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G. SACHSENRÖDER ET AL

2,268,462

TUBE CONTAINER

Filed Nov. 4, 1938

Fig.1

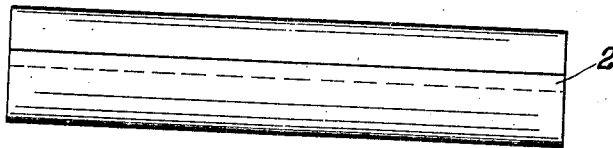


Fig.3

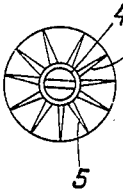


Fig.2

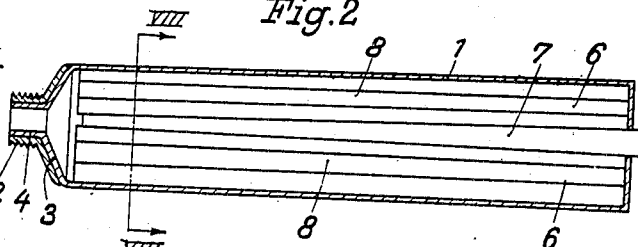


Fig.4

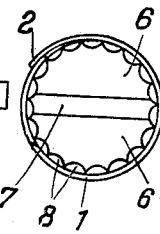


Fig.5

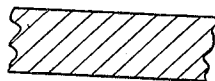


Fig.6



Fig.8

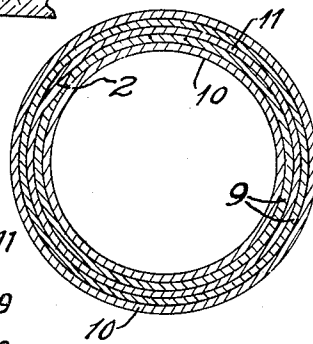


Fig.7

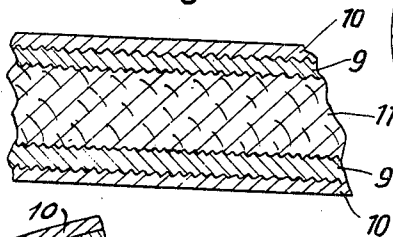
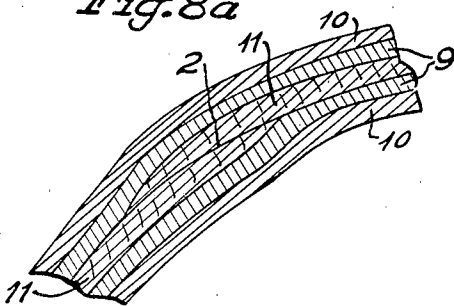


Fig.8a



Inventors:
Gustav Sachsenröder
and Alois Brossette
By *Haseltine, Lake & Co.*
Attorneys.

UNITED STATES PATENT OFFICE

2,268,462

TUBE CONTAINER

Gustav Sachsenröder and Alois Brossette,
Wuppertal-Barmen, GermanyApplication November 4, 1938, Serial No. 238,783
In Germany November 6, 1937

6 Claims. (Cl. 93—39.1)

This invention relates to methods of producing tubes of the kind used as envelopes for colours, dental or shaving cream and the like and to the products of such methods.

The primary object of the invention is to produce tubes of the kind referred to from cellulosic material.

A special object is to treat or coat the cellulosic material in a manner to prevent any interaction between the cellulosic material and the filling substance that may be detrimental for the filling substance and/or for the tube.

Another special object is to treat or coat the cellulosic material at first in a manner to render its surface more adapted for the application of a protective coating and to prevent peeling off of said protective coating.

Various further objects of the invention will become apparent from the following detailed description of the invention in connection with the accompanying drawing showing by way of example some embodiments of products of our novel methods, viz.—

Fig. 1 is a side view of a tubular hose of cellulosic material.

Fig. 2 is an axial section of the tubular body with the contracted and reinforced mouth end, stretched on a mandrel for drying.

Fig. 3 is a front elevation of the tube shown in Fig. 2.

Fig. 4 is an end elevation of the same tube.

Fig. 5 is a fragmentary cross sectional view of cellulosic material which has been parchmented throughout.

Fig. 6 is a similar view of partly parchmented material.

Fig. 7 is a fragmentary cross sectional view of the wall of the tube in its coated form.

Fig. 8 is a cross section on line VIII—VIII of Fig. 2.

Fig. 8a is a detail of Fig. 8.

Similar reference numerals denote similar parts in the various figures.

