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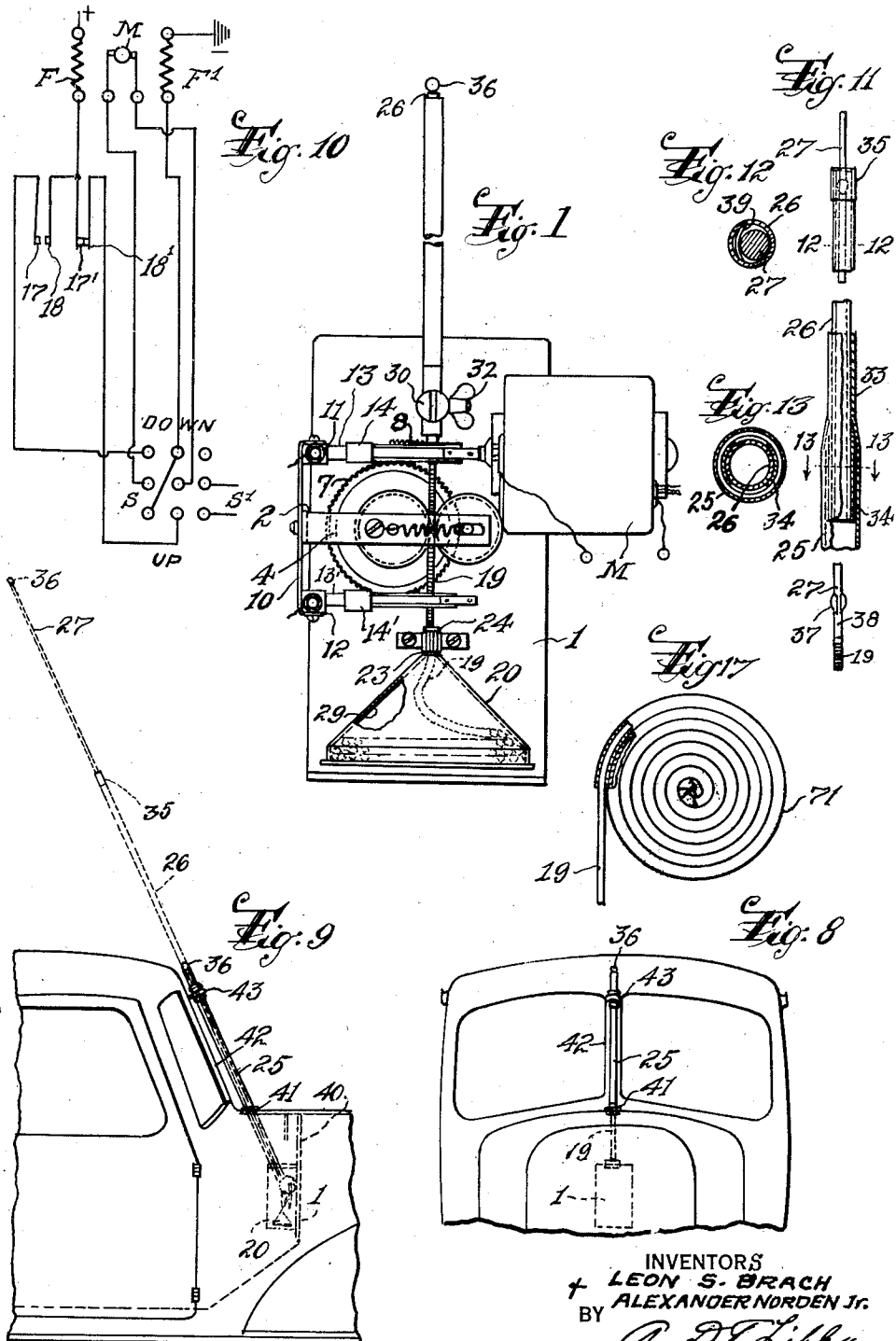
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AUTOMOTIVE VEHICLE ANTENNA

