# United States Patent [19]

**Miller**

[11] **3,778,537**

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[54] **CLIP DEVICE FOR MOUNTING ACCESSORY ON AN ANTENNA BOOM**


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[52] **U.S. Cl.**..... **174/138 R,** 24/81 CC, 174/163 R, 248/229

[51] **Int. Cl.**..... **F16b 2/22**

[58] **Field of Search**..... 174/40 CC, 138 R, 174/138 G, 163 R, 175; 24/73 R, 73 PF, 73 SA, 73 AP, 81 CC, 81 AT, 81 G, 129 D, 243 G, 255 R, 255 C, 257 R; 248/72, 73, 221, 223, 224, 225, 226 E, 228, 229, 316 D



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*Attorney*—Harold B. Hood et al.

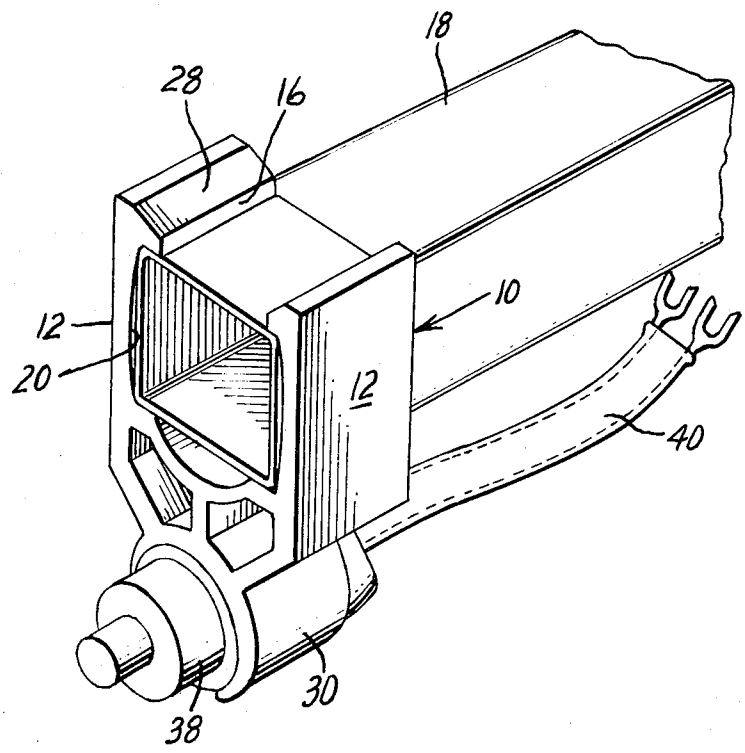


[57] **ABSTRACT**

A clip device for mounting accessories on antenna booms comprising a frame of plastic material having a first U-shaped clamp portion, the arms and base of which have interior surfaces that generally conform to three sides of a straight boom of square cross-section. The arms have inwardly projecting retainer flanges, respectively, on the distal ends thereof. The flanges have inner surfaces that generally conform to the fourth side of the aforesaid boom. The flanges have outer cam surfaces that are flat and incline downwardly and inwardly toward the base. The facing surfaces of the arms between the ends are slightly curved outwardly, the arms being resilient. The base is provided with a part-cylindrical depression symmetrically disposed between the ends. The inner surfaces of the clamp portion are symmetrical about and generally parallel to an axis through the central portion. A second clamp portion is disposed beneath the base and is secured thereto by a rigid connection, all these parts being integrally formed. The second clamp portion is part tubular in shape and so disposed that the opening thereof extends oppositely to that of the opening in the first clamp portion. The arms of the second clamp portion are also resilient.

Adapters are provided for altering the interior shape of the clamp portion, one typical adapter having a part-cylindrical curvature on the inner side thereby to adapt the clip device to be fastened to a cylindrical boom. Another typical adapter is primarily square shaped thereby to adapt the clip device for fastening to a boom of square cross section smaller than that to which the first clamp portion may be directly fastened.


