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(54) A tube holder device

(57) A tube holder device has a substantially C-shaped holding part (1) mountable on a carrier (4) and shaped to engage by more than 180° around a tube (8) to be held, and a substantially U-shaped closure part (2), having arms (7) engageable over arms (6) of the holding part (1) from the open side of the holding part (1) which is opposite a yoke (3) of the holding part (1). Protrusions (15) project inwardly from the ends of the closure part arms (7) for engaging corresponding recesses (13) in the arms (6) of the holding part (1), and with the arms (6) at least of the holding part (1) being elastically flexible. A clearance remains between the holding part (1) and the tube (8) after fitting the closure part (2), which clearance allows an axial displacement of the tube (8) in the holding part (1) to prevent bending of the tube (8) and/or detachment of the tube holder device from its anchoring due to thermally caused variations in length or axial loadings of the tube between two such devices.

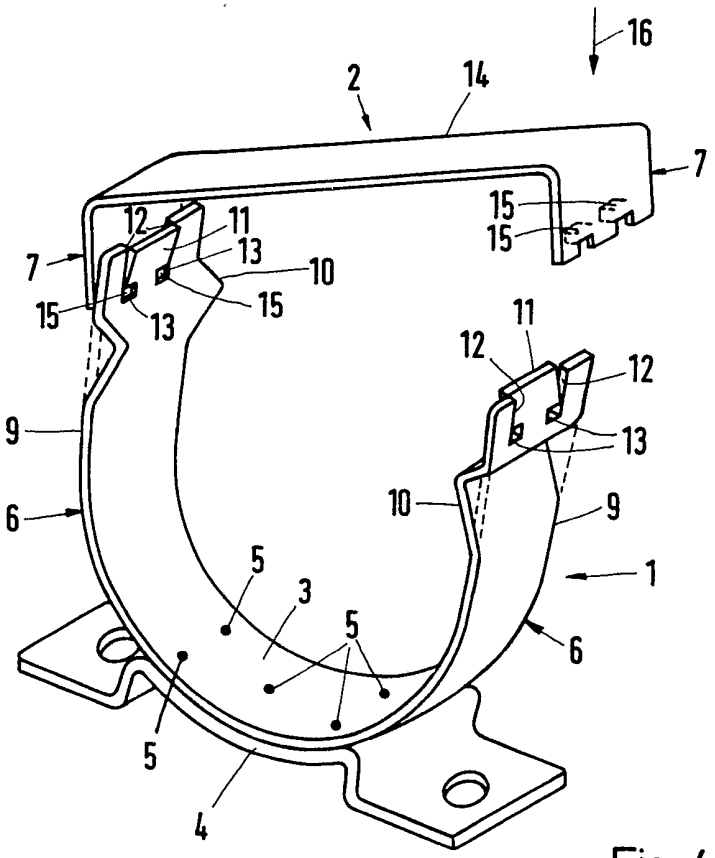

Fig. 4

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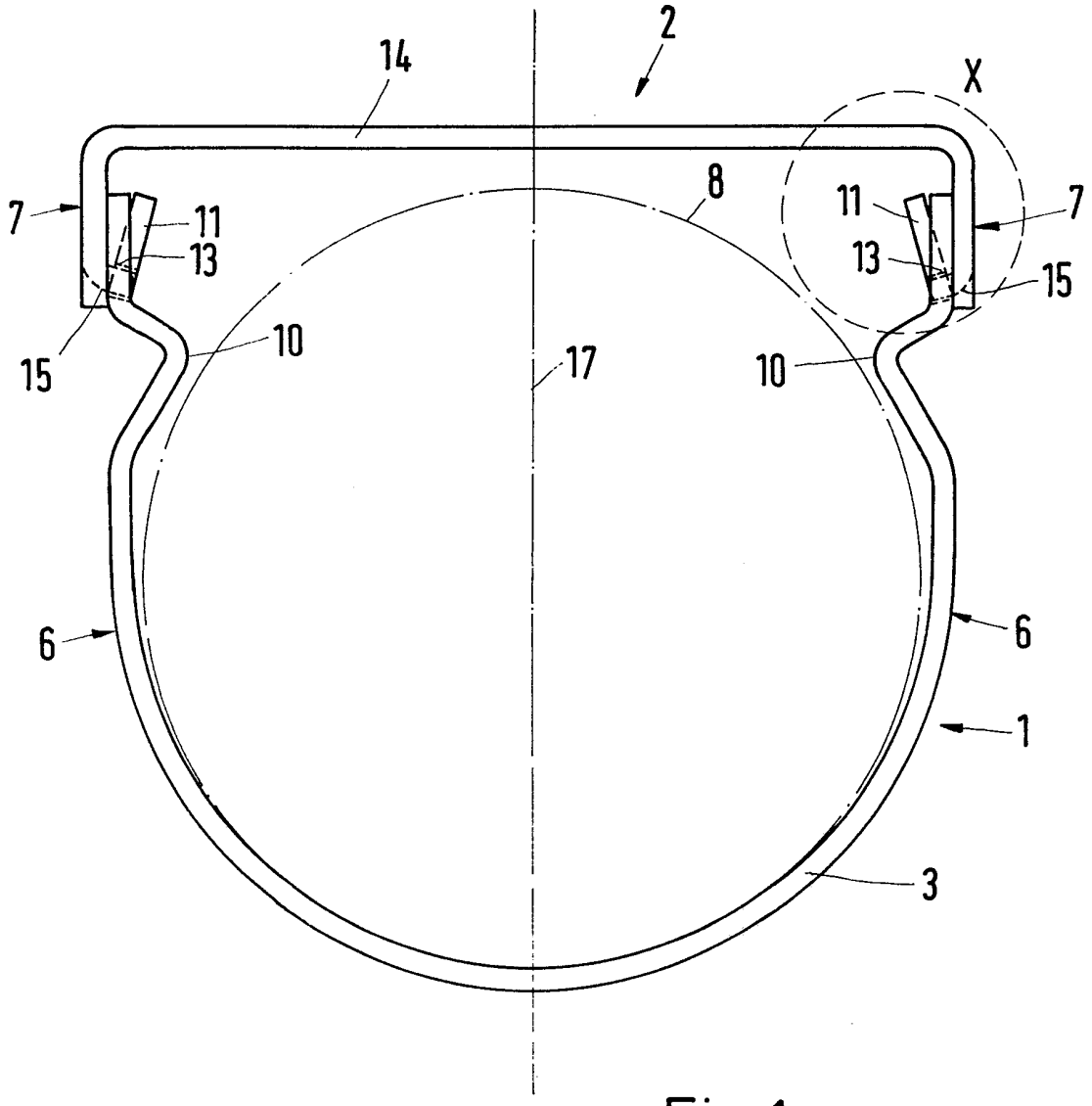

Fig. 1

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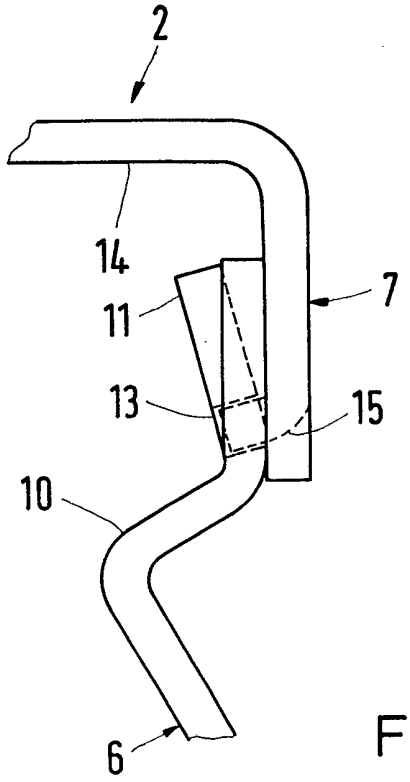

