

Dec. 24, 1940.

W. H. MYERS

2,226,522

AUTOMOTIVE ANTENNA EQUIPMENT

Filed Feb. 12, 1940

2 Sheets-Sheet 1

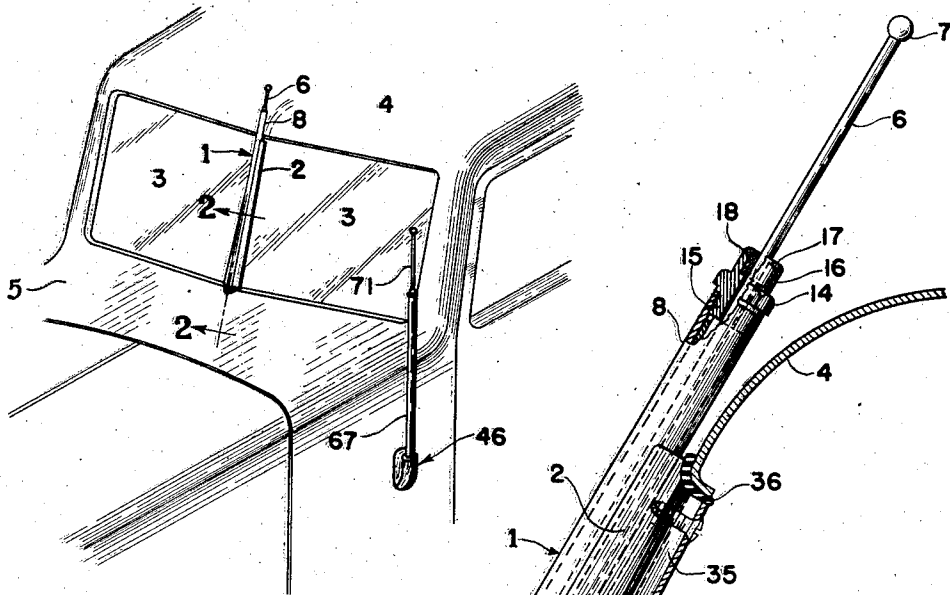


FIG. 1.

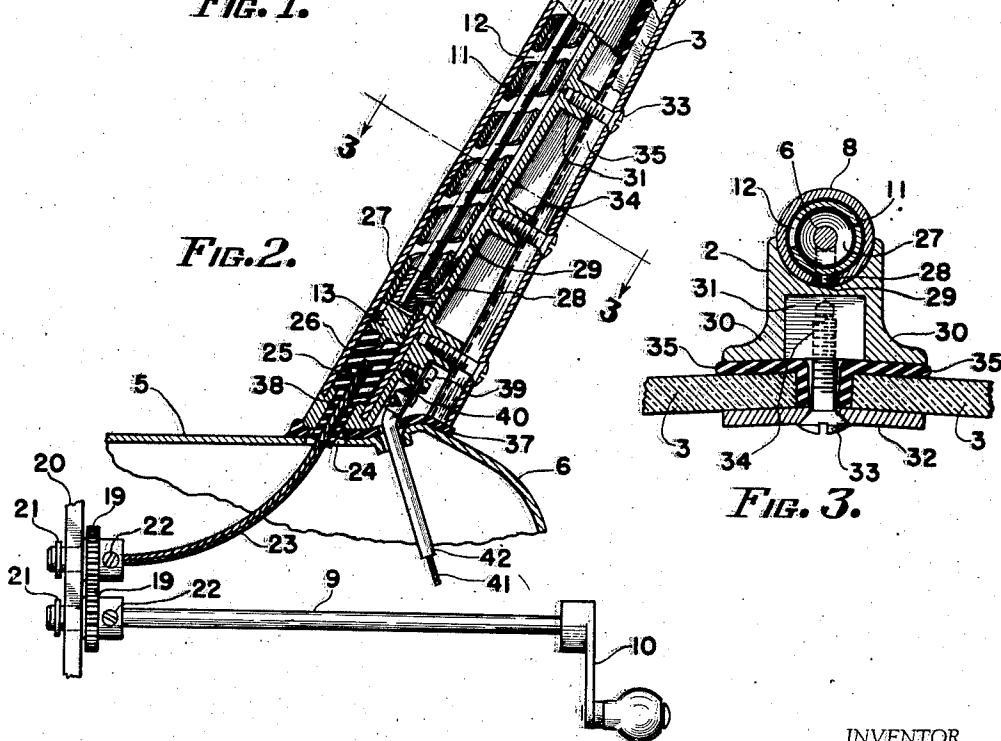


FIG. 2.

