

Aug. 27, 1957

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2,803,871

SPRING CLIP ATTACHING TOOL

Filed Aug. 18, 1954

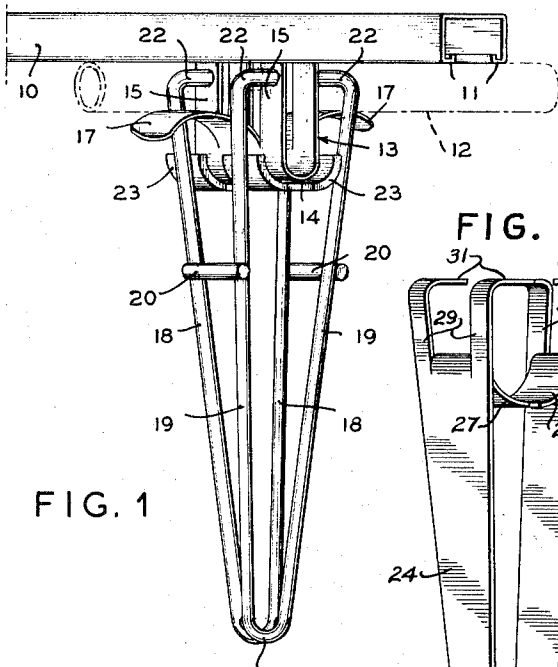


FIG. 1

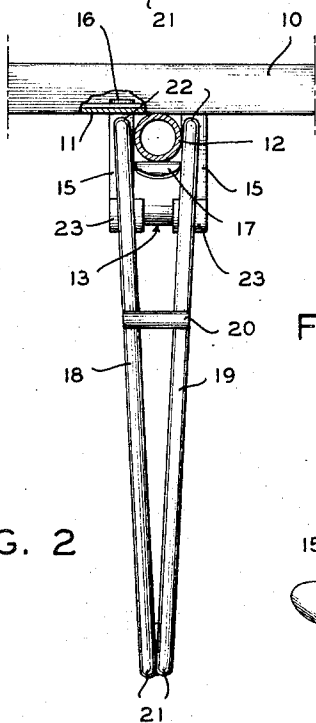


FIG. 2

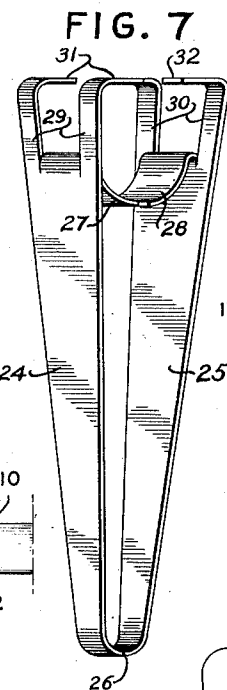


FIG. 7

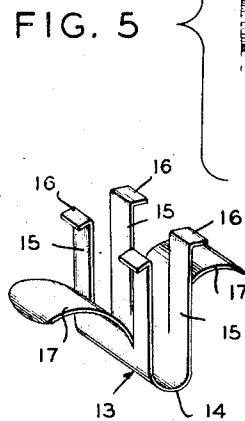


FIG. 5

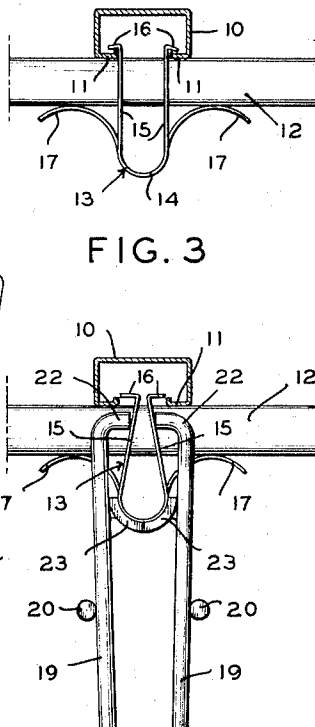


FIG. 3

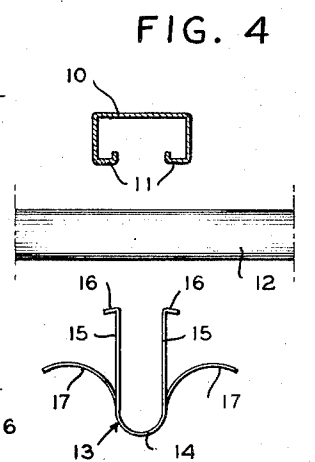


FIG. 4

FIG. 6

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SPRING CLIP ATTACHING TOOL

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Application August 18, 1954, Serial No. 450,680

1 Claim. (Cl. 29—235)

The present invention relates to manipulative tools and more particularly to a hand tool for applying and removing spring clips of the type used for attaching tubing to channel supporting structures.

