

(No Model.)

H. GOODWIN.
PROCESS OF AND APPARATUS FOR MAKING TUBES FOR ARTISTS'
COLORS, &c.

No. 570,728.

Patented Nov. 3, 1896.

Fig. 1.

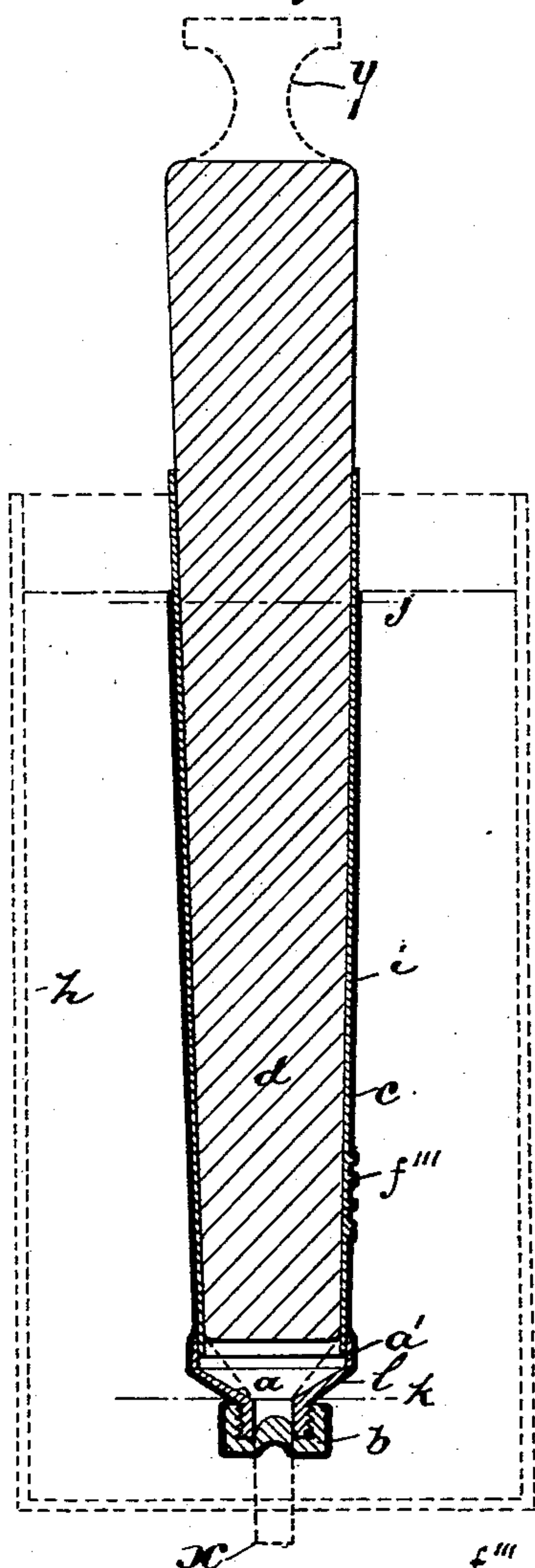


Fig. 2.

