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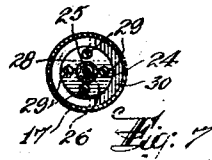
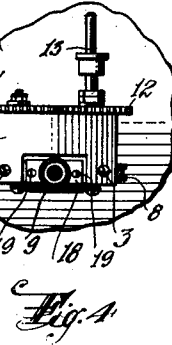
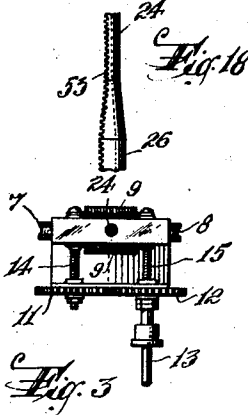
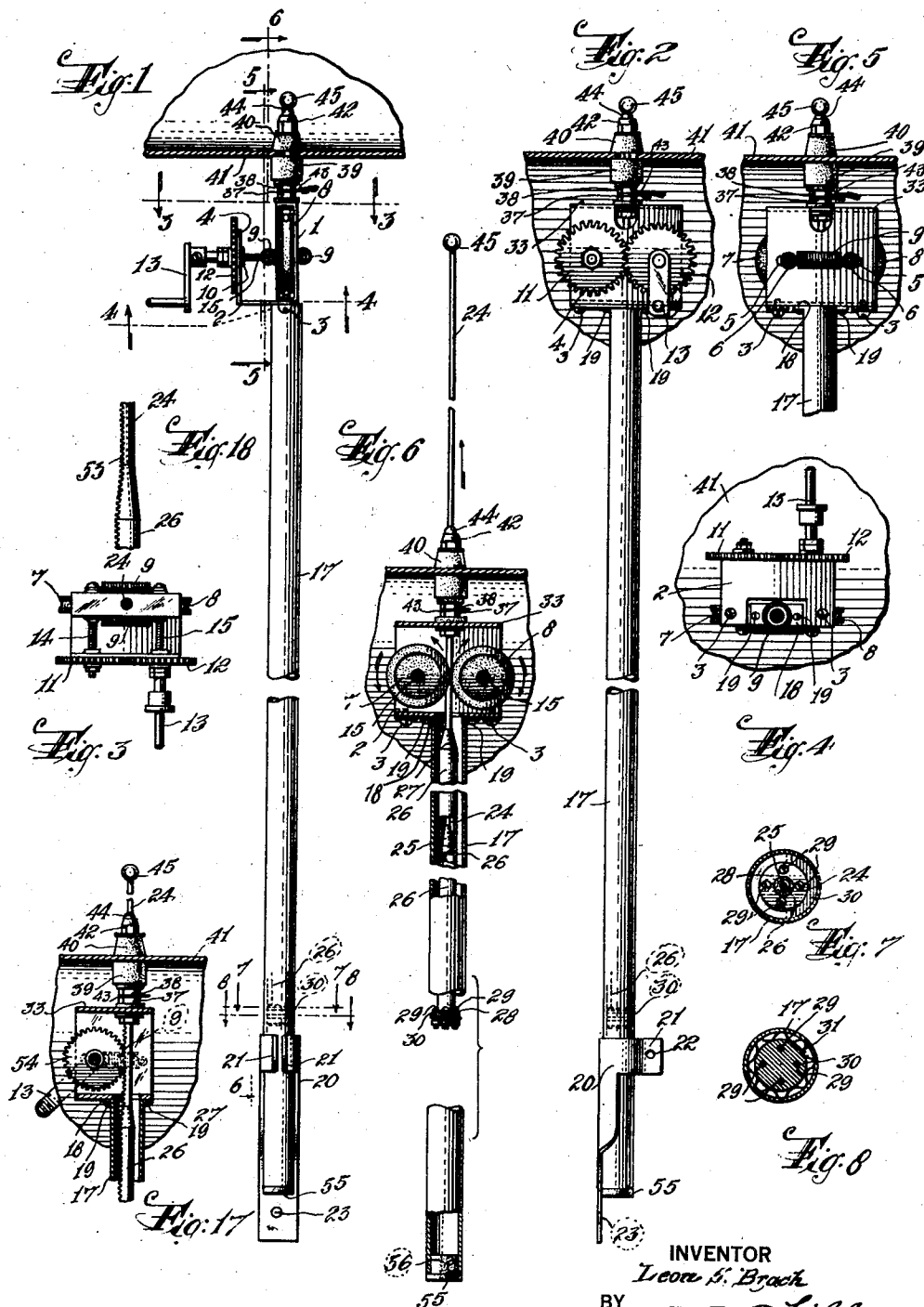
L. S. BRACH

