

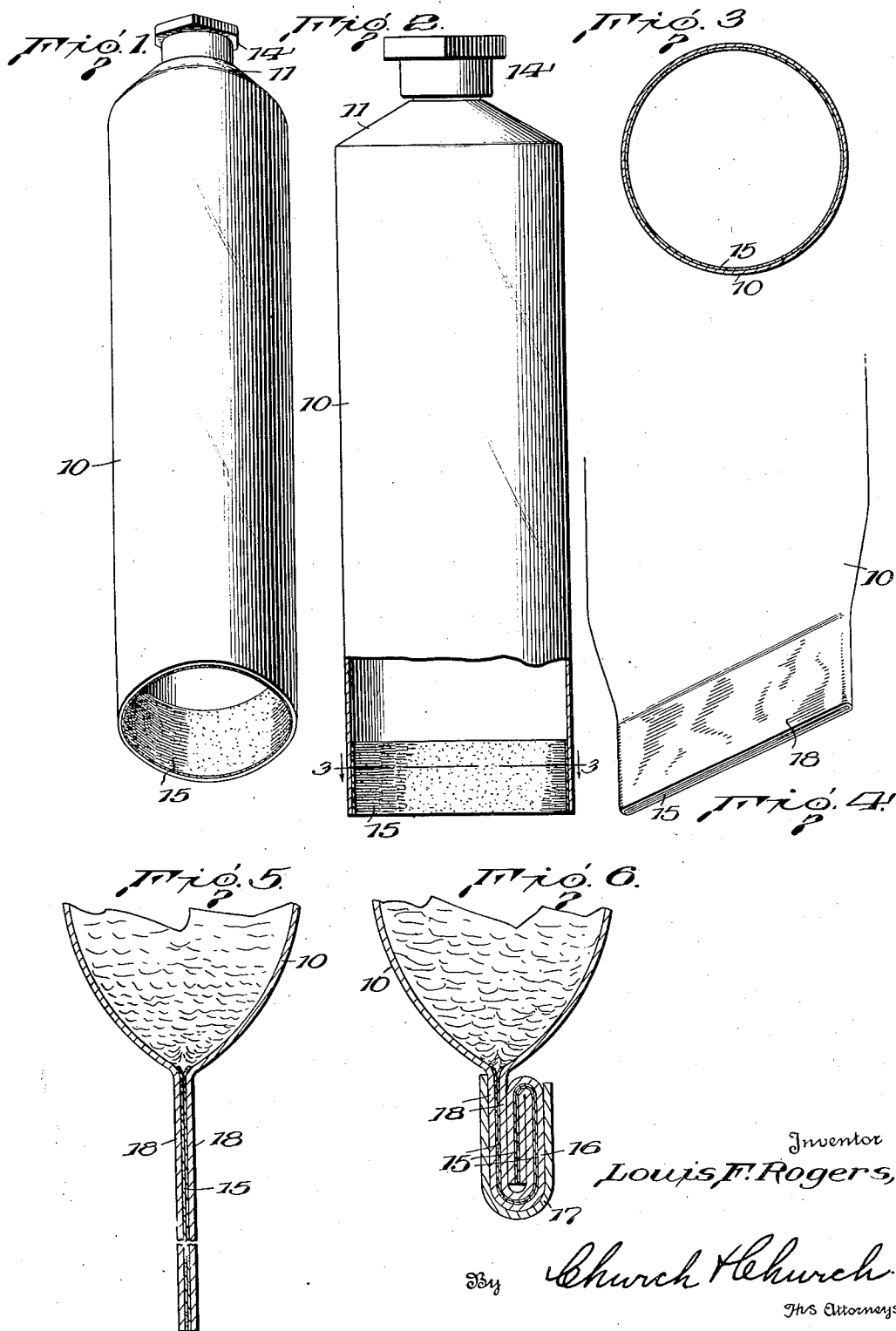
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COLLAPSIBLE TUBE

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UNITED STATES PATENT OFFICE

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COLLAPSIBLE TUBE

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My invention relates to improvements in collapsible tubes and the method of making the same.

