FIG 1

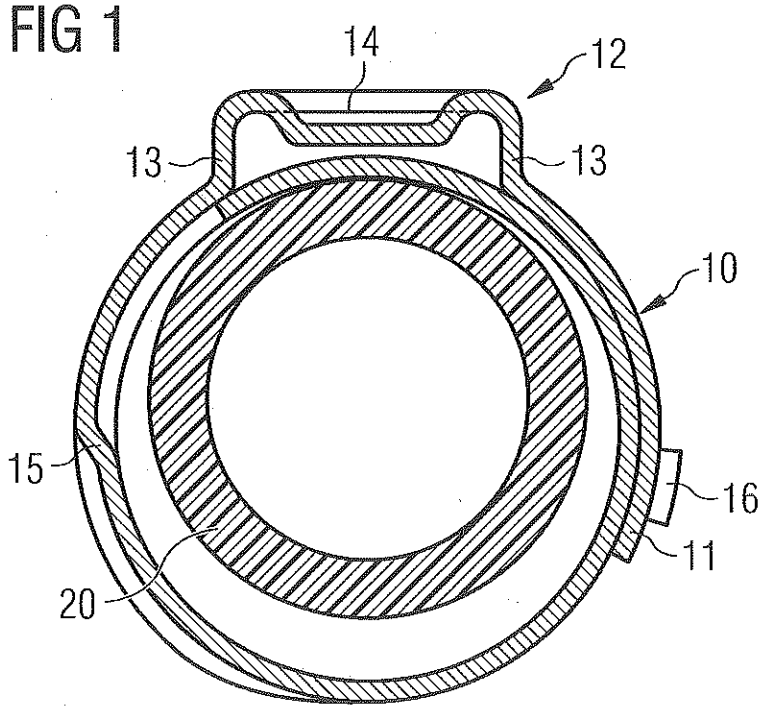
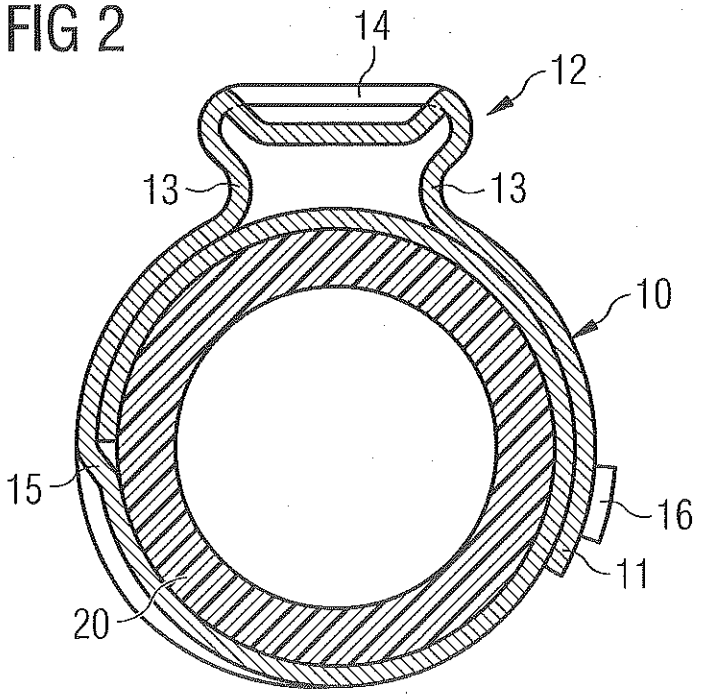


FIG 2



Ear clamp

Prior art

Ear clamps, such as known from e.g. US 4,711,001, are used for tightly connecting a tube and an object, e.g. a bent metallic pipe, inserted into an end of the tube. The known ear clamp is made of a clamping band in which an ear-like tightening structure having two outward extending legs interconnected by a web is formed.