2,294,362

AUTOMOTIVE VEHICLE ANTENNA

Filed Dec. 12, 1939

2 Sheets-Sheet 1



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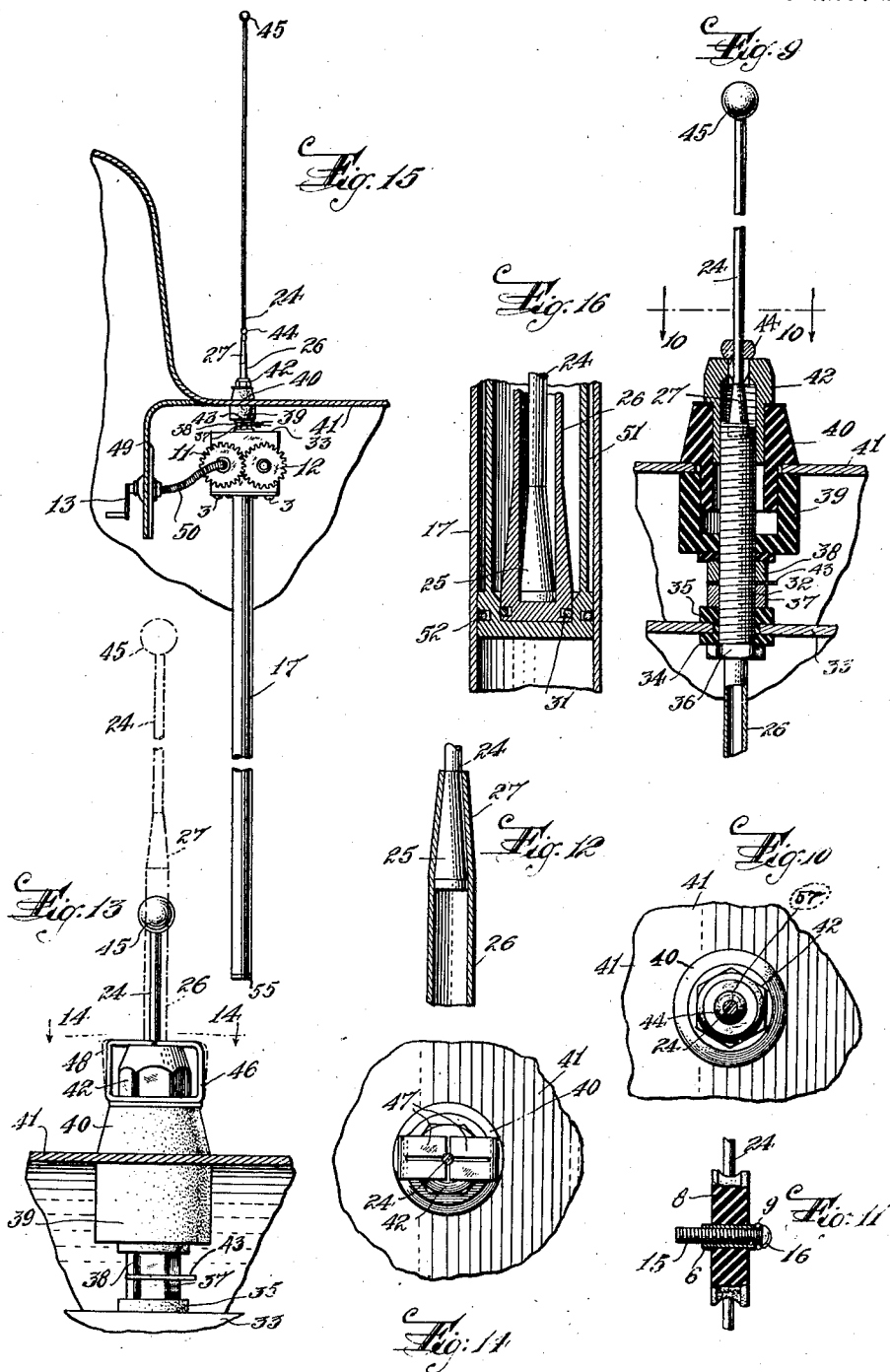
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AUTOMOTIVE VEHICLE ANTENNA

