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TUBING CLOSURE

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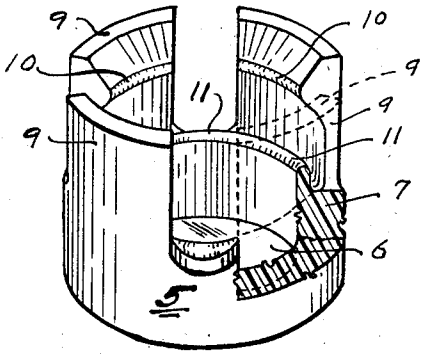


FIG. 1

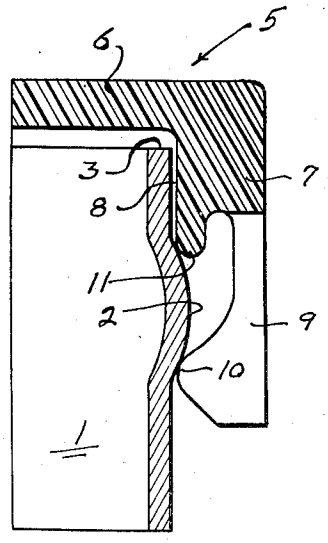


FIG. 3

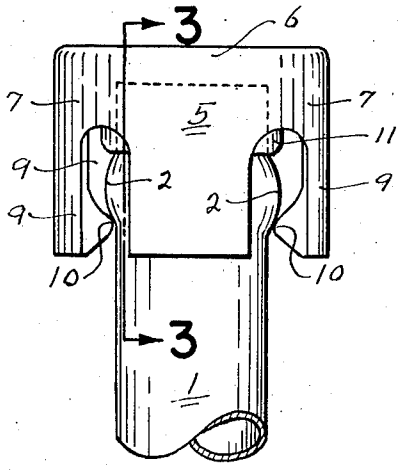


FIG. 2

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TUBING CLOSURE

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5 Claims. (Cl. 138—96)

Our invention relates to closures or caps for tubing, and more particularly to caps for temporarily closing the ends of tubing while it is being stored, shipped, or otherwise handled prior to its permanent use.

The prime object of the invention is to provide a closure for the ends of threadless tubing sections, such as those used in connection with air craft, for fuel or other fluid conveyance.

The present invention is intended as an improvement on the tubing closure disclosed in our pending patent application Serial Number 494,426, filed upon the 12th day of July, 1943, and entitled Improvement in tubing closure.

In the closure of the former application, the end of the tubing section was permitted to contact the inside surface of the end of the closure, and when the closure is made of plastic material, it has been discovered that there is some danger of the metal tubing clipping off small particles of the cap. These particles may well enter the tubing, and consequently when the tubing is installed and placed in service, they can and sometimes do cause trouble in the apparatus to which the tubing is connected.

It is therefore an important object of the present invention to provide a tubing closure so designed that there is no possibility that particles thereof may become chipped off by the tubing and enter the same.

A further object is to provide a tubing closure so designed that it may be die-cast from plastic material, and yet positively retain itself upon the tubing solely through its inherent resilience.

Another object is to provide a tubing closure which may be manually installed upon and removed from the tubing without the use of tools.

A still further object is to provide a device of this class which is sufficiently strong to prevent deformation of the tubing ends through normal handling.

Other objects will be apparent from the following description when taken in connection with the accompanying one-sheet drawing, wherein:

Figure 1 is a perspective view, a portion being broken away to disclose the interior thereof;

Figure 2 is an elevational view of the closure installed upon a tubing section; and,

Figure 3 is a fragmentary sectional view taken substantially along the line 3—3 of Fig. 2.

Like characters of reference designate like parts in all the figures.

In the drawing:

The reference numeral 1 indicates, as a whole, a typical tubing section as commonly used in air-craft for conveying fluids, such as fuel, lubricating oil, etc. The section 1 is formed with an annular enlargement or bulge 2 adjacent to but spaced slightly from its extreme end 3. The bulge 2 is usual with air-craft conveyor tubing and is provided for the purpose of lending frictional grip to hose couplings and the like. The closure of the present invention is designed for use in connection with tubing sections having the bulge 2, or its mechanical equivalent.