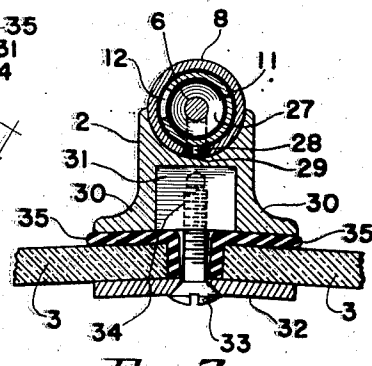


FIG. 3.

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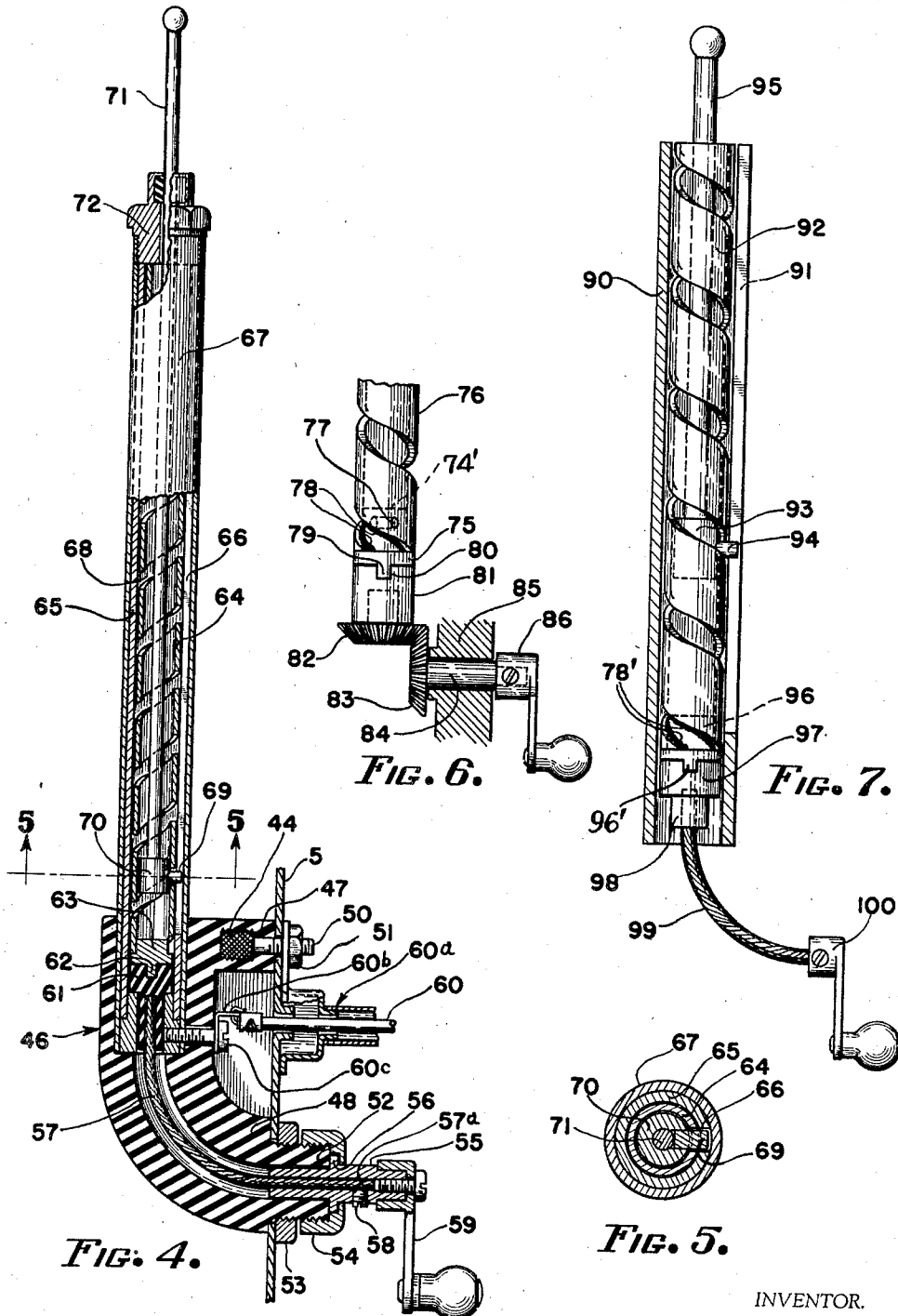
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2 Sheets-Sheet 2



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AUTOMOTIVE ANTENNA EQUIPMENT

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Application February 12, 1940, Serial No. 318,399

3 Claims. (Cl. 250—33)

This invention relates to radio antennae, particularly to antennae of the type adapted to be extended and retracted under certain conditions during use. More specifically the invention relates to antennae for motor vehicles adapted to be extended above the vehicle at times when it is desired to have a greater clearance above the same, or when for other reasons it is desired to have an antenna retracted toward or within such a vehicle.