During assembly, there is a difficulty in that the clamp must be held in its mounting position while it is tightened. This difficulty is particularly great when the tube has a smooth surface, as is true with materials used in the plumbing trade, such as PEX (cross-linked polyethylene), or when the tube extends vertically, and is specifically cumbersome during manual assembly and constricted mounting space.

Any attempt to fit the inner diameter of the clamp exactly to the outer diameter of the tube will fail due to the unavoidable tolerances that exist in both the clamps themselves and the tubes used. Even careful manufacture will regularly leave a play of at least 1 mm between the inner diameter of the clamp and the outer diameter of the tube for which the clamp is intended.

US 3,235,925 A und US 4,222,155 A disclose further ear clamps. The drawings of these documents show the clamps as surrounding the tube free of play already in the non-tightened condition. The drawings, however, are idealised representations which do not show the situation in the practical use of the hose clamp. The problems explained above exist also here.

Summary of the invention

It is a general object of the invention to avoid the above-mentioned difficulties at least to some extent. A more specific object may be seen to reside in providing a combination of a tube and an ear clamp for sealing the tube against an object inserted into the tube, as well as a method for sealing a tube against the object, by means of an ear clamp wherein the assembly is facilitated.

This object is met by the invention defined in claim 1 and, respectively, claim 2. In the invention, the ear-like tightening structure, which is known *per se*, serves a double purpose, namely first to adapt the diameter of the clamp to the diameter of the tube by pre-deforming the ear – preferably done during manufacture - and subsequently to tighten the clamp in the mounted condition. With the pre-deformed ear, the elasticity thereof is exploited in that the ear can be moved to the desired position during assembly although it sits of the tube already so tightly that it cannot slip inadvertently.

Brief description of the drawing

The invention will now be explained in more detail with reference to the drawing which shows cross-sections of an ear clamp in the closed but not yet tightened condition, wherein:

Fig. 1 relates to a conventional ear clamp, and

Fig. 2 relates to an ear clamp in accordance with an embodiment of the invention.

Detailed description

The ear clamp shown in Figs. 1 and 2 of the drawing is made of a clamping band **10** which, starting from its outer end **11** which has a window (not shown), has a tightening structure in the form of a so-called "Oetiker-ear" **12** with two radially outward extending legs **13** and a web **14** interconnecting the outer ends of the legs, an inward projecting step **15**, and a hook **16** which, in the closed condition shown, passes through the window in the outer clamping band end. A depression is stamped in the web **14** of the ear **12** to prevent buckling. In both figures, the ear clamp surrounds a tube **20** at a position where an object (not shown), such as a bent metal pipe, is inserted into the tube.

In the conventional case illustrated in Fig. 1, there is a play of at least 1 mm between the inner diameter of the ear clamp and the outer diameter of the tube **20**, for which the ear clamp is intended, to make sure that, irrespective of tolerances in the dimensions of the tube **20** and of the clamp itself, the clamp can be moved along the tube to the desired mounting position in the area of the object inserted into the tube. In this position, the clamp is then tightened around the tube **20** by narrowing the ear **12**, for instance using a pliers-type tightening tool, to make a sealed connection between the tube and the object.

Since the ear clamp surrounds the tube **20** with play, it must be held in place at the mounting position during the tightening process. This is cumbersome especially in manual assembly as it is necessary to hold also the tube and the inserted object in the desired positions relative to one another.

The difficulty in the handling during tightening of the clamp is particularly great when the tube **20** has a smooth surface, as is true with the PEX (polyethylene) materials often used in the plumbing trade, and specifically when the tube extends vertically at the assembly site.

The mentioned difficulty is avoided in the ear clamp shown in Fig. 2. Here, the ear **12** is pre-deformed prior to placing the camp on the tube **10** to such an extent that the clamp surrounds the tube free of play. The pre-deformation, which is preferably done during the manufacturing process of the clamp, can be readily performed such that the elasticity rendered by the pre-deformed ear permits the clamp to placed on the tube and to be moved to the mounting position without effort, yet holds the clamp in this position and in the orientation of the ear **12** suitable for tightening.