**5 Claims, 6 Drawing Figures**



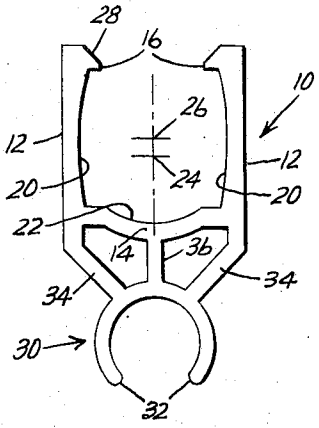



FIG.1

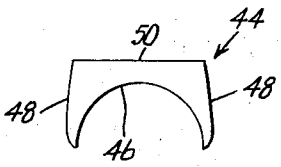



FIG.2

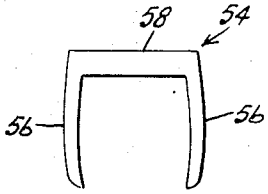



FIG.3

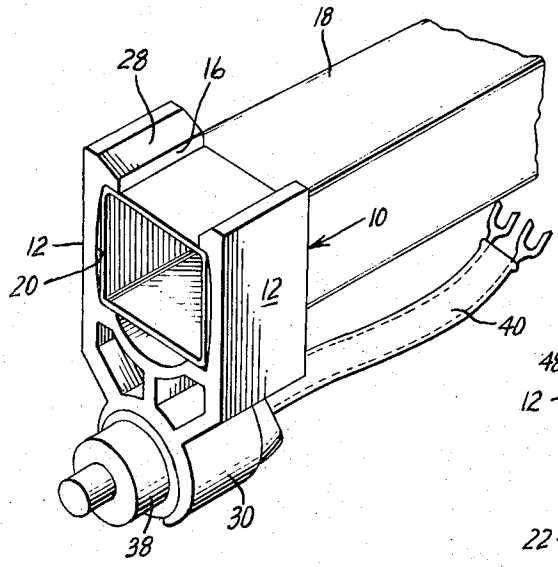



FIG.4

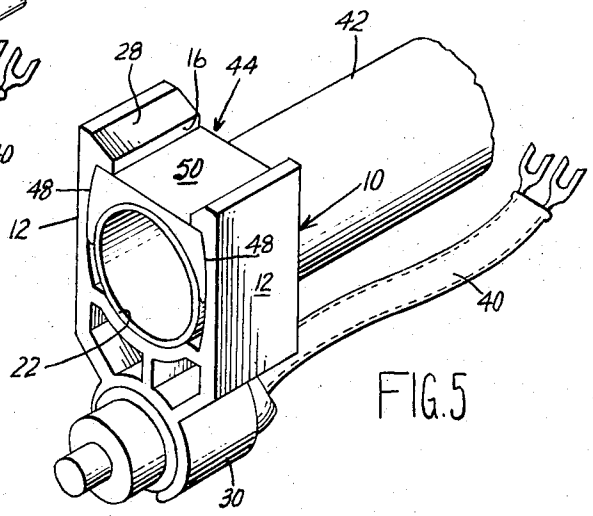



FIG.5

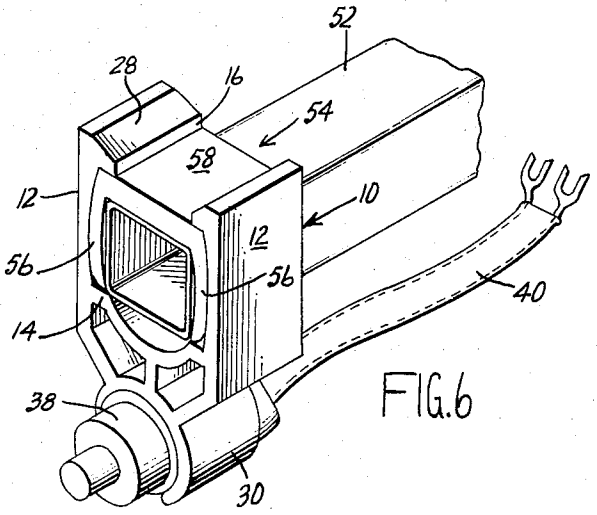



FIG.6

# CLIP DEVICE FOR MOUNTING ACCESSORY ON AN ANTENNA BOOM

## BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to devices for television and FM antennas and more particularly to clip devices for fastening accessories, such as matching transformers, to the booms or some similar structural member of such antennas.