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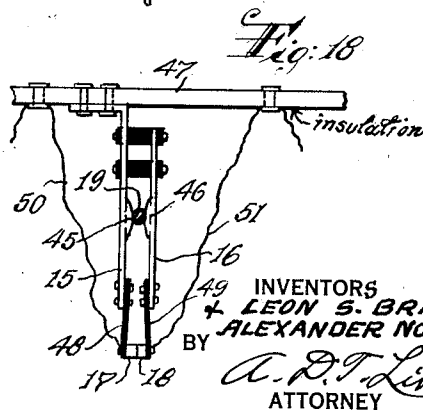
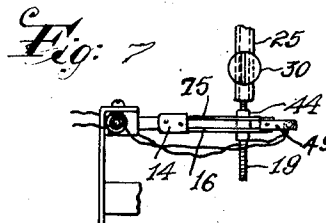
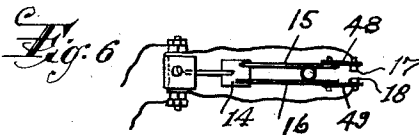
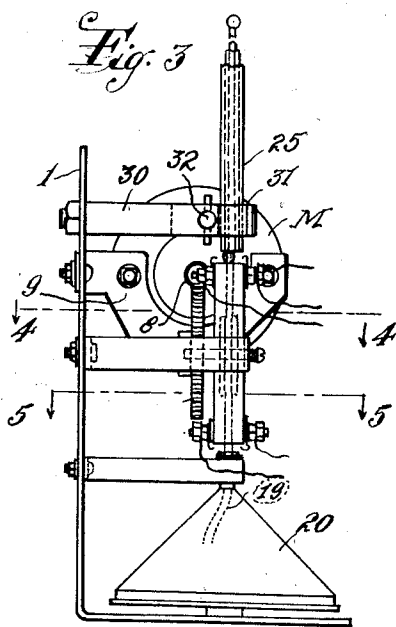
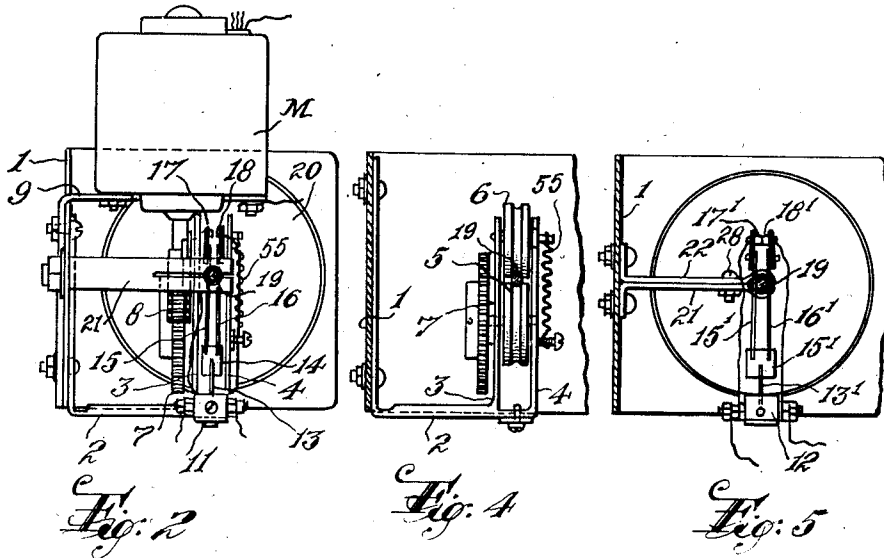
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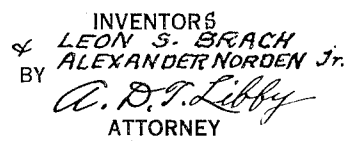
3 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,329,329

AUTOMOTIVE VEHICLE ANTENNA

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10 Claims. (Cl. 250—33)

This invention relates to the construction of an automotive vehicle antenna for use in connection with a radio set installed on the vehicle. Different types of antennas or aerials have been heretofore proposed and used, one of which is the so-called "fish-pole" type. While this type of antenna gives good radio reception on the vehicle, it has the objectionable feature of protruding above the body of the car, and being thus exposed, it is subject to injury besides being more or less unsightly.

