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P. WITTE

2,203,376

BLANK FOR FORMING COLLAPSIBLE TUBES

Original Filed March 16, 1938

Fig. 1.

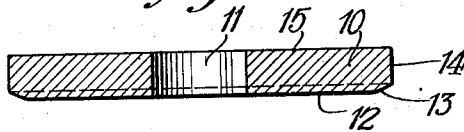


Fig. 2.

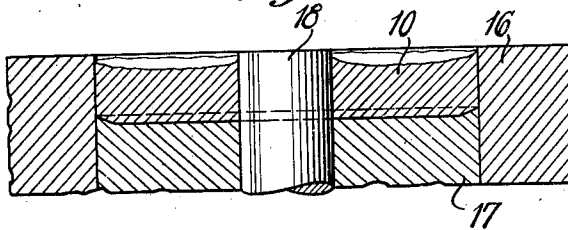


Fig. 3.

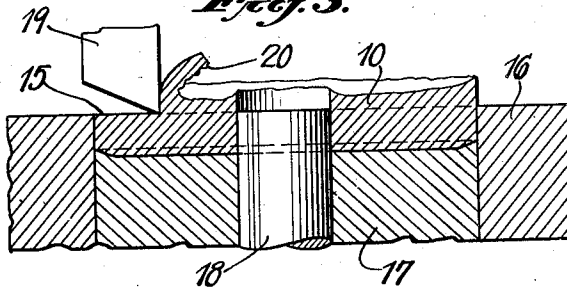


Fig. 4.

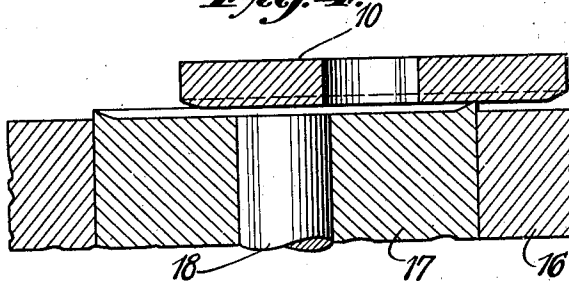
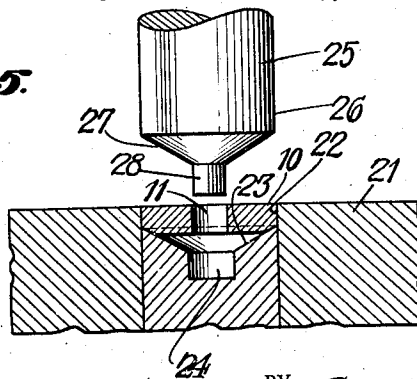


Fig. 5.



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BLANK FOR FORMING COLLAPSIBLE
TUBES

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Original application March 16, 1938, Serial No.
196,163, now Patent No. 2,172,745, dated Sep-
tember 12, 1939. Divided and this application
June 30, 1939, Serial No. 282,052

2 Claims. (Cl. 29—148)

The present application is a division of my
application Serial No. 196,163, filed March 16,
1938 now Patent No. 2,172,745, September 12,
1939.

My present application relates to a blank or
slug of soft ductile material suitable for forming
into a collapsible tube by extrusion under pres-
sure.

Collapsible tubes for containing pastes, such as
tooth paste, shaving cream and similar materials,
are formed of very soft ductile metals, such as tin
and lead, or alloys of such metals. In forming
a collapsible tube, a slug or blank of a soft metal
or alloy is placed in a hollow die of the outside
diameter of the tube to be formed, and recessed
to the dimensions and shape of the neck and
shoulder of the tube. Thereupon, an inner
plunger, or inner die, of the internal shape and
dimensions of the tube to be formed, is forced
against the blank or slug and into the hollow die.
As the inner die member is forced into the hollow
die, it compresses the slug first into the space
between the dies and then, upon further move-
ment of the inner die, causes some of the metal
to flow through a narrow space or slot between
the dies and thence over the inner die in a thin,
seamless sheet to form the tube-like body, some
of the metal being left in the die to form the
shoulder and neck. The body of the tube thus
formed is very thin, being only a few thousandths
of an inch in thickness, and the shoulder and
neck portions are somewhat thicker.

Blanks for forming such tubes have heretofore
been cast in the form of discs, the thickness of
the disc being sufficient to provide metal not only
for the neck and shoulders of the tube, but for
the thin seamless tube-like body that is forced
or extruded from the die, and inasmuch as there
is some variation in a cast slug or blank, some
excess thickness must be permitted in order to
ensure a tube of sufficient length. When a
solid disc or blank is used, it is contacted first
by a projecting tip of the inner die which forms
the inner opening of the neck. The effect of
this is to displace a corresponding amount of
the metal of the disc while it remains unconfined
in the die and thus further to distort the blank or
disc and render it of uneven or unregulated
thickness.

In my present invention I provide a disc hav-
ing a central opening or recess of approximately
the diameter of the neck part of the inner die
so as to avoid any substantial extrusion of the
metal as this part of the inner die enters the
outer or recessed die and before the metal is

confined within the two dies. Moreover, I pro-
vide a blank that is machined to an accurate
thickness and independent of any inaccuracies
in casting, and which has a face to fit accurately
into the bottom or bottom edges of the outer die.