Referring now to the drawing in greater detail, Fig. 1 shows a rectangular sheet 1 of parchment paper wound in a circular form in such a manner that the opposite longitudinal edges overlap each other as indicated at 2 in Figs. 1 and 4. The parchment paper advantageously consists of alkaline cellulose, more particularly, sodium cellulose where the tube is intended for fatty substances, and of cotton or cellulose wool or wood pulp where the tube is intended for substances containing much water. The material may be in the form of a continuous strip which

is formed to a hose in a continuous operation and cut off to the length required for the tube, by means of machines known in the tube making industry. The paper may be parchmented by hydrating it, for instance, by action of sulphuric acid, before it is folded to form a hose. Preferably, the folding and joining operations of the overlapping ends are carried out while the sulphuric acid is still acting upon the material. In this case, the surfaces of the paper are still sticky and may be joined by simply pressing them together, so to speak, in a welding operation. It is, however, also contemplated to use an additional adhesive or glue for joining the overlapping edges although the "welding" of the seam in the parchmentizing operation yields a very strong and uniform joint which in most instances will be better than the joint obtained by an adhesive.

When the hose has been formed and cut to the desired length, its front end is contracted to form a mouth piece 3 of any suitable form, for example, of the conventional form shown in Figs. 2 and 3. The contracting may be carried out in machines similar to those known in the tube making industry, in such a manner that folds 5 are formed in the material which become deeper and deeper towards the front end to permit the reduction in diameter. Thus, the screw cap portion 4 is thickened at the same time. Advantageously, the contracting is carried out before the hydrating process is finished so that the folds will also weld together and form a solid unit.

The tube body may now be provided with a protective varnish coating, but we have found that it is very advantageous to treat the surface of the tube body at first in a manner to render it more suitable for the application of the varnish coating, because the hornified surface of the parchmented paper does not generally permit good adhesion of the varnish coating. The substance which is filled into the tube, more particularly slight percentages of water in this substance, tend to penetrate through the varnish coating into the parchment material whereby the coating is separated from the parchment material.

In order to remove this drawback, we apply on the tube wall at first a coating 9, Fig. 7, which is highly adhesive and removes the hygroscopicity of the tube walls to such an extent that the varnish coating sticks very tightly to the tube body even at the portions that may be folded in the use of the tube.

We have found that as such adhesive coating polymerisation products are highly suitable, i. e. artificial polymerisation products, for example, polyacrylic acid ester or polyvinyl acetate or artificial rubber or caoutchouc of the kind known under the trade name "Buna", or natural polymerisation products, for example, organic rubber substances, such as, latex, guttapercha and the like, dissolved in organic solvents or dispersed in water.

The adhesive coating 9 may be applied by dipping or immersing the tube into it, in the smooth form as shown in Fig. 1, or in the form with a contracted mouth end as shown in Fig. 2. Another method is to apply the coating by a spraying process. The tubular body is then dried before application of the protective varnish coating. In order to prevent the parchment from shrinking and forming folds, it is preferably dried in a stretched condition. To this end, a bipartite mandrel 6 may be inserted into the tube, and spread by a wedge member 7. The mandrel and wedge are preferably fluted as at 8, Fig. 4 to permit the access of air to the inner surface.

When the adhesive coating 9 has been dried or hardened, as the case may be, the outer coating, 10, Fig. 7, may be applied, in a similar manner as the coating 9. The varnish 10 is applied in the form of a solution of artificial resin, nitrocellulose, acetyl cellulose, cellulose acetobutyrate or the like in a suitable solvent. Preferably, mixtures of varnishes may be used.

Any other varnish may also be used within the scope of the invention provided that it is capable of imparting to the material the waterproof characteristics required.

The cross section of a completed three-layer tube is shown in Figs. 8 and 8a, illustrating the three layers and the way they are joined at 2.

In order to prevent any detrimental action of the varnish film upon the adhesive layer, a solvent is used for the varnish which while ensuring a good anchoring of the varnish material in the adhesive layer does not destroy the continuous layer thereof. The same applies as regards the solvent of the adhesive layer. The thicknesses of both layers may be increased by repeatedly coating the tube.

Where the tube is intended for fatty substances, the paper or parchment is preferably strongly hydrated, i. e. to such an extent that no non-hydrated or non-gelatinized fibres remain in the material, as indicated in Fig. 5, while tubes intended for substances containing much water are preferably only slightly hydrated, i. e. to such an extent only that the central portion of the paper still shows non-gelatinized fibres, as indicated at 11 in Fig. 6. In this case it is possible to use as the first coating substance polymerisation products or organic rubber material (latex) dispersed in water, whereby the solid residues of the dispersion penetrate deeply into the fibrous interior region of the parchment and form a deeply reaching anchoring for the protective layer. Accordingly the process is in this case carried out in such a manner that the tube sections before being formed with a contracted mouth end are treated with a dispersion of polymerisation products or organic rubber substances in water, which are then dried and hardened, if necessary, whereupon the covering layer 10 is applied.

