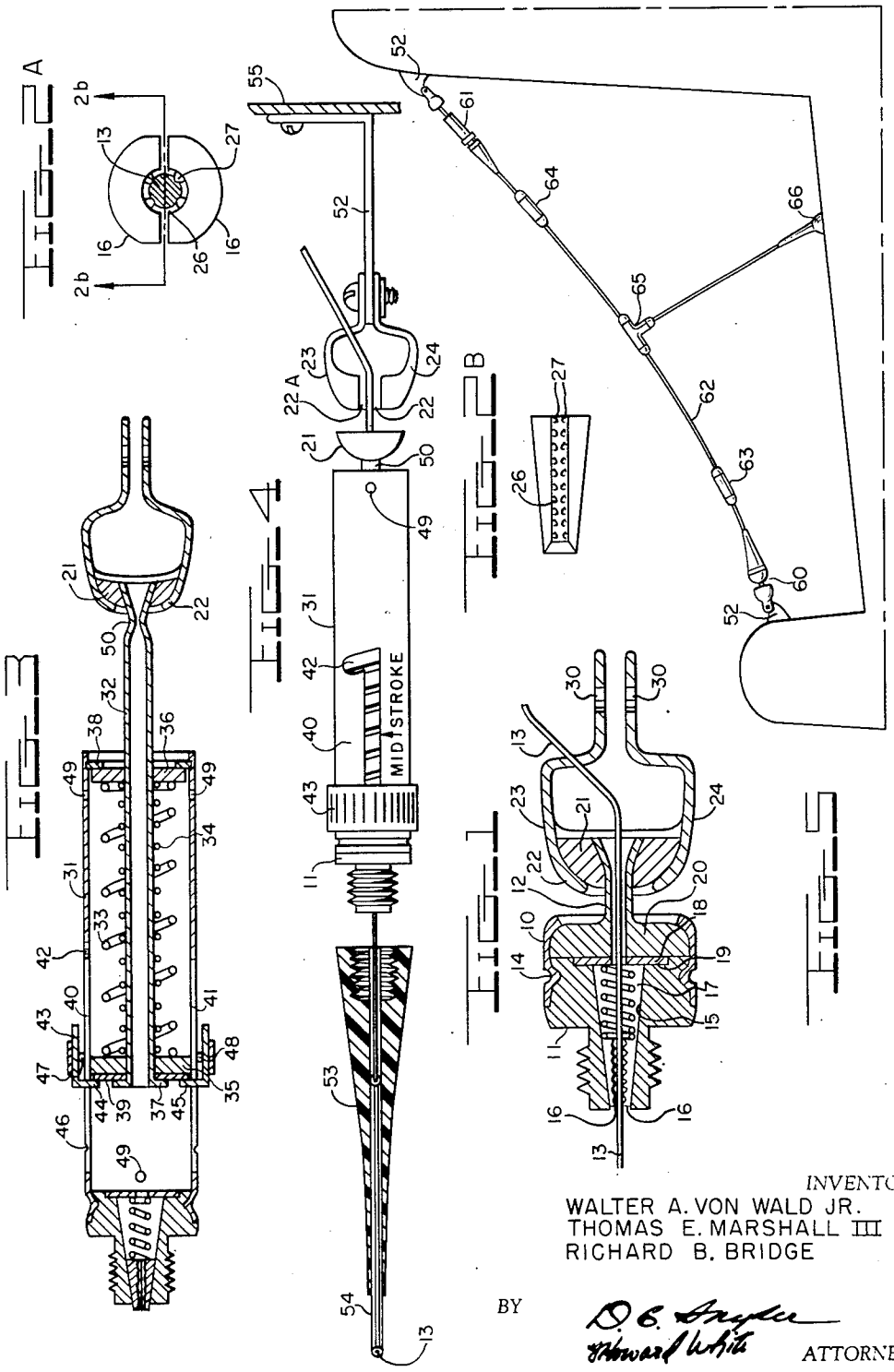
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ANTENNA TENSION TAKE-UP UNIT

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ANTENNA TENSION TAKE-UP UNIT

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1

This invention relates generally to line tightening devices and more particularly to take up devices for wire antennas.

