Nov. 1, 1955 W. H. BINGEMAN ET AL 2,722,625

TAB FASTENING DEVICE

Filed May 25, 1951

Fig. 1

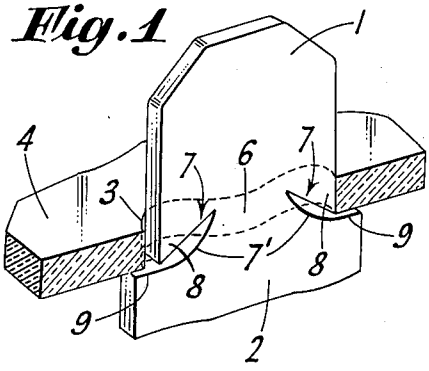


Fig. 4

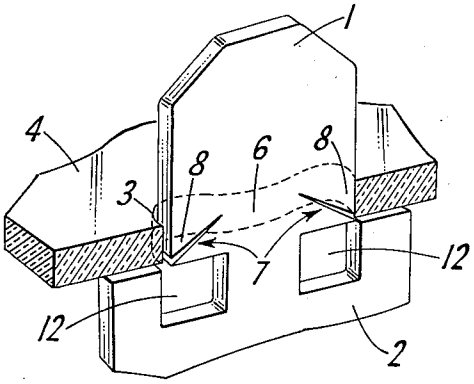


Fig. 2

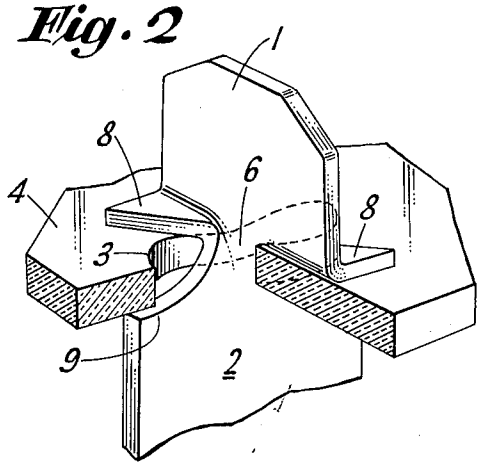


Fig. 5

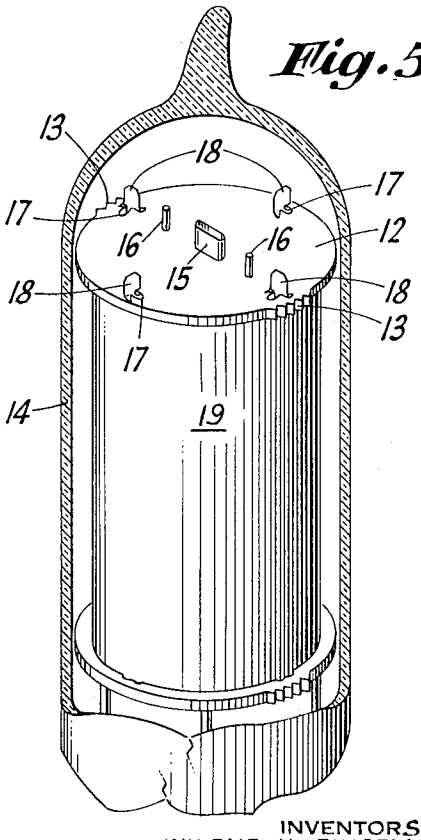
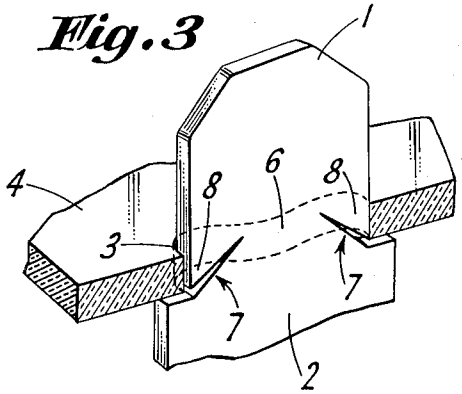


Fig. 3



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TAB FASTENING DEVICE

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3 Claims. (Cl. 313—260)

This invention relates to articles made of sheet metal, and more particularly to a new and improved construction for joining portions of such material. More specifically, the invention relates to an improved tab fastening device for use in quickly joining the end of one sheet of material to a second sheet of material.

An object of the invention is to provide a joint structure having a positive clamping action, yet one which may be made quickly and easily with simple tools.

Another object of the invention is to provide a quickly assembled joint structure which will retain the joined parts in position indefinitely.

A further object of the invention is the reduction of strain and tearing of the tab or the slot forming the joint.

Still another object is the utilization of the natural resilience of the sheet materials forming the joint to aid the clamping action.

In accordance with this invention, these objects and others which may appear from the following detailed description are attained in a new and improved tab fastening device, in which a metal twist tab attached to one object being fastened is inserted through an aperture in a second object being fastened, and the protruding end of the tab is then twisted, forcing the surfaces of the deformed metal against the outer edges of the slot, thereby binding the two objects together, special cuts in the tab providing downward extending flaps which fold as the tab is twisted and provide the principal surface contact area in the joint.

For better understanding of my invention, reference is made in the following detailed description to the appended drawings, in which:

Fig. 1 is a perspective view, partly in section of a partially assembled tab joint of the invention.

