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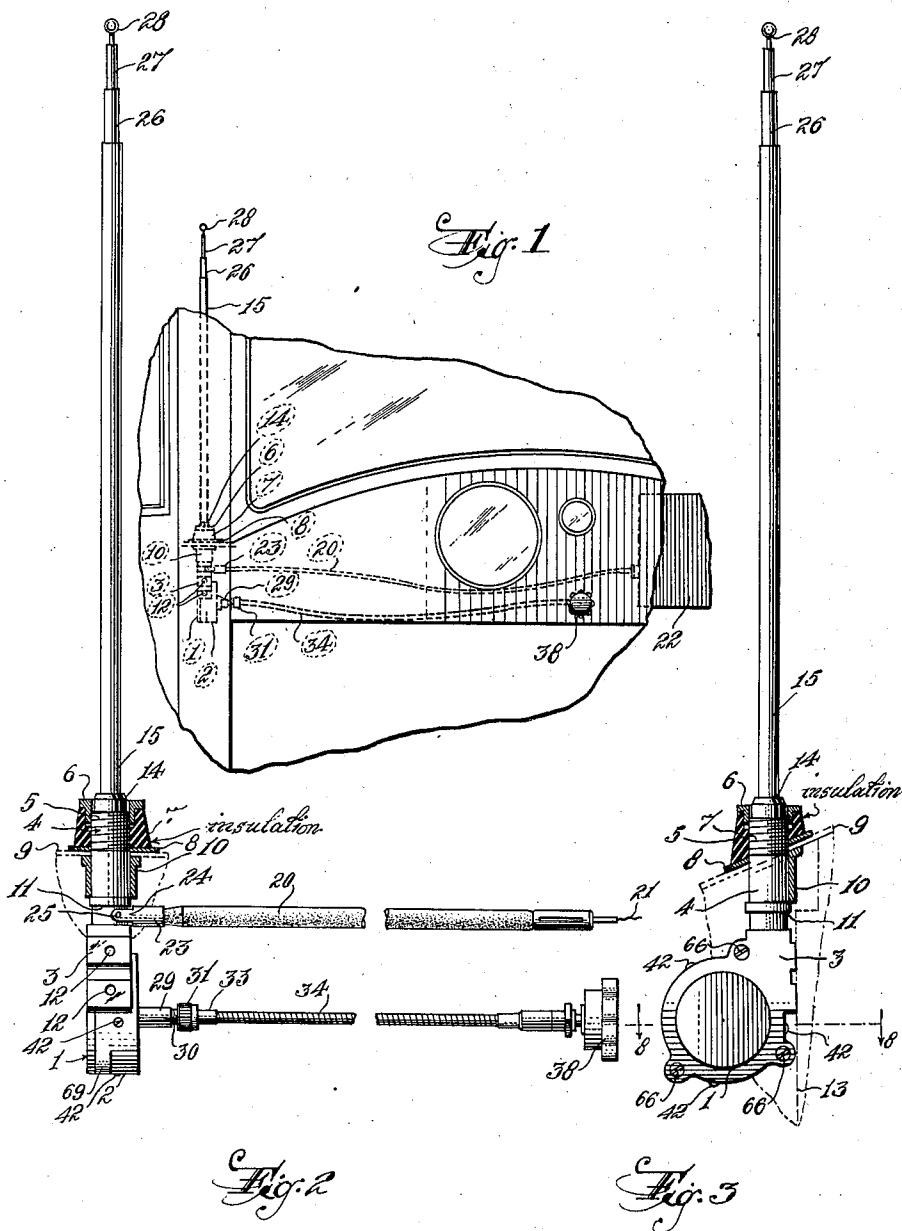
L. S. BRACH

