March 21, 1944. L. S. BRACH 2,344,490

ANTENNA OPERATING REEL

Filed March 25, 1940 3 Sheets-Sheet 1

Fig. 1

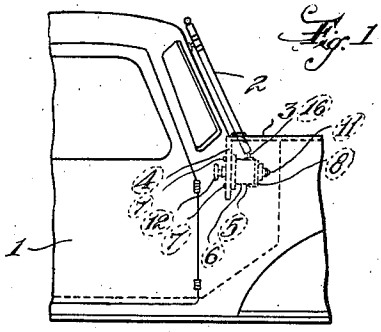

Fig. 2

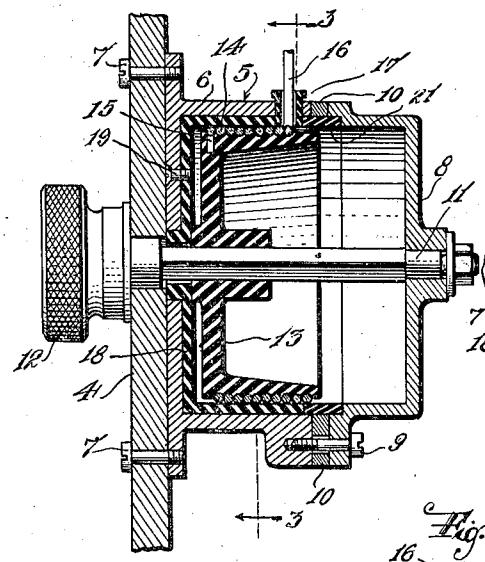

Fig. 3

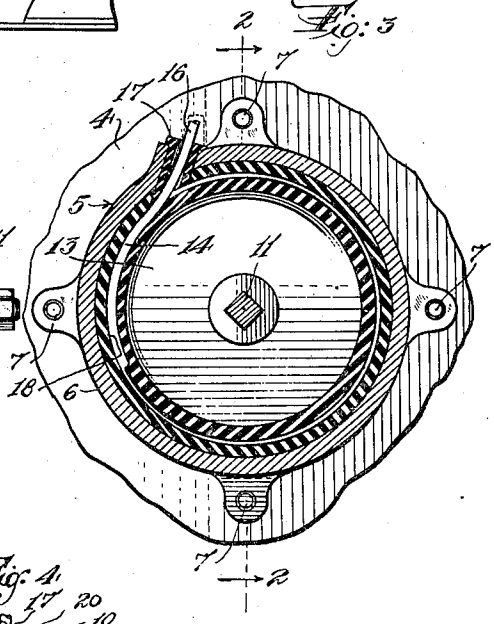

Fig. 4

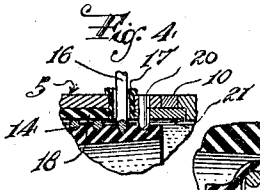

Fig. 5

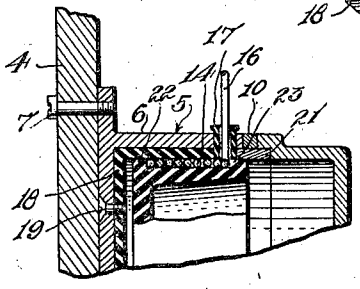

Fig. 6

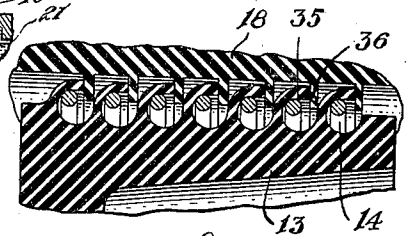

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Fig. 7

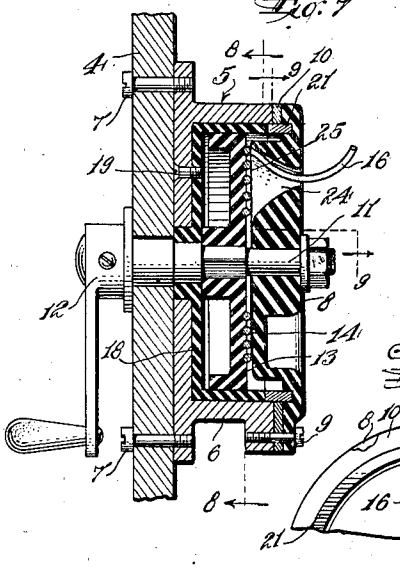

Fig. 8

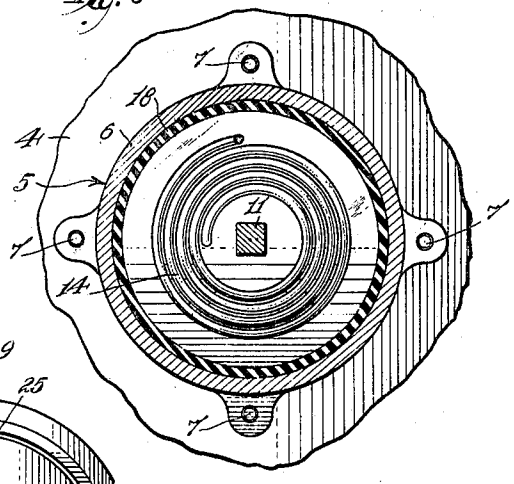

Fig. 9

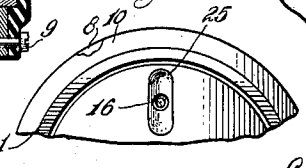

Fig. 10

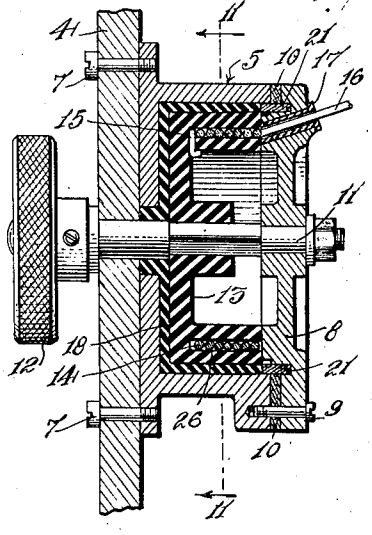

Fig. 11

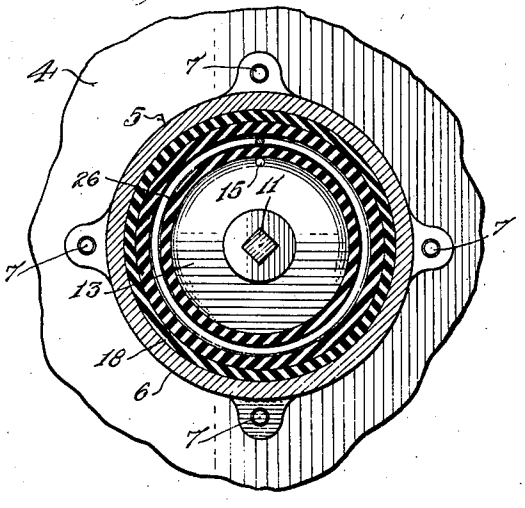

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Fig. 12

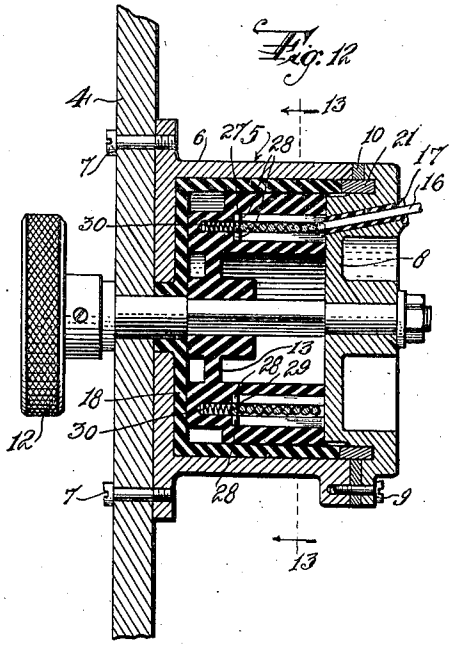


Fig. 13

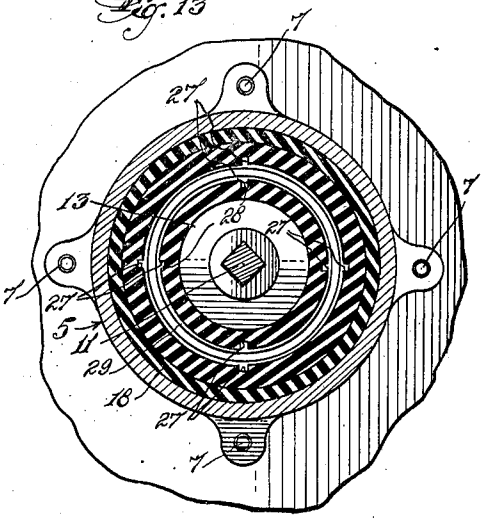


Fig. 15

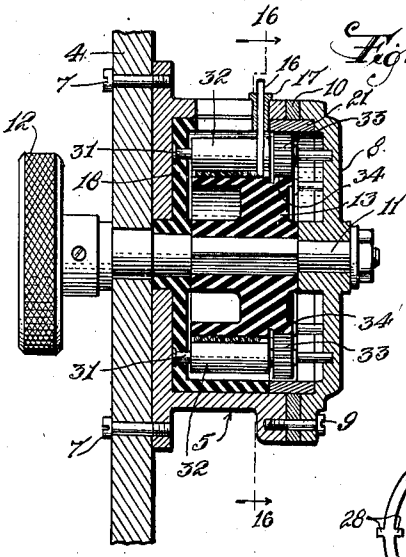


Fig. 16

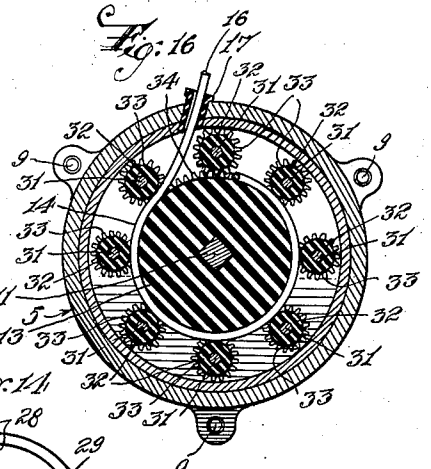
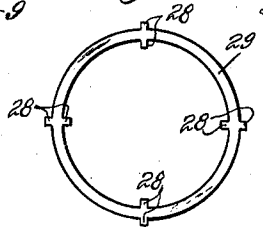


Fig. 14



