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T. F. GRAY ET AL
PRESSURE-OPERATED DISPENSING NOZZLE
FOR COLLAPSIBLE TUBES
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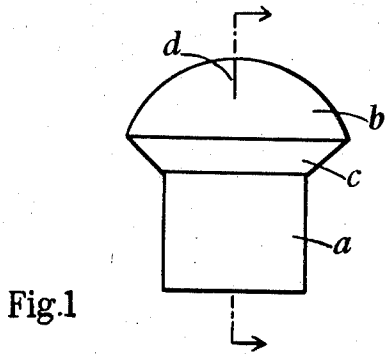


Fig. 1

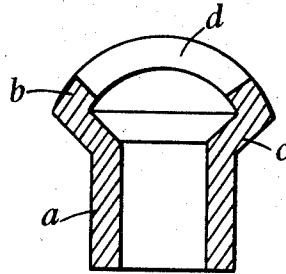


Fig. 2

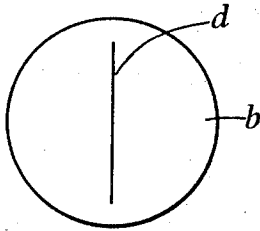


Fig. 3

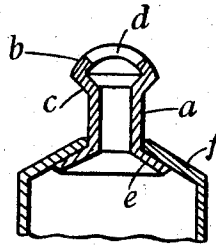


Fig. 4

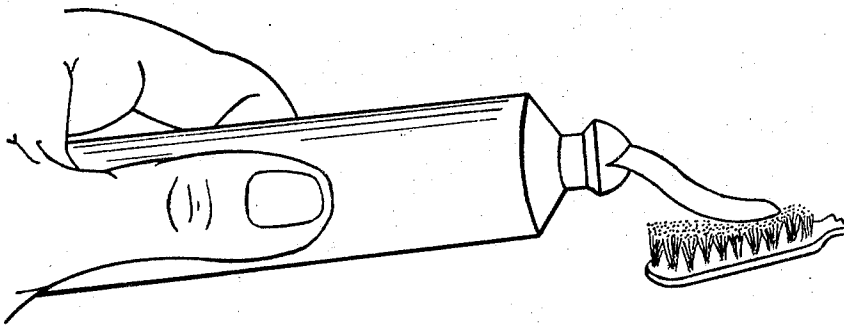


Fig. 5

Inventors
T. F. Gray
K. V. Gray
By Glascoth Kinning DeHoll
Attys.

UNITED STATES PATENT OFFICE

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PRESSURE-OPERATED DISPENSING NOZZLE
FOR COLLAPSIBLE TUBESTom Frederick Gray and Kenneth Victor Gray,
Salford, EnglandApplication July 17, 1947, Serial No. 761,600
In Great Britain September 25, 1946

1 Claim. (Cl. 222-490)

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This invention relates to collapsible tubes such as are used for holding and delivering liquid and paste materials, such as tooth paste, and is concerned more particularly with the extrusion aperture and the means for its closure when any extrusion operation is completed. At present the tube is provided with an orifice of any desired shape in the neck portion and a cap is threaded on to the neck when delivery of liquid or paste ceases.

The object of the present invention is to provide an improved arrangement of extrusion orifice which obviates the employment of a cap and which automatically cuts off the flow of the liquid or paste when the extrusion pressure ceases.

In accordance with our invention, we provide a rubber or like resilient cover adapted to fit on or in the neck of the tube and having a plain clean cut slit which is forced open by the contents of the tube which squeeze through the slit when pressure is applied to the tube and so to its contents, the slit closing again when the pressure is released due to the strength and resiliency of the material of the cover. The strength and resiliency of the rubber or like material of the cover ensure that whilst pressure applied to the tube will cause the tube contents to open the slit so that it forms a delivery orifice through which such contents are delivered, withdrawal of such pressure from the tube will allow the said rubber or like material to close the orifice in the cover and cut off delivery automatically. The strength of the rubber or like material of the cover is also such that accidental or light pressure upon the tube will not cause delivery through the slit.

The invention further comprises a rubber or like resilient cover having a cylindrical part adapted to fit on or in the neck of the tube, and a domed part with a plain clean cut slit adapted to be forced open by the tube contents so that the latter squeeze through the slit when pressure is applied to the tube, and to close again when the pressure is released.

The invention further comprises a resilient cover in which the cylindrical part is flared at the end remote from the domed part, to fit inside the end of a collapsible tube. For convenience of transport and storage the slit may be covered from within by a disc of impermeforate material or from outside by an adhesive strip or the like, so preventing undesired delivery, such internal or external disc or strip being removed, when extrusion is required.

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The rubber or like cover may have a reinforced edge which may be sprung over a flange on the tube neck. Or the cover may be secured to the neck by adhesive. The cover may be fixed on to the tube by the manufacturer, or it may be supplied separately and used with a normal tube after removal of the usual screw cap.