It is one of the objects of our invention to provide a rod-type antenna which may be retracted or collapsed into a basic section that is mounted in such a way as to entirely eliminate the unsightly appearance when the radio set is not being used.

Another object of our invention is to provide an antenna which may be automatically erected to the desired length within any range of the structure. This may be done by a driver or occupant of the vehicle. At the same time, the antenna may be automatically withdrawn into the basic section.

Another object of our invention is to provide an arrangement in which the antenna may be automatically erected and collapsed or withdrawn on the turning on or off of the radio set in the vehicle.

Another object of our invention is to provide a location for the rod aerial which will not detract from the appearance of the vehicle, and in which the aerial is mounted in closer cooperation with the radio set than has heretofore been the practice, thereby producing less loss in the general reception of the radio set.

Another object of our invention is to provide indicating means to show the length of the aerial or antenna to the driver or occupant of the vehicle.

Another object of our invention is to provide an antenna which may be erected and withdrawn by an occupant of the vehicle, the antenna telescopic sections being so constructed as to eliminate mechanical noises.

These and other objects will be discerned from a study of the specification taken in connection with the annexed drawings, wherein:

Figure 1 is an elevational view of one form of our invention, with the casing member removed.

Figure 2 is a plan view looking down on the top of Figure 1.

Figure 3 is a view of Figure 1 looking from left to right.

Figure 4 is a view on the line 4—4 of Figure 3.

Figure 5 is a view on the line 5—5 of Figure 3.

Figure 6 is a plan view looking down on one pair of contact members.

Figure 7 is a fragmentary side-view similar to that shown in Figure 1 of the upper pair of contact members, showing the lower portion of the basic member of the antenna, and the means on the flexible operating member for opening the contacts, as shown in Figure 6.

Figure 8 is a fragmentary view of the front of an automobile showing the basic member of the antenna as it comes through the cowl and extends toward the top of the car.

Figure 9 is a side-view of Figure 8 but with the antenna in extended position.

Figure 10 is a wiring diagram of the apparatus shown in Figure 1.

Figure 11 is a quarter-sectional view, in fragmentary form, of the antenna per se.

Figure 12 is a section on the line 12—12 of Figure 11, but on an enlarged scale.

Figure 13 is a section on the line 13—13 of Figure 11, but on an enlarged scale.

Figure 14 is a plan view similar to Figure 1, but showing a modified arrangement of connecting the motor to the apparatus, also a slightly different arrangement of the motor automatic control contacts.

Figure 15 is a front elevational view showing a manually operated structure.

Figure 16 is a side view of Figure 15 looking from left to right, but with the indicator attachment omitted.

Figure 17 is a plan view of a modified form of receiver used in the apparatus.

Figure 18 is a view looking down on the top of the automatic control contacts used in Figure 14.

In the drawings, wherein like numbers refer to corresponding parts in the various views, 1 is a mounting member having a bracket 2 from which extend a pair of parallel arms 3 and 4, between which are pivotally mounted a pair of friction-engaging rollers 5 and 6. As shown in Figures 1 to 4 inclusive, the rollers 5 and 6 are indicated as of insulating material for a purpose which will be hereinafter pointed out.