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2,294,362

AUTOMOTIVE VEHICLE ANTENNA

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Application December 12, 1939, Serial No. 308,880

16 Claims. (Cl. 250—33)

This invention relates to the construction of an antenna mechanism suitable for use with a radio receiving set on an automotive vehicle, wherein the antenna generally is of the concealed type. In certain types of so-called collapsible antennas now on the market, a vacuum, compressed air or hydraulic means are used for raising and lowering, to a certain extent, the antenna, but so far as I am aware the top section, which is of smaller diameter, still must be raised and lowered by hand because of the lack of surface to control the raising and lowering of this particular section. In my construction to be herein described, I entirely avoid this objection.

The operating parts of the antenna are so constructed that they may be placed in a position convenient to the driver of the vehicle or to one sitting in the vehicle next to the driver.

It is the principal object of my invention to provide an antenna mechanism which allows the antenna to be placed within the vehicle, with the possible exception of a small end which may protrude a very short distance above and outside the cowl when the device is used on an automobile, the mechanism being constructed so that the antenna may be extended to any desired height within its range by control means within the vehicle, and preferably placed convenient to the operator of the vehicle.

Another object of my invention is to provide an antenna-operating mechanism which is relatively simple and inexpensive in construction, yet one that is highly efficient in its method of operation.

These and other objects will be discerned by one skilled in this art on reading the following specification, taken in connection with the annexed drawings, wherein:

Figure 1 is a side elevational view on a reduced scale of the device as installed on the cowl of an automotive vehicle.

Figure 2 is a view similar to Figure 1, looking from left to right, with certain parts removed.

Figure 3 is a view on the line 3—3 of Figure 1.

Figure 4 is a view on the line 4—4 of Figure 1.

Figure 5 is a view on the line 5—5 of Figure 1.

Figure 6 is a view on the line 6—6 of Figure 1, with certain parts broken away and with the antenna partially extended.

Figure 7 is a view on the line 7—7 of Figure 1.

Figure 8 is a view on the line 8—8 of Figure 1.

Figure 9 is a part-elevational and part-sectional view on an enlarged scale of the upper portion of the antenna-operating mechanism.

Figure 10 is a view on the line 10—10 of Figure 9.

Figure 11 is a part-sectional and part-elevational view through the center of one of the friction drive rollers.

Figure 12 is a view on an enlarged scale of the junction between the antenna section of smaller diameter with its cooperating section.

Figure 13 is an elevational view corresponding to Figure 9, showing a modification of certain details.

Figure 14 is a view on the line 14—14 of Figure 13.

Figure 15 is a view similar to Figure 2 with the antenna partly extended, but showing a modified form of operating means.

Figure 16 is a view on an enlarged scale showing the cooperative inner ends of a collapsible antenna having three sections instead of two sections as indicated in Figure 6.

Figure 17 is a view of a modified form of antenna-operating means.

Figure 18 is a fragmentary view of part of the construction shown in Figure 17.