Fig. 2

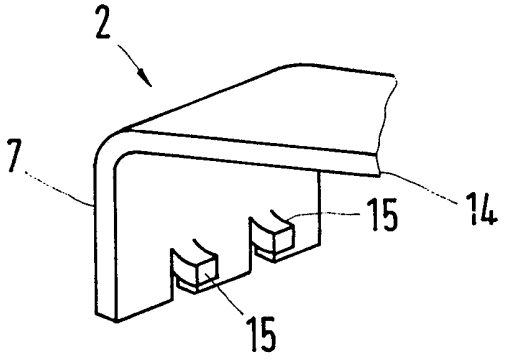

Fig. 3

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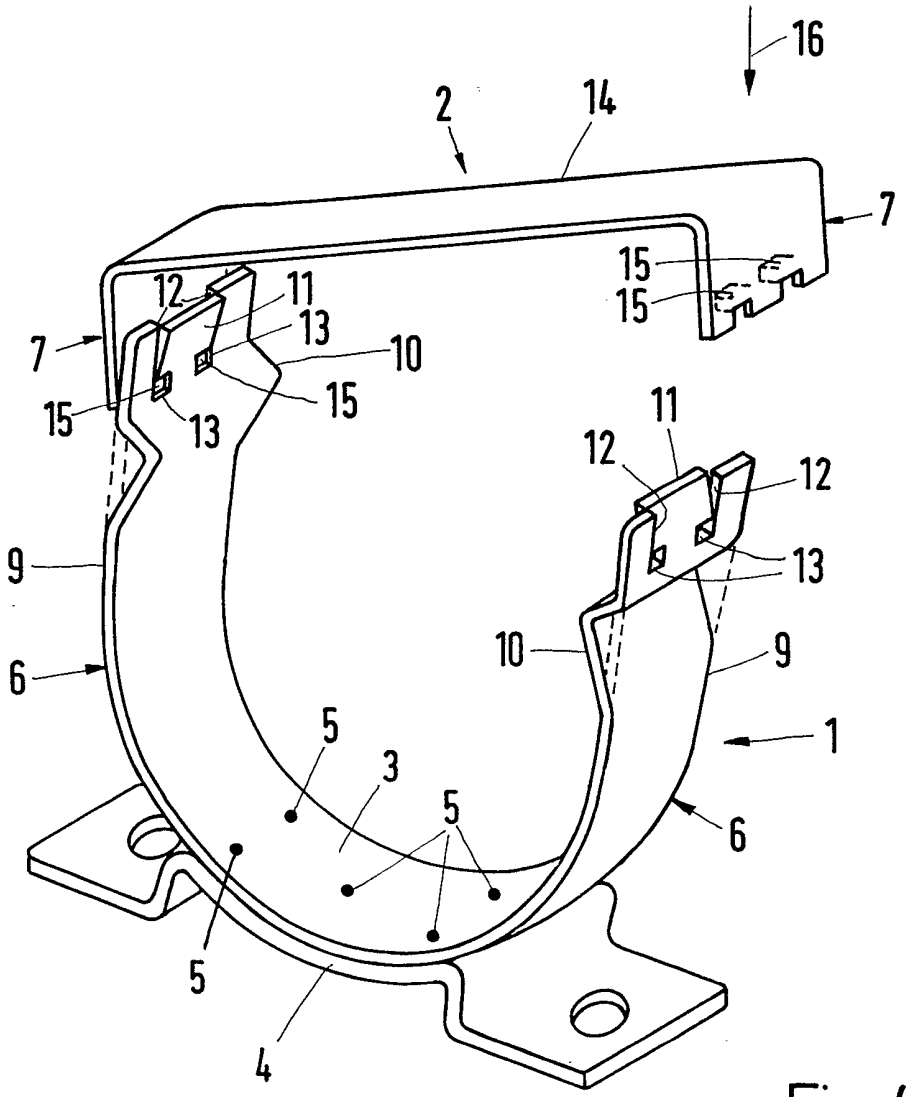

Fig. 4

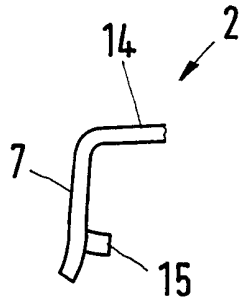

Fig. 5

SPECIFICATION

A tube holder device

This invention relates to a tube holder device which does not require screws. Such a device generally includes a substantially C-shaped holding part mountable on a carrier and shaped to engage by more than 180° around a tube to be held. A substantially U-shaped closure part is provided, having arms engageable over arms of the holding part from the open side of the holding part which is opposite a yoke of the holding part and, protusions project inwardly from its ends for engaging corresponding recesses in the arms of the holding part. The arms at least of the holding part are elastically flexible in their common plane.

In a known tube holder device of this type, made of synthetic plastics material, the arms of the holding part, once the closure part has been fitted in place, bear in a force-locking manner on the tube to be held. If a plurality of such tube holder devices are used to hold a tube which is subject to axial loadings and/or suffers an axial displacement by virtue of thermally caused variations in length, there is the risk that the tube holder devices will become detached from the support and/or that the tube will bend.

There is thus a need for a generally improved tube holder device in which the risk of the device becoming detached from the carrier and/or of the tube becoming bent is at least minimised.