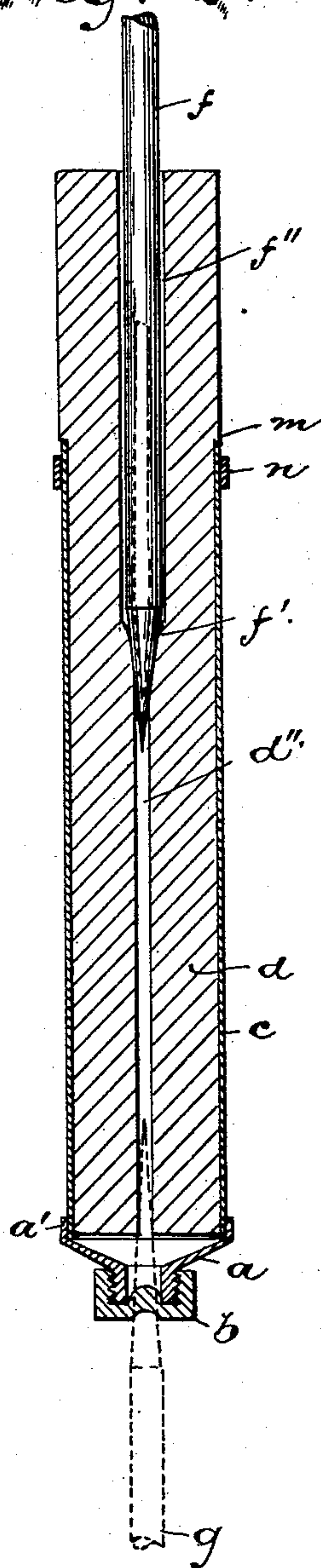


Fig. 3.

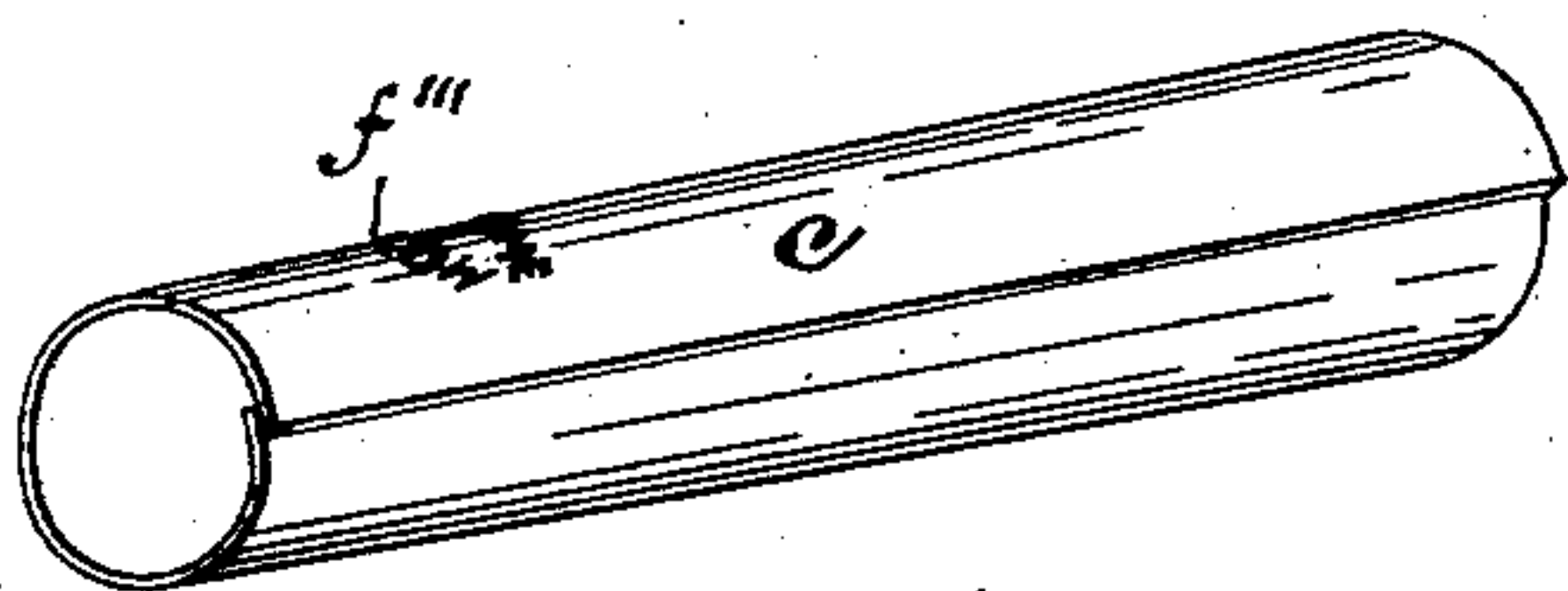
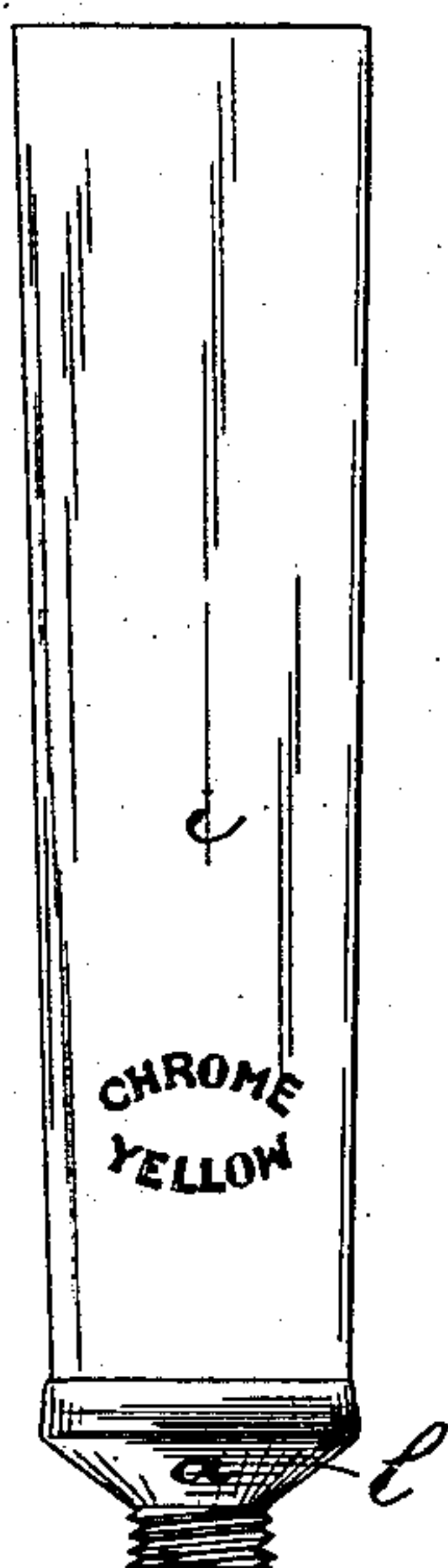