Heretofore, particularly in experimental work, it has been difficult to properly support pneumatic tubing on a test panel structure and various types of spring clips have been used for the purpose and the Unistrut clip has been found to be especially adaptable for the purpose, but these Unistrut clips have not been readily attachable and detachable from the supporting channels because they have been inserted and removed by hand, resulting in many damaged clips and requiring a great deal of time for installation and removal with the resulting economic costs and inconvenience.

It is an object of the present invention to provide a tool for the application and removal of Unistrut spring clips whereby a person may readily apply and remove the spring clips with one hand.

Another object of the present invention is to provide a tool which will retain the spring clip and provide for applying a direct force for compressing the spring clip into a condition for application and removal and a direct force for insertion of the spring clip in place.

A further object of the invention is to provide a tool of a shape and configuration to receive the spring clip as well as a portion of the tubing which is to be supported.

Other and further objects will be apparent as the description proceeds and upon reference to the accompanying drawing wherein:

Fig. 1 is an oblique view of a portion of a test panel including a supporting channel, a Unistrut spring clip, and the tool of the present invention with a length of tubing shown in phantom;

Fig. 2, a view of the supporting channel with a part broken away showing the tube in section and the tool applied on the spring clip for either insertion or removal thereof;

Fig. 3, a view showing how a tube is retained by the spring clip on a supporting channel;

Fig. 4, a view similar to Fig. 3 showing the tool of the present invention compressing the spring clip for applying or removing a spring clip;

Fig. 5, an exploded view showing the supporting channel in section and the tube and spring clip in position to be attached to the supporting channel;

Fig. 6, a perspective view of the Unistrut spring clip.

Fig. 7, a perspective of a tool produced from sheet material.

Briefly, the present invention comprises a tool having opposed jaws, each of which is in the form of an A-frame with the apices joined together by a resilient connection permitting the diverging ends of each A-frame to move toward and from the other A-frame. The diverging ends of each A-frame are inturned toward a similar inturned portion on the other A-frame providing lugs for engaging spaced spring fingers with outwardly bent ends of a resilient U-shaped clip while an abutment means is secured on

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the inner face of each A-frame spaced from the diverging ends for engaging the bight portion of the U-shaped clip whereby the outwardly bent ends of the fingers of the clip may be moved inwardly for application of the spring clip to inturned lip portions of a supporting channel. The spaces between the legs of each A-frame permit the reception of a tube as well as a reversely bent intermediate spring portion of the clip during the application and removal of the spring clip.

Referring more particularly to the drawing, a channel 10 having inturned lips 11 provides a support for a tube 12 which is retained on the open side of the channel 10 by means of a spring clip 13 known as Unistrut. The spring clip 13 includes a bight portion 14 having a plurality of resilient fingers 15 extending therefrom which terminate in outwardly bent ends 16. Intermediate portions 17 of the spring clip between the fingers 15 are reversely bent to provide tube engaging elements.

The spring clip applying and removing tool of the present invention comprises a pair of jaws arranged in opposed relation and removable toward and away from each other. Each jaw consists of an A-frame having legs 18 and 19 connected at their apices and also connected together by a bar 20 spaced from the diverging free ends. The corresponding legs of each A-frame are made of a single piece of resilient rod bent at 21 with the bent portions being welded or otherwise secured together thereby rigidifying each A-frame. The free end of each leg of each A-frame is provided with an inwardly projecting portion or lug 22 for engagement with a corresponding spring finger 15 of the resilient clip. An abutment 23 in the form of a quarter section of tubing is secured to the inner face of each leg of each A-frame for engagement of its concave surface with the bight portion 14 of the spring clip. The free end portions of the legs 18 or 19 of each A-frame are spaced apart a sufficient distance without any obstruction therebetween to permit the tube 12 and the reversely bent intermediate portions 17 of the clip to be accommodated during the operation of applying or removing the spring clip to the channel 10.

