

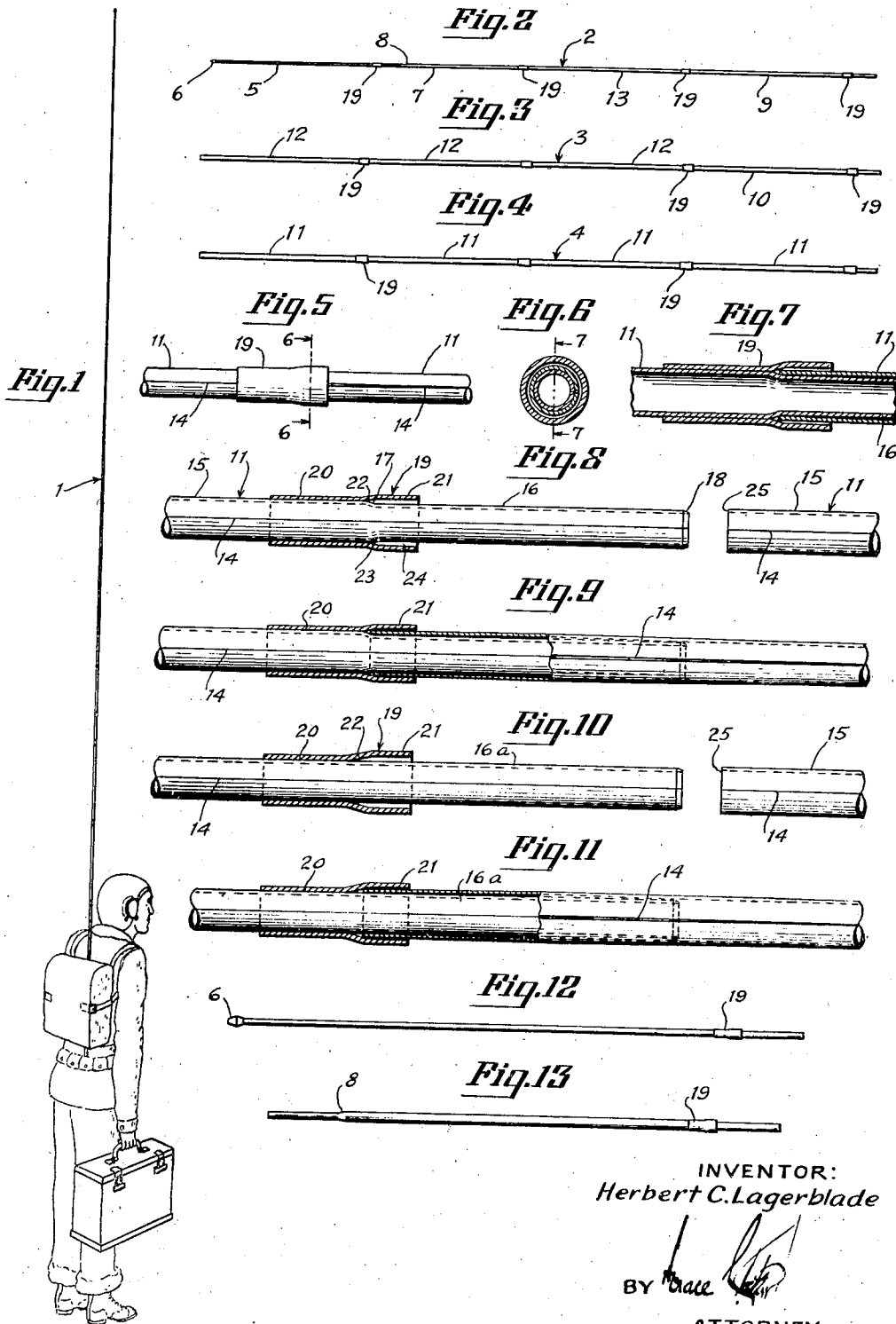
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PORTABLE RADIO ANTENNA

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PORTABLE RADIO ANTENNA

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My invention relates to a portable radio antenna.

