Wheeler et al.	Feb. 12, 1867
1,313,397	McKeogh	Aug. 19, 1919
1,703,697	Frickey	Feb. 26, 1929
1,909,935	Freyfus	May 23, 1933
1,826,696	Charch	Oct. 6, 1931
2,218,116	Magill	Oct. 15, 1940
2,008,717	Jarrier	July 23, 1935
405,133	Whitney	June 11, 1889
1,345,512	Smolker	July 6, 1920
1,508,469	Osgood	Sept. 16, 1924
2,163,318	Scusa et al.	June 20, 1939
2,241,104	Van Der Grinten	May 6, 1941
2,176,122	Chapman	Oct. 17, 1939
1,871,687	Hamersley	Aug. 16, 1932
760,123	How	May 17, 1904
916,162	Jenkins	Mar. 23, 1909
2,288,896	Fink	July 7, 1942

FOREIGN PATENTS

Number	Country	Date
105,610	British	Apr. 19, 1917