Fig. 2 is a modified view similar to Figure 1, illustrating completion of the locking process.

Figs. 3 and 4 illustrate modifications in construction of the invention shown in Fig. 1.

Fig. 5 is a view of a vacuum tube showing an electrode structure utilizing the present invention.

In Fig. 1, twist tab 1 projects from a first sheet of material 2 through aperture 3 in a second sheet of material 4. A narrow neck 6 formed between punchouts 7 joins tab 1 to sheet 2. Wings 8 are formed at each lower corner of tab 1 by the upward slant of cut-outs 7. For ease of manufacture and to reduce concentrated local strains the sides 7' of slots 7 are rounded.

In Fig. 2, tab 1 is shown after it has been twisted to lock sheet 4 in place between wings 8 and upper surfaces 9 of sheet 2. The twisting of tab 1 has caused a bending up of wings 8 and a deformation of the material forming neck 6 in the area immediately between the inner ends of slots 7. The deformation of neck 6 has caused a foreshortening which tends to draw tab 1 in towards sheet 2. The bending of wings 8 has resulted in the development of a certain amount of tension in the wings, in that they tend to press down on sheet 4. The effect of the foreshortening of neck 6 and the bending of wings 8 is to produce concurrently acting forces which are transmitted to sheet 4 through wings 8 and serve to bind the material of sheet 4 between wings 8 and upper surfaces 9 of sheet 2.

It should be noted that it is preferable for the upper end of slots 7 to extend a short distance above the top surface of sheet 4 so that wings 8 will yield readily when a twisting force is applied to tab 1 for locking. However, increasing the length of slot 7 excessively beyond the plane of the outer surface of sheet 4 would produce a reduction in efficiency and strength of the locking device. It should also be understood that it is preferable to employ a slot having widened ends in order to facilitate passage of the ends of wings 8 as tab 1 is twisted. In the drawing, aperture 3 is panduriform in outline, that is obovate, with a concavity in each side. If aperture 3 is made rectangular, some deformation of the material of sheet 4 around sheet 2 may occur.

Figures 3 and 4 illustrate modifications which may be made in the tab structure illustrated in Figures 1 and 2. Where the old structure has not been modified the same reference figures are used. In Figure 3 the curved side 7' of Figure 1 has been eliminated, leaving a narrow slot and permitting the use of a simpler cutting tool.

In Figure 4, a further modification is shown in which recesses or cut out areas 12 are provided at the base of neck 6 in order to remove areas of strain due to twisting of the neck from the region of the slot 3 in the completed joint.

It should be noted that many materials can be used in sheet 4, in tab 1 and sheet 2. For example, tab 1 of sheet 2 may be of metal, plastic, or any ductile resilient material. Similarly, sheet 4 may be of metal or of an insulating material, provided that the surface of it is relatively hard. It is not essential that tab 1 be integral with sheet 2 as it should be clear to the skilled mechanic that there are many situations where a separate tab would be more convenient.

While in the drawings and the description above the shape of wing 8 has been shown as triangular, and this is the preferred form, it will be apparent to those skilled in the art that other forms may be found useful as well. For example, square or rectangular wings may be used, preferably with a suitable modification of slot 3 to facilitate operation of the twist lock.

In Fig. 5, a view is shown of a typical use of this twist lock in the structure of a vacuum tube. In this illustrative embodiment, a mica separator used for supporting the electrodes is held in place on the electrode structure by twist tabs of the sort described above. Mica 12 having serrations 13 on at least part of its periphery for making contact with envelope 14, has apertures for receiving cathode 15 and grid side rods 16. Slots 17 are provided for passing twist tabs 18 extending from anode 19. The tabs are twisted to lock mica 12 and anode 19 together. This use of the invention has proved its worth by demonstrating its superior locking ability and the elimination of damage to the mica separator caused by older forms of twist lock.

Although several embodiments of the invention have been shown and described, it should be understood that there is no intention to limit the invention to such embodiments, but rather that the following claims be interpreted to cover all modifications and alternatives within the spirit and scope of the invention.

What we claim is:

1. A joint between sheet materials comprising a first member having an elongated aperture therethrough, a second member bearing against a first surface of the first member and having a tab extending through said aperture, said tab lying in a surface displaced with respect to

the surface of the second member, and said tab having wings extending away from the surface of the tab and bearing against a surface of said first member opposite to said first surface, whereby said members are locked together.

2. A vacuum tube having a mount structure therein, said mount structure including an anode and an insulating spacer at an end of said anode, said spacer having an elongated aperture therein, said anode having a tab extending through the aperture with an edge of the anode bearing against a surface of the spacer and with the tab extending perpendicular to the spacer but at an angle to the adjacent anode wall, and wings extending laterally from the tab bearing on the surface of the spacer opposite to said first surface, whereby said anode and spacer are locked together.

3. The process of assembling an anode having a tab in which there are diagonal slits extending from lateral edges

thereof toward the free end of the tab with an insulating spacer having an elongated opening with central constricted portion and widened end portions, said process comprising inserting the tab through the opening in the spacer bringing the anode close to a surface of the spacer and twisting the tab to cause portions of the tab adjacent the slits to engage edges of the opening at the wider portions thereof and to bend them out of the openings to bring them against the adjacent opposite surface of the spacer to lock the anode and spacer together.

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