Referring to the accompanying explanatory drawings:

10 Figure 1 is a side elevation of a closure cover according to the invention.

Figure 2 is a section on the line 2-2 in Figure 1.

Figure 3 is a plan view.

15 Figure 4 shows a modified construction, in section, fixed in the neck of a tube.

Figure 5 shows the manner in which the device is used.

Referring to Figures 1-3, the closure cover has a cylindrical part *a* adapted to fit over the neck of a collapsible tube, a domed part *b* and a conical part *c* connecting the domed part *b* to the cylindrical part *a*. In the domed part *b* there is a cut *d* extending to within a short distance of each side.

25 The strength of the rubber or like material of which the cover is made is such that the cut *d* normally remains closed, but when pressure is applied to the tube, it causes compression of the liquid or paste therein which results in the sides of the cut being forced apart so that the liquid or paste emerges as shown in Figure 5. When the pressure on the tube is released, the sides of the cut come together due to the strength and resiliency of the material of the cap and cut off the flow of liquid or paste.

35 The construction shown in Figure 4 is intended for use with a collapsible tube in which the usual neck is dispensed with. The cylindrical part *a* has at the end opposite to the domed part *b*, a flared part *e* which fits inside the end of the tube bearing against the shoulder *f* thereof, with the part *a* projecting through the opening of the tube. Pressure applied to the tube causes the part *e* to seat firmly on the shoulder *f* of the tube, so that the paste will flow into the domed part *b* and will not leak out around the flared part *e*. The cover may further be cemented into the tube.

45 The shape of the cover as shown in the drawing has the advantage that paste entering the enlarged part of the cover formed by the conical part *c* and the domed part *b* exerts a lateral pressure, which tends to prevent gaping at the cut *d* and ensures that the paste will emerge in the form of a very thin ribbon.

55 It is clearly seen, therefore, that the present

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invention provides a dispensing nozzle for co-
operation with a collapsible tube, the nozzle com-
prising a resilient body of uniform wall thickness
and including a cylindrical portion *a* attachable
to the end of a collapsible tube and constituting
a neck for said tube. An extension on the outer
end of the neck is provided that defines in cross
section a first angular portion *c* having a length
less than the length of the cylindrical portion *a*
and a permanently domed portion *b* as an out-
ward continuation of said angular portion. As
seen in Figure 2, the arc of curvature of the
domed portion is less than the curvature of a
hemisphere and the inner wall of the domed por-
tion defines together with the inner surface of
the angular portion a volumetric capacity of a
length of the cylindrical portion corresponding to
the longitudinal distance between the juncture of
the angular portion with the cylindrical portion
and the inner central apex of the domed portion.
Further as shown, the domed portion has a
sharply defined slot therein terminating in end
surfaces parallel with the inner faces of the an-
gular portion lying in the same transverse plane
as the end surfaces of the slot and the length or
extent of the slot is greater than a diameter of
the cylindrical portion the arrangement being
such that as material is expressed from a col-
lapsible tube with which the nozzle is associated
the resiliency of the nozzle in cooperation with
the uniform wall thickness and the juncture of
the angular portion with the cylindrical portion
establishes a hinging action at such juncture so
that the slot opens due to the pressure of the ma-
terial being expressed and upon cessation of ex-
pressing pressure the resiliency of the material
and the hinging action results in the closing of
the slot.

What we claim is:

A dispensing nozzle for cooperation with a col-
lapsible tube comprising a resilient body of uni-
form wall thickness including a cylindrical por-
tion attachable to the end of a collapsible tube

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and constituting a neck, an extension on the outer
end of the neck defining in cross section a first
angular portion having a length less than the
length of the cylindrical portion and a perma-
nently domed portion as an outward continuation
of said angular portion, the arc of curvature of
the domed portion being less than the curvature
of a hemisphere and the inner wall of the domed
portion providing together with the inner sur-
face of the angular portion a volumetric capacity
greater than the volumetric capacity of a length
of the cylindrical portion corresponding to the
longitudinal distance between the juncture of the
angular portion with the cylindrical portion and
the inner central apex of the domed portion, and
the domed portion having a sharply defined slot
therein and the length of the slot being greater
than the diameter of the cylindrical portion
whereby as material is expressed from a col-
lapsible tube the resiliency of the nozzle in co-
operation with the uniform wall thickness and
the juncture of the angular portion with the cy-
lindrical portion establishes a hinging action at
such juncture so that the slot opens due to pres-
sure of material being expressed and upon ces-
sation of expressing pressure the resiliency of the
material and the hinging action results in the
closing of the slot.

TOM FREDERICK GRAY.
KENNETH VICTOR GRAY.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,650,967	Smith	Nov. 29, 1927
1,658,233	Falk	Feb. 7, 1928
1,859,382	Cruze	May 24, 1932
2,107,100	Beyer	Feb. 1, 1938