2. Description of the Prior Art

Antenna booms conventionally are made of aluminum tubing, such tubing being of either square or round cross section. The tubing conventionally is also of different standard cross sectional sizes. Accessory devices such as matching transformers are often fastened to antenna structures, different mounting devices being used for this purpose.

In the prior art, devices are so constructed to be fastened to elongated members of either round or square cross section, such devices conventionally being adapted to fit directly onto the member of square cross section but requiring an insert for mounting it on a member which is of cylindrical shape. White U.S. Pat. No. 2,544,817 discloses a typical mounting device.

## SUMMARY OF THE INVENTION

In accordance with the broader aspects of this invention there is provided a plastic clip device for mounting accessories on antenna booms comprising a frame having a first U-shaped clamp portion, the arms and base thereof having interior surfaces that generally conform to three sides of a boom of square cross section. The arms are provided with inwardly projecting retainer flanges, respectively, on the distal ends thereof, these flanges having inner surfaces that generally conform to the fourth side of the aforesaid boom. The flanges have outer cam surfaces that are flat and incline downwardly and inwardly toward said base. The facing surfaces of the arms between the ends thereof are curved outwardly. The arms are resilient and the base has a part-cylindrical depression in the central portion between the ends thereof. The inner surfaces of the clamp portion are symmetrical about and generally prallel to an axis through the central portion thereof. A second clamp portion is disposed beneath the base and is integrally secured thereto by means of a rigid connection. The second clamp portion is part-tubular in shape, the open side thereof being disposed oppositely from the open side of the first clamp portion. The arms of the second clamp portion are also resilient.

This clip device just described is adapted to be clamped onto a boom of square cross section conforming to the size and shape of the inner surfaces of the first clamp portion. In order to adapt the same clip device to be mounted on a boom of circular cross section, an insert is used which has a part-cylindrical surface that may be disposed symmetrically opposite the part-cylindrical depression in the aforesaid base. This insert is provided with sides that substantially conform to and are embraced by portions of the inner surfaces of the two arms, and a flat surface that is engaged by the inner surfaces of the two flanges and bridges the space therebetween.

The clip device may also be adapted to be clamped onto a boom of square cross-section smaller than that first mentioned by providing a second insert generally



of U-shaped cross section but defining a square shape interiorly. The outer surfaces of this insert are shaped to conform substantially to the inner surfaces of the two arms and the flanges with the base of the insert bridging the space between the two flanges. The space inside the insert bridged by the base of the first clamp portion defines a square of smaller cross-section than the square of the clip device itself.

It is an object of this invention to provide a clip device for mounting an accessory on an antenna structure, and more particularly the boom thereof.

It is another object of this invention to provide a resilient plastic clip device for mounting an accessory on the boom of an antenna whether the boom be round or square or of different cross sectional size.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and objects of this invention and the manner of attaining them will become more apparent and the invention itself will be best understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings.

FIG. 1 is a side view of one embodiment of this invention;

FIG. 2 is a side view of an adapter to be used in conjunction with the device in FIG. 1;

FIG. 3 is a side view of another adapter for use with the device in FIG. 1;

FIG. 4 is a perspective view showing the device of FIG. 1 mounted on the boom of an antenna;

FIG. 5 is a similar view utilizing the adapter of FIG. 2 for mounting the device on a boom of circular cross section; and

FIG. 6 is another perspective view using the clip of FIG. 1 with the adapter of FIG. 2 whereby the clip device may be mounted on a boom of cross section smaller than that of FIG. 4.

Referring to the drawings, the structures of FIGS. 1, 2, and 3 are perferably made of plastic having suitable dielectric characteristics for use on conventional television and FM antennas. In the embodiment illustrated, the clip is shown as being designed for mounting a matching transformer onto an antenna boom, the matching transformer being primarily of cylindrical shape.