According to the present invention, there is provided a tube holder device, including a substantially C-shaped holding part mountable on a carrier and shaped to engage by more than 180° around a tube to be held, and a substantially U-shaped closure part having arms engageable over the arms of the holding part from the open side of the holding part which is opposite a yoke of the holding part, protrusions being provided projecting inwardly from the closure part arm ends for engaging corresponding recesses in the arms of the holding part, the arms at least of the holding part being elastically flexible in their common plane, and the holding and closure parts being dimensioned such that after the closure part has been placed in position around a tube, a clearance remains between the holding part and the tube which is being held.

The clearance between the holding part and the tube which is held permits axial displacement of the tube in the holder device so that the tube is unable to exert any axial forces on the tube holder device and cannot, due to heat expansion, become bent between two tube holder devices.

Preferably the holding part and the closure part are made of sheet metal, the protusions on each arm of the closure part are two axially adjacently disposed projections pressed out of the sheet metal part and, impressed into the arms of the holding part from the outside are slots of substantially rectangular cross-section and of a width corresponding to the axial distance between the axially outermost sides of the projections, said slots opening and deepening towards the ends of the arms, and enlarged depressions being provided in the bottoms of the slots. This tube hoider device can easily be manufactured from metal and easily installed. Thus, strips of sheet metal can easily be bent into the desired shape of the holding part and closure part and the projections and slots pressed out of these sheet metal strips. Once the tube has been fitted into the holding part, the closure part only requires to be pushed over the ends of the holding part arms until the projections on the closure part click into place in the depressions in the holding part. The slots in the ends of the holding parts arms act in this case as guides which facilitate insertion of the projections into the depressions. Furthermore, the parts are so symmetrical that the closure part, even if rotated through 180° about a central axis which coincides with the central plane of its arms, can still be fitted onto the holding part.

Conveniently the slots are formed by parallel longitudinal cuts in the arm ends of the holding part and by an inwardly bent tongue which remains between the cut edges. This requires only minimal deformation forces when the slots are produced and at the same time provides flat guide surfaces for the projections.

The depressions may be continuous holes which are stamped out simultaneously with the longitudinal cuts. This likewise simplifies manufacture.

In this respect, the holes may be open into the associated slot towards the edges of the adjacent longitudinal cut. In the region between the holes only a narrow web wiil remain and this can be more easily bent in order to bend inwardly the tongues which define the slots.

Also the projections can be formed by parallel longitudinal cuts in the ends of the closure part arms and inwardly bent tongues which remain between the cut edges. In this way, the tongues which form the projections can likewise be produced by reduced bending forces.

Advantageously impressed in initially rectilinear end portions of the arms of the holding part, with the distance between the end portions being somewhat greater than the outside diameter of the tube to be held, is in each case a cross-sectionally substantially V-shaped furrow in the region between the depressions and the curved yoke of the holding part and the distance between the mutually facing inside surfaces of the furrows preferably is

smaller than the outside diameter of the tube to be held. The initially rectilinear form of the end portions of the arms on the holding part has, compared with a curved form, the advantage that regardless of the diameter of tube for which the tube holder device is to be produced, the furrows can always be pressed out of a straight strip by the same tool. One side of each furrow will form a ramp to guide in the tube which is to be introduced into the holding part and will at the same time, after introduction of the tube, ensure the necessary radial securing of the tube to prevent its falling out of the holding part when the tube holder device is fixed on a carrier in a position in which the clearance remaining between the ends of the holding part arms opposite the yoke of the holding part is underneath the yoke and the closure part has not yet been fitted. When the closure part has been fitted, the weight of the tube acts to press against the radially inner sides of the furrows and to spread apart the ends of the holding part arms so that they are all the more firmly pressed against the arms of the closure part, the greater the weight of the tube. This provides an additional safeguard against unintended removal of the closure part. When the closure part has been removed, the oblique radially inner sides of the furrows prevent the tube being pressed out of the holding part or radial withdrawal of the holding part from the tube.

Conveniently the yoke of the closure part is rectilinear. This form of closure part is easy to produce.

The arm ends of the closure part may be bent outwardly. In this way, the inside faces of the ends of the closure part arms form guide ramps which facilitate fitment of the closure part arms form guide ramps which facilitate fitment of the closure part onto the ends of the holding part arms.

For a better understanding of the present invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a side view of a tube holder device according to an embodiment of the invention with no fixing base and on a scale of approximately 1:1,

Figure 2 is a side view of an enlarged detail X of Figure 1,

Figure 3 is a perspective partial view of a detail of a closure part of Figure 1,

Figure 4 is a perspective view of the device of Figure 1 with a welded-on fixing base, and

Figure 5 is a side view of a modified part of the closure part of Figure 1 in which arm ends have been bent slightly outwardly.