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ANTENNA OPERATING REEL

Filed Aug. 17, 1940

3 Sheets-Sheet 1



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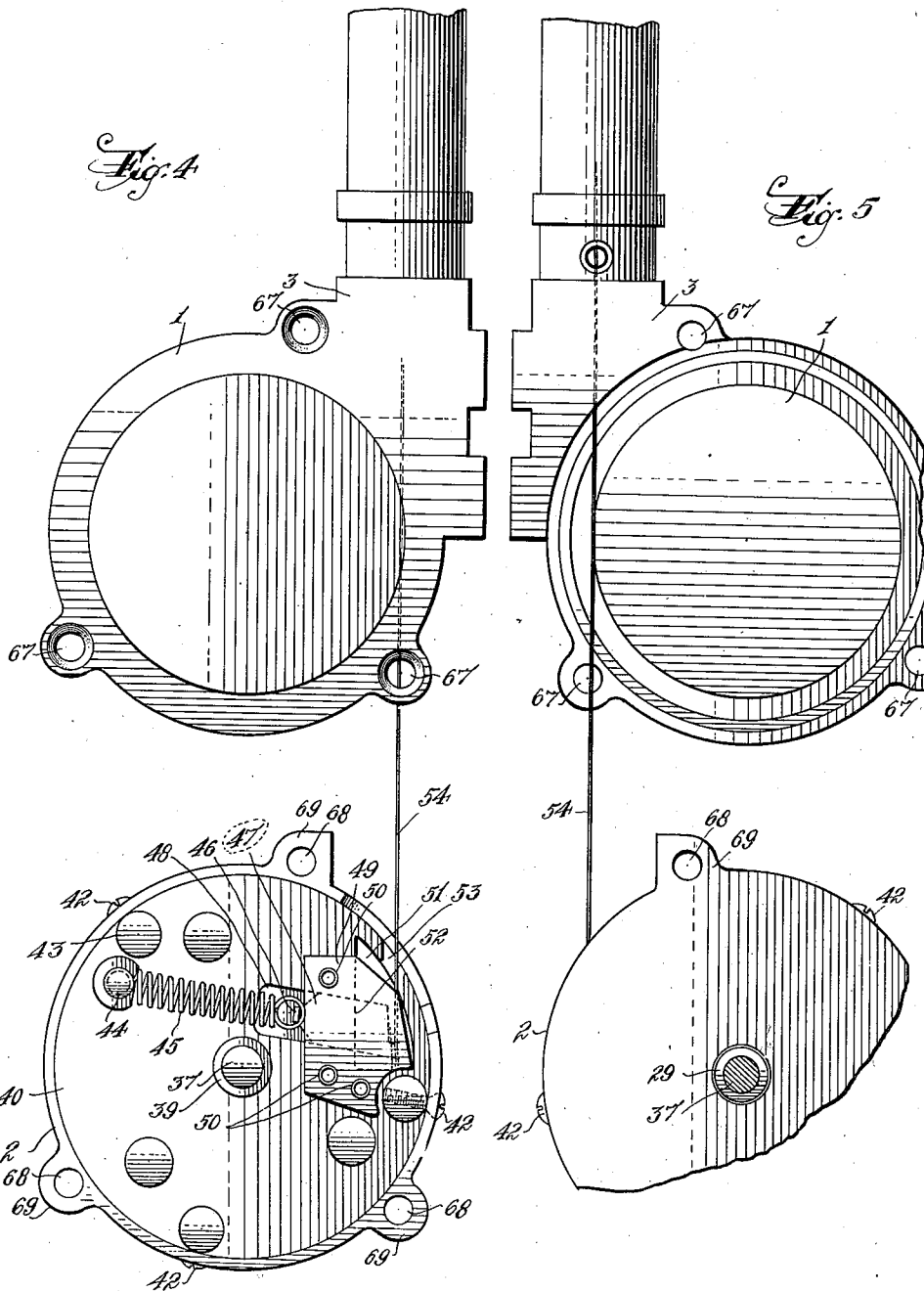