In wire antenna installations it is customary to support the antenna some distance from the supporting structure by means of guy wires and strain insulators disposed at each end of the antenna. The desired tautness of the antenna wire is usually obtained by adjustment of the guy wires. The guy wires may be made of the same material as the antenna. In the case of insulated wire antennas designed to eliminate precipitation static, portions of the guy wires are likely to extend into regions susceptible to corona discharge and it becomes important to provide guy wires of highly insulated wire such as the antenna wire. Take-up devices suitable for tightening insulated wire without impairing the strength of the wire or its insulation are therefore required.

A further problem is presented by wire antennas since they cannot easily be dismounted without requiring readjustment of the tension when remounted. This is particularly noticeable in aircraft installations where it is often desired to dismount the antenna while parking or repairing the aircraft.

It is then an object of this invention to provide a line take-up device.

It is a further object of this invention to provide a take-up device for insulated wire.

It is a further object of this invention to provide a tension take-up device.

It is a still further object of this invention to provide a tension take-up device incorporating a disconnecting means.

It is another object of this invention to provide a take-up device having a pivotal disconnectable mounting.

Other objects and features of this invention will be apparent from the following description and accompanying drawings wherein similar characters of reference indicate similar parts throughout the several views.

In the drawings:

Fig. 1 is a cross-sectional view of one embodiment of this invention;

Figs. 2*a* and 2*b* are enlarged views of a portion of Fig. 1;

Fig. 3 is a cross-sectional view of a variant embodiment of this invention;

Fig. 4 is a side elevational view of a complete take-up assembly; and

Fig. 5 is an elevational view of an antenna installation employing the embodiments of Figs. 1 and 3.

2

Briefly, this invention provides a wire take-up device having a wire-gripping chuck in a feed through arrangement whereby the wire may be pulled through the chuck until the desired tautness is obtained. The gripping action of the chuck prevents the wire from slipping back through the chuck. In another embodiment the chuck holder is spring loaded to maintain spring tension on the wire. The chuck holders are pivotally supported in a ball and socket type of joint which is disengageable when sufficient slack is present in the wire. In the tension embodiment this slack is readily provided by a locking means for holding the tension spring in compression. At the mouth of the chuck the wire is encased in an externally tapered member to prevent sharp bends in the wire.

Referring now to the drawings in detail, Fig. 1 shows a cross-sectional view of one embodiment of this invention. An outer tubular member 10 holds the chuck housing 11, an inner tubular member 12 provides the feed through path for the wire 13 and, as will be described, provides a pivotal support for the wire gripping assembly.

The chuck housing 11 is secured by a rolled joint 14 to the outer tube 10 and protrudes therefrom with a reduced size externally threaded portion. The chuck housing has a tapered bore 15 with its smaller end at the protruding end of the housing. A pair of wedge shaped jaws 16 are disposed within and shaped to fit the tapered contour of said bore. The jaws 16 are biased together by a coil spring 17 urging them toward the small end of bore 15. Spring 17 may be retained within the housing 11 by means of a washer 18 disposed within a recess 19 in the housing 11 surrounding the bore 15. The washer 18 may be held in the recess by staking.

One end of inner tube 12 is terminated in a disc-like member 20 enough larger than tube 12 to snugly fit the inside of outer tube 10. Outer tube 10 may be rolled over the edge of disc 20 to join same and permit the chuck housing to be supported from tube 12. The other end of tube 12 terminates in a ball and socket fitting to provide the pivotal support. The ball 21 has a hole through its center through which the inner tube 12 passes. Inner tube 12 is supported by ball 21 and retained thereon by the flared end of tube 12. The socket 22 for ball 21 is formed from a pair of mounting brackets 23 and 24 which are spaced apart for a suitable distance beyond the socket to permit insertion of the ball end of the assembly. The ball 21 may be hemispherically shaped as indicated in the drawings. The washer

18 and disc 20 each have a central aperture in alignment with the axis of coil spring 17, bore 15, and inner tube 12 to provide an opening through the entire assembly for the passage of wire 13. From the flared end of tube 12 the end of wire 13 may be brought out to the side between the brackets 23 and 24 where it hangs or projects unattached as shown in Figs. 1 and 4.

Fig. 2*a* is an enlarged view of the jaws 16 as seen from their larger end. The adjacent faces of the jaws have identical longitudinal grooves 26 lined with teeth 27 for respectively receiving and gripping the wire 13.

Fig. 2*b* is an elevational view of the grooved face of one of the jaws 16. It will be noticed that the groove is flared at the smaller end of the jaw to facilitate insertion of the wire between the jaws.