In the various views, wherein like numbers refer to corresponding parts, 1 is a box-like frame preferably of metal, such as steel, having an L-shaped bracket with an arm 2 fastened thereto in any satisfactory manner as by screws 3. The bracket has an upright arm 4 which is parallel to the portion 1, forming with it what I term a supporting structure. The box portion 1 of this supporting structure has oblong slots 5 in its opposite sides. Positioned within these slots are bearing sleeves 6 which support friction rollers 7 and 8 preferably made of suitable insulating material which will provide the necessary gripping qualities to the antenna sections as will be hereinafter pointed out. The friction rollers may be made of side metal plates gripping a friction track of insulating material therebetween, but I prefer to make the rollers entirely of suitable insulating material. The ends of the bearings protrude beyond the sides of the box structure 1 and preferably have grooves therein to receive the ends of tension springs 9 which act to continuously pull or urge the friction rollers 7 and 8 toward each other so as to provide the necessary gripping action on the antenna sections.

The arm 4 of the L-shaped bracket carries bearing studs 10 which support gears 11 and 12 which are in permanent meshing position. One of the gearwheels, for example 12, is provided with a crank arm 13 for turning it as well as the gear 11. To connect the gears 11 and 12 with

their cooperating rollers 7 and 8, I have provided flexible drives 14 and 15 which may be in the form of tightly coiled spring wire having its opposite ends fastened to the gear shafts and to the friction roller shafts in any satisfactory manner as by welding or soldering. As shown in Figure 11, the bearing 6 of the roller 8 is hollow so that the flexible shaft 15 will pass there-through and the end is soldered or welded at 16 to the bearing 6. In place of the type of shaft shown, two solid shafts may be used with a universal joint therebetween, but the form shown is much simpler and less expensive and allows the friction rollers 7 and 8 to move transversely so as to grip the antenna sections of different diameters as they are forced through the mechanism, as will be presently described.

Associated with the support structure, is a tube 17 which acts as a guide and shield for the antenna sections. As indicated in Figures 6 and 5, the tube 17 has a pair of extended ears 18 which are fastened to the box structure 1 as by screws 19. The tube 17 is so mounted with respect to the box 1 that its axial center is centrally located between the bearings 6 of the friction rollers and in a plane providing proper frictional contact with the antenna sections.

The tube 17 is provided at its lower end with an adjustable bracket 20 having clamping lugs 21 which may be brought together by means of a bolt passing through the holes 22 in the lugs. The lower end of the bracket 20 is provided with one or more holes 23 for fastening to some member of the automotive vehicle.

Mounted within the tube 17 are a plurality of antenna sections. The inner one, 24, of smaller diameter, has its inner end 25 formed somewhat as shown in Figure 12, while the upper end of the next cooperating section, 26, is formed at 27 somewhat as shown in Figure 12, so that, as the crank 13 is turned, the friction wheels 7 and 8, which normally grip the antenna section 24 when the antenna is in collapsed position, will start lifting the antenna section 24 until its lower end 25 engages the contracted end 27 of the next section, 26, causing the section 26 to be pulled upwardly between the friction rollers 7 and 8 which are capable of being spread apart as heretofore described, into somewhat greater gripping power than before, thus drawing the antenna 26 to its full upper limit.

In order to insure that the antenna section 24 is pulled out to its full extent, the lower portion of the section 26 is provided with a flange 28 which is fastened as by rivets 29 to a washer 30 of insulating material which is provided with a groove carrying a friction member 31, which may be in the nature of a corrugated strip adapted to engage the inner wall of the tube 17 sufficiently to provide friction enough to prevent the section 26 from moving until the section 24 has been extended to its full length.

The support structure 1 has fastened thereto a hollow externally threaded metal stud 32 which passes through the upper edge 33 of the box 1 but is insulated therefrom by suitable insulating bushings 34 and 35, clamping nuts 36 and 37, and lock nut 38 being used to clamp the stud in position on the box structure so that the axial center of the stud is substantially in alignment with the axial center of the antenna sections and the tube 17. The upper part of the stud 32 carries insulators 39 and 40 which are adapted to engage part of the cowl 41 and to be clamped thereagainst by a special nut 42 as clearly indi-

cated in Figure 9. A terminal 43 for making connection to the antenna may be clamped between the nuts 37 and 38 inside the cowl.