Mounted on the same bearing stud that carries the friction roller 5, is a worm-type of gear-wheel 7 that is connected to a motor M by means of a worm 8 mounted on the end of the motor shaft. The motor M is fastened to the support

1 by any satisfactory means as by a bracket 9. Carried on the bracket 2 is an arm 10, the ends of which are bent over and carry insulators 11 and 12. To the insulator 11 is fastened a flat spring member 13 which in turn supports an insulator 14 from which extend two contact spring members 15 and 16 carrying, respectively, contact members 17 and 18 of suitable material. Fastened to the insulating block 12 is a member 13', similar to 13, and this spring carries an insulator 14' which supports spring members 15' and 16' carrying insulating strips 48 and 49 which, respectively, have contacts 17' and 18' of suitable material. The members 15, 16, 15' and 16' have their edges turned outwardly away from their inner surfaces as at 75, making them somewhat channel-shaped so as not to present sharp edges to a member 19 which slides up and down between the said members for a purpose which will be hereinafter referred to.

Positioned for operation between the two sets of springs 15 and 16, and 15' and 16', is a member 19 which may be made up of steel-spring wire wound in reverse direction so as to give substantial stiffness for stresses applied longitudinally of the member, for instance either a push or a pull, but which leaves the member 19 flexible or bendable. The member 19 may be made with a core of steel wire covered with insulating material, or in some other satisfactory manner. The lower end of the flexible member 19 is positioned in a receiver 20 which, in the form shown in Figures 1 and 3, is conical in shape having a nozzle portion which is held in position by two support members 21 and 22 fastened to the support member 1 as more clearly shown in Figure 5.

The nozzle of the member 20 is insulated from the support members 21 and 22 by an insulating bushing 23, and is provided with a flange 24 to prevent it from dropping out of the curved ends of the support members 21 and 22 which are held in position by a screw 25 so that their curved ends engage the insulator 23, the adjustment being such as to allow the receiver 20 to turn more or less, particularly when the member 19 is being withdrawn and inserted into the receiver. By thus allowing the receiver to turn, the member 19 will coil up within its interior without becoming snarled up. It is to be understood that the cone receiver 20 may be made of metal, although it may be made of insulating material, or metal lined with insulating material such as 29, as indicated in Figure 1, to prevent the end of the member 19 from coming in contact with the metal when the cone is made of metal.

The upper end of the member 19 extends into the basic member 25 of the antenna, which is of the telescopic type, three sections being indicated, the second section being numbered 26 and the outer section being numbered 27. The member 19 passes through the sections 25 and 26 and is attached to the lower end of the section 27.

The basic section 25 is adjustably mounted in the split end of a stud 30 carried by the frame member 1 but insulated therefrom by an insulator 31. The clamping screw 32 is used to hold the basic section 25 in position in the stud 30. The outer end of the basic section 25 is drawn or swedged down to a smaller diameter as indicated at 33 in Figure 11, and the lower end of the section 26 is provided with a split collar 34 fastened thereto in any satisfactory manner as by soldering or spot-welding, so that when the section 26 is pulled to its outer position the collar 34 will hit the reduced portion 33, thereby

stopping the section 23 from being pulled entirely out of the section 25. The outer end of the section 26 is provided with a cap 35 having a hole therein to pass the outer section 27, which is in the form of a rod having a ball 36 thereon.

The section 27 is provided with a stop made by swedging or upsetting the metal at 37 which will engage the cap 35, thereby preventing withdrawal of the section 27 from the section 26. The outer end of the flexible member 19 is attached to the end 38 of the section 27. To prevent rattle of the section 27 within the section 26, we provide a thin metal strip 39, preferably of copper, which strip will take the position somewhat as indicated in the section of Figure 12. A similar strip may be used between the sections 26 and 25.