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Patented Mar. 21, 1944

2,344,490

UNITED STATES PATENT OFFICE

2,344,490

ANTENNA OPERATING REEL

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Application March 25, 1940, Serial No. 325,725

26 Claims. (Cl. 250—33)

This invention relates to means for raising and lowering radio antenna and especially one of the telescopic section type such as used on an automotive vehicle.

In certain of the "fish pole" type of antennas, where the structure has been made of telescopic sections, it has been the practice to raise and lower these by hand, requiring the operator to do this from the exterior of the vehicle.

More recently it has been proposed to operate the telescopic sections more or less automatically by some type of motor or by a hand operating means within the vehicle but the motor operative means is more expensive than the hand operative means. It is the principal object of my present invention to provide a simple and inexpensive means for operating the collapsible sections of an antenna from the interior of the vehicle.

Other and ancilliary objects will be discerned from a reading of the following specification taken in connection with the annexed drawings wherein

Figure 1 shows a fragmentary view of an automotive vehicle having the antenna in collapsed or retracted position and connected to one form of my improved operating means.

Figure 2 is a part sectional and part elevational view through the antenna operating means shown in Figure 1.

Figure 3 is a view on the line 3—3 of Figure 2.

Figure 4 is a fragmentary view showing a slightly modified construction of a detail of the device shown in Figure 2.

Figure 5 is a partial view of the upper portion of Figure 2 showing a further modified construction.

Figure 6 shows a further modification.

Figure 7 is a view similar to Figure 2 but showing a further modified construction.

Figure 8 is a view on the line 8—8 of Figure 7.

Figure 9 is a view on the line 9—9 of Figure 7.

Figure 10 is a view similar to Figure 2 but of a further modified construction.