Collapsible tubes are customarily used for packaging many different chemical or pharmaceutical preparations. These collapsible tubes are usually formed of a suitable soft metal or alloy and comprise a body portion with a relatively thin wall and an upper end having a screw-threaded neck provided with a discharge opening. A cap is customarily screwed upon this neck to close the discharge opening. The lower end of the collapsible tube is left open until the tube is filled, whereupon the portion of the wall of the tube adjacent the open end is flattened to form two contacting thicknesses of metal, which are folded over upon each other several times and then secured by a clip. In this way, the filled collapsible tube is sealed, so that its contents have to be discharged through the discharge opening by squeezing the body portion of the tube.

The seal thus made proves quite satisfactory for many preparations, but difficulty has been experienced with it when the tubes are used for preparations containing appreciable quantities of volatile solvents or certain salts. For example, preparations containing appreciable quantities of alcohol and preparations containing halogen salts are apt to leak through the seal thus made, because, no matter how tightly the metal surfaces are crimped together in forming the seal, there is a tendency for such constituents to creep along the surfaces of the metal and escape through the seal. The same difficulties have been experienced where such tubes are used to contain colors in oil or similar compositions.

The principal object of my invention is to provide a collapsible tube which is so effectively sealed as to prevent leakage of the contents due to such creeping action. A further object of my invention is to provide the inner surfaces of the portions of the tube wall, which are crimped together to form the seal, with a layer of anti-wetting material, so selected with reference to the contents of the tube that such contents will not wet these coated surfaces or creep along them. A

further object of my invention is to provide an improved method of making collapsible tubes in which, after the tube is formed and before it is filled, a layer or coating of anti-wetting material is deposited on the inner surface of the tube wall, adjacent the open end thereof through which the tube is to be filled.

Further objects, and objects relating to details and economies of construction and operation, will definitely appear from the detailed description to follow. In one instance, I accomplish the objects of my invention by the devices and means set forth in the following specification. My invention is clearly defined and pointed out in the appended claims. A structure constituting a preferred embodiment of my invention is illustrated in the accompanying drawing, forming a part of this specification, in which:

Figure 1 is a perspective view of a collapsible tube embodying my invention prior to the filling and sealing of the tube;

Fig. 2 is a view in side elevation, a part of the side wall being broken away, of the tube shown in Fig. 1;

Fig. 3 is a transverse, sectional view, taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary, perspective view of the lower end of the tube of Fig. 1, showing the tube wall flattened preparatory to crimping;

Fig. 5 is a vertical sectional view through the lower portion of the filled tube shown in Fig. 4, and

Fig. 6 is a similar view of the filled and sealed tube.

In the drawing, the same reference numerals indicate the same parts throughout the several views.

In general, my invention consists in depositing a layer or coating of anti-wetting material upon the inner surface of the collapsible tube wall, adjacent the open end thereof, so that, when the tube has been filled and closed by flattening and folding over the end portion, the layer of anti-wetting material will prevent the contents of the tube creeping along the inner surfaces of the folded over portions, and thus leaking

through the seal so established. It is a well recognized fact that certain compounds wet surfaces of certain materials with greater facility than surfaces of other materials. The creeping action above-mentioned is believed to be due to the tendency of certain compounds to wet the wall of the collapsible tube, and thus creep along it and through the folded over or crimped portions which form the seal. I propose to prevent such leakage by providing a band of material, deposited upon the inner surface of the tube wall adjacent the parts which are to be crimped over to form the seal, which material is so selected, with reference to the contents to be packaged in the collapsible tube, that it interrupts the interfacial film normally existing between the metal of the tube and the contents, so that the contents will not tend to wet this band of material. I designate this as "anti-wetting" material.

Referring to the numbered parts of the accompanying drawing, in which I have illustrated a preferred embodiment of my invention, I have shown, in Figs. 1 and 2, a collapsible tube prior to the filling thereof, the body of the tube being indicated at 10 and having at its upper end the head 11 and the screw neck provided with the usual discharge opening 13. A cap 14 is screwed on this neck to close the discharge opening. I have shown, at 15, a coating of anti-wetting material, deposited upon the inner surface of the tube wall adjacent the open end thereof. This material may be applied to or deposited upon the tube wall in many different ways, as, for instance, by spraying, brushing or dipping. When the material is applied by brushing or spraying, it may be deposited on the inner surface of the tube wall only, and this is all that is required to form a seal in accordance with my invention, as it is this inner coating which prevents leakage through creeping. When the coating is applied by dipping the end of the tube in the anti-wetting material, such material will be deposited upon both inner and outer surfaces of the tube wall. While this may be done in some cases, it is not so desirable, because the coating on the outer surface of the tube wall gives an untidy appearance.