After assembling the various parts as described above, the socket brackets 23 and 24 are mounted to any desired rigid supporting structure as by means of holes 30. An end of wire 13 is inserted into the bore of housing 11, into the flared end of jaws 16, through grooves 26, through the center of washer 18, disc 20, tube 12 and may then be pulled out to the side of brackets 23 and 24. Teeth 27 on the jaws tend to grip wire 13. As the wire is moved to the right (Fig. 1), jaws 16 will be carried to the right with it against the pressure of spring 17. As the jaws move to the right they are permitted to separate because of the expanding taper of bore 15 and will release their grip on wire 13. Presuming the left end of wire 13 to be fixed, the right end may be pulled through the jaws 16 until the desired tautness is obtained in the wire. The wire will then remain taut since its own weight, or any other force, pulling the wire to the left will carry jaws 16 to the left with the wire. As jaws 16 move to the left the taper of bore 15 will cause teeth 27 to bite firmly into the wire.

In Fig. 3 a variant embodiment of this invention providing spring tension on the wire is shown in cross section. This embodiment employs a longer outer tube 31 and a longer inner tube 32 than tubes 10 and 12 respectively of Fig. 1. The longer outer tube 31 of Fig. 3 houses a pair of concentric springs 33 and 34 operating between a pair of disc bearings 35 and 36. A flange 37 is formed in the left end of inner tube 32. The springs 33 and 34 force bearing 35 against flange 37 through washer 39. The springs apply an opposite force against the right end of outer tube 31 through bearing 36 and its retaining ring 38. Concentric springs 33 and 34 are used in this embodiment instead of a single spring to reduce the overall length of the tubular members. By using concentric springs instead of a single spring the spring tension provided for the same spring length is nearly doubled.

Outer tube 31 is provided with a pair of longitudinal slots 40 and 41, disposed opposite each other and extending from near the center to near the left end of the tube. The right end of each slot terminates in a short transverse slot indicated at 42. A knurled collar 43 is slidably mounted on tube 31 and has a pair of depending lips 44 and 45 entering the tube through slots 40 and 41 respectively. Lips 44 and 45 penetrate their respective slots far enough to engage the left face of washer 39. Therefore, by moving collar 43 to the right against the springs to the end of slots 40 and 41 and then turning the collar so that the lips 44 and 45 engage the transverse slots 42, the springs may be held in compression and slack is supplied to the antenna. This slack

permits easy disengagement of the ball 21 from its socket 22.

An annular groove 46 circumscribes tube 31 near the left end of slots 40 and 41. A similar but slightly larger groove 47 circumscribes the inside of collar 43. A substantially triangular shaped ring 48 of spring wire rides inside the collar groove 47 and engages groove 46 when the collar is moved to the left and operates to hold the collar out of the way.

Disc bearing 35 moves with inner tube 32 and hence slides against the inner surface of outer tube 31. Disc bearing 36 moves with outer tube 31 and hence slides against inner tube 32. These bearings and the ball 21 are preferably made of oil impregnated bronze.

A number of holes 49 may be made in outer tube 31 to facilitate moisture drainage. Inner tube 32 may be reduced in size for a short length 50 near its entrance into ball 21, thus the hole in ball 21 can be kept small to provide more bearing surface. Further advantage is found in the small diameter section 50 in that it permits greater deflection for a given size hole in the socket 22.

It will be noted in the elevational view of socket 22 shown in Fig. 4, that the socket end of the brackets 23 and 24 are continuous on one side but define a narrow slot 22A, on the other. This slot permits removal of the ball from the socket when slack is supplied to the wire as by holding the springs in compression. Removal is then accomplished by moving the entire fitting to the right until the ball 21 is opposite the open side of the brackets 23 and 24, the inner tube may then be passed through the slot 22A as the ball is removed through the open side of the bracket. In the case of the embodiment of Fig. 1, the inner tube 12 may be too short to permit the ball to move back to the opening in the brackets and will require the fitting to be pivoted so that the tube 12 can be moved through slot 22A and the ball removed diagonally from the brackets.