It has heretofore been proposed to equip so-called walkie-talkie portable radio sets with aluminum telescopic antennae, but these have not been satisfactory in military use. One source of difficulty arises from the fact that the same are readily deformed, while if any section is damaged, as frequently occurs when using aluminum, as for example, by bending when passing under the bough of a tree or the like, the entire antenna is rendered useless and it cannot then be telescoped. Moreover, such constructions also have been expensive, due to the necessarily precise interconnection and fitting of the several telescoping sections one within the other, and for like reasons delay and expense has been experienced in repairs and replacements of damaged sections. Such telescoping antennae have also been so large, due to the necessarily large diameter of the butt or base section which must telescopically receive all of the others, as to be bulky and also to require the use of aluminum to minimize weight, while further difficulty has resulted from the entry of rain into the sections.

To meet these objections, efforts have been made to produce a multi-sectional antenna of ordinary separable seamless steel fishing rod sections, but this also has been found to be impractical. This has been due in large part to the small tolerance permitted and the nicety of fit necessarily required between adjacent sections; only the sections which have been pre-fitted together at the factory, fitting properly in the field and this difficulty becoming even more marked after wear has occurred. Thus, interchangeability of sections is made impossible, while replacements of damaged or broken sections in the field is impossible since, due to the small tolerances permissible, the provision of a replacement section which will fit the two remaining adjacent sections with the required precision, remains a factory operation. Further, in such antennae, even although free from defective sections, the task of assembling the antenna has been a confusing and time consuming one, due to the considerable number of short sections of like length required in an antenna of 13 or 14 feet in length and to the necessity for bringing the particular prefitted male and female joints together when several of them are of substantially the same length, cross section and appearance. In addition, it has been found impossible to produce from seamless tubing, a construction which

will withstand the bending and/or torsional strains encountered in service, while continued difficulty has been encountered due to the entry of rain into the joints.

My invention has among its objects to provide an improved antenna for such walkie-talkie sets, whereby it is made possible to eliminate the objections to previous constructions. A further object of my invention is to provide an improved multi-sectional structure comprising a plurality of improved interchangeable sections having improved joints therebetween of such improved construction as to eliminate the close tolerances and the prefitting heretofore required and the difficulties incident thereto arising in the field. A still further object of my invention is to provide such an improved multi-sectional structure wherein, while obtaining these advantages, the length of the antenna may be increased as desired by merely inserting one or more additional interchangeable sections, and wherein the improved joint construction is such as markedly to facilitate and expedite the process of assembly and disassembly of the antenna. A still further object of my invention is to provide an improved joint between adjacent sections including improved cooperating elements on each of said sections which are of an improved construction and adapted to permit ready assembly and disassembly within wholly new wide limits of tolerance while producing a secure and satisfactory joint and one in which the effects of wear are also minimized, as well as the entry of water. Still another object of my invention is to produce an improved open seam structure which, while light and capable of being very compactly packaged, is also stronger than previous constructions and also as a result of improved resiliency, is adapted to withstand bending and torsional strains, without either breaking, collapsing, or taking a permanent set, as has occurred in prior constructions. Still another object of my improvement is to provide such an improved antenna which, while obtaining the above advantages, by reason of its improved construction and with its advantages, is yet capable of being very inexpensively manufactured as compared with either prior telescopic aluminum antennae or prior seamless steel constructions. These and other objects of my improvements will, however, hereinafter more fully appear.

In the accompanying drawing, I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In this drawing,

Figure 1 is a view of my improved antenna in use in a walkie-talkie set, the same being shown as mounted on the bearer's pack in a well known manner;

Fig. 2 is an enlarged side elevation of the tip portion of the antenna;

Fig. 3 is a like view of the intermediate portion thereof;

Fig. 4 is a like view of the butt or base portion thereof;

Fig. 5 is an enlarged side elevation of one of the joints in assembled relation, the remote portions of the adjacent sections being broken away to facilitate illustration;

Fig. 6 is an enlarged section on line 6—6 of Fig. 5;

Fig. 7 is a longitudinal section on line 7—7 of Fig. 6;

Fig. 8 is a sectional view similar to Fig. 7 showing one of the joints used when the adjacent sections are of equal diameter, and when these sections are in process of assembly;

Fig. 9 is a view similar to Fig. 8 but showing the joint assembled;

Fig. 10 is a view similar to Fig. 8 but showing the joint used when the adjacent sections are of different diameter;

Fig. 11 is a view similar to Fig. 10 but showing the sections in assembled relation;

Fig. 12 is an enlarged side elevation of the topmost or tip section, and

Fig. 13 is an enlarged side elevation of the section next the tip section.