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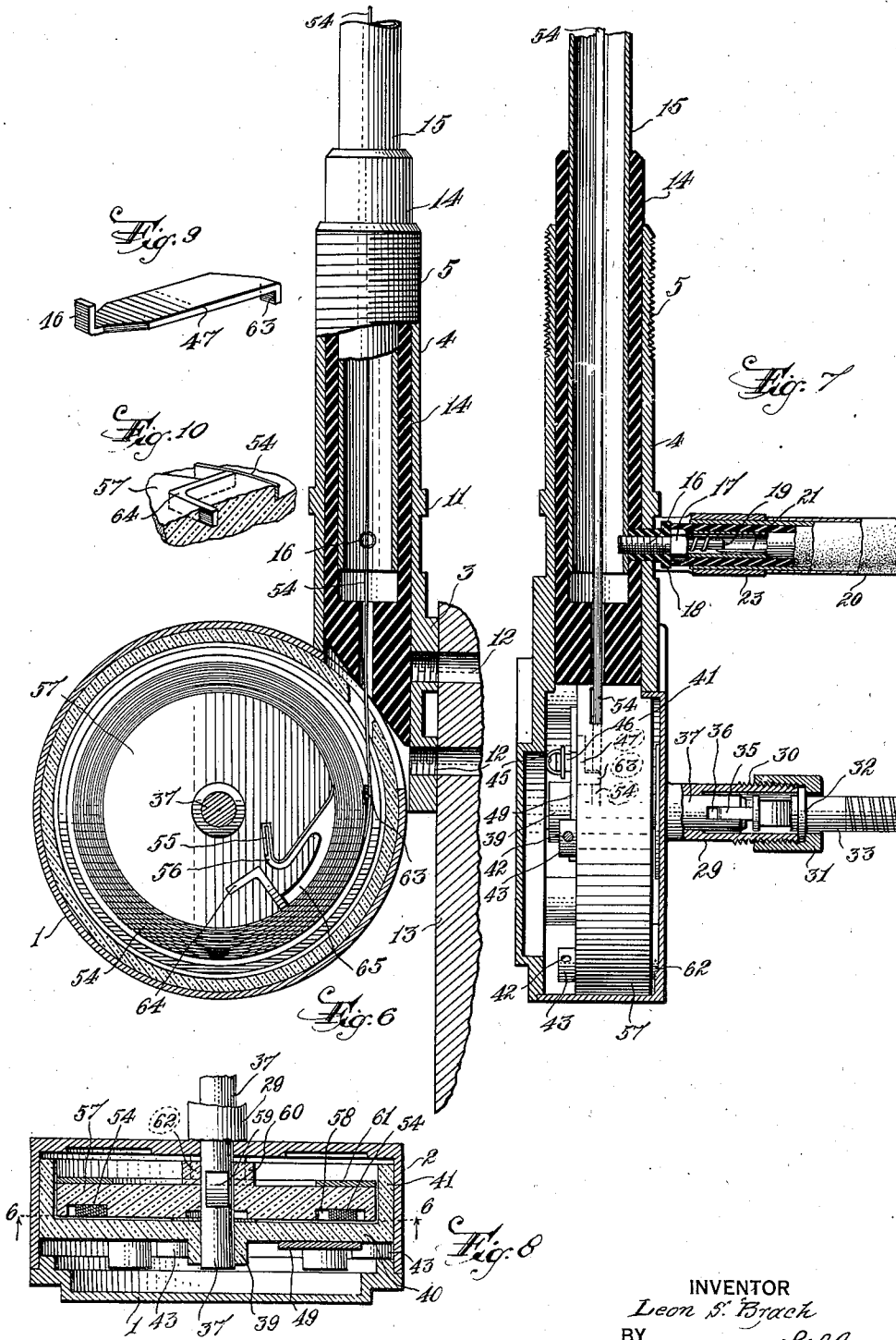
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UNITED STATES PATENT OFFICE