After the coating of anti-wetting material has been deposited upon the inner surface of a portion of the tube wall, as shown in Figs. 1 and 2, that portion of the tube is flattened, at 18, to form two thicknesses of metal with the coating of anti-wetting material interposed between them, as shown in Fig. 5, and these flattened portions of the tube are then crimped or folded over upon themselves, as shown at 16, to form a sealing seam or joint, and the seal thus formed is held by means of a clip 17.

The anti-wetting material employed should be selected with reference to the

chemical composition of the preparation which is to be packaged in the collapsible tube. I have found that rubber latex makes a very desirable anti-wetting material for use with chemical preparations containing alcohol or the halogen salts and, therefore, in such cases, I propose to apply a coating of rubber latex to the inner surface of the tube wall, as indicated at 15, at those portions of the tube wall adjacent the open end, which is to be sealed after the tube has been filled. In some cases, the contents of the tube may contain chemicals having a solvent action on the rubber latex and, then, some other anti-wetting material should be used, such as, for instance, gelatine, which I have found satisfactory for use on tubes which are to contain colors in oil or similar compositions.

I have found that the deposit of such a coating of anti-wetting material upon the inner surface of the tube wall, on those portions which are located adjacent the seal to be formed by folding over and securing the end of the tube, results in a very effective sealing of the tube against leakage of the character previously described, attributable to the creeping action of the tube contents. I believe this to be due to the fact that the deposit of anti-wetting material on the wall of the tube prevents this creeping action and, hence, prevents the contents from working through the seal formed by folding over and clipping the end of the tube.

I am aware that the structure and method herein described may be changed considerably, without departing from the spirit of my invention, and therefore I claim my invention broadly as indicated by the appended claims.

What I claim is:

1. A collapsible tube dispensing container for a substance containing an ingredient of searching character having a strong tendency to creep and leak through the conventional folded and crimped metallic seam, comprising a collapsible metallic tubular container body adapted at one end for dispensing the contents, and having its other or charging end flattened, folded over and crimped to constitute a closure seam, and means for precluding the tendency of said searching ingredient to creep through said seam, said means comprising an endless band in the form of a thin coating disposed within and hermetically bonded to the internal surface of the flattened portion of said tubular body, said band being composed of material the surface of which is inherently resistant to wetting by said searching ingredient and upon which said ingredient will not creep.

2. A collapsible tube dispensing container for a substance containing an ingredient of searching character such as alcohol or a halogen salt having a strong tendency to creep and leak through the conventional

folded and crimped metallic seam, comprising a collapsible metallic tubular container body adapted at one end for dispensing the contents, and having its other or charging
5 end flattened, folded over, and crimped to constitute a closure seam, and means for precluding the tendency of said searching ingredient to creep through said seam, said means comprising an endless band in the
10 form of a thin coating disposed within and hermetically bonded to the internal surface of the flattened portion of said tubular body, said band being composed of latex the surface of which is inherently resistant to wet-
15 ting by said searching ingredient and upon which said ingredient will not creep.

3. A collapsible tube dispensing container for a substance containing an oily ingredient of searching character having a strong tendency to creep and leak through the conventional folded and crimped metallic seam, comprising a collapsible metallic tubular
20 container body adapted at one end for dispensing the contents, and having its other or charging end flattened, folded over and crimped to constitute a closure seam, and means for precluding the tendency of said searching ingredient to creep through said
25 seam, said means comprising an endless band in the form of a coating disposed within and hermetically bonded to the internal surface of the flattened portion of said tubular body, said band being composed of gelatin the surface of which is inherently resistant to wet-
30 ting by said oily searching ingredient and upon which said ingredient will not creep.

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