The antenna apparatus shown in Figures 1, 2 and 3, is preferably mounted on the cowl member 40 as indicated in Figure 9, and the section 25 extends upwardly through the cowl, through a suitable insulating bushing 41 in alignment with and directly over the centrally arranged window-frame member 42 of the automotive vehicle, a suitable clamp such as 43 being used to fasten the basic section 25 in position, but the clamp 43 is insulated from the section 25. The length of this section is such that when the antenna is collapsed, as shown in Figure 8, the ball 36 is somewhere near the top of the body of the vehicle. This makes a very neat and ornamental arrangement. In some cases the window-frame member 42 may be made so that the basic section 25 may be concealed within the frame member, it of course being insulated therefrom and coming out of this frame member at the top.

The operation of the structure so far described is illustrated in the diagram of Figure 10, in which the motor M is provided with two series field windings F and F', the armature being connected to a double-throw switch S. As shown in Figure 10, when the switch S is in the "up" position, meaning that the antenna is extended to the position shown in dotted lines in Figure 9, the contacts 17 and 18 are opened by reason of an enlargement 44 (see Figure 7) on the flexible member 19. In other words, when the flexible member 19 and the various sections reach the position of Figure 9, the motor circuit is opened and the contacts 17 and 18, due to the enlargement 44, pass between the spring members 15 and 16. When it is desired to withdraw or collapse the antenna, the switch S is thrown to the "down" position which reverses the current through the motor armature, turning it in reverse direction. The contacts 17 and 18 will then be closed, and when the member 19 and the various sections get to substantially the full limit of their retraction or collapsing stroke, an enlargement similar to 44 on the member 19 opens the contacts 17' and 18', thereby stopping the motor.

If desired, the switch S may have an extra set of contacts S' which close the circuit through the radio set when the switch S is thrown to the "up" position. In other words, when the radio set is turned on the motor is started and the antenna is moved to extended position, and vice-versa.

As shown in Figure 14, the motor M is mounted at right angles to that shown in Figure 1. The contacts 17 and 18 and 17' and 18' of Figure 14 are mounted somewhat differently from those shown in Figure 1 and corresponding figures. The spring members 15 and 16 are provided with projections 45 and 46 which are en-

gaged by the flexible member 19. The members 15 and 16 are mounted on an insulator 47. In each case the contacts 17 and 18 and 17' and 18' are carried on insulators 48 and 49 which are attached to the spring members 15 and 16, and connection is made to these contacts by individual wires such as 50 and 51 shown in Figure 18. Furthermore, in Figure 14 the basic section 25 is attached to a swivel adjusting member 52 in any satisfactory manner as by a flexible insulating collar 53.

The friction wheels 5 and 6 may be made of insulating material or metal, or a combination of the two, but when made of metal they should be insulated from the bracket arms 54. In both forms, one of the friction drive wheels, for example 6, is preferably mounted with a spring take-up 55 so that it will provide the necessary tension between the two friction drive wheels and at the same time allow for slippage if the timing between the motor and its control contacts and the antenna section is not precise.

In Figures 15 and 16, I have shown a hand-operating device in which the basic section 25 is carried in a holder 56 of insulating material which may, if desired, be mounted on the exterior part of the door.

In this arrangement the flexible member 19 is driven by the rollers 5 and 6 operated by a pair of beveled gears 57 through the medium of a hand-crank 58, one of the gears 57 being connected to a shaft carrying, for example, the drive roller 5. A guide roller 59 is preferably used to guide the member 19 into an insulating bushing 60 which is mounted in cooperation with the holder 56. The receiver 61 is somewhat different from the receiver 20 shown in Figure 3, it being indicated as a circular disc having insulators 62 and 63 insulating it from its support members 64 and 65.

One of the shafts supporting the drive rollers 5 and 6, for example the shaft 66 carrying the roller 6, is extended and has a threaded end on which is mounted an insulator 67 to which is attached a flexible drive member 68 carrying an indicator 69 which cooperates with a scale 70 to indicate to the operator the height to which the antenna has been extended.

The receiver may take a different form from those shown at 20 and 61. For example, in Figure 17, the receiver is in the form of a coiled conduit 71 for receiving the member 19.