Fig. 4.

Witnesses

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UNITED STATES PATENT OFFICE.

HANNIBAL GOODWIN, OF NEWARK, NEW JERSEY.

PROCESS OF AND APPARATUS FOR MAKING TUBES FOR ARTISTS' COLORS, &c.

SPECIFICATION forming part of Letters Patent No. 570,728, dated November 3, 1896.

Application filed March 19, 1895. Serial No. 542,304. (No model.)

To all whom it may concern:

Be it known that I, HANNIBAL GOODWIN, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Process of and Apparatus for Making Tubes for Artists' Colors, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to certain devices and to the process employed in manufacturing flexible tubes of transparent or translucent pyroxylin films or pellicles for use in holding artists' colors, viscid and semifluid matters, drugs, &c., the object of the invention being to enable such flexible tubes to be made longitudinally seamless, so that they will have a more perfect and durable connection with the metallic end piece to which the removable caps are applied, and thus to provide stronger and more durable tubes.

The invention consists in the devices and in the process for making the seamless transparent or translucent and flexible pellicular tubes, all as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters indicate corresponding parts in each of the views, Figure 1 is a sectional view showing the devices employed and their relation to the process of manufacturing the longitudinally-seamless flexible tubes. Fig. 2 illustrates a preferred construction. Fig. 3 is a view of the tube detached from the forming devices, and Fig. 4 is a detail perspective view of a sheet-metal former over which the tube is shaped.

In said drawings, *a* indicates a metal or other end piece for the mouth of the tube, which end piece is preferably threaded at said mouth to receive a correspondingly-threaded cap *b*, and back from the mouth said end piece is expanded or enlarged to about the size of the body of the desired tube, said end piece being cylindrical at its inner end, as at *a'*, to receive the end of an expansible former

c, so that when the said former *c* is forced outward against the inner walls of said cylindrical portion *a'* of the end piece the said end piece will be held in place on said former during the subsequent operations and steps in the process of manufacturing the pellicular tubes.