Since the hole through the end of the nut 42 must be large enough to pass the section or sections having a diameter larger than the section 24, means are provided for closing the clearance around the section 24 when the antenna is in collapsed position. One such means shown on an enlarged scale in Figure 9, comprises a bushing 44 having its lower end adapted to pass through the hole in the nut, while its outer end is cylindrical in shape so as to close the hole to prevent water from passing into the interior of the shielding tube 17. As the section 24 is withdrawn, the bushing 44 may pass along with it, but when the section is moved to collapsed position, the ball 45 on the end of the section 24 will force the bushing 44 into its closing position. The inner end of the bushing 44 may be slit as indicated by radial dotted lines 57 in Figure 10, so this portion which is made on a taper may be adjusted to frictionally engage the wall of the hole in the top of the nut 44. This construction will hold the bushing in place until the section 26 lifts it out. It will be returned to sealing position by the ball 45 when the section 24 is returned to collapsed position.

Another means for closing the opening to a great extent is indicated in Figures 13 and 14 wherein a member 46 is positioned around the stud 32 below the nut 42, but has its ends looped upwardly and over the outer surface of the nut, these inwardly bent ends 47 having a very fine slit therein so that these ends may be readily pushed apart by an antenna section of larger diameter than that of the section 24, as shown by the dotted line 48 in Figure 13. The terminal clamp 43 is shown in position between the nuts 37 and 38.

It may not be possible in all cases to place the antenna mechanism heretofore described in a position where the crank 13 will be readily accessible to the vehicle operator, and in those cases the crank 13 may be mounted on a depending portion 49 of the cowl 41 and connected by a flexible drive 50 to one of the gearwheels such as 11.

In Figure 16, I have shown, on an enlarged scale, an arrangement wherein the antenna is composed of three sections, 24 and 26 as heretofore described, and a third section 51. As shown in this figure, the section 26 has its lower end formed with a groove to receive the friction-engaging spring 31, and the member 51 is formed to receive a similar friction-engaging spring 52, the purposes of which are the same as heretofore described; that is to say, to allow first the section 24 to be withdrawn before the section 26 is started, and this latter section to be withdrawn to its full limit before starting the withdrawal of the section 51.

In Figures 17 and 18, I have shown a modification in which the antenna sections are to be provided with teeth 53 which may be rolled or cut on a part of the outer periphery of the sections, and these teeth may preferably be adapted to mesh with a gear 54 which in turn is operated by the crank 13 to raise and lower the antenna.

It is to be understood that the frictional engagement between the various sections of the telescopic type of antenna is such as to hold them in extended position. This is indicated by the form of construction shown in Figure 12, wherein the relatively long tapered cooperating surfaces

are forced by the friction wheels into secure holding position.

While I have shown a bushing 55 with a hole therethrough at the bottom of the tube 17, this is not necessary, although it acts to prevent dust and dirt from being driven by the motion of the vehicle, up into the tube 17. If this bushing is used it is preferably provided with a small hole 56 so as to allow any water which might, for some reason, get into the tube 17, to drain out.

It may be noted in passing that the antenna may be extended and collapsed by hand from the outside of the vehicle, by taking hold of the knob 45 and pulling it out or pushing it in, if for any reason this should become necessary, but in either case, the outer or last section to be extended cannot be passed through the friction rollers because of the washer 30 and friction member 31 carried thereby, the washer 30 being materially larger in diameter than the section to which it is attached and will not pass through the friction rollers.

Also, it may be noted that by making the friction rollers of insulating material, instead of metal which would require insulating them from their supports, and encasing them in a metal box-like structure, and using a shield tube 17 which should be grounded, the antenna, especially when partially extended, is shielded from the disturbing currents which may come from the high tension ignition of the vehicle.