The center frame member of the front window may be constructed and arranged so as to act as the basic section member of the antenna, one end being prolonged or extended into the cowl, if necessary, to make suitable cooperative connection with the apparatus required to raise and lower the aerial, the height of which may be controlled, as heretofore explained, by a suitable switch. Furthermore, the antenna may take the form of a coil member such as shown in Figure 17, or, if made up in sections as heretofore described, the sections may take a different form than that illustrated.

In Figure 11 we have indicated the member 19 as being directly connected to the antenna section 27, but this union may be an insulating joint, so that the member 19 and the receiver, whatever form is used, are electrically insulated from the extensible portion of the antenna. Where the member 19 and the receiver are insulated from the extensible portion, connection may be made from the antenna to the receiving set at some point such as at the stud 30 in Fig-

ure 1. If the connection between the member 19 and the antenna section 27 is metallic, then connection to the radio set may be made through the stud supporting one of the metal friction rollers that drive the member 19.

Since the capacity of the antenna decreases when it is shortened, and vice-versa, its reactance increases and decreases for the same frequency, and to compensate for this and get the maximum efficiency from the antenna at different frequencies, we may connect to some properly arranged part of the equipment, such as the member 67 or an equivalent device on the motor-driven arrangements, an arm 80 carrying a reactance in the form of an inductance coil 81 that may be moved over the core 82 carried by a support 83. The coil 81 is connected into the antenna circuit, preferably using flexible conductors 84 and 85. It is obvious that the core may be moved and the coil held stationary, or turns may be cut in and out of the coil to vary the reactance thereof. Instead of an inductance, the reactance may be a combination of inductance and capacity which may be required in some cases.

From what has been said, it will be understood that various changes may be made in the details, without departing from the spirit of our invention or the scope of the appended claims.

What we claim is:

1. A radio antenna for the purpose described having a plurality of relatively movable telescopic sections, the basic one of which extends within and is insulatingly mounted to a part of the body of the vehicle, and means for extending from the basic section the other sections to any desired height within the full-length range of the antenna, and retracting the sections when desired, said means including a pair of friction rollers of suitable material, with means for turning at least one of them, and a flexible member of relatively stiff material passing between and gripped by said rollers and having one end connected to the inner antenna section, and a movable self-adjusting receiver at the other end of said flexible member to receive the same when the antenna is collapsed.

2. A radio antenna for the purpose described having a plurality of relatively movable telescopic sections, the basic one of which extends within and is insulatingly mounted to a part of the body of the vehicle, and means for extending from the basic section the other sections to any desired height within the full-length range of the antenna, and retracting the sections when desired, said means including friction rollers with means for turning them, and a metallic member passing between and gripped by said rollers, the rollers being arranged so as not to ground said metallic member which has one end connected to the inner antenna section and a movable self-adjusting receiver at the other end, said metallic member being flexible enough to coil up in the receiver when the antenna is in a retracted position, yet stiff enough to push the antenna sections out of the basic member.

3. An automotive vehicle antenna combination including, a basic support section adapted to have other sections telescopically housed therein with means for preventing the sections from being separated when the sections are moved to extended position, the basic section being insulatingly mounted on a part of the vehicle, a flexible member having one end fastened to the lower end of the inner antenna section and means comprising

a pair of friction wheels, with means under control of an occupant of the vehicle for turning at least one of them, the flexible member being positioned between said wheels, for causing the said flexible member to extend and retract the antenna sections, and a movable self-adjusting receiver for the flexible member when the antenna is in retracted position.

4. An automotive vehicle antenna combination including, a basic support section adapted to have other sections telescopically housed therein with means for preventing the sections from being separated when the sections are moved to extended position, the basic section being insulatively mounted on a part of the vehicle, a flexible member having one end fastened to the lower end of the inner antenna section and means comprising a pair of friction wheels, with electric motor means under control of an occupant of the vehicle for turning at least one of said wheels for causing the flexible member, positioned between the wheels, to extend and retract the antenna sections, a receiver for the flexible member, and means cooperatively carried by the flexible member for opening the motor circuit when the antenna has been extended and retracted to fixed positions.