The former *c* consists of a sheet-metal plate turned into the shape of a cylinder or other shape, with a longitudinal split, by which the edges may overlap, as in Fig. 4, when detached from a supporting or expanding tool or when said supporting-tool is reduced in diameter by pressing together its separated halves. The longitudinal edges of the plate are made quite straight and regular, so that when they are brought together or abut the joint will not be open to admit an entrance of the pyroxylin solution therethrough, but, on the other hand, said edges will nicely connect or be brought into contact and there will be little or no mark in the tube due thereto. The sheet metal possesses more or less resilience, and thus the edges tend normally to come together or to overlap, as in Fig. 4. When the support or expander *d* is brought to bear, it acts against this normal tendency in the construction herein shown.

The support or expander *d*, which may be cylindrical and of a size to fit within the former *c*, is preferably split, as by a saw, the split or cut *d'* extending longitudinally part way through the same, so that by the introduction of a wedge or tapering piece *f* the support or expander, which is interiorly shouldered at *f'*, will be forced to bear outward against the interior walls of the former *c*, as indicated in Fig. 2. Said support or expander may be of a conical or slightly-tapering shape, as indicated in Fig. 1, and in this form I may dispense, though preferably not, with the above-described slit and its accompanying wedge. The conical expander when forced down within said former *c* will expand said former and bring it into holding relation with the end piece *a*. The support or expander may have a tapering end *x* of such reduced size as will permit it to pass through the mouth of the metal end piece while said end piece is being brought into contact with the end of the former, and will thus serve not only to keep both end piece and former into

required position to each other, but as a handle by which the combined parts may be suspended into the pyroxylin solution, or the supporting-handle may be a reduced projection from the broader end of the expander, as indicated by *y*.

The former *c* may, and preferably does, have raised letters or advertising-figures on the outer side, as at *f'''*, Fig. 4, by means of which a corresponding advertisement is formed in the pellicular tube, as indicated in Fig. 3.

In operating the devices thus described and in carrying out the process of making tubes in accordance with the invention I first, in accordance with my preferred method, take the metallic end piece *a* and remove the screw-cap *b* therefrom to open the mouth or smaller end. I then insert the expansible and collapsible former *c*, so that one end thereof impinges upon the interior walls of the end piece, after which I insert into the former *c* the support or expander *d*, and the parts are then locked by the introduction of a wedge *g* through the mouth of the end piece. I then insert within the said support or expander *d* the wedge *f*, the pressure of which causes the expander *d* to expand or spread and the former *c* to increase in diameter, so that said former *c* bears hard upon the end piece to hold the latter in fixed relation to said former after the removal of the locking-wedge *g*. The longitudinal joint in the former *c*, because of the outward pressure and the resilience of the sheet metal, is closed preferably by bringing the edges into close abutting contact. The locking-wedge *g* is then removed and the cap replaced to prevent an inflow of fluid, or said locking-wedge, if so closely fitting into the mouth of the end piece as to prevent the inflow of fluid, may remain instead of replacing the cap, or the locking-wedge may itself be dispensed with, providing more care be given to the adjusting within the expander of the main expanding-wedge *f*. The parts thus arranged and in large numbers, a gross, more or less, are suitably suspended, as on a lowering and raising rack, and are then dipped in a pyroxylin solution contained in a tank or suitable receptacle *h*, as indicated in outline in Fig. 1, and are next removed and suspended, so that superfluous fluid may drip therefrom, and that which remains adhering to the outside of the former, end piece, and cap may dry thereon to form the tubular pellicle. After drying, the pellicle or adhering coating (marked *i* in Figs. 1 and 3) may be cut by a knife or other means at *j* and *k* to trim the end, should said end be ragged or of undue length and to admit a removal of the cap *b* from the end piece. In drying, the pellicle tends to contract to some extent, and thus it hugs the end piece with great firmness, and the union is rendered more firm and secure than if the pellicle (in the present construction covering the shoul-