The various features of my invention are il-
lustrated by way of example in the accompany-
ing drawing, in which—

Fig. 1 is a section taken on a diameter of the
disc.

Fig. 2 is a vertical section of a casting mold in
which the metal to form the blank is cast.

Fig. 3 is a view similar to Fig. 2 showing the
blank being machined to an accurate predeter-
mined thickness.

Fig. 4 is a view showing the expulsion or re-
moval of the blank from the mold, and

Fig. 5 is a view on a smaller scale showing the
blank in position in the outer or recessed die of
an extrusion machine immediately before being
extruded and formed into a tube.

In the example of the invention shown in the
accompanying drawing, the blank 10 is formed
in the shape of a thin circular disc having a cen-
tral opening 11, and a lower face 12 the periph-
eral edge of which is inclined or rounded up-
wardly as at 13 to the peripheral face 14. Each
of the faces 11, 12, 13 and 14 is formed by casting
the metal into a smooth surfaced, accurately di-
mensioned mold. An upper face 15, parallel to
the face 12, is formed by machining the upper
part of the blank to remove any unevenness from
the surface of the blank and to reduce it to a
predetermined and accurately gauged thickness.
This is obtained by one or more machinings in
which the cast metal is lifted from its mold to a
predetermined height relative to the cutting edge
of a tool that planes away the excess metal as
described in my Patent 2,172,745.

The resulting blank is one of accurately gauged
thickness with the edges at the periphery and at
the central opening sharply and accurately
shaped except for the rounded edge 13 which is
to fit against the inner surface of an extrusion
die.

The manner of forming the blank is illustrated
in Figs. 2, 3 and 4 in which Fig. 2 shows the blank
10 cast into a mold comprising an outer wall
16 having a cylindrical opening in which fits a
plunger 17. The plunger 17 forms the bottom
of the mold of which 16 forms the peripheral
wall. A post station 18 stationary with respect
to the wall 16 and of no greater height, is posi-
tioned centrally of the plunger 17. There is thus
formed an annular recess into which the molten

metal is poured to form the blank 10. Thereafter the plunger 17 is lifted or raised, pushing the blank 10 upwardly so that its upper surface is above the upper surface of the wall 16 and post 18. Thereupon a cutting blade 19 passes over the disc, trimming away the upper surface portion 20 of the cast blank and forming the machined edge 15. It will be understood that the machining may take place with two cuts in order to obtain a smoothly machined surface and an accurate thickness of the blank. When the machining has been completed, the plunger 17 is lifted still further to clear the upper surface of the wall 16 whereupon the blank 10 is pushed to one side and is ready for extrusion.

An example of the relation of the blank 10 to the extrusion apparatus is shown in Fig. 5. In this figure the blank 10 is placed in a lower or recessed die 21 having a cylindrical recess 22, the lower part of which is sloped at 23 to correspond to the shoulder portion of a tube to be formed, and having a lower cylindrical recess 24 corresponding to the neck of the tube. The disc 10 is positioned in the extruding recess with the inclined or rounded edge 13 fitting the inclined edge 23 of the die recess. The plunger die 25 is then brought downwardly from the position shown in Fig. 5 into the recess of the die 21. The die 25 has a cylindrical body portion 26 of a diameter smaller than the diameter of the recess 22, corresponding to the thickness of the wall of the tube to be formed, that is, it will have a diameter of a few thousandths of an inch less than the diameter of the recess 22. At the lower end of the cylindrical body portion 26 the plunger 25 has an inverted frusto-conical surface 27 corresponding to the inclined surface 23 of the die recess. Depending from the lower end of the frusto-conical surface 27 is an extension or post 28 adapted to fit into the recess 24 with a clearance corresponding to the thickness of the neck of the tube.

As the plunger 25 is forced into the die recess in which the blank 10 is placed, the neck projec-

tion or post 28 passes into the central opening 11 of the blank. The opening 11 need not be of the exact dimension of the part 28, but is sufficiently close to the dimension as to avoid displacement of any considerable metal until the plunger 25 is in a position to confine the metal of the blank 10. As the plunger 25 moves into the recess therefore, it presses the metal against the inclined walls 23 until the cylindrical part 26 enters or is about to enter, the cylindrical wall of the recess 22. Inasmuch as the post 28 enters the opening 11, there is no substantial displacement of any metal from one part of the blank to another until the metal is confined and the cylindrical part 26 enters the die recess. Thereupon the pressure causes the metal to flow in the minute slit between the plunger 25 and the recessed edge, and to move upwardly over the wall of the plunger, forming the body of the tube.

Owing to the accurate formation of the blank and to the provision of the opening 11, the extrusion takes place from a blank in which metal has not been forced from one part of the blank to another unconfined part and there is, therefore, no irregularity in the blank at the time it is confined by the plunger and then to be extruded from the recess. Consequently, the formation of the wall of the tube is uniform and accurately gauged and a blank of minimum weight or volume may be employed.

What I claim is:

1. A circular collapsible tube blank of soft, highly ductile metal, having parallel flat faces and a central opening, one of said flat faces being machined to a sharp edge at the periphery and at the opening, and the peripheral edge of the opposite face being rounded.

2. A collapsible tube blank of soft, highly ductile metal having a central opening and a substantially flat machined face, a face opposite said flat face and parallel thereto and having a peripheral margin inclined to correspond to a shoulder of a tube, and having a central opening.

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