Before the advent of the so-called "turret-topped" automobile, it was comparatively easy to provide an antenna within a top structure so that it was sufficiently insulated from the body of the car and from the stamped metal members of which its sides were composed. With integrally formed stamped metal "turret tops" it was found that antennae disposed between the top structure and the inner lining of the car were so thoroughly shielded by the metal top that they could not perform their function. Moreover, such disposition of the antenna structure resulted in a high capacity from the antennae to the body, which was objectionable.

In an effort to provide satisfactory antennae structure with this type of body, resort was had to the under-car type or the fixed extension or whip type of antennae, both of which have certain disadvantages well known to persons skilled in the art. The under-car type is extremely likely to be ripped from its moorings due to being struck by or entangled with some object on or adjacent the ground or roadway and is subject to picking up certain undesirable high frequency currents. The whip type has some advantage over the under-car type from certain points of view for the installation picks up the desired signals more readily. Still the whip type is not a particularly pleasing structure and is likely to get in the way and become entangled with overhead objects under certain conditions.

Objects of the present invention are to overcome the disadvantages of prior antenna structures and to provide a simple, efficient, self-contained structure which can be extended above the car or retracted at will. Antennae constructed according to the invention are attractive in appearance, efficient in operation and can be extended to a sufficient height to receive an adequate signal. Such structures may be built onto the motor vehicle to which they are to be attached and may be operated from within the vehicle at a point within easy access of the operator thereof. The invention is an improvement in the antenna

structure described and claimed in the patent to Daugherty and Myers, No. 2,138,427 dated January 30, 1940.

Other objects of the invention will more clearly appear when reference is had to the following specification and drawings, in which certain exemplary embodiments of the invention are shown.

In the drawings, Figure 1 is a perspective view of a motor vehicle in which two antenna structures according to the principles of the invention have been incorporated.

Figure 2 is an enlarged elevation of one form of device incorporated with the mullion of a windshield, parts being shown in section.

Figure 3 is an enlarged section taken along the line 3—3 of Figure 2.

Figure 4 is a partial section and partial elevation of a modified form of device adapted to be attached to the side of the car.

Figure 5 is a fragmentary view showing a modified form of drive for extending and retracting the movable part of the antenna structure, and

Figures 6 and 7 are fragmentary views showing further modified drive means.

In Figures 1 to 3, an illustrative automobile antenna structure designated generally as 1 is associated with or incorporated in a mullion 2 between the windshield members 3 of an automobile having a top 4 and cowl 5. The antenna may consist of an extensible rod 6 having an enlarged head 7 disposed within a housing 8. The rod 6 is adapted and arranged to be extended and retracted from the housing 8 by means hereinafter to be described, manually or otherwise operable from within the vehicle at a point within easy reach of the operator, as by turning the shaft 9 by hand-crank 10.

Within the housing 8 is provided a tubular member 11 having a spiral slot 12. The member 11 is rotatably mounted within the housing as by plugs 13 at its ends. As shown, only one plug 13 need be provided at the lower end of spiral 11, and the intermediate and upper end portions may be permitted to rotate freely within the housing 8, the member 11 being held against upward thrust by screw-threaded bushing 14, the lower end of which may abut the end of the spirally slotted member 11. The upper end 16 of bushing 14 may be provided with annularly spaced ears indicated generally at 17 adapted to be turned inwardly and downwardly to hold packing 18 disposed around rod 6. The bushing or gland 14 is arranged to permit a slidable or longitudinal movement of the rod 6.

The rod 6 is mounted for a longitudinal move-

ment of translation with respect to the housing 8 and spiral 11 upon the rotation of the spiral when the shaft 9 is turned. This may be accomplished by providing gears 19 on stud shafts journaled in suitable bearings on a bracket 20. C washers 21 may be provided on the stub shafts to prevent the longitudinal movement thereof. The gears 19 may have collars 22 integrally formed therewith within which shaft 9 and flexible shaft 23 may be clamped by set screws 22. The flexible shaft 23 may extend upwardly through an opening 24 in the cowl 5, and secured to or within a combined bearing and driving member 25 of insulating material such as Bakelite or hard rubber. The top of member 25 may have a slot adapted and arranged to receive a projecting ear 26 formed upon the lower end of the bushing 13.

It will be observed that rotation of shaft 9 in the above described illustrative structure will cause the spirally slotted member 11 to rotate within the housing 8. This rotational movement is caused to impart a translational movement to rod 6 by providing a plug 27 at the lower end of the rod and a pin or similar projection 28 on said plug so that it extends through the spiral slot 12 of the member 11 and into a longitudinally extending slot 29 formed within the housing 8. The respective slots should be sufficiently wide to permit movement of pin 28 therethrough without undue frictional losses. Rotation of member 25 through the instrumentalities previously described will cause the plug 27 with its rod 6 to move upwardly or downwardly within the housing 8, the movement being guided by the pin 28 in slot 29.