In this illustrative construction, I have shown my improved radio mast or antenna, generally indicated at 1, as comprising a plurality of improved tubular interconnected sections, certain of which form a tip portion, generally indicated at 2, while others form an intermediate portion, indicated at 3, and the remainder form a butt or base portion, indicated at 4; each of these portions 2, 3 and 4 herein being formed of a plurality of sections, and each comprising interconnected separable sections of an improved construction, and also having improved adapter sections between adjacent portions, while the several sections are connected together by improved connecting means or joints of an improved construction, all as hereinafter more fully described.

Referring more particularly to the portions 2, 3 and 4, it will be understood that each may be of any desired length and each comprise any desired number of connected sections. However, in the particular antenna illustrated, I have shown each portion as comprising four sections. Further, while, if desired, the component sections in the several portions 2, 3 and 4, apart from the extreme tip, may be, if desired, of the same diameter, I have herein shown the antenna as comprising such portions 2, 3 and 4 of decreasing diameter toward the tip, this construction being found better adapted to use in a portable antenna. Moreover, the tip section, in this construction indicated at 5, carries a usual enlarged tip or extremity 6 and herein is connected to an adjacent section 7 having a step 8 reducing its diameter adjacent its upper extremity, while at the lower ends of portions 2 and 3 special so-called adapter sections 9 and 10 are also provided to connect them to the next lower sections of larger diameter.

The remaining sections are of standard construction and interchangeably connectible in their respective portion. Thus, all of the four

sections 11 in the butt or base portion 4 are completely interchangeable one with another, and the same is true of the three sections 12 in the intermediate portion 3 other than the adapter section 10. Obviously, if desired, the same interchangeability of the two intermediate sections 7 and 13 of the tip portion 2 may be provided by omitting the step 8 in the tip section 7 and merely using a larger tip section 5.

All interchangeable sections being identical save as to diameter, reference is here made to Figures 5, 6, 7, 8 and 9, which show two adjacent butt or base sections 11, for a specific description of typical interchangeable sections. Each of these sections 11 comprises a suitable length, herein about thirteen inches, of rolled open seam tubing, free from taper in this embodiment and having an open seam 14 extending throughout the length thereof. As shown, each of these sections 11 is also provided with a portion 15 of uniform diameter extending from the upper extremity thereof to a point two or more inches from the lower end thereof. There, a portion of slightly reduced diameter 16 is provided which is joined to the portion 15 by an annular reducing step 17 and is of only slightly greater outside diameter than the inside diameter of the portion 15 of the next lower section shown at the right in Fig. 8. Thus, a lower end portion 16 is provided on the upper section 11 which, while formed of the same open seam tubing as the upper portion 15 of that section and also integral therewith, is adapted to be received in the open end of the portion 15 of the adjacent, or lower, section 11.

The slightly longer and somewhat compressible open seamed joint portion 16 thus being receivable in an expansible open seamed portion 15, it will be apparent that a wide range of tolerance is provided in the fitting of the adjacent portions 15 and 16 of adjacent sections 11 in such manner as thereby to permit quick and ready telescoping of the upper portion 16 into the adjacent lower portion 15. As shown, the portion 16 is also of such substantial length as to provide a frictional engagement of substantial length and area between the exterior of the portion 16 and the interior of the expansible portion 15. In the preferred construction, the extremity of the portion 16 is also rounded off as shown at 18, to facilitate entry into the adjacent lower portion 15.