As shown in Figures 1 to 5 of the accompanying drawings a tube holder device of the invention includes a substantially C-shaped holding part 1 and a substantially U-shaped closure part 2. As shown Figure 4, a fixing base or carrier 4 is welded by spot welds 5 onto a substantially semi-circularly bent yoke 3 of the holding part 1.

Instead of the carrier 4 of Figure 4, however, it is also possible for the most widely diverse different fixing parts, e.g. tongues, threaded rods, T-bars or similar parts to be fixed to the holding part 1 in order to mount the tube holder device on all manner of supports such as side walls, ceilings, beams, in a sanitary area and on pipelines.

The holding part 1 and the closure part 2 preferably are made of sheet metal such as steel sheet, preferably St3K40 or chrome nickel steel, so that their arms 6 and 7 are elastically flexible.

The inside diameter of the holding part 1 is somewhat larger than the outside diameter of the tube 8 to be held which tube is indicated diagrammatically in Figure 1 by dash-dotted lines, so that there is between the tube 8 and the arms 6 of the holding part 1 a clearance which permits axial displacement of the tube 8 in the tube holder device even when the closure part 2 is fitted in position. This displaceability of the tube 8 in the tube holder device ensures that when there is an axial loading on the tube 8 or in the event of thermally caused axial elongation or contraction of the tube 9 between two such tube holder devices, the tube holder device is not torn out of its anchored position nor is the tube bent.

As Figure 1 shows and as indicated in Figure 4 by broken lines by way of clarification, end portions 9 of the arms of the holding part 1, prior to being impressed into cross-sectionally substantially V-shaped furrows 10 or slots, are rectilinear and not curved while their distance apart is greater than the tube diameter, so that regardless of what happens to be the rated diameter of the tube for which the tube holder is intended to be produced, the tube diameter can always be pressed out of a flat strip of sheet metal or similar strip by means of the same tool.

In the free ends of the arms 6, are formed two parallel longitudinal cuts between which remain tongues 11, which are bent over slightly radially inwardly towards each other. The tongues 11 form the bottom, and the cut edges 12 of the longitudinal cuts on both sides of the tongues 11 form side walls of in each case a slot which is impressed in the arms 6 and of which the depth increases towards the ends of the arms 6. The tongues 11 furthermore in each case have two continuous holes 13 which open into the associated slot towards the cut edges 12 and which are stamped out simultaneously when the longitudinal cuts are formed. These holes 13 lie adjacent one another in each arm 6 and axially in relation to the longitudinal axis of the holder. The tongues 11, slot edges 12 and holes 13 can by reason of the originally rectili-

near form of the end portions 9 (Figure 4) be produced independently of the relevant tube diameter but always by means of the same tool.

The closure part 2 has a rectilinear flat yoke 14, the arms 7 of which stand out in a straight line and at right-angles thereto. Each arm 7 is provided with four parallel longitudinal cuts extending from its end, and the tongues which are left between any two axially outer longitudinal cuts are bent over virtually a right-angle inwardly and towards one another. The distance between the axially outer side walls of the protrusions or projections 15 formed by these tongues and the shape of the projections 15 are so selected that when the closure part 2 is placed in position on the free ends of the arms 6 of the holding part 1, the projections 15 are guided into the slots formed by the tongues 11 and the cut edges 12 and finally engage in the holes 13. The inner spacing between the arms 7 prior to fitment of the closure part 12 is slightly smaller than the distance between the outside surface of the end portions 9 of the arms 6.

To fit the closure part 2 onto the arms 6 of the holding part 1, as shown in Figure 4, one arm 7 of the closure part 2 first has its projections 15 fitted into the holes 13 of one arm 6 after which the closure part 2 is pressed in the direction of the arrow 16 onto the end of the other arm 6. Thus, the arms 6 are initially and minimally bent towards each other by the arms 7 so that, upon engagement of the projections 15 of the other arm 7 into the holes of the other arm 6, they can elastically spring open until they bear against the inside faces of the arms 7. They continue to lie there under the action of initial spring tension so that the closure part 2 reliably retains the closed position. Opening of the closure part 2 to remove the tube 8 which is held in the holding part 1 can be brought about by using a screwdriver or the like and/or by manual compression of the arms 6 and simultaneous withdrawal of the closure part 2.