Figure 11 is a view on the line 11—11 of Figure 10.

Figure 12 is a view similar to Figure 2 but of a still further modified form of construction.

Figure 13 is a view on the line 13—13 of Figure 12.

Figure 14 is a view of one of the elements shown in Figure 12.

Figure 14 is a view similar to Figure 2 but of a still further modified form of construction,

Figure 16 is a view on the line 16—16 of Figure 15.

In the various views wherein like numbers refer to corresponding parts, 1 is a vehicle to which a collapsible antenna 2 is attached, the antenna extending through a portion of the hood 3 of the vehicle. Mounted on the cowl 4 is an operating device 5 made according to one of the forms of the construction hereinafter described.

The antenna operating means comprising what may be generally termed a reel having, as illustrated in Figure 2, a cylindrical or drum-shaped, metallic casing with a portion 6 fastened to the cowl 4 in any satisfactory manner as by screws 7. The casing is completed by a cover portion 8, which may be of insulating material, fastened to the portion 6 in any satisfactory manner as by screws 9. A slightly compressible gasket 10 may sometimes be used when the separate ring 21 is utilized for sealing the joint between the two portions 6 and 8 of the casing. Where the ring 21 is omitted, the cover 8 has its flange extended sufficiently to take up for the space occupied by the gasket 10.

Carried by the casing members is an operating shaft 11 having a knob 12 thereon for turning the shaft. Carried on the shaft 11 and revoluble therewith is a drum type member 13. The peripheral surface of the drum 13 is spirally grooved to receive a coiled means 14. This means may be made up of steel spring wire wound to fit the groove in the drum and to give substantial stiffness for stresses applied longitudinally of the member, for instance either a push or a pull but which leaves said means flexible or bendable. However, this means may be made up in some other manner to attain the result hereinafter pointed out.

The inner end 15 of the means 14 is securely fastened to the drum while the outer end 16 protrudes through the casing or an insulating portion 17 in the casing for connection to the inner surface of the collapsible antenna 2. The diameter of the drum 13 which is made of suitable insulating material, is such that the convolutions of the bendable or flexible member 14 line in close proximity to the inner surface of an insulator 18 which is fastened to the casing member 6 as by screws 19 and thereby forms part of the casing. By this arrangement the convolutions of the member 13 are held in their operative position within the spiral grooves of the drum 13.

Preferably the shaft 11 within the casing has

a flat surface or may be square as shown in Figure 3 and the drum 13 is adapted to move transversely along the shaft as the knob 12 is turned. Turning the knob in one direction forces the end 16 outwardly and thereby raises the antenna sections. Turning the knob 12 in the opposite direction will wind up the member 14 to the position shown in Figure 2, thereby moving the antenna sections to retracted position as shown in Fig. 1.

In Figure 4 I have shown a guide and control pin 20 which is fixed in the wall of the casing and its inner end projecting into a continuation of the groove and the drum provided for the member 14. This construction acts to guide and steady the movement of the drum as the operating shaft 11 is turned.

In Figure 5 the construction is the same as in Figure 2 with the exception that the outer peripheral surface of the drum has no grooves therein but the convolutions of the member 14 are in close relation with the inner peripheral surface of the flange of the member 18. The opposite edges of the drum are provided with projections 22 and 23 which serve to prevent the convolutions on the member 14 from slipping over the ends of the drum.

In Figure 6 the outer periphery of the drum 13 is provided with hook-like formations 35 cooperating with projections 36 extending downwardly from the inner periphery of the flange of the member 18, thus forming substantially closed recesses for the turns of the cable 14.

In Figure 7 the face of the drum is provided with spiral grooves and the cable 14 is disposed therein. The free end 16 projects through a flat funnel-shaped opening 24, the opening into the funnel being indicated at 25 in Figure 9, in the cover member 8 which in this case is preferably made of insulating material. In this case the ring 21, if used, may be of metal.

In Figure 10 the drum 13 has a thick rim which has an annular recess 26 within which the cable 14 is positioned, the width of the recess being slightly greater than the diameter of the flexible cable 14. While in this construction the member 18 is illustrated, it is obvious that it may be omitted, which is also the case with the construction shown in Figure 7, it being understood that in both cases the shaft would be provided with a bushing carried by the casing member 6.