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ANTENNA OPERATING REEL

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Application August 17, 1940, Serial No. 353,047

17 Claims. (Cl. 250—33)

This invention relates to the construction of a reel especially adapted for use in raising and lowering antennae used in connection with radio receiving sets on automotive vehicles.

There are many operators of automotive vehicles who do not care to have the radio antenna of the whip-socket type extended when they are not using the radio. In the early types of collapsible antennae, it was necessary to pull out the sections comprising the antenna by hand from the exterior of the vehicle. To raise and lower the antenna by means of a reel, from the interior of the vehicle, might, to one familiar with fishing reels, clothes-line reels, wire and other types of reels, seem like an easy problem, but I have found, from investigation and many tests, that nothing in these types of reels suggests a solution of the particular problem involved in raising and lowering automotive vehicle antennae. Many difficulties are present; for example, I have heretofore used a round cable, which has been the standard practice, having considerable stiffness lengthwise of its direction, but otherwise flexible, and connected to the proper antenna section for raising and lowering the antenna, but I have found that a round wire, which can buckle in any direction, buckles at a time when it should not, thereby causing binding in the reel or receptacle containing it, when being operated, which in turn creates trouble and dissatisfaction to the user.

It is the object of my present invention to provide a reel that is materially different from anything so far proposed and which will eliminate the troubles which I have heretofore observed and encountered; and to secure an antenna reel which can be manually operated from the inside of the vehicle with a smooth and easy action.

Another object of my invention is to provide a reel in which there is a positive stop provided to limit the distance to which the antenna may be extended.

These and other objects will be apparent from a reading of the following specification taken in connection with the annexed drawings wherein:

Figure 1 is a fragmentary view showing a portion of the cowl of an automotive vehicle, with my improved type of antenna mechanism installed thereon.

Figure 2 is an end view of the antenna mechanism shown in Figure 1, but on a somewhat larger scale, the bushings where the antenna

comes through the body of the vehicle being shown in section.

Figure 3 is a view similar to Figure 2, but turned ninety degrees.

Figure 4 is a view somewhat enlarged of the reel, the two parts of the exterior casing being separated longitudinally, one from the other.

Figure 5 is a view similar to Figure 4, but looking at the opposite side, the cable from the receiving set as well as the operating drive for the reel being removed.

Figure 6 is a vertical section through the reel per se corresponding to the line 6—6 of Figure 3, the upper part of the outer casing stud being shown in elevation.

Figure 7 is a view somewhat similar to Figure 6, taken at ninety degrees thereto, showing the method of attaching the antenna wire going to the receiving set to the antenna section, and also showing the drive connection to the reel.

Figure 8 is a section on the line 8—8 of Figure 3.

Figure 9 is a perspective view of the guide link used for guiding the antenna section drive wire.

Figure 10 is a perspective view showing the stop mechanism for stopping the rotation of the reel when the antenna has reached the limit of its extended position.

In the various views, wherein like numbers refer to corresponding parts, my improved reel mechanism is made up of two casings, one inside the others. The outer casing is preferably of metal and is composed of two parts 1 and 2 fastened together by screws 66 going through screw holes 67 in the member 1 and into tap holes 68 in the lugs 69 of the member 2. The part 1 comprises a plate portion having a mounting stud extending therefrom. The stud has a base portion 3 preferably cast integral with the plate 1, and a stem portion 4 threaded at 5 to receive a lock nut 6 which is adapted to engage an insulator 7 which in turn engages a flexible gasket 8 that rests against the exterior portion of the car 9. A metal bushing 10 serves to position the mounting stud to that part of the body 9 through which the stud protrudes, the lower end of the bushing 10 engaging a collar 11 on the stud.

The base portion 3 is provided with threaded screw holes 12 for fastening the reel to a bracket or part of the vehicle body 13. Positioned within the stud is a hollow insulator 14 which preferably protrudes beyond the threaded portion 5 of the stud. Located within the insulating bushing 14 is what may be termed the basic or permanently

positioned and lower section 15 of the antenna. The section 15 is fastened in position by the threaded end 16 of a stud 17, a shouldered insulator 18 being used to insulate the stud 17 from the stem 4. The stud 17 has a reduced end 19 positioned within a flexible cable 20 which brings the antenna wire 21 from the radio receiving set 22 to the stud around which the antenna wire 21 is wrapped and soldered. The cable 20 has a fork-type clamp 23 fastened thereto, the arms 24 of the fork engaging the stem 4 and being fastened thereto in any satisfactory manner as by rivets 25, thereby anchoring the antenna cable securely to the lower outer section 15 of the antenna. Other sections of the antenna are indicated at 26, 27 and 28, which may be arranged and constructed somewhat as shown in my joint application with Alexander Norden, Jr., Serial No. 267,530, filed April 13, 1939.