Referring to FIG. 1, the clip device resembles an open frame having a clamp portion generally indicated by the numeral 10 of generally U-shaped configuration, the two arms 12 being joined to a base 14. On the upper ends of the two arms 12 are two inwardly extending flanges 16 shaped as shown. It may be stated at this point that the drawings are substantially to scale.

The inner surfaces of the arms 12, the base 14 and the flanges 16 define generally a square shape conforming substantially to the shape of a conventional square boom 18 of FIG. 4. The inner surfaces 20 of the two arms 12 are slightly curved outwardly as shown between the ends thereof while the inner surfaces of the flanges 16 are substantially flat. The inner surface of the base 14 is provided with a part-cylindrical depression 22 between the ends thereof having a center of curvature at 24 which is below the frame axis 26 which is generally midway between and parallel to the inner surfaces of the arms 12, the base 14 and the flanges 16.

The inner surfaces 28 of the flanges 16 are substantially flat and are inclined downwardly and inwardly

toward the base **14** as shown, defining planes substantially parallel to axis **26.**

Extending beneath and integrally connected to the base **14** is a second clamp portion generally indicated by the numeral **30** which, in this illustrated embodiment, is part tubular in shape with the open side **32** thereof facing oppositely from the open side of the clamp portion **10.** Two rigid extensions **34** of the two arms **12** angle symmetrically inwardly for connection to the tubular clamp portion **30,** a central web **36** connecting the central portion of the base **14** to the central portion of the tubular clamp **30.**

The arms **12** as well as the corresponding parts of the tubular clamp **30** are resilient and are preformed to be slightly smaller than the parts they are to embrace. As regards the clamp portion **10,** the arms **12,** as shown more clearly in FIG. **4,** are preformed inwardly such that inner surfaces of the arms **12,** the base **14** and the flanges **16** will frictionally embrace the boom **18.** The slight curvature **20** of the inner sides of the two arms **12** permits some outward deflection of the upper ends of the arms such that the latter will firmly, resiliently embrace the boom **18** with the inner surfaces tending to lie flat against the boom sides.

A conventional, cylindrically shaped matching transformer **38** having a connecting lead **40** is inserted in the clamp **30,** the latter being made slightly smaller than the outer diameter of the transformer **38** such that once inserted, the transformer will be frictionally embraced and held in position by the clamp portion **30.**

In some instances, it may not be possible to telescope the clamp portion **10** onto the boom **18.** Instead, the cam surfaces **28** on the flanges **16** may be engaged with the sides of the boom **18** and merely forced over the boom unitl it snaps into embracing relationship as shown. The flanges **16** are made short enough such that the arms **12** will not be bent outwardly so far as to break or produce a permanent set. By reason of the resiliency of the arms **12,** it is possible to mount to clip devices in this manner.

Referring now to FIG. **5,** the clip device of FIG. **1** may be mounted securely on a circular boom **42** as shown. In this instance, a boom **42** of the same curvature as the part-cylindrical depression **22** (FIG. **1**) is positioned on the latter and an insert **44** (FIG. **2**) is inserted between the boom **42** and the inner surfaces of the flanges **16** and the arms **12.** The insert **44** is somewhat crescent shaped, being provided with a part cylindrical inner surface **46** which conforms to the outer surface of the boom **42** and two side surfaces **48** which conform to the shape of the upper halves of the inner surfaces of the two arms **12.** The remaining surface **50** is flat and conforms to the shape of the inner surfaces of the flanges **16** and serves to bridge the distance between the two flanges. The spacing between the two sides **48** is made slightly larger than the distance between the inner surfaces of the two arms **12** so that the latter will be distended slightly thereby providing for a resilient clamping force whereby the assembly frictionally embraces the boom **42.** The thickness of the insert **44** is made such that engagement of the flat surface **50** with the under sides of the flanges **16** will resiliently force the insert **44** against the boom **42** thereby insuring a frictional clamping force.