In Figure 12 the drum is very similar to that of Figure 10, having the same type of groove 26 for the convolutions of the cable 14. In addition, two pairs of oppositely disposed grooves 27 are provided to receive projections 28 carried by a ring member 29 located in the bottom of the groove 26. A plurality of springs 30 are located in arcuately disposed recesses in the drum and press against the ring 29 so that as the projecting end 16 of the cable 14 is moved outwardly by turning the knob 12, the springs and ring assist in this outward movement and also serve to position the convolutions in the recess 26 as the antenna is returned to retracted position.

In the form shown in Figures 15 and 16, the member 18 supports one end of spindles 31 which carry rollers 32 arcuately spaced around the periphery of the drum 13. The other end of the spindles 31 is supported in the cover member 8 and mounted on this latter end of each spindle is a pinion 33 which is adapted to engage teeth 34 positioned on one edge of the drum 13. By this arrangement, the frictional resistance to the operation of the member 14 is reduced, thereby making it very easy for the operator to raise and lower the antenna sections.

From what has been said it will be seen that I have provided an antenna operating reel of simple construction comprising a casing, and an operating shaft and a drum within the casing, the parts being so arranged that a member relatively stiff longitudinally of its length can be easily and quickly moved by the operator to raise and lower the antenna to which the extensible member is attached.

It will be readily understood that the details of construction may be widely varied without departing from the spirit of my invention or the scope of the appended claims.

What I claim is:

1. An antenna operating reel comprising a cylindrical casing, an operating shaft carried by the casing, a drum-like member carried on said shaft and completely housed within the casing, an insulating structure fitting closely on the inside of the casing and outside the drum, means having considerable stiffness longitudinally of its length, yet being bendable into turns, wound on said drum in close proximity to said insulating structure, said means being capable of raising and lowering at least an antenna of the telescopic automotive vehicle type when connected to the antenna and the said shaft is operated.

2. For raising and lowering an automotive vehicle antenna, of the telescopic section type, an operating reel comprising a cylindrical casing adapted to be fastened to to the vehicle near the base of the antenna, an operating shaft carried by the casing, an insulating structure fitting closely within the casing, a member completely housed within the casing and inside said insulating structure and carried on the shaft and revoluble with the shaft within the casing, means capable of being formed into turns and having considerable stiffness longitudinally of its length, yet being bendable, carried on said member in a single layer of spaced turns, said means adapted to be connected to the inner of said telescopic antenna sections to move it and the other sections when said shaft is rotated.

3. For operating an antenna composed of telescopic sections; a reel including a cylindrical casing, an operating shaft carried by the casing, a member carried on the shaft within the casing, for rotation with the shaft, an insulating structure fitting within the casing between it and said member and uniformly spaced therefrom, and a cable having considerable stiffness longitudinally of its length carried by said member so the successive turns are spaced longitudinally along the member closely adjacent said insulating structure and having one end extending from the casing for attachment to the proper section of the antenna.

4. For operating an antenna composed of telescopic sections; a reel including a cylindrical casing, an operating shaft carried by the casing, a member carried on the shaft within the casing for rotation with the shaft, an insulating structure fitting within the casing between it and said member and uniformly spaced therefrom, and a cable having considerable stiffness longitudinally of its length carried by said member, said member having screw-thread type grooves in its outer periphery to receive said cable which has one end extending from the casing for attachment to the proper section of the antenna.

5. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member

of insulating material carried on the shaft within the casing for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member, said member having a spiral groove in one face thereof to receive said cable, a disc-shaped cover for the casing acting to hold the cable in position in the groove and having an exit opening for the end of the cable going to the antenna.

6. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member of insulating material carried on the shaft within the casing for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member, said member having an annular recess in one side, of a width slightly greater than the diameter of the cable, to receive the cable, the cover of the casing acting to hold the cable in the recess and means for leading out the end of the cable going to the antenna.

7. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member carried on the shaft within the casing for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member, said member having an annular recess in one side, of a width slightly greater than the diameter of the cable, to receive the cable, a ring resiliently mounted in the bottom of the recess in engagement with the inner turn of the cable, the cover of the casing acting to hold the cable in the recess and means for leading out the end of the cable going to the antenna.

8. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member carried on the shaft within the casing, for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member and having one end extending from the casing for attachment to the proper section of the antenna, and means between the drum and the casing acting to prevent the cable from developing frictional contact with the casing.

9. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member carried on the shaft within the casing for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member and having one end extending from the casing for attachment to the proper section of the antenna, and means, comprising a plurality of rollers located between the cable on the drum and the interior wall of the casing, acting to prevent frictional contact with the casing.

10. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member carried on the shaft within the casing for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member on its outer periphery which is positioned with respect to the inner wall of the casing so as to provide a space that will limit the turns of the cable to a single layer and prevent riding of one turn onto another as the cable is pushed out of and drawn into the casing, the free end of the cable extending without the casing for attachment to the proper antenna section.

11. For operating a radio antenna composed of extensible and retractable sections; a reel including a casing, an operating rotary shaft carried by the casing, a member positioned on the shaft within the casing for longitudinal movement along the shaft and rotary motion therewith, and a cable of the type described carried by said member and having one end extending from the casing for attachment to the proper antenna section.

12. For operating an antenna composed of telescopic sections; a reel including a casing, an operating shaft carried by the casing, a member of insulating material carried on the shaft within the casing for rotation with the shaft, and a cable having considerable stiffness longitudinally of its length carried by said member, said member having an annular recess in one side, at least the beginning of the recess from the side being of a width but slightly greater than the corresponding dimension of the cable, and means for holding the cable in the recess and means for leading out the end of the cable going to the antenna.

13. In an extensible antenna assembly adapted to be mounted on a motor vehicle, an extensible radio signal-carrying member mounted on said vehicle for extension and retraction with respect thereto, a flexible actuating member secured to said extensible member, a reel with a cylindrical face adapted to receive said flexible member in coils about said face and by its rotation cause said flexible member to actuate said extensible member and a cylindrical outer member integral with said reel to restrain said coils from unwinding.

14. In an extensible antenna assembly adapted to be mounted on a motor vehicle, an extensible radio signal-carrying member mounted on said vehicle for extension and retraction with respect thereto, a flexible actuating member secured to said extensible member, a reel, a coil-receiving recess formed in said reel and bounded by inner and outer cylindrical side walls and adapted to receive said flexible member therein in a series of coils of the same diameter and a guide to direct said flexible member as it is guided by said reel.

15. In an extensible antenna assembly adapted to be mounted on a motor vehicle, an extensible radio signal-carrying member mounted on said vehicle for extension and retraction with respect thereto, a flexible actuating member secured to said extensible member, a reel, a non-rotatable guide member adjacent said reel to direct said flexible member to and from said reel, and means to bodily shift said reel and said guide with respect to each other.

16. In an extensible antenna adapted to be mounted on a motor vehicle, an antenna member adapted to be extended or retracted with respect to the vehicle body, a reel mounted for rotation adjacent the antenna, a continuous guiding passage in said reel comprising a series of circumferential convolutions extending about the axis of said reel and a flexible connecting member secured at one end to said antenna and at the other end coiled about said reel in the continuous passage thereof.

17. In an extensible antenna adapted to be mounted on a motor vehicle, an antenna member adapted to be extended or retracted with respect to the vehicle body, a reel mounted for rotation, a continuous guiding passage formed in said reel and extending about the axis of said reel and comprising a series of circumfer-

ential grooves, a flexible member secured at one end to said antenna and at the other end coiled about said reel in the continuous passage thereof, a cover member closely adjacent said reel and overlying the grooved face thereof to close said grooves and retain said flexible member therein and an opening in said cover to permit passage of said flexible member on and off said reel to actuate said antenna.

18. In an extensible antenna adapted to be mounted on a motor vehicle, an antenna member adapted to be extended or retracted with respect to the vehicle body, a reel mounted for rotation adjacent the antenna and provided with a generally radial face, a continuous guiding face in the radial face of said reel comprising a series of convolutions extending about the axis of said reel, a flexible member secured at one end to said antenna and at the other end coiled about said reel in the continuous recess thereof, a cover member conforming to said general radial face and closely adjacent said reel to close said recess and retain said flexible member therein, and an opening in said cover to permit passage of said flexible member on and off said reel to actuate said antenna.