5. For an automotive vehicle, a collapsible antenna composed of telescopic sections, a basic antenna section insulatively carried within the cowl of the vehicle and extending through the cowl near to and following the direction of a centrally located front window frame member and being fastened thereto but insulated therefrom, and means under control of an occupant of the vehicle for extending the antenna sections from the basic section and then later retracting the extended sections into the basic section when it is not desired to use them, said means including a motor device and a flexible operating member extending within certain of the telescopic sections and fastened to the inner one, means for operatively connecting the motor device to the flexible member, interlocking means between the sections whereby the inner section when it moves will pick up and move any section between it and the basic section, springs carrying contacts for controlling the motor circuit, said springs being positioned so said flexible member passes between them, and means carried by said flexible member for moving said springs to open and close said contacts.

6. For an automotive vehicle, a collapsible antenna composed of telescopic sections, a basic antenna section insulatively carried within the cowl of the vehicle and extending through the cowl near to and following the direction of a centrally located front window frame member and being fastened thereto but insulated therefrom, and means under control of an occupant of the vehicle for extending the antenna sections from the basic section and then later retracting the extended sections into the basic section when it is not desired to use them, said means including a motor device and a flexible but longitudinally stiff operating member having one end fastened to the inner of said antenna sections, and a receiver at the opposite end of the flexible member, means for operatively connecting the motor device to the flexible member, and means carried by the flexible member to automatically stop the motor when the flexible member has

moved the antenna sections to predetermined points in both directions.

7. A radio antenna for the purpose described having a plurality of relatively movable telescopic sections, the basic one of which extends within and is insulatively mounted to a part of the body of the vehicle, and means for extending from the basic section the other sections to any desired height within the full-length range of the antenna, and retracting the sections when desired, said means including a flexible member fastened to the inner section and capable of pushing the sections apart and pulling them together, with operating means for moving the flexible member, and a receiver for the flexible member when the antenna sections are pulled together, said receiver being mounted so it may turn of itself to better accommodate the flexible member as it is forced back to the receiver.

8. An automotive vehicle antenna combination including, a basic tubular section adapted to have other sections telescopically housed therein with means for preventing the sections from being separated when the sections are moved to extended position, the basic section being insulatively mounted on a part of the vehicle, a flexible member having one end fastened to the lower end of the inner antenna section and means under control of an occupant of the vehicle for acting on said flexible member to move said sections to extended position, and also to move them to retracted position, and a conically shaped receiver for the flexible member when the antenna is in retracted position, the receiver being mounted so it may turn of itself as the flexible member is moved in and out of the receiver.

9. A radio antenna for the purpose described having a plurality of relatively movable telescopic sections, the basic one of which extends within and is insulatively mounted to a part of the body of the vehicle, and electric motor-driven means including a relatively stiff but flexible elongated member for extending the movable sections from the basic section, and automatic means for stopping the motor when the antenna has been extended for radio wave reception, and further automatic means for stopping the motor when the antenna has been collapsed by reverse direction of the motor, said automatic means including, enlargements on the flexible member and two sets of spaced spring contact members between which the flexible member passes, one set of contact members being acted on by one of said enlargements to open the motor circuit at the end of movement of the antenna sections in one direction, while the other set of contacts is acted on by the other enlargement to open the motor circuit at the end of movement of the antenna sections in the opposite direction and switch means for starting the motor in the proper direction of rotation to initiate movement of the flexible member and the antenna sections.

10. For an automotive vehicle, an antenna capable of being coiled up, a receiver for the antenna and means under control from within the vehicle for extending the antenna from and retracting it to the receiver the receiver being mounted to turn more or less due to force applied thereto by the antenna for the purpose described.

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