Cooperating with both the portion 16 and the adjacent expansible extremity 15 of the next lower section 11 is a member 19 in the nature of an umbrella. In the preferred construction, this umbrella 19 is in the form of a band of seamless stock punched out into the form illustrated and having a cylindrical portion 20 snugly received on and suitably fixed, as by brazing, to the lower end of the portion 15 of the upper section 11, and preferably extending down to the step 17. Also, the opposite end of the umbrella 19 as shown comprises a cylindrical portion 21 which is of increased diameter and connected to the portion 20 of smaller diameter by an annular sloping step 22 opposite the sloping step 17. The step 17 and the step 22, being oppositely disposed, cooperate to form a wedge shaped inner end 23 in an annular socket 24 provided between the portion 21 and the part of the portion 16 enclosed within the portion 21. The portion 21 of the umbrella being also of greater diameter than the outside diameter of the adjacent portion 15 of the next lower section, even when said portion 15 is ex-

panded by the portion 16, it will be apparent that when the section 15 is thus expanded and as it moves over the portion 16, the end 25 of the portion 15 will freely enter the annular socket 24. Further, that end 25 will engage the walls of the wedge shaped end 23 of that socket in such manner as not only to limit the relative movement of the two sections in that direction, but also to securely position the two sections in their connected relation, while this engagement further cooperates with the frictional engagement between the outside diameter of the portion 16 and the inside diameter of the outer portion 15 to prevent relative rotation thereof.

It will also be apparent that with the portions 21 and 22 of the umbrella 19 thus housing the extremity of the portion 15 therein, and with both of these portions 21, 22 rigidly connected by the portion 20 to the upper section 11, these portions 21 and 22 will effectually prevent such further expansion of the lower section 11 as would otherwise result should its extremity 25 merely strike the outwardly inclined step 17 and such portions 21 and 22 be omitted. Moreover, it will be apparent that with the umbrella member 19 downwardly disposed, the same will act to minimize the entry of rain into the joint, while the length of the portion 16 is such as effectually to close the portion of the seam 14 on the adjacent lower section 15 which has been expanded by the entry of portion 16 therein, all in such manner that a substantially watertight joint is thus provided despite the use of open seam tubing for the sections. Here attention is also directed to the fact that while the lower portion 15 will expand as above described and as shown in somewhat exaggerated form in Fig. 9, the amount of expansion is insufficient to prevent the ready entry of the extremity thereof in the annular socket 24 due to the increased diameter of the portion 21 on the umbrella; the parts, instead, during connection, moving freely from the relation shown in Fig. 8 into the assembled relation shown in Fig. 9.

In the adapter sections 9 and 10, the construction is essentially similar to that heretofore described except that the section carrying the umbrella 19 is of uniform diameter throughout, as shown in Figs. 10 and 11, i. e. the step 17 heretofore described is omitted; such a step being unnecessary where the portion 15 of the lower section 11, shown at the right in Fig. 10, is of larger diameter than the portion 16a of the upper section 11, shown at the left in that figure. The same general relation between the seamed extremities of the adjacent portions 15, 16a being retained, so that the portion 16a of the upper or left hand section 11 will be received in and expand the portion 15 of the lower or right hand section 11, obviously the desired frictional engagement heretofore described will also continue to be obtained. Further, when the extremity 25 of the lower section 11 engages the sloping wall of the step 22 on the umbrella 19, both the desired limiting of relative longitudinal movement and the engagement of the extremity 25 with this sloping wall will result as heretofore described, despite the omission of the step between the portions 16a and 15 of the upper or left hand section 11.

As a result of my improved construction, a wholly new range of tolerances is made possible while maintaining the desired connection of the sections, all in such manner as not only to facilitate assembly, but also to make possible a wholly new and desirable interchangeability of

sections markedly facilitating assembly and repairs in the field. My improved construction also makes it possible to produce all of the antenna sections from sheet stock in relatively simple rolling operations, without requiring the use of drawing dies and the reduction of the tubing in such dies as has heretofore been necessary in the production of sections of seamless tubing. Further, it is thereby made possible to utilize high carbon steel, as distinguished from low carbon steel, and at the same time, through the elimination of drawing, it is also made possible to eliminate the hardening incident thereto. Moreover, while utilizing high carbon steel, it is made possible to heat treat the same in such manner as obviously to produce a superior section of increased strength and resiliency as compared with an ordinary low carbon steel section hardened as above described and having, as distinguished from the resiliency of heat treated high carbon steel, no substantial resiliency and consequently a tendency to retain a permanent set whenever bent. Attention is also directed to the fact that through the use of open seam tubing, markedly improved results as regards withstanding torsion are obtainable as compared with seamless tubing, the open seam tubing, within limits, permitting torsion without distortion and not collapsing or taking a permanent bend under torsion, whereas seamless tubing under like torsion tends to resist the twist and consequently to collapse or break. Attention is further directed to the fact that while, as a result of my improved construction, it is made possible to obtain the above advantages incident to open seam tubing, it is also made possible at the same time to reenforce each section by my improved umbrella member adjacent one end thereof, and in such manner as further to increase the strength of the upper section carrying the umbrella, at the same time that over-expansion and excessive longitudinal telescoping of the open seam tubing of the lower section is also effectually prevented; this being due to the stepped portions respectively formed on the umbrella and enclosed therein in the interchangeable sections, or formed only on the umbrella in the adapter sections.

