Aug. 31, 1943. G. O. BENSON 2,327,990

ADJUSTABLE MAST

Filed Aug. 12, 1940

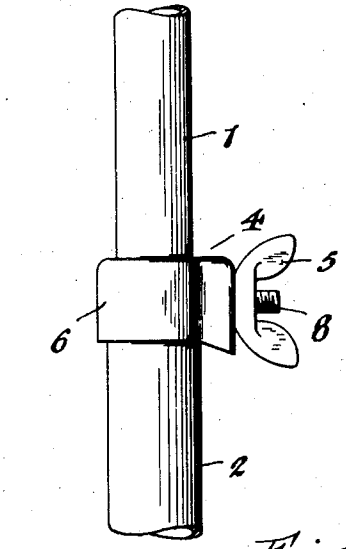


Fig. 1.

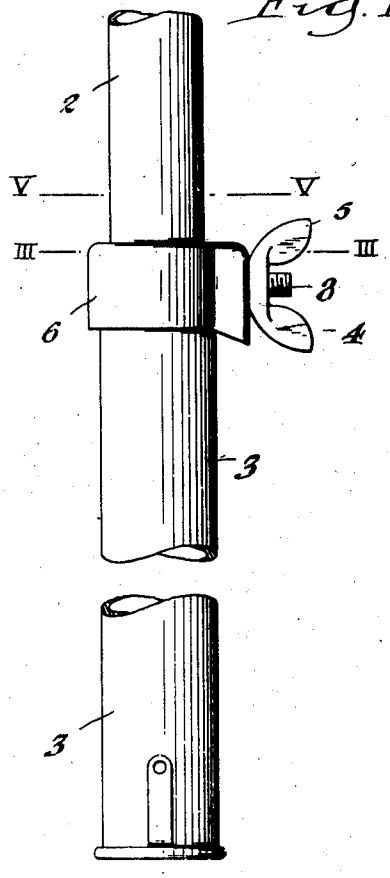


Fig. 5.

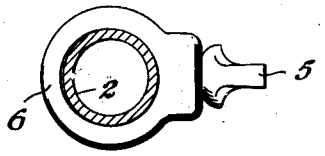


Fig. 2.

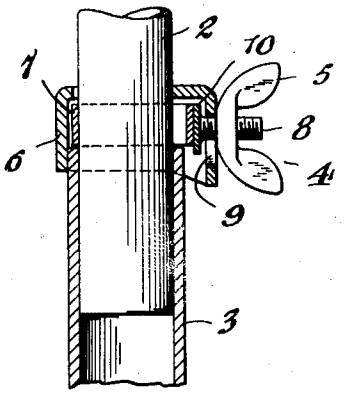


Fig. 3.

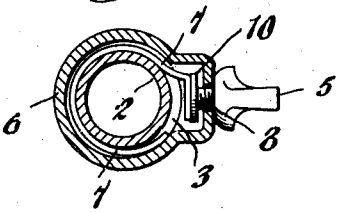


Fig. 4.



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ADJUSTABLE MAST

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3 Claims. (Cl. 287—58)

This invention relates to adjustable masts such as are used as tent poles or as supports for radio antennae and in some cases as the radio antenna itself, and has for an object the provision of an improved article of the class referred to.

Adjustable masts obviously require means for fixing the parts in the relative positions required to give the desired length. The means by which the parts are fixed in their relative positions must grip the movable element with a pressure sufficient to restrain relative movement of the parts when the mast is used to support, for example, a tent or a radio antenna. At the same time, the means by which the parts are held in position must not mar or deform the part upon which the pressure is exerted and must permit quick and easy adjustment as to length when it is desired to collapse or extend the mast. These requirements for a high degree of pressure, together with quick adjustability as to length and freedom from injury to the movable element, have been found to be difficult to meet, and one of the objects of the present invention is to provide a mast in which these requirements are fully and satisfactorily met.

One means by which telescoping parts have been fastened to one another heretofore has been a set-screw in threaded relationship with one element and having an end in engagement with the other element. Such means, however, very frequently mars the element engaged by the end of the set-screw, and sooner or later the deformations thus caused seriously reduce the adjustability of the device. This disadvantage of the set-screw as a fastening means is increased when thin-walled tubing is used, and such tubing is preferred, and even demanded, for many applications because ease of handling, supporting and/or transporting is essential. Furthermore, set-screws do not provide adequate electrical contacts in such applications as radio antennae, especially after the tube has been marred by the set-screw adjacent the new setting.

A drawing is appended to provide a better understanding of the invention, but it is to be understood that it is to be taken as illustrative, and not as limiting the invention.

In the drawing—

Figure 1 is a view, in elevation, of a mast made according to the present invention;

Figure 2 is a view, partly in section, of a portion of the mast shown in Figure 1, said portion including the clamping or fastening means;

Figure 3 is a sectional view taken through the line III—III of Figure 1;

Figure 4 is a perspective view of the tensioning band forming a part of the clamping arrangement illustrated in Figures 1, 2 and 3; and

Figure 5 is a view, partly in section, taken along the line V—V of Figure 1.

Similar reference numerals are used throughout the specification and drawing to designate similar parts.

The mast illustrated in Figure 1 comprises three tubular elements 1, 2 and 3, in telescoping relationship, and the clamping elements 4, one of which joins the tubular elements 1 and 2, and the other joins the tubular elements 2 and 3.