The mouth end of the tube is preferably reinforced by additional material as indicated at 12

in Fig. 2, in order to make the tube head more resistive mechanically and to permit threading of the cylindrical end nipple 4. To this end, cellulosic material may be applied by dipping or spraying, or metal such as tin or aluminium may be applied by dipping the tube head into the molten metal or by spraying the metal onto the tube head after the well known metal spraying process.

Our novel method of making tubes is preferably carried out in a continuous process comprising the steps of forming a hose from the paper strip, cutting the hose to pieces of the desired length, hydrating the paper, contracting the mouth end, applying the adhesive layer, drying or hardening the same, applying the covering layer and drying or hardening the same and reinforcing the mouth end which may be provided with a thread as indicated at 12.

It will be understood that the single steps of the process may be carried out in the above mentioned order or in any other suitable order, depending on the special conditions.

Example

Sodium cellulose in the form of a band similar to blotting paper is immersed into sulphuric acid of a strength of 58° Bé. and of a temperature of 15° C. for a period of 1 to 30 seconds depending on the thickness of the paper and the desired degree of hydration. The band is then formed into a hose and immersed into a bath consisting of a mixture of vinyl acetates of different characteristics, i. e., different viscosity, containing at least 50% solid matter, dissolved in ethyl ether. Benzene, amyl acetate, butyl acetate or acetic acid ether may also be used as solvents and all the said solvents may be used individually or in any suitable combination.

The amount of solvents to be used is governed by the requirement that the vinyl acetate must be dissolved fully in the solvent but in case of butyl acetate the strength should be 85%.

The material is then dried and immersed in a bath consisting of acetyl cellulose containing 25% solid matter and dissolved in acetone, some softening or plastisizing agent, for example, toluol, being contained, if desired. The amount of the solvent is governed by the fact that the solution must be suitable for forming a hardening varnish film on the tube material. The coating or film thus formed is again dried or hardened in the manner described and the tubular body may be treated further in the manner described above to form the tube.

Various substances and method steps for treating cellulosic materials have been described in the U. S. Patent 2,075,328. The substances and method steps mentioned in this patent may be used in connection with our novel process as far as they are suitable in connection with this process, but it will be clear that in our process the resin material is not converted by means of pressure and heat, but by a method which is similar to the usual vulcanizing methods, using chemically reactive substances for converting the interior layer. By way of example, parchment, containing gelatine, is converted to an insoluble substance by formaline which causes hardening of the gelatine. In a similar manner the varnish coating acts chemically upon the adhesive coating.

We are aware that many changes may be made and numerous details of the process and product

may be varied through a wide range without departing from the principles of this invention.

We claim:

1. In a process of producing tubular envelopes of the kind referred to, the steps which comprise forming a tube body of cellulosic material, at least partly parchmentizing said cellulosic material, contracting the mouth end of said tube body, and treating said cellulosic material with a substance adapted to improve the adhesiveness of said cellulosic material and then with a varnish film.
2. In a process of producing tubular envelopes of the kind referred to, the steps which comprise forming a tube body of cellulosic material, at least partly parchmentizing said cellulosic material, contracting the mouth end of said tube body, treating said cellulosic material with a liquid containing an adhesive of the group comprising polymerisation products, organic rubber substances, and artificial rubber substances, drying, and then treating the body with a varnish.
3. In a process of producing tubular envelopes of the kind referred to, the steps which comprise forming a tube body of cellulosic material, contracting the mouth end of said tube body, treating said cellulose material with polymerisation products dissolved in organic substances, drying, and then treating the body with a varnish.
4. In a process of producing tubular envelopes

of the kind referred to, the steps which comprise forming a tube body of cellulosic material, at least partly parchmentizing said cellulosic material, contracting the mouth end of said tube body, treating said cellulosic material with polymerisation products dispersed in water, drying, and then treating the material with a varnish.

5. In a process of producing dispensing tubes for aqueous substances, the steps which comprise forming a tube body of cellulosic material, slightly parchmentizing said cellulosic material, inwardly crimping one end of the body to form a tube end, treating said material with an aqueous dispersion of a substance of the group comprising polymerisation products, organic rubber and artificial rubber, and then treating said tube with a varnish adapted to form a film.

6. In a process of producing dispensing tubes for fatty substances, the steps which comprise forming a tube body of cellulosic material, thoroughly parchmentizing said cellulosic material, inwardly crimping one end of the body to form a tube end, treating said material with a substance of the group comprising polymerisation products, organic rubber, and artificial rubber dissolved in an organic solvent, and then treating said tube with a varnish adapted to form a film.

GUSTAV SACHSENRODER.
ALOIS BROSSETTE.