The embodiment of Fig. 3 is shown in elevation in Fig. 4 together with an additional bracket 52 and a tapered wire support 53. In this view the components are shown strung along the wire but disconnected to more clearly present the fittings. The invention is here shown with insulated antenna wire. The wire support 53 is shown in section to permit viewing of the antenna wire. It will be noted that the wire insulation 54 is removed for a short distance ahead of the chuck housing to permit adjustment of the length of the wire. Wire support 53 offers a tapered flexibility which prevents sharp bending of the wire at its entrance to the chuck. The wire support has an internally threaded portion to fit the externally threaded reduced size portion of chuck housing 11. It is preferred to adjust the wire length so that disc 35 is normally visible through slot 40 opposite the arrow marked "mid stroke." The socket bracket is here shown attached to a bracket 52 suitable for attaching to the "skin" 55 of an aircraft. As is more clearly shown in Fig. 4 the brackets 23 and 24 forming socket 22 are continuous on one side of the socket to provide greater bearing surface and add strength to the socket.

A representative antenna installation is shown in Fig. 5. Typically the take-up unit shown in Fig. 1 is used at one end of the antenna and the tension take-up unit shown in Fig. 3 is used at the other. As shown in Fig. 5 a take-up unit 60 is used at the left and a tension take-up unit 61 is used at the right to support the antenna 62.

The antenna is insulated and further supported by a pair of strain insulators **63** and **64** such as disclosed in the copending application of W. A. Von Wald, Jr. and H. H. Slaughter, Jr., Serial No. 132,962, filed December 14, 1949. A lead-in from the antenna suspension is obtained through a T-connector **65** such as disclosed in the aforesaid copending application and may be brought into the aircraft through a lead through insulator **66** such as disclosed in the copending application of W. A. Von Wald, Jr. and T. E. Marshall, III, Serial No. 99,823, filed June 17, 1949.

Although certain specific embodiments of this invention have been herein disclosed and described, it is to be understood that they are merely illustrative of this invention and modifications may, of course, be made without departing from the spirit and scope of the invention as defined in the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. A wire take-up device comprising, a wire gripping chuck having spring loaded jaws operating in a tapered recess and a wire receiving channel therethrough, an outer tubular member attached to and partially encasing said chuck, an inner tubular member in axial alignment with said wire channel and protruding from said outer tubular member, spring tension means including a coil spring coaxial with said inner tubular member and having one end in engagement therewith and the other end in engagement with said outer tubular member, a substantially ball-shaped means attached to the protruding end of said inner tubular member and apertured to provide access thereto, and socket means having an open side for admitting said ball-shaped means and the protruding end of said inner tubular member.

2. A wire take-up device comprising, a wire gripping chuck having spring loaded jaws operating in a tapered recess and a wire receiving channel therethrough, an outer tubular member attached to and partially encasing said chuck, an inner tubular member in axial alignment with said wire channel and protruding from said outer tubular member, spring tension means including a coil spring disposed within and having one end in engagement with said outer tubular member, said spring being coaxial with, partially encasing and having its other end in engagement with said inner tubular member, a substantially ball-shaped means attached to the protruding end of said inner tubular member and apertured to provide access thereto, and socket means having an open side for admitting said ball shaped means and the protruding end of said inner tubular member.

3. A wire take-up device comprising, a wire gripping chuck having spring loaded jaws operating in a tapered recess and a wire receiving channel therethrough, an outer tubular member attached to and partially encasing said chuck, an inner tubular member in axial alignment with said wire channel and protruding from said outer tubular member, spring tension means including a coil spring disposed within and having one end in engagement with said outer tubular member, said spring being coaxial with, partially encasing and having its other end in engagement with said inner tubular member, a pair of L-shaped substantially longitudinal slots in said outer tubular member, a collar slidably mounted on said outer tubular member and having a pair of depending lips engaging said spring through said slots, a substantially ball-shaped means attached to the protruding end of said inner tubular member and apertured to provide access thereto, and socket means having an open side for admitting said ball-shaped means, said collar being operative to hold said spring in compression to facilitate disengagement of said ball from said socket.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
419,545	Olson	Jan. 14, 1890
718,948	Green	Jan. 20, 1903
823,594	Frazee	June 19, 1906
1,258,102	Foster	Mar. 5, 1918
1,814,609	Smith	July 14, 1931
2,105,178	Berndt	Jan. 11, 1938
2,139,642	Osolin	Dec. 6, 1938
2,214,961	Hawley	Sept. 17, 1940
2,286,655	Supnick	June 16, 1942
2,288,138	Jugle	June 30, 1942
2,438,548	Ehmann	Mar. 30, 1948

FOREIGN PATENTS

Number	Country	Date
141,088	Great Britain	Apr. 6, 1920