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CAP FOR PLASTIC EXTRUSION TUBE CONTAINER

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Fig. 1.

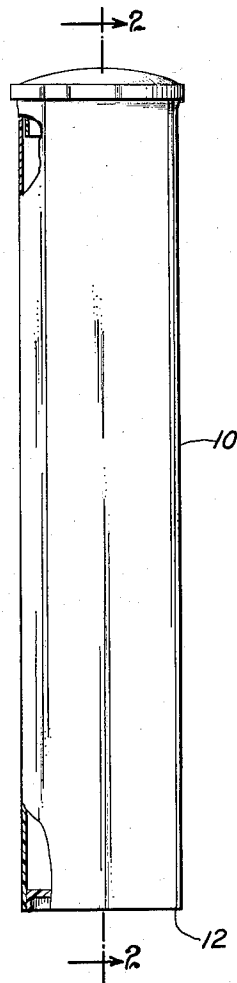
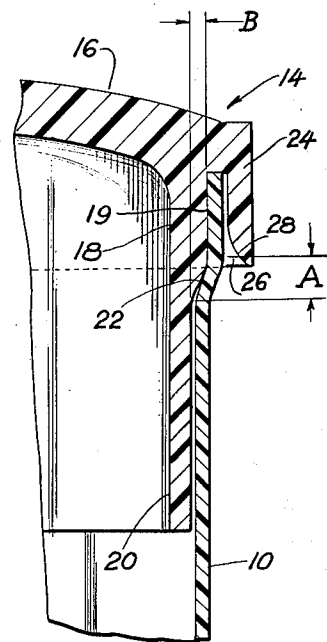
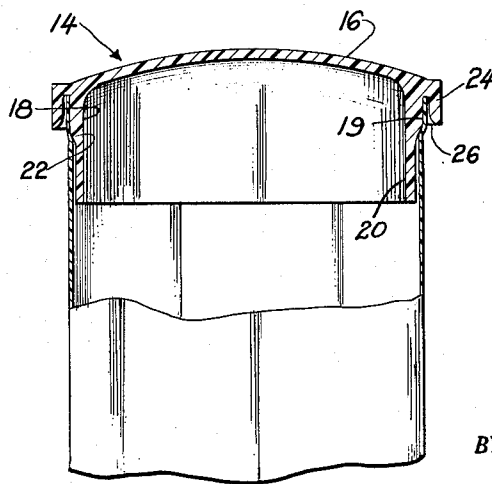


Fig. 3.

Fig. 2.



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CAP FOR PLASTIC EXTRUSION TUBE CONTAINER

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3 Claims. (Cl. 150—.5)

This invention relates to an improved type of closure 15
for plastic extrusion tube containers.

As is known, it is virtually impossible to manufacture
plastic extrusion tubes with predetermined tube diam-
eter and wall thickness. As a result considerable dif-
ficulty is experienced in getting a satisfactory seal with 20
the standard type of unthreaded cap or plug closure
which is made to fit a certain size container of set di-
mensions.

In accordance with the present invention I provide a
plug type cap for the container which is adapted to seal 25
the mouth of the extrusion tube container by stretching
the mouth of the tube a limited amount. The plug of
the cap includes a lead in portion which is small enough
to fit into the mouth of the tube regardless of varia-
tions in its diameter and which is connected to the plug 30
by means of a connecting shank or taper which stretches
the mouth of the container as the plug is pushed home
in the tube. By stretching the mouth of the container
around the plug I achieve a highly efficient frictional seal 35
between the mating surfaces of the plug and container.
Excessive stretching of the mouth of the container to
a point where it would give a loose fit is prevented by
an annular flange spaced outwardly away from the plug
which forms a slot surrounding the plug for receiving 40
the mouth of the container.

My invention can be readily understood by reference
to the accompanying drawing in which

Fig. 1 is a front elevational view of my plug type
cap for the plastic extrusion tube container shown.

Fig. 2 is a sectional view of the cap taken on line 45
2—2 of Fig. 1.

Fig. 3 shows an enlarged view of Fig. 2.

Referring to the drawings, container 10 is an ordi-
nary type of plastic extrusion tube which is sealed off
at its bottom 12 to form the container shown. The con- 50
tainer may be made of any suitable plastic material
capable of extrusion molding such as the cellulose esters,
cellulose ethers, or highly plasticized vinyl derivatives
and the like. Preferably I use cellulose acetate or
cellulose acetate butyrate for the extrusion tube. 55
The manufacture of these extrusion tubes is well known
in the art but with the equipment currently in use it is
impossible as a practical matter to keep the diameter of
the tube and its wall thickness constant. For example,
with a tube one inch in diameter the thickness of the 60
tube wall may vary about one thousandth of an inch or
from approximately .013 to .012 inch and the outside
diameter of the tube may vary about ten thousandths of
an inch or from approximately 1.060 to 1.070 inch.
With a tube of such variable dimensions, the ordinary 65
type of cap which is made to fit a container of set di-
mensions does not give a satisfactory seal.

