

July 3, 1945.

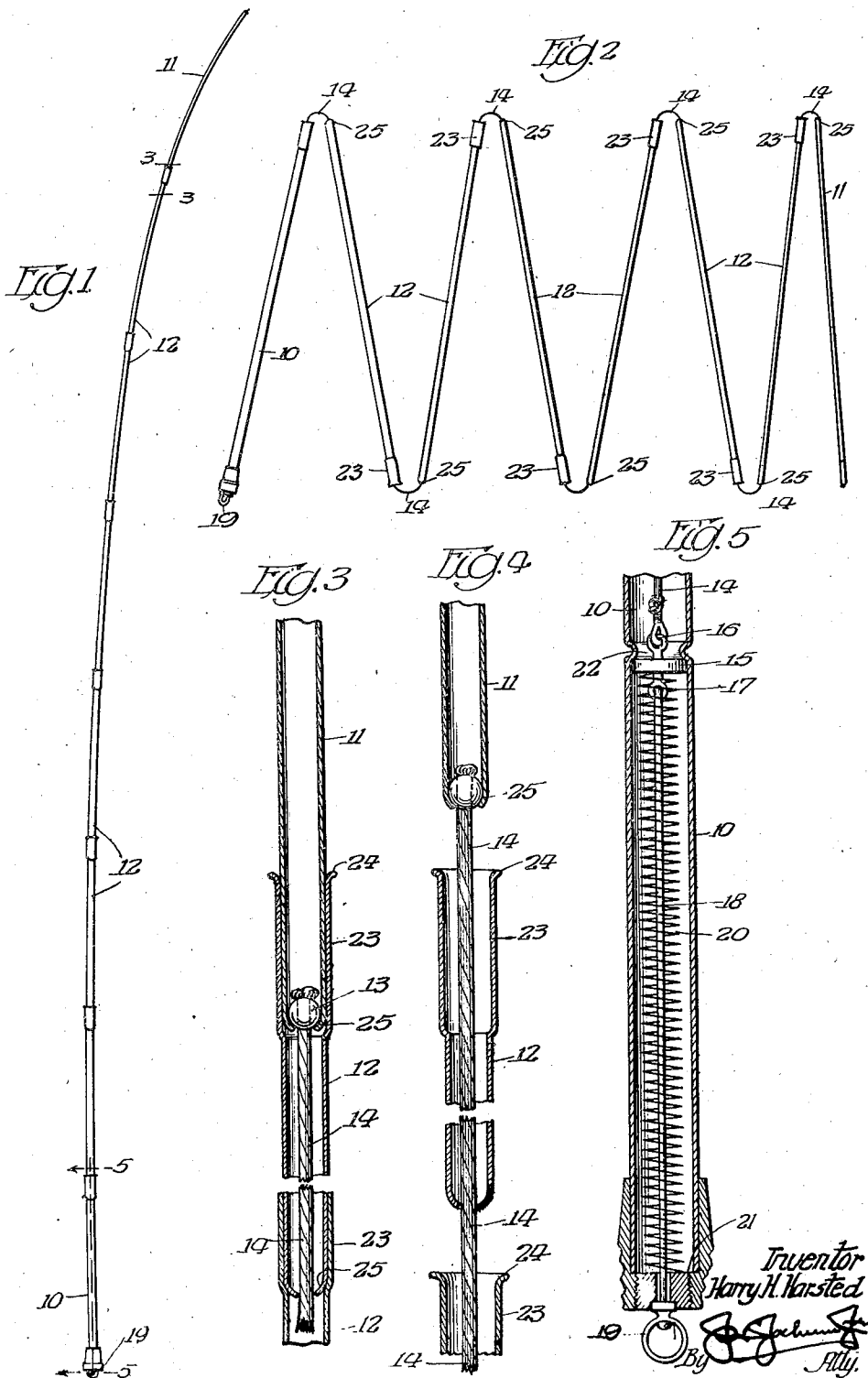
H. H. HARSTED

2,379,577

FOLDABLE ANTENNA

Filed Jan. 25, 1943

2 Sheets-Sheet 1



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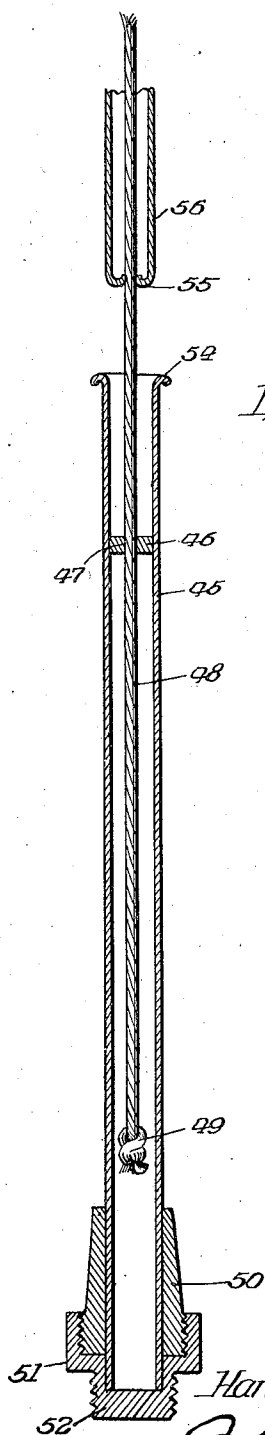
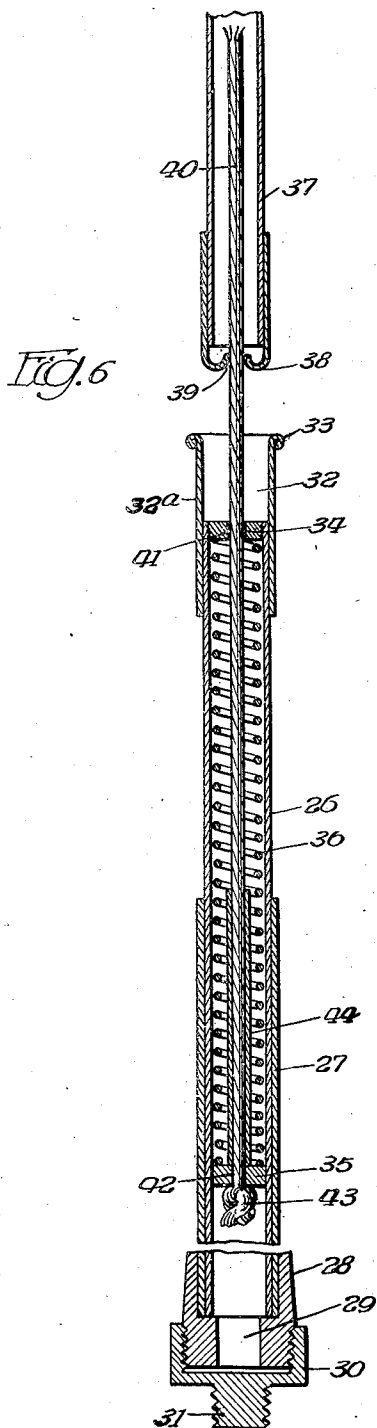
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UNITED STATES PATENT OFFICE

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FOLDABLE ANTENNA

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2 Claims. (Cl. 189-26)

This invention relates, in general, to antenna particularly adapted, though not necessarily limited in use with portable radio apparatus, and one of the objects is to provide an improved antenna or rod of this character which will be of sectional construction, provided with means whereby the sections, when detached with respect to each other, will remain connected together to prevent loss or misplacement of any of the sections, and which separated, but connected, sections may be folded together into a compact bundle.

A further object is to provide improved means whereby the sections may be readily secured together, end to end, in an assembled relation, ready for use.

A further object is to provide an improved sectional antenna or rod of this character, in which the means that maintains the sections connected together when they are in disassembled relation, will also serve as a means for drawing or assembling the sections together, with portions of the proximate ends of adjacent sections telescoping with each other.

A further object is to provide an improved sectional rod or antenna, in which, when the sections are connected together in assembled relation, the antenna or rod will have the necessary rigidity and, at the same time, the desired flexibility to permit it to bend or yield without causing any damage thereto.

A further object is to provide an improved antenna or rod of this character which will be simple, durable and strong in construction, and effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention, and in which

Fig. 1 is an elevation of an antenna or rod of this character, constructed in accordance with the principles of this invention, and showing the sections secured together and in position for use.

Fig. 2 is a view showing the sections disconnected from each other, but connected together and in a partially folded condition with respect to each other.

Fig. 3 is an enlarged detail sectional view taken on line 3—3, Fig. 1.

Fig. 4 is a view similar to Fig. 3, with the sec-

tions disconnected, but in alinement, so as to be drawn together.

Fig. 5 is an enlarged detail sectional view taken on line 5—5, Fig. 1.

Fig. 6 is a detail sectional view of one end section and a portion of the adjacent section of a rod, showing a modified form of the invention.