From the above description the operation of applying and removing the spring clips for attachment to and detachment from a tube of a channel support is believed to be obvious. Assuming that the spring clip 13, the tube 12, and the channel 10 are separated as shown in Fig. 5 and it is desired to mount the tubing on the open side of the channel as shown in Figs. 1 to 3 inclusive, the tool is positioned with the lugs 22 thereof in contact with the spring fingers 15 of the clip and the bight portion 14 in contact with the abutments 23. The spring clip is received in the tool with the tool jaws in their normally open position without appreciable deformation of the clip but retaining such clip in the tool. The clip and the tool are then positioned over the tubing 12 with the intermediate reversely bent portions 17 in contact with the tube. The operator then presses the jaws together by using his thumb on one A-frame and the index finger on the other, then moving the thumb and index finger together thereby compressing the spring fingers 15 of the clip to the condition shown in Fig. 4.

The free ends of the fingers 15 of the spring clip are then guided into the channel by movement of the tool toward the channel so that the abutments 23 press on the bight portion of the spring clip to overcome the reaction of the reversely bent portions 17 on the tube and thereafter the outwardly bent ends 16 of the spring clip fingers are positioned inwardly under lips 11. The pressure between the thumb and the forefinger on the applying tool is released and the fingers of the clip spring outwardly against the lips 11 and upon removal of the tool the clip and tube are retained as shown in Fig. 3.

There is appreciable spring pressure on the reversely bent

portions 17 of the spring clip and therefore, the operator must exert a steady pressure on the tool toward the channel to position the clip in proper position.

For removing the spring clip and the tube from the supporting channel, the operations are performed in the reverse order by placing the tool in the position shown in Figs. 1 and 2, pressing the jaws together and exerting longitudinal force on the tool if necessary and then removing the clip from the channel while keeping the jaws pressed together in the condition shown in Fig. 4.

Although each jaw of the tool has been described as being of A-shape, this specific description has been used for convenience in the specification and claim and it should be understood that an equivalent structure is intended to be covered by such expression, such as the structure shown in Fig. 7 in the drawing.

Instead of making the spring clip attaching tool from wire or rod stock, as shown in Fig. 7 it may be manufactured of one piece construction from sheet material of metal or the like having a resiliency to permit it to be contracted to compress the spring clip. As previously described, it is U-shaped and with its free ends each inwardly turned and bifurcated to accommodate the lateral portions of the spring clip between the same.

The legs or side members 24 and 25 have a curved spring connection 26 between the same so that the sides may be moved toward each other and returned by their spring action to their original position. These sides may be tapered or increased in width from their connected ends to their free ends and preferably bifurcated at such free ends by having a strip 27 cut from one end and a corresponding strip 28 cut from the other to provide clip engaging or seating portions and spaced lug portions 29 and 30 with inwardly directed extremities 31 and 32. Such extremities are located in opposed relation and correspond to the ends 22 of the embodiment of Figs. 1, 2 and 4.

The device described when produced from sheet material or the like is less expensive since it eliminates welding and the addition of the abutments 23 of the previously described structure since they are integral or are part of the original sheet. The free end portions 31 and 32 of the legs 24 and 25 of each of the side members are spaced apart the width of the lateral portions 17 of the clip to permit these lateral portions and the tubing to be accommodated during the application and removal of the clip to and from channel member 10. The spring clip attached tool of Fig. 7 is intended to be used in the same manner as the tool of the preceding figures but is simpler, less expensive and more satisfactory.

From the above it is believed that the operation and utility of the device is clear and that it is useful for temporarily or permanently supporting elongated members in position on any surface in which ledges are provided for engagement by the outwardly bent ends 16 of the spring clip.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specification but only as indicated in the appended claim.

What is claimed is:

A tool for applying a U-shaped clip having multiple spring fingers with outwardly bent ends and having reversely bent intermediate portions for engagement with an elongated tube on a supporting channel having internal lips for retaining the outwardly bent ends of the clip fingers, comprising opposed jaws each of which is a generally planar frame of A-shape, said jaws being connected at their apices and being free at their diverging ends, each leg of each A-frame having an end projecting toward the corresponding leg of the other A-frame, abutment means extending between the inner faces of said A-frames and located between the ends and apex thereof for engagement with the bight portion of the U-shaped clip, the legs of each A-frame being spaced apart a sufficient distance for accommodating the elongated tube and a reversely bent tube engaging portion of the clip therebetween, whereby the spring clip may be supported in the tool with the bight portion of the clip against the abutment and the inwardly projecting ends of the A-frame engaging the spring fingers, so that gripping of said tool will press the spring fingers of the clip together while the reversely bent portions extend between the legs of each A-frame so the clip can be pressed against the elongated tube and can be positioned with the outwardly bent ends of the spring fingers in the supporting channel so that upon release of the A-frames the outwardly bent ends of the spring fingers of the clip may positively engage the channel.

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