It will further be evident that while I have described my invention herein as applied to an antenna, my improved sections and the improved joints therebetween are also adapted to use in other relations wherever interconnected tubular sections are required, as, for example, in fishing rods. Moreover, it will be apparent that, due to the substantial reduction in cost incident to my improved construction, it is made possible very substantially to reduce the cost of manufacture as compared with prior structures while also producing an improved article. These and other advantages of my improvements will, however, be clearly apparent to those skilled in the art.

While I have in this application described one embodiment which my invention may assume in practice, it will be understood that the same is shown for purposes of illustration, and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. Cooperating tubular sections having adjacent ends disposed in telescoping relation and comprising an open seam female section and a

cooperating male section and having means on said male section for limiting the expansion of said female section and the relative longitudinal movement of said sections, said means and said male section having a plurality of oppositely disposed annular sloping surfaces engageable by the extremity of said female section.

2. A tubular telescopic section comprising a length of open seam tubing and having annular means fixed thereto at a point adjacent one extremity thereof for enclosing and limiting the expansion and relative longitudinal movement of a member telescopically receiving said extremity, said length having a step portion reducing the diameter thereof and enclosed within said means.

3. A tubular telescopic section comprising a length of open seam tubing and having annular means fixed thereto at a point adjacent one extremity thereof for enclosing and limiting the expansion and relative longitudinal movement of a member telescopically receiving said extremity, said length having a step portion reducing the diameter thereof and enclosed within said means, and the latter means also including a step portion increasing the diameter thereof and substantially opposite said first mentioned step portion.

4. A tubular telescopic section comprising a length of open seam tubing and having annular means fixed thereto at a point adjacent one extremity thereof for enclosing and limiting the expansion and relative longitudinal movement of a member telescopically receiving said extremity, said length being of uniform cross section throughout and said means including a step portion intermediate the ends thereof.

5. A tubular telescopic section having an annular umbrella member fixed thereto longitudinally spaced from one extremity thereof and comprising an annular portion fixed to said section, a step portion adjacent said annular portion and increasing the diameter of said umbrella member, and an enclosing portion extending from said step portion toward said extremity.

6. A tubular telescopic section, of open seam tubing having an annular umbrella member fixed thereto adjacent one extremity thereof and comprising an annular portion fixed to said section, a step portion adjacent said annular portion and increasing the diameter of said umbrella member, and an enclosing portion extending from said step portion toward said extremity, said section being of uniform diameter throughout its length.

7. A tubular telescopic section of open seam tubing having an annular umbrella member fixed thereto adjacent one extremity thereof and comprising an annular portion fixed to said section, a step portion adjacent said annular portion and increasing the diameter of said umbrella member, and an enclosing portion extending from said step portion toward said extremity, said section also having a sloping portion reducing the diameter of said extremity and enclosed within said umbrella member.

8. In combination, a plurality of telescopically connected sections, each of said sections comprising a length of expansible tubing and adjacent sections having telescopically connected male and female portions and having near the extremity of the male portions means for enclosing and engaging the cooperating female portions and limiting the expansion thereof and the relative longitudinal movement of said portions, a plurality of said sections being of one diameter and a plurality of said sections being of another diameter, the sections of the first diameter being interconnected to form one tubing portion and the sections of the second diameter being interconnected to form another tubing portion, the tubing portion of smaller diameter having on its extremity for making connection to the other tubing portion a male connecting portion of greater diameter than the other male connecting portions of said first-named tubing portion.

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