Fig. 7 is a sectional view, similar to Fig. 6, of still another form of the invention.

Throughout the specification, the device will be described as an antenna, but it is to be understood that its construction is well adapted for other purposes.

The antenna consists, essentially, of two end sections 10, 11, with intermediate sections 12, any number of which latter may be provided, and the sections may be of any desired length, constructed of any suitable material, and are preferably hollow. The end section 11 has secured to it at one end thereof and in any suitable manner, as at 13, a flexible member or cable 14. In the drawings, the flexible member 14 may be secured by soldering or welding the same in position, as indicated at 13. This flexible member 14 is of any suitable length, according to the number of sections employed in the antenna. In the present exemplification of this invention, eight sections are shown, and the flexible member 14 passes through each of the sections 12 and into the other end section 10.

Within the section 10 is a suitable anchor 15, to which the other end of the flexible member 14 is secured, as at 16. Attached also to the anchor 15, as at 17, is another flexible member 18 which preferably extends through the section 10 and has secured to it, at its free end, a handle or grip member 19.

Encompassing the flexible member 18 within the end section 10, is a resilient element 20 in the form of a coil spring, one end of which engages and rests against the anchor 15, and the other end abuts a shoulder 21 at the end of the section 10. Normally, the resilient element 20 will hold the anchor 15 against a shoulder 22 in the section 10, and the anchor 15 is adapted to be moved by the handle 19 within the section 10, and against the stress of the resilient element 20.

The flexible member 14 is of such a length that when the sections of the antenna are detached, as shown in Fig. 4, the sections may be folded with respect to each other, and into a compact bundle, Fig. 2 illustrating the sections in a partially folded condition. When the sections are folded together, the resilient element, in each of the forms of the invention, will, through the me-

dium of the flexible member, maintain the sections in folded relation.

Assuming the sections to be folded, when it is desired to assemble the sections for use, they may be first straightened out or arranged in substantial alinement with each other, by grasping the section 10 and throwing the other sections outwardly into a substantially straight line, with the outermost sections resting upon the ground to cause the sections to assume relative positions with respect to each other, as illustrated in Fig. 4. The operator then grasps the handle 19 and pulls upon the flexible member 18 so as to cause the anchor 15 to move within the section 10, thereby drawing upon the flexible member 14, which will cause the proximate ends of adjacent sections to telescope with each other, in the manner shown in Fig. 3. When the sections are thus drawn together, they will have a tight frictional telescopic engagement with each other, which holds them together independently of the flexible member.

After the sections have been thus drawn together, it will be manifest that the flexible member 18 would, under ordinary conditions, project beyond the free end of the section 10. However, the resilient element 20, when the antenna sections are assembled, will cause the anchor 15 to move backwardly in the section 10 until it engages the shoulder 22, thereby drawing the flexible member 18 into the end section 10. Obviously, it would be immaterial as to whether the flexible member 14 within the remaining sections is in a taut or loose condition.

If desired, in order to facilitate the drawing of the respective sections together in telescoping relation, the proximate ends of adjacent sections may be provided one with an enlarged seat portion 23 with its outer edge 24 flared, and the other with a tapered extremity 25, the tapered portion 25 cooperating with the flared portion 24 to guide the adjacent ends of the sections into telescoping relation.

In Fig. 6 there is shown a modified form of the invention, in which the end section 26 is preferably reinforced, as at 27, by means of a sleeve or tubular member telescoped thereover, and the open end of the section, together with the sleeve, may be closed by means of a collar 28 having an opening 29 therethrough, and this opening 29 may be closed by means of a cap 30 having a threaded extension 31, by means of which latter the antenna may be anchored to the radio apparatus.

The section 26 may be of any desired length, and at the other end there is provided a seat or socket 32 which may be formed in any suitable manner, either by drawing out the end of the section 26 or by means of an additional tubular member 32^a sleeved thereover and secured thereto in any suitable manner. The upper end of the seat member 32 is flared, as at 33.

Within the section 26 is arranged a collar or shoulder 34 which is anchored thereto, and slidable within the section 26 is an abutment member 35, a coil spring 36 being disposed between the abutment member 35 and the shoulder 34. The proximate end of the adjacent section 37 is shaped to form a closure 38 having an aperture 39 therethrough, and this closure 38 is beveled or tapered so as to co-operate with the flared extremity 33 of the seat or socket 32, whereby the section 37 will be guided into telescoping relation with respect to the section 26.