The outer casing member 2 has a projection 29 threaded at 30 to receive a nipple 31 which engages a collar 32 fastened to a sleeve 33 which in turn is anchored to a flexible shaft conduit 34, through which extends a flexible drive shaft having a spade end 35 adapted to enter a slot 36 in the end of a stub shaft 37. To the outer end of the flexible shaft is fastened an operating crank or knob 38 which is mounted on the cowl in a convenient location to the driver or one sitting in the front seat of the vehicle. The inner end of the stub shaft is positioned in a hub 39 formed on one member 40 of the inner casing which has an annular flange 41 held in position within the outer metallic casing member 2 in any satisfactory manner as by screws or expansion pins 42 which enter the studs 43 preferably moulded integral with and located on the outer surface of the member 40 toward the outer casing member 1.

Also located on this same side of the insulator 40, toward the outer casing member 1, is a stud 44, to which is attached one end of a spring 45, the outer end of which is fastened to a lug 46 integral with a guide plate 47 that fits in a recess 48 in the outer face of the insulator 40. The guide plate 47 is held in its recess or seat 48 by a retainer plate 49 which is fastened to the outer face of the insulator 40 by a plurality of rivets or eyelets 50. The face of the insulator 40 has a portion cut out at 51 as defined by the broken line 52, most of the portion being covered by the retainer plate 49. Also, the flange 41 has an opening 53 therein at the junction of the flange with the base, to allow the passage there-through of the drive wire 54, the inner end 55 of which is bent over and located in a hook-like formation 56 moulded in the insulator 57 which comprises the second member of the inner casing. The inner face of the member 57 is provided with an annular track 58, within which are located the turns of the drive wire 54, as shown in Figures 6 and 8.

It should be noted at this point that the drive wire 54 is rectangular in cross-section and I have found that music wire, which is of a high-grade tempered steel, approximately .018" thick and .065" wide, gives excellent results, it being understood that the outer end of the drive wire 54 is attached to the inner end of the inner antenna section 23. This type of drive wire will only bend or buckle in two directions, whereas the ordinary round wire, which has been used heretofore as the drive wire, will buckle in any direction. By having a drive wire that will buckle in only two directions, I can control its opera-

tion in a manner to be hereinafter pointed out.

The stub shaft 37 has a flat 59 thereon and is moulded integral with the disc-type casing member 57, a hub 60 preferably being provided on the insulator 57 to secure a sufficient length of bearing for the stub shaft 57. Preferably, a friction washer 61 is positioned between the insulator 57 and a plurality of bosses 62, three being all that are necessary, projecting inwardly from the casing member 2.

The guide plate 47 is provided with a hook or finger 63 which projects over the convolutions of the drive wire 54, with the exception of the outer convolution or turn, as I have found that the reel works better if the last one or two turns are left free or outside the hook or finger 63. The main function of the finger 63 is to prevent a binding action upon the drive wire which would result if the guide plate and finger were not used, because all of the turns of the wire would expand to the outside of the track, and when the reel is turned to effect an upward motion of the antenna sections, these turns would be apt to pinch the outer turn between the inner rim of the track of the reel and the other expanding turns or convolutions. This would prevent the drive wire from coming out of the reel in a satisfactory manner, but by using the guide plate 47 with its finger 63 in the manner above indicated, between the majority of the convolutions of the wire and preferably the outer turn, this turn is left free from this pinching action and can therefore readily assume a position, as it comes out of the reel, which will give free and easy action.

The member 57 is provided with a recess in which is fitted an L-shaped stop member 64 preferably of suitable metal such as steel. The inner edge of the track 58, between the stop member 64 and the hook formation 56, is cut away at 65 so that when the inner convolution of the drive wire is reached, the lug or projection 63 of the guide plate 47 will pass into this cut-away space 65 and engage the stop member 64, thereby providing means for preventing the drive wire 54 from being pulled free of its hook seat.

From what has been said, the operation of the structure will be apparent without further description. It will likewise be obvious that certain of the details may be varied without departing from the spirit of my invention or the scope of the appended claims.

What I claim is:

1. For operating a vehicle antenna composed of telescopic sections; a reel including a pair of casings, one inside the other, the outer casing supporting the said sections, the inner casing at least being of insulating material and having one stationary part fastened to the other casing and one part revoluble in the stationary part, means for revolving said revoluble part and driving means for the sections having considerable stiffness longitudinally of its length, yet being bendable, normally wound concentrically and positioned between the parts of said inner casing and having one end anchored to the revoluble part with its free end extending through the peripheral portion of the stationary part into a portion of the outer casing and connected to the proper section of the antenna.