der *l*, formed at the sides of the mouth of the end piece) terminates at the cylindrical portion *a'*, as will be understood. The closing of the mouth of the end piece *a* and the longitudinal joint of the former *c* prevents the solution from entering within said parts and interfering with a removal of the pellicle, which is extremely thin and yet very strong. The pellicle being dried and cut as described, the support or expander is removed and the former *c* detached from the pellicle. Any suitable means may be employed to facilitate the removal or detachment of the pellicle. For example, I may coat the former with a silver plating, but by preference I dip the collapsible former and its pellicular tube into water, first in hot, then in cold, or more frequently dip in water at common temperature, which tends to loosen said tube, so that by slight hand manipulation the parts are detached from one another.

To secure uniformity in the length of the tubes and to exactly guide the support *d* into proper relative position, I prefer to form a shoulder *m* on the outer side of said support, the parts being so formed as that when said shoulder engages the end of the former *c* the longitudinal joint in the latter will be properly closed.

I may employ a sliding collar *n* to more certainly close the joint in the former, but this is ordinarily unnecessary. It may be said that the axial center in the support or expander, at its upper or unsplit end, is bored or cored out, as at *f''*, to admit a passage to the wedge *f*, the shoulder *f'* being formed at the termination of the boring considerably below the upper or inner end of the split *d''*. The projecting support or expander or its wedge *f* provides facilities for suspending the device in any ordinary manner.

The pyroxylin solution dried as described produces a tube differing from others known to me in that said tube does not possess a resilience capable of drawing or sucking back undischarged contents after discontinuing the discharging pressure, and thus this thin pellicular tube of my invention does in its action resemble the flexible metallic tubes common in the market, excepting in that the improved tube is transparent or translucent. The open end of the tube may be closed in any suitable manner.

The pyroxylin or soluble cellulose from which my tubes are made is dissolved in a menstruum containing a solvent, such as amylacetate, ethylacetate, methylacetate, methyl alcohol, glacial acetic acid, acetone, camphor-oil, or other pyroxylin solvent, but preferably containing two or more of such combined and used as solvents, or solvents and dilutents of solvents, and further and preferably containing at least one element which possesses a boiling-point above that of water, such as amylacetate, nitrobenzol,

one of the higher aldehydes, or camphor-oil. Economy and other advantages may be subserved by diluting the menstruum with fusel-oil or a hydrocarbon, such as benzene or ethyl alcohol, &c.

Having thus described the invention, what I claim as new is—

1. The process of making a compressible tube with a metallic end piece which consists in attaching a metallic end piece to the end of a former, coating the end piece and former exteriorly with a continuous film of a liquid solution of a flexible material, evaporating from the said film the solvent of said solution to form a non-fluid residual film which covers both end piece and former, stripping said film and metallic end piece together from the former, said end piece and residual film remaining fast together in permanent relation, substantially as set forth.

2. The process of making tubes for viscid materials, which consists in applying a metallic end piece forming a portion of the tube, to the open end of a collapsible form, covering the form and its end piece with a solution capable of drying and leaving a pellicular covering and drying said solution, substantially as set forth.

3. The combination of the longitudinally-split support, means for expanding said split support, and a collapsible sheet-metal former,

all arranged and combined, substantially as and for the purposes set forth.

4. The combination of a resilient sheet-like former turned edge to edge, and having an advertising-figure upon its outer side, and a support for holding said sheet into holding relation to the end piece, substantially as and for the purposes set forth.

5. The combination of the collapsible former, split support and wedge all arranged and operating, substantially as and for the purposes set forth.

6. The combination of the collapsible former, split support which is centrally and longitudinally bored out and shouldered at *f'*, and a wedge expanding said support, substantially as and for the purposes set forth.

7. The combination of the collapsible sheet-metal former, a split and centrally and longitudinally bored out or cored expander having an exterior shoulder, *m*, and a wedge *f*, all said parts being arranged and adapted to operate, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 9th day of March, 1895.

HANNIBAL GOODWIN.

Witnesses:

CHARLES H. PELL,
BEATRICE CHARLES.