19. In an extensible antenna adapted to be mounted on a motor vehicle, an antenna member adapted to be extended or retracted with respect to the vehicle body, a reel mounted for rotation adjacent the antenna, a continuous guiding passage in said reel comprising a series of spaced convolutions extending about the axis of said reel, a flexible member secured at one end to said antenna and at the other end coiled about said reel in the continuous passage thereof, a metallic container surrounding said reel and insulated from said flexible member and an electrical connection from said container to the vehicle body.

20. In an extensible antenna adapted to be mounted on a motor vehicle, an antenna member adapted to be extended or retracted with respect to the vehicle body, a reel mounted for rotation adjacent the antenna, a continuous guiding passage in said reel comprising a series of convolutions extending about the axis of said reel, a flexible connecting member secured at one end of said antenna and at the other end coiled about said reel in the continuous passage thereof, a cover member closely adjacent said reel to close said passage and retain said flexible member therein and an opening in said cover to permit passage of said flexible member on and off said reel to actuate said antenna.

21. In an extensible antenna adapted to be mounted on a motor vehicle, an antenna member adapted to be extended or retracted with respect to the vehicle body, a cylindrical reel mounted for rotation adjacent the antenna, a continuous guiding recess in the peripheral face of said reel comprising a series of convolutions extending about the axis of said reel, a flexible member secured at one end to said antenna and at the other end coiled about said reel in the continuous recess thereof, a cylindrical cover member closely adjacent said reel and overlying the peripheral face thereof to close said recess and retain said flexible member therein and an opening in said cover to permit passage of said flexible member on and off said reel to actuate said antenna.

22. In an extensible antenna assembly adapted to be mounted on a motor vehicle, an extensible radio signal-carrying member mounted on said vehicle for extension and retraction with respect thereto, a flexible actuating member secured to said extensible member, a reel adapted to receive said flexible member in coils thereabout and by its rotation cause said flexible member to extend or retract said extensible member, and means rotatable with said reel to prevent said coiled flexible member from expanding radially with respect to said reel.

23. An extensible and retractible antenna construction comprising a plurality of telescoping members, one slidable within another, a relatively incompressible filamentary element connected to an inner one of said members and also extending through and from the outer thereof, and means for actuating said element to project and retract the inner member, comprising a support, a reel rotatably carried by the support, the filamentary element being connected to the reel, said reel having a substantially cylindrical winding surface upon which said filamentary element may be wound to retract the antenna element and from which it may be unwound to project said antenna element, a guard portion rotatable with said reel and surrounding but spaced from said winding surface, the spacing between said winding surface and guard portion being greater than the thickness of said filamentary element but less than twice the thickness thereof, said space between the winding surface and guard portion forming a laterally opening slot, and means at the open end of the slot for feeding the filamentary element laterally into and from the same when the reel is turned to wind and unwind said filamentary element, respectively, the winding surface and the inner surface of said guard portion being relatively smooth, whereby the turns of said filamentary element may slide laterally in and out of said slot as said element is wound and unwound.

24. Means as set forth in claim 23 in which said support comprises a casing portion bearing against and closing the open end of said slot, said means for feeding the filamentary element comprising an opening through said portion of the casing opening into said slot in a path substantially tangential to the winding surface.

25. Means as set forth in claim 23 including one fixed and a plurality of slidable telescoping members, means preventing separation of said members, the filamentary element being connected to the innermost member only, the internal diameter of the other members being sufficient to permit free passage of the filamentary element therethrough but insufficient to permit buckling thereof, and the outermost member communicating with said means for feeding the filamentary element.

26. Means as set forth in claim 23 in which said support comprises a casing portion bearing against and substantially closing the open end of said slot, said means for feeding the filamentary element comprising an opening through said portion of the casing, opening into said slot in a path substantially tangential to the winding surface, one of said telescoping members being fixed with relation to said casing, and an inner member being slidable therein, said filamentary element being connected to said inner member, the internal passage in the fixed member being of sufficient size to permit free passage of the filamentary element therethrough but of insufficient size to permit buckling thereof, said internal passage communicating with said opening.

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