2. For operating a vehicle antenna composed of telescopic sections; a reel including a pair of casings, one inside the other, the outer casing supporting the said sections, the inner casing at least being of insulating material and having one stationary part fastened to the outer casing

and one part revoluble in the stationary part, means for revolving said revoluble part and a driving means for the sections comprising a single steel wire having a shape rectangular in cross-section, normally wound concentrically and positioned between the parts of the inner casing, a track for the convolutions formed in one of the parts of the inner casing, one end of the wire being drivingly connected to the part having the track, the other end of the wire extending through the peripheral portion of the stationary part into a portion of the outer casing and connected to the proper section of the antenna.

3. For operating a vehicle antenna composed of telescopic sections; a reel including a pair of casings, one inside the other, the outer casing supporting the said sections, the inner casing at least being of insulating material and having one stationary part fastened to the outer casing and one part revoluble in the stationary part, means for revolving said revoluble part and a driving means for the sections comprising a single steel wire having a shape which will permit bending the wire in only two directions, a track for the wire which is normally wound concentrically to fit in said track, one end of the wire being drivingly connected to the revoluble part, the other end of the wire extending through the peripheral portion of the stationary part into a portion of the outer casing and connected to the proper section of the antenna.

4. A reel for operating an antenna as defined in claim 1, further characterized in that the outer casing is of metal and has a projecting stem by which the reel is mounted on the vehicle, the stem also carrying the lower antenna section, and means for making electrical connection from the receiving set to the antenna section comprising a stud going through said stem but insulated therefrom and into the said lower section.

5. A reel for operating an antenna as defined in claim 1, further characterized in that the outer casing is of metal and has a projecting stem and an elongated insulator positioned in the stem and protruding through the end of the stem which passes through a part of the vehicle body, fitting means engaging this said end of the stem to clamp it to the vehicle body, the said insulator having a hole therein to receive the lower of said sections and the driving means, means for insulatingly anchoring the section in the insulator and stem, said anchoring means serving also to complete an electrical connection between the radio receiving set and said lower section.

6. For operating a vehicle antenna composed of telescopic sections; a reel including an outer metallic casing having means for mounting the reel on a part of the vehicle, an inner plural-part casing of insulating material, one of the parts of the inner casing having a stub shaft anchored thereto for rotation with said shaft, the shaft extending through the outer metallic casing and adapted to receive operating means, a drive wire circularly positioned in convolutions between said part carrying the stub shaft and another part of the casing of insulating material which is fixed to the outer casing, the drive wire having one end anchored to said rotating part, while the other end passes through portions of both casings, and at least part of said mounting means, but insulated therefrom and connected to the inner of said sections.

7. For operating a vehicle antenna composed

of telescopic sections; a reel including an outer metallic casing having means for mounting the reel on a part of the vehicle, an inner two-part casing of insulating material, one part being fastened to the outer casing and having a flange encompassing the other part, said other part having an operating shaft extending through the outer casing and adapted to receive operating means, said part having the shaft also having a circular track near its outer periphery, a drive wire located in the track and held therein by the first of said parts of the inner casing, the inner end of the wire being anchored to the part having the shaft, while the other end of the wire passes through said flange and through the outer casing, but insulated therefrom, and connected to the inner of said sections.

8. An antenna reel as set forth in claim 6, further defined in that a guide plate is carried by said fixed part of the inner casing, the guide plate having a finger overlapping the convolutions of the drive wire, except at least the outer turn, and a spring for continuously exerting a pull on the guide plate and pressure on the said convolutions to thereby better position the drive wire in the casing and allow easy movement of the drive wire to and from the casing.

9. An antenna reel as set forth in claim 6, further defined in that a guide plate is carried by said fixed part of the inner casing, the guide plate having a finger overlapping the convolutions of the drive wire, except at least the outer turn, and a spring for continuously exerting a pull on the guide plate and pressure on the said convolutions to thereby better position the drive wire in the casing, and a retainer plate carried by said fixed part of the inner casing and extending over the guide plate.