The closure is indicated as a whole by the reference numeral 5, and consists substantially of the following described integral parts.

A disc-like end portion or closure plate 6 has, around its edge, a depending annular flange 7. The flange 7 has an inside diameter slightly greater than the outside diameter of the tubing end 3, so that when the closure is installed upon the tubing, a slight annular space 8 will be left between the two as illustrated in Fig. 3.

The flange 7 terminates in a plurality of circumferentially spaced fingers or prongs 9, each having an inwardly projecting arcuate lip 10 adjacent its free end for frictionally engaging the sloping portion of the bulge 2 lying most remote from the tubing end 3. The fingers 9 are each sufficiently thin for a portion of their longitudinal extent to permit the lips 10 to be sprung slightly outwardly so as to pass over the crown of the bulge 2 as the closure is being installed.

In addition to the fingers 9 which depend from the outer edge of the flange 7, the inner wall of the flange 7 is extended longitudinally to provide a completely annular abutment 11. The abutment 11 is sufficiently thick to be rigid, and is adapted to contact the bulge 2 and act as a stop for limiting the extent to which the closure may be moved longitudinally upon the tubing. The abutment 11 and lips 10 contact opposite sides or slopes of the bulge 2, and when the closure is in place upon the tubing, the abutment acts to hold the plate portion 6 clear of the end 3 of the tubing (Fig. 3).

Since the plate portion 6 of the closure does not come in contact with the tubing end 3, and since the inside diameter of the flange 7 is greater than the outside diameter of the tubing 1, it is obvious that the end portion of the tubing cannot scrape the closure as the same is being installed. This prevents any possibility of particles of the plastic closure being chipped off and entering the tubing. It is pointed out that the fingers 9 are somewhat longer than the distance between the lip 10 and the adjacent end of the abutment 11, and

that the fingers are thereby rendered more resilient than if the flange were extended to a point even with the free end of the abutment, and the fingers were consequently shortened.

The closure of the present invention may be manually installed or removed without any tools, and is sufficiently sturdy to protect the tubing end against damage in ordinary handling. The fingers 9 grip the bulge 2 with sufficient resilient friction to prevent inadvertent removal of the closure under ordinary handling, and the closure is of such a size that a hose cannot be installed thereover.

It is thought that the present tubing closure offers considerable improvement and many advantages over closures now in use.

We claim:

1. A closure for tubing having an annular enlargement spaced from its end, said closure including: a substantially cylindrical hollow cap having one closed end and adapted to fit over said tubing end; circumferentially spaced fingers extending from said cap to a point beyond said enlargement and adapted to frictionally engage the same for holding the cap on the tubing; and a rigid stop carried by the cap for contacting the other side of the enlargement and preventing the closed end of the cap from contacting the tubing end.

2. A closure for tubing having an annular enlargement spaced from its end, said closure including: a substantially cylindrical hollow cap having one closed end and adapted to fit over said tubing end; circumferentially spaced resilient fingers extending from said cap to a point beyond said enlargement and adapted to frictionally engage the same for holding the cap on the tubing; and a rigid stop carried by the cap for contacting the other side of the enlargement and preventing the closed end of the cap from contacting the tubing end.

3. The combination with tubing having an annular enlargement adjacent its end, of a closure therefor including: a body formed to cover the tubing end and close the bore thereof; spaced resilient fingers extending beyond said enlargement and co-acting to surround and frictionally engage the same for holding the closure upon the tubing; and means carried by the body for contacting the enlargement and preventing the closed end of the body from contacting the tubing end.

4. As an article of manufacture, a tubing closure and protector including: a body adapted to fit over the tubing end and close the bore thereof; spaced resilient fingers extending from the body and coacting to surround the tubing; means carried by the ends of the fingers for frictional engagement over an enlargement on the tubing to hold the body thereon; and means carried by the body for engaging the enlargement and preventing contact between the tubing end and the closed end of the body.

5. As an article of manufacture, a tubing closure and protector including: a body adapted to fit over the tubing end and close the bore thereof; spaced resilient fingers extending from the body and co-acting to surround the tubing; means carried by the ends of the fingers for frictional engagement over an enlargement on the tubing to hold the body thereon; and means carried by the body and engaging the enlargement for limiting movement of the body with relation to the tubing.

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