The cap I provide for such an extrusion tube container
designated by 14 includes a top section 16 and a hollow
thin walled plug or stem 18. Stem 18 includes a top 70
portion 19 for sealing the mouth of the container and
a lower lead in portion 20 for guiding the stem into

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the mouth of the container. Lead in portion 20 is
offset from top portion 19 and connected with it
by means of a connecting shank 22 which forms a taper
between the lower lead in portion 20 and top sealing
portion 19 of stem 18 for stretching the mouth of tube
10. Preferably the slope of connecting shank 22 is
abrupt and its length should not exceed approximately
2½ times the resulting increase in the diameter of lead
in portion 20. That is, A should not exceed approxi-
mately 2½ B.

The diameter of lead in portion 20 of stem 18 is made
slightly smaller than the minimum inside diameter of
extrusion tube 10 and the diameter of the top portion
19 of stem 18 is made slightly larger than the maximum
inside diameter of tube 10. For example, if the ex-
trusion tube has the dimensions described above I achieve
a highly effective seal by making the diameter of lead
in portion 20 approximately 1.025 inch and the out-
side diameter of the top sealing portion 19 approxi-
mately 1.054 inch. With this construction the lead in
portion 20 of cap 14 readily fits into the mouth of tube
10 and when the cap is pushed home connecting shank
22 stretches the mouth of the tube as it rides up on
stem 18. To avoid excessive stretching of the mouth of
tube 10 to a point where it would fit loosely on top
portion 19 of stem 18 I provide top section 16 with a
flange 24 spaced outwardly from the stem which forms
an annular slot 26 for seating and containing the open
mouth of the tube. The lower end portion of flange
24 is preferably flared outwardly at 28 to assist in
orienting the cap on the rim of container 10. For best
results I make the mating portion of slot 26 approxi-
mately .031 inch deep so that a seal is achieved between
surface areas of stem 18 and tube 10 and not just with
the rim of tube 10. Since the width of annular slot
26 is made approximately .001 inch greater than thick-
ness of the walls of extrusion tube 10, it readily receives
tube 10 and guides the open mouth of the tube along
the surface of the top portion 19 of stem 18. In addi-
tion flange 24 serves as a guard against excessive dis-
tortion of the mouth of the tube. For certain applica-
tions where an exceptionally tight seal is desired the
width of slot 26 may be made approximately equal to
the thickness of wall 10. When this is done slot 26 grips
both the inside and outside surfaces at the mouth of tube
10 to materially increase sealing action of the cap.

The dimensions of cap 14 must be closely controlled
to achieve the proper size relationship between the cap
and extrusion tube. This may readily be done by form-
ing cap 14 by means of any of the well known meth-
ods of molding such as by injection molding. Since the
standard tolerance of a molded piece is plus or minus
.005 thousandth, the maximum diameter of lead in por-
tion 20 for the example given above would be 1.030 inch
which is .004 thousandth less than the minimum inside
diameter (1.034 inch) of extrusion tube 10. Similarly
the minimum outside diameter of top portion 19 of
stem 18 would be 1.049 inch which is .003 more than
the maximum inside diameter (1.046 inch) of tube 10.

Since connecting shank 22 and stem 18 stretch the
mouth of tube 10 the cap must have greater resistance
to distortion than the tube. In general the cap may be
made of any substantially rigid plastic material which is
capable of being molded and which has greater resistance
to distortion than the material of the tube. For exam-
ple, when the cap is made by injection molding I may
use polystyrene or one of the acetate materials or if
the cap is made by compression molding I may use
the phenolic or urea plastic materials. For best results
I use a polystyrene cap for a tube of cellulose acetate
and I prefer to keep the difference in hardness and re-
sistance to distortion of the materials of the cap and

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tube equivalent to the difference in hardness between polystyrene and cellulose acetate.

It will be understood that I do not intend to limit my invention to the example given herein which is merely chosen for the purpose of illustration. It will be further understood that it is intended to cover all changes and modifications of my invention which do not constitute departures from the spirit and scope of the invention.

What I claim is:

1. A cap adapted to stretch and thereby seal the mouth of an extrusion tube container of plastic material, said cap comprising a thin walled hollow stem of substantially rigid plastic material which substantially conforms to the shape of the interior walls of the tube in the area around its mouth and which is capable of stretching the mouth of the container without distorting the stem, said stem having a top sealing portion with outside diameter greater than the inside diameter of the container in the area around the mouth thereof and said stem having a lower lead in portion offset from the top sealing portion by means of a taper, said lead in portion being of smaller outside diameter than the inside diameter of the container so that it will readily fit therein and said taper having an abrupt slope wherein the length of the taper from top to bottom is not substantially greater than two and one-half times the resulting increase in the diameter of the said lead in por-

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tion whereby the mouth of the tube is stretched as it rides up over the taper to form a frictional surface fit with the top sealing portion of the stem when the cap is pushed home into the mouth of the container and said stem having a top covering section which extends outwardly over the rim of the container.

2. A structure as specified in claim 1 in which the top covering section of the stem also includes a thin walled annular flange spaced outwardly away from the stem to form a slot around the top sealing portion of the stem for receiving the mouth of the container.

3. A structure as specified in claim 2 in which the width of the slot formed by said annular flange is approximately equal to the thickness of the wall of the container whereby the container wall is tightly gripped on both its inside and outside surfaces by the top sealing portion of the stem and annular flange respectively when the container is pushed home into the slot.

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