By reason of its symmetry about an axial plane coinciding with the central axis 17 of the device, the closure part 2 can be fitted either way round on the holding part 1.

The (in Figure 1) upper flanks of the furrows 10 which subtend an angle of 60° with the central axis 17 facilitate insertion of the tube 8 into the holding part 1 while at the same time spreading apart the arms 6 until the tube 8 has engaged in position behind the furrows 10.

The holding part 1 can be fixed not only with upwardly directed arms 6, as shown in Figs. 1 and 4, but also with downwardly or laterally directed arms 6 on a support (a ceiling, a side wali, a beam or the like), without the tube 8 falling out of the holding part 1 prior to the closure part 2 being fitted, so long as it does not have too great a dead weight. This facilitates fitting the closure part 2. Also the holding part 1 and the tube 8 can be preassembled.

If the holding part 1 is fixed on the carrier with downwardly directed arms 6 and if the closure part 2 when the tube 8 is inserted into the holding part 1 has been pushed onto the ends of the arms 6, the pressure of the tube 8 on the radially inner flanks of the furrows 10, forming an angle of about 30° to the central axis 17, will exert on the arms 7 an additional clamping force so that the closure part 2 will be all the more rigidly seated on the ends of the arms 6 the greater the weight of the tube 8.

Manufacture of the parts 1 and 2 of the tube holder device is relatively simple since by reason of the sheet metal which is used as a starting material, only stamping and bending processes are required which are virtually the same with any diameter of tube so that they can be carried out by means of the same tool. In this case, the bending angles of 90°, like the inside angle of the furrows 10 (see Figure 2) and the right-angle between the arms 7 and the yoke 14 of the closure part 2 can be made particularly easily.

In the case of the modification shown in Figure 5, the free ends of the arms 7 of the closure part 2 are bent slightly outwardly to produce a guide ramp to facilitate fitting the closure part 2 on the ends of the arms 6 of the holding part 1.

CLAIMS

1. A tube holder device, including a substantially C-shaped holding part mountable on a carrier and shaped to engage by more than 180° around a tube to be held, and a substantially U-shaped closure part having arms engageable over the arms of the holding part from the open side of the holding part which is opposite a yoke of the holding part, protrusions being provided projecting inwardly from the closure part arm ends for engaging corresponding recesses in the arms of the holding part, the arms at least of the holding part being elastically flexible in their common plane, and the holding and closure parts being dimensioned such that after the closure part has been placed in position around a tube, a clearance remains between the holding part and the tube which is being held.

2. A device according to Claim 1, wherein the holding part and the closure part are made of sheet metal, wherein the protrusions on each arm of the closure part are two axially adjacently disposed projections pressed out of the sheet metal part and wherein impressed into the arms of the holding part from the outside are slots of substantially rectangular cross-section and of a width corresponding to the axial distance between the axially outermost sides of the projections, said slots open-

ing and deepening towards the ends of the arms, and enlarged depressions being provided in the bottoms of the slots.

3. A device according to Claim 2, wherein the slots are formed by parallel longitudinal cuts in the arm ends of the holding part and by an inwardly bent tongue which remains between the cut edges.

4. A device according to Claim 3, wherein the depressions are continuous holes which are stamped out simultaneously with the longitudinal cuts.

5. A device according to Claim 4, wherein the holes open into the associated slot towards the edges of the adjacent longitudinal cut.

6. A device according to any one of Claims 2 to 5, wherein the projections are formed by parallel longitudinal cuts in the ends of the arms of the closure part and inwardly bent tongues which remain between the cut edges.

7. A device according to any one of Claims 2 to 6, wherein impressed in initially rectilinear end portions of the arms of the holding part, with the distance between the end portions being somewhat greater than the outside diameter of the tube to be held, is in each case a cross-sectionally substantially V-shaped furrow in the region between the depressions and the curved yoke of the holding part and wherein the distance between the mutually facing inside surfaces of the furrows is smaller than the outside diameter of the tube to be held.

8. A device according to any one of Claims 2 to 7, wherein the yoke of the closure part is rectilinear.

9. A device according to any one of Claims 1 to 8, wherein the arm ends of the closure part are bent outwardly.

10. A tube holder device according to Claim 1 or Claim 7, in combination with a tube to be held.

11. A tube holder device substantially as hereinbefore described with reference to Figures 1 to 4, as modified or not by Figure 5, of the accompanying drawings.

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