A flexible member 40 which is secured at one end to the outer section of the antenna or rod

passes through the section 37, also through an opening 41 in the shoulder 34, and also through an opening 42 in the slidable abutment 35, and is then either formed into a knot 43 or it may be provided with any other suitable formation connected thereto so as to prevent disengagement of the flexible member with respect to the abutment 35. The portion of the flexible member which is within the section 26 passes through the coil spring 36, and surrounding the flexible member and also within the coil spring 36 is a tubular member 44 which may be of any desired length, and may be either attached to the abutment 35 or rest loosely thereupon.

With this form of the invention, it will be manifest that by holding the section 37 and then grasping the section 26 and moving the same away from the section 37 to draw upon the flexible member 40, the aligned sections of the antenna or rod will be drawn together in telescoping relation with respect to each other, in a manner similar to the form of the invention shown in Figures 1 to 5, with the exception that when the section 26 is moved away from the section 37, and as the abutment or collar 35 is free to move lengthwise of the section 26, the coil spring or resilient member 36 will be contracted or compressed. The extent of compression of the spring 36 is controlled by means of the tubular member 44, which will engage the shoulder 34 when the spring 36 is sufficiently compressed.

After the other sections of the rod or antenna have been drawn together, the end section 26 may be telescoped over the adjacent section 37, and as the spring 36 is under compression until the section 26 is telescoped with the section 37, it will be manifest that, as soon as this telescoping relation is effected, the tension of the spring 36 will draw upon the flexible member 40 and maintain the latter taut. The flexible member 40 is preferably in the form of a cable, and when the sections of the rod or antenna are separated and folded, and even though the spring 36 is under tension, there will be sufficient friction created by the bends of the flexible member 40 while the sections are folded, to permit the sections to remain in a folded condition with respect to each other.

In the form of the invention shown in Figure 7, the spring 36 and the sliding abutment 35, together with the tubular member 44, are omitted, and there may be provided in the end section 45 a shoulder 46 having an opening 47 therethrough, and through which opening a flexible member 48 passes. A knot or formation 49 is provided on the end of the flexible member, which is of a sufficient size to prevent such end of the flexible member from being drawn through the opening 47. The end of the section 45 may be closed by means of a collar 50 having a cap 51 removably attached thereto, and the cap is provided with a threaded extension 52 to form an anchor for the antenna.

In this form of the invention, the upper end of the section 45 may be flared, as at 54, to receive the proximate end 55 of the rod section 56. Obviously, the shoulder 46 may be provided at any suitable point throughout the length of the section 45, and the flexible member 48 may also be of any desired length. Suffice it to say that, with this form of the invention, like the form shown in Figure 6, the section 45 forms a handle for drawing or pulling upon the flexible member 48, so that when the formation 49 contacts the shoulder 46, the antenna or rod sections will be drawn together in telescoping relation. There-

after, the free end of the flexible member 48 will remain within the section 45.

An antenna constructed in accordance with the principles of this invention, and as shown in any of the preferred forms thereof, will not only possess the desired strength and rigidity, but will also be flexible, so that it will not be damaged by striking any object. When the sections are disassembled with respect to each other, they may be folded together into a small or compact bundle which may be readily transported. At the same time, when it is desired to make use of the antenna, the sections may be connected in telescoping relation, very quickly and with little effort.

While the preferred forms of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. A foldable rod formed of a plurality of sections assembled together end to end, a flexible element connected at one end to one of said sections and passing through others of the sections for drawing the sections together, from a folded relation, said sections when drawn together having a tight frictional telescopic engagement with each other, which holds the sections together independently of said flexible element, means connecting the other end of said flexible element to another of said sections, whereby the latter sec-

tion will serve as a handle to draw upon said flexible element, and means within the last recited section serving, when the sections are in assembled relation, for taking up the slack in said flexible element, the last said means and the said flexible element being disposed within the confines of the periphery of the rod, whereby the rod will be free from operating parts extending beyond the periphery thereof, the last said means also operating to permit the said sections to be separated and folded together, and to maintain the rod sections in folded relation.

2. A foldable rod formed of a plurality of sections assembled together end to end, a flexible element connected by one end to one of the sections and passing through others of the sections for drawing the sections together from a folded relation, said sections when drawn together having a tight frictional telescopic engagement with each other, which holds the sections together independently of said flexible element, means connecting the other end of said flexible member to another of said sections, whereby the latter section will serve as a handle to draw upon said flexible member, and means within the last recited section serving, when the sections are in assembled relation, for taking up the slack in said flexible member, the last said means also operating to permit the said sections to be separated and folded together, and also operating to maintain the rod sections in folded relation.

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