The section of greatest diameter makes a good sliding fit with the inner wall of the stud 32 and acts to make electrical contact therewith, although a contact wiper may be included, if necessary. Also, this outer section substantially fills the hole in the bushing 42 and thus assists in keeping water out of the stud 32 and tube 17.

From what has been said it will be understood that various details in this construction may be changed without departing from the spirit of my invention or the scope of the appended claims.

What I claim is:

1. An automotive vehicle radio antenna comprising a plurality of telescopic sections, means for operating the sections including a pair of friction rollers of insulating material positioned to consecutively grip said sections therebetween, a pair of gears in constant mesh with means for turning at least one of them, each of said gears being connected to one of said friction rollers, said connections including a flexible drive so the friction rollers will separate without displacing the gears, to accommodate a section of larger diameter as the sections are extended, and resilient means for constantly urging said friction rollers toward each other.

2. An automotive vehicle radio antenna mechanism comprising a pair of friction rollers with resilient means for urging said rollers toward each other, a pair of gears in spaced relation to said rollers, with means for operating them, and connected to the rollers in pairs by flexible drives and telescopic sections having the one of smaller diameter normally engaged by the rollers when the antenna is in collapsed position, and cooperative means between the section ends for preventing them from being pulled apart and for bringing a following section into engagement with said rollers.

3. An automotive vehicle radio antenna mechanism comprising a supporting structure, a pair of spaced flexible shafts carried by the structure, meshing gears operatively connected to corresponding ends of said shafts, rollers of insulating

material operatively connected to the opposite ends of said shafts, resilient means continuously urging said rollers toward each other, a shielding tube depending from said structure, and telescopic sections normally housed within said tube, the one of smaller diameter normally positioned between the rollers when the antenna is in collapsed position, and cooperative means between the section ends for preventing them from being pulled apart and for bringing a following section into engagement with said rollers.

4. An automotive vehicle radio antenna mechanism comprising a pair of friction rollers with resilient means for urging said rollers toward each other, a pair of gears in spaced relation to said rollers, with means for operating them, and connected to the rollers in pairs by flexible drives and telescopic sections having the one of smaller diameter normally engaged by the rollers when the antenna is in collapsed position, means positioned on the lower end of a section of larger diameter than the one of smaller diameter to cause sufficient friction between it and the next adjacent section or wall of said shielding tube to allow the section of smaller diameter to be withdrawn from its next adjacent section without moving this adjacent section until the said smaller diameter section has been withdrawn to its limit, and cooperative means between said two sections for causing the one of smaller diameter to draw the one of larger diameter between the rollers.

5. An automotive vehicle radio antenna mechanism comprising a supporting structure independent of any part of the vehicle, a hollow metallic stud insulatingly mounted on said structure and carrying insulators for mounting the structure on a suitable part of the vehicle, a shielding tube carried by the structure, telescopic sections normally housed within said tube when the sections are in collapsed position, and rotatable means including members operated from within the vehicle, and section-engaging members flexibly connected to the first-mentioned members, whereby the said section-engaging members may automatically move bodily laterally without disturbing the operative relation of the first-mentioned members, said means being carried by said structure engaging first with the inner section and then with the next outer one, and so on, for moving the sections successively through said hollow stud to extend the sections and operating on the sections in reverse order to collapse the sections.

6. An automotive vehicle radio antenna mechanism comprising a supporting structure, a hollow metallic stud insulatingly mounted on said structure and carrying insulators for mounting the structure on a suitable part of the vehicle, a shielding tube carried by the structure, telescopic sections normally housed within said tube when the sections are in collapsed position, a pair of meshed gears and a pair of rollers carried on the structure, flexible shafts connecting a gear and roller, means for urging said rollers toward each other into gripping engagement with the said sections as the sections are successively moved by the rollers on turning the gears.