10. An antenna reel as set forth in claim 6, further defined in that a guide plate is carried by said fixed part of the inner casing, the guide plate having a finger overlapping the convolutions of the drive wire, except at least the outer turn, and a spring for continuously exerting a pull on the guide plate and pressure on the said convolutions to thereby better position the drive wire in the casing, a retainer plate carried by said fixed part of the inner casing and extending over the guide plate, and stop means carried by the rotating part coacting with the guide plate to limit the extent of protrusion of the antenna sections.

11. An antenna reel as set forth in claim 6, further defined in that a guide plate is carried by said fixed part of the inner casing, the guide plate having a finger overlapping the convolutions of the drive wire, except at least the outer turn, and a spring for continuously exerting a pull on the guide plate and pressure on said convolutions to thereby better position the drive wire in the casing and allow free movement from and into the casing, a retainer plate carried by said fixed part of the inner casing and extending over the guide plate, and a metallic angle piece located in an angle recess in the rotating member, the end of one arm of the angle acting with the guide plate finger to provide a stop for the reel.

12. An antenna reel as set forth in claim 7, further defined in that a guide plate is set in a recess in the fixed part which has a retainer plate over the guide plate, the guide plate having a finger overlying the convolutions of the drive wire, except at least the outer one, in said track, and a spring carried by the fixed part acting on

the guide plate to apply a continuous pull on the guide plate so its finger will draw the stated convolutions of the drive wire toward the inner wall of the track for the purpose described.

13. An antenna reel as set forth in claim 7, further defined in that a guide plate is set in a recess in the fixed part which has a retainer plate over the guide plate, the guide plate having a finger overlying the convolutions of the drive wire, except at least the outer turn, in said track, with a spring carried by the fixed part acting on the guide plate to apply a continuous pull on the guide plate so its finger will draw the stated convolutions of the drive wire toward the inner wall of the track, a member acting at least as part of a stop means for the reel located so a portion is substantially flush with the inner wall of the track, the track wall being relieved between said member and the guide plate substantially as and for the purpose described.

14. For operating a vehicle antenna composed of telescopic sections; a reel including an outer metallic casing having means for mounting the reel on a part of the vehicle, an inner two-part casing of insulating material, a rotatable shaft carried by one of said two parts, a track formed in the part carrying the shaft, a drive wire rectangular in cross-section coiled concentrically in the track, the depth of the track being but slightly greater than the width of the wire, the inner end of the wire being anchored to the part carrying the shaft, while the outer end of the wire passes through the wall of the inner casing and into the outer casing and thence to the proper antenna section, the other part of the inner casing being fixed to the outer casing and overlying the track and wire convolutions therein, resilient pressure means for drawing the convolutions, except at least the outer one, together where the wire leaves the inner casing, and means for preventing the drive wire, during nor-

mal operation of the reel, from being pulled out of the reel.

15. An antenna reel as set forth in claim 14, further characterized in that a friction plate is positioned between the outer casing and the rotating part of the inner casing.

16. For operating a vehicle antenna composed of telescopic sections; a reel having a fixed casing and a rotatable member therewithin with means extending from the fixed casing for operating the rotatable member, driving means for the sections having considerable stiffness longitudinally of its length, yet being bendable, normally wound concentrically and carried by said rotatable member and having one end anchored thereto for actuation therefrom, while the other end is connected to the proper section of the antenna, and means comprising a guide plate having a finger overlying at least part of the turns of said driving means, and a spring applying a continuous pull on the drive plate for preventing any binding action of the driving means within the reel.

17. For operating a vehicle antenna composed of telescopic sections; a reel having a part operatively carrying a flexible drive member for operating the antenna sections to extended and retracted positions, with means extending within the reel for actuating the driving member, and means within the reel comprising a resiliently actuated slidable guide plate for engaging the drive member, with means for holding the guide plate in operative position for preventing any binding of the drive member within the reel as it is operated, and further means permanently fixed within the reel acting as a positive stop to the part carrying the drive member to prevent the drive member from being disconnected from the reel.

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