The manner in which the elements are joined by means of the clamp 4 is shown in more detail in Figure 2. In this figure, the tubular element 3 is shown in section, whereas the tubular element 2 is shown in elevation. The clamp 4, also shown partially in section, comprises the ferrule 6, which embraces the end portion of the tube 3 and extends beyond the same, a tensioning band 7, a threaded stud 8 and a nut 5 in threaded engagement with said stud. The nut 5, shown in the drawing as a wing nut, but which may be any suitable kind of a nut, is illustrated as having been turned to the position whereby the tensioning band 7 has drawn the tubular element 2 into non-movable relationship with respect to the tubular element 3. Although not specifically shown in Figure 2 as being attached, the ferrule 6 is attached to the tubular element 3 by welding, or in any other suitable manner.

Figure 3 shows the arrangement of the various elements, including the tubular members 2 and 3, the ferrule 6, the tensioning band 7, the threaded stud 8 and the wind nut 5. As shown in this figure, the tensioning band 7 makes contact with the inner wall of the ferrule 6 at a point in proximity to the enlarged section of the ferrule 6, at which point the said tensioning band 7 is attached to the said ferrule 6 by welding, or in any other suitable manner, and embraces the tubular element 2 over an area extending substantially completely around said element. The end of the tensioning band opposite that which is attached to the inner wall of the ferrule is attached to the enlarged head 10 of the threaded stud by welding or by other suitable means. The threaded stud 8 passes through the aperture 9 and projects beyond the ferrule 6 a distance sufficient to retain the wing nut 5 when the wing nut 5 has been backed off sufficiently to permit effective reduction in the pressure exerted by the tensioning band 7 upon the tubular element 2.

The aperture 9 in the ferrule 6 is made con-

siderably longer than the diameter of the stud 8, as shown in Figure 3, but of a width only slightly greater than the diameter of the stud 8, as shown in Figure 3, in order to permit assembly of the band 7 and stud 8, as illustrated in Figure 4, prior to the assembly of the clamping element 4, and to provide, at the same time, a satisfactory bearing surface for the wing nut 5 without the use of a washer between the ferrule and the wing nut.

The tensioning band 7 preferably should be flexible, yet of sufficient resiliency to provide restoration to substantially its original position when the wing nut 5 is run back to permit relative movement between the tubular elements 2 and 3.

By positioning and fastening the end of the tensioning band 7 in proximity to the enlarged portion of the ferrule, and consequently also in proximity to the other end of the tensioning band 7, which is attached to the threaded stud 8, almost complete encirclement of the tubular member 2 is accomplished. As a consequence of this, the total pressure that may be applied to the tubular element 2 by virtue of the tensioning band 7, the stud 8 and the wing nut 5 is very large. This high total pressure is made possible not only because of the broad area of contact between the tensioning member 7 and the tubular element 2, but also because of the fact that the pull exerted on the end of the tensioning band 7 by the stud 8 causes a slight rotation of the tubular element 2. This rotation of the tubular element 2, although very slight, provides relief as the wing nut 5 is being tightened, and consequently injury to the tubular element 2 is avoided.

While specific embodiments have been used to illustrate the invention, it will be appreciated that the invention is not limited to the specific means shown. For example, the tensioning band can be operated by means of a cam and lever arrangement instead of by the threaded stud and wing nut illustrated.

In addition to the advantage of positive gripping action without damage to the tubular elements, the present invention has the further advantages that it is inexpensive to manufacture and is sturdy and not easily damaged in normal use. One factor contributing to the economical production of the device of the present invention is that the tubular elements can be made of lighter weight material than usual because of the freedom from injury thereto by the clamping member. Heretofore the tubular members of a mast have been made of heavier weight material than was required to carry the load because such additional strength was required to withstand the localized pressures applied by the clamping members. More recently, however, minimum weight of material has been emphasized and even demanded, and consequently the problem of providing suitable clamping means has been intensified.

Having thus described my invention, I claim:

1. The combination comprising a plurality of tubular members in telescopic relationship and a clamp attached to the outer of said tubular members comprising a ferrule which embraces the end portion of said outer tubular member and extends longitudinally beyond the same, a band which embraces the inner of said tubular members over an area extending substantially completely around said inner tubular member and is positioned within said ferrule and has one end attached thereto, and tensioning means attached to the other end of said band.

2. The combination comprising a plurality of tubular members in telescopic relationship and a clamp attached to the outer of said tubular members comprising a ferrule which embraces the end portion of said outer tubular member and extends longitudinally beyond the same, a band which embraces the inner of said tubular members over an area extending substantially completely around said inner tubular member and is positioned within said ferrule and has one end attached thereto, and tensioning means attached to the other end of said band comprising a threaded stud and a nut in engagement therewith.

3. The combination comprising a plurality of tubular members in telescopic relationship and a clamp attached to the outer of said tubular members comprising a ferrule which embraces the end portion of said outer tubular member and extends longitudinally beyond the same, a band which embraces the inner of said tubular members over an area extending substantially completely around said inner tubular member and is positioned within said ferrule and has one end attached thereto and tensioning means attached to the other end of said band comprising a threaded stud which projects through an aperture in the wall of said ferrule and a nut in engagement therewith and on the outside of said ferrule.

GEORGE O. BENSON.