7. An automotive vehicle antenna mechanism as defined in claim 5, further characterized in that the outer end of said stud has a metallic bushing nut for holding the mounting insulators in mounting position, the nut having an opening therein to at least pass a section having a diameter greater than that of a section of smaller

diameter and means for substantially closing the opening in the bushing nut around the section of smaller diameter when it is in retracted position after the section of larger diameter has been retracted to a point below the bushing nut.

8. An automotive vehicle radio antenna mechanism comprising a supporting structure with means for supporting the structure on the vehicle, a pair of friction rollers mounted so at least one has lateral movement with means acting to continuously draw it toward the other, means for turning said rollers, a shielding tube associated with said structure so its axis is in cooperative relation with the proper frictional surface of said rollers, telescopic sections adapted to be housed within said tube, the inner section of smaller diameter being normally positioned between and gripped by said rollers and extending just outside the body of the vehicle, and cooperative means between the sections to cause them to successively pass between said rollers when the latter are turned.

9. An automotive vehicle radio antenna mechanism as set forth in claim 8, further characterized in that the means for turning said rollers includes a pair of meshed gears connected, through a flexible drive, one to each of said rollers, means being provided for turning the gears.

10. An automotive vehicle radio antenna mechanism as set forth in claim 8, further characterized in that a hollow metallic stud is insulatively mounted on the structure so its axis is in alignment with the axis of the antenna sections, the stud having an internal diameter large enough to pass the section of largest diameter.

11. An automotive vehicle radio antenna mechanism as set forth in claim 8, further characterized in that a hollow metallic stud is insulatively mounted on the structure so its axis is in alignment with the axis of the antenna sections, the stud having an internal diameter large enough to pass the section of largest diameter, and means carried by the stud for closing up the clearance around the inner section when the antenna is collapsed.

12. An automotive vehicle radio antenna mechanism as set forth in claim 8, further characterized in that a hollow metallic stud is insulatively mounted on the structure so its axis is in alignment with the axis of the antenna sections, the stud having an internal diameter large enough to pass the section of largest diameter, and means carried by the stud for closing up the clearance around the inner section when the antenna is collapsed, and further means for making electrical contact to the antenna through the stud.

13. An automotive vehicle radio antenna mechanism

comprising a supporting structure with means for insulatively carrying the structure on the vehicle, a shielding tube associated with the structure, substantially rigid telescopic sections housed within said tube when the antenna is in collapsed position, a pair of friction rollers gripping the inner section of smaller diameter when the antenna is collapsed, means for operating the rollers to draw the inner section out of the tube, cooperative means between the inner section and its immediate surrounding section to engage the latter to draw it between said rollers, said rollers being mounted to have lateral movement to pass a section of larger diameter than the inner section, and means for retarding the withdrawal of the second-mentioned section until the section inside it is withdrawn to its full extent.

14. An automotive vehicle radio antenna mechanism comprising a supporting structure, a hollow metallic stud fastened to the structure and adapted to protrude through the cowl of the vehicle, means for insulatively fastening the stud to the cowl, a pair of friction wheels mounted so a tangent line between them passes through the axis of the stud, a tube associated with the structure so its axis includes said tangent line, telescopic antenna sections housed within the tube when the antenna is collapsed, the inner section being normally positioned between said rollers when the antenna is collapsed and extending just through the stud, means for turning the rollers, means cooperative between the sections to cause the one between the rollers to draw the next immediate one between the rollers, and means for allowing the rollers to move laterally to accommodate a section of different diameter than a preceding one.

15. A radio antenna comprising a plurality of telescopic sections and a housing for the sections when in collapsed position, and friction rollers acting successively on the outer peripheral surface of said sections to extend and retract the sections, operating means for the rollers and flexible drive means between the operating means and the rollers so the rollers will automatically adjust themselves laterally to positively receive sections of different diameters.

16. A radio antenna comprising a plurality of telescopic sections of different diameters adapted to be positioned within an enclosure when not in use, but in operative relation with an exit opening from the enclosure large enough to pass sections of different diameters, and automatically adjustable means engageable with the different antenna sections for keeping the exit opening substantially closed at all positions of the antenna sections.

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