The clip device in FIG. **1** may also be used on a boom **52** of square cross section (FIG. **6**) which is smaller than the boom **18.** In this instance, an insert like that shown in FIG. **3** is used, this insert, indicated by the numeral **54,** being adapted to be fitted snugly and resiliently inside the clamp portion **10** and in turn over the boom **52.** The insert **54** is generally U-shaped with the sides **56** being curved slightly to conform to the inner surfaces, respectively, of the arms **12.** The sides **56** are also made to a length as will extend from the inner surfaces of the flanges **16** to the base **14.** The remaining side **58** is substantially flat thereby to engage intimately one side of the boom **52** and the undersides of the flanges **16.**

The insert **54** is so sized that it will have a sliding fit with the interior of the clamp portion **10.** The inner surfaces defined by the insert **54** in combination with the base **14** is made to a size just slightly smaller than that of the boom **52** such that insertion of the latter into the insert **54** results in slight resilient distension of all the parts thereby providing the necessary reslient clamping force for securing the clip device on the boom **52.** The booms **18, 42** and **52** of FIGS. **4, 5,** and **6,** respectively, are conventional in the television antenna industry and furthermore are of standard size, the boom **18** being one inch square measured on the outside, the boom **42** one inch outer diamter, and the boom **52** 13/16 inch square outside dimension. The same plastic clip of FIG. **1** is used to mount the matching transformer **38** on all three booms, the inserts **44** and **54** being used to adapt the clip to the round and square shapes, respectively.

While there have been described above the principles of this invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of the invention.

What is claimed is:

**1.** A clip device for mounting accessories on antenna booms comprising a frame having a first U-shaped clamp portion, the arms and base of said clamp portion having interior surfaces that generally conform to three sides of a straight boom of orthogonal cross-section, said arms having inwardly projecting retainer flanges, respectively, said flanges having inner surfaces that generally conform to the fourth side of the aforesaid boom, said flanges having outer cam surfaces that are flat and incline downwardly and inwardly toward said base, the facing surfaces of said arms between the ends thereof being curved outwardly, said arms being resilient, said base having a part-cylindrical depression symmetrically disposed between the ends thereof, the inner surfaces of said clamp portion being symmetrical about and generally parallel to an axis through the central portion thereof, and a second clamp portion disposed beneath said base and secured thereto by a rigid connection, said second clamp portion having two arms that define a general U-shape opening in a direction opposite to that of said first U-shaped clamp portion, the arms of said second clamp portion being resilient.

**2.** The clip device of claim **1** in which said orthogonal cross-section is substantially square and said axis being centrally disposed in the part-cylindrical depression having a center of curvature on the near side of said axis and in a plane midway between said arms and which includes said axis.

**3.** The clip device of claim **2** including an insert having a part-cylindrical inner surface of generally the same radius as said depression, said insert having an outer surface that conforms to the shapes of the inner surfaces of said arms and flanges, said outer surface in-

cluding a flat portion symmetrically opposite said part-cylindrical inner surface and two side portions that extend for about one-half the length of the inner surfaces of said first clamp portion arms, the distance between said two side portions being slightly greater than the unsprung distance between the arms of said first clamp portion.

**4.** The clip device of claim **2** including an insert of generally U-shape with the sides and base being orthogonally related, the outer surfaces of said sides generally conforming to the entire length of the inner surfaces of said arms of said first clamp portion, the inner and outer surfaces of the insert base being substantially flat and parallel, the inner surfaces of said insert sides being curved outwardly between the ends thereof, said inner surfaces of said insert and the base of said first clamp portion defining a square shape, the spacing between the outer surfaces of said sides being slightly greater than the spacing between the arms of said first clamp portion, the last-mentioned arms resiliently embracing said insert with the base of the latter bridging the space between and being engaged by said flanges, said frame and insert being of dielectric plastic material.

**5.** The clip device of claim **1** in which said rigid connection includes two inwardly downwardly and inwardly inclined integral extensions of said arms, respectively, said second clamp portion being part tubular with the side opposite the opening thereof integrally joining said extensions.

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