The housing 8 is preferably fixed to the front of mullion member 2 within a longitudinally extending recess therein as shown in Fig. 3. The mullion member may be provided with longitudinally extending supporting members 30 and a plurality of raised bosses 31 disposed along the center line of member 2. The assembly may be mounted between the glass members 3 by providing a plate 32 paralleling the mullion. Securing means such as screws 33 may extend through suitable openings in plate 32 into threaded holes 34 and bosses 31. An insulating and shock-absorbing strip 35 is disposed between the supports 30 and the glass members 3. It will be apparent that with the structure above described, the assembly may be fixed in position by taking up on the screws 33 and clamping the glass and insulation between members 30 and 32.

In order to ensure the proper insulation of the antenna structure at the top and bottom as well as at the sides, insulating strips 36 and 37 of suitable composition and configuration are provided between the mullion assembly and the adjacent metal parts 4 and 5 of the body of the vehicle. An insulating collar 38 may be provided for shaft 23, as shown in Fig. 2.

In order to provide a connection for a lead-in wire the lower portion of mullion 2 may be provided with a recess in which there is a step containing a drilled and threaded hole. A screw 39 is threaded into said hole in order to secure a connection 40 of lead-in 41 to the mullion in metal-to-metal contact. A loom or shield 42 is disposed around the wire 41 for reasons well known in the art.

It will be noted that with the construction described the operator of the vehicle may raise or lower the antenna rod 6 according to the conditions of clearance for the vehicle as desired by the operator. It is necessary merely to turn the

crank 10 which is within easy reach of the operator and not at a point so remote that the adjusting operation will interfere with the necessary concentration of the driver. It is of course to be understood that the hand-crank and gear construction disclosed in this and succeeding modifications are illustrative merely. The operation of the device may be obtained by the power drive of any desired nature through a wide variety of mechanical connections.

It may be desirable to rotate the rod within a fixed spiral member instead of rotating the spiral member as described.

The antenna structure comprises not only the rod 6 but the housing 8 and the conductively connected parts of the mullion structure. The length of the antenna may be increased by the provision of additional spiral members arranged so that when the limit of extension of the first is reached a second or even a third spiral will be effective on the rod to push it still further upwardly and outwardly.

In Figures 4 and 5 is illustrated a form of antenna structure suited to be mounted on the side of the cowl of the vehicle or upon some other suitable vertical member 5. The antenna may be mounted within a bracket 46 of insulating material such as Bakelite, said bracket having an upper end 47 and a lower end 48 adapted to bear against the vertical portion of the cowl member 5. Within the top portion 47 of member 46 is molded or otherwise suitably attached a knurled head 49 of a bolt 50, adapted to extend through an opening in the member 5 so that the top portion of the bracket may be secured to the vertical member as by nut 51. The lower portion 48 of member 46 may be provided with an extension 52 extending through an opening in the member 5 and threaded to receive a nut 53. The outer end of the projecting portion 52 may receive a cap 54 containing an annular groove adapted to fit a flange 56 on a shaft 55. The shaft 55 is arranged so that it may rotate within the cap 54 and within the inner end of the projection 52 and the shaft 55 may be made hollow to receive the end 57^a of flexible shaft 57 the other end of which is connected to the operating parts of the antenna structure. A set screw 58 may be provided to fix the end 57^a of the flexible shaft in position. A crank 59 may be provided at the end of shaft 55.

The upper end 47 of the bracket 46 is bored or molded to receive the lower end of a housing 67 containing the antenna structure proper. Within the housing 67 is provided a cylindrical member 65 having a longitudinal groove or slot 66. At the lower end of this cylindrical member is provided within suitable bearings a driving and bearing member 61, the upper end of which contains a slot to receive the fin 62 on bushing 63. The lower end of member 61 is molded around or otherwise secured to the end of the flexible shaft 57.

The bushing 63 is suitably secured to the lower end of a spirally slotted cylindrical member 64 and extends partially within said member and partially outside of it so that its outer periphery fits against the inner surface of the member 65. The upper ends of the spiral member 64 and the tubular member 65 may be arranged to abut a cap 72 in order to hold them against lengthwise movement.

Within the spiral member 64 is provided the antenna rod 71 the lower end of which is provided with a plug 70 having a pin 69 extending

through the spiral slot 63 of the slotted member 64 and into the longitudinal slot 66 of the member 65.

It will be apparent that the structure above described will permit the spiral member 64 to be turned upon rotation of the crank 59 or other driving means and this in turn will cause the plug 70 to travel up and down with respect to the supporting structure, thereby extending and retracting the antenna rod 71. A lead-in wire 60 may be extended through a suitable shield and supporting structure 60^a and connected by connection 60^b to a suitable screw or binding post 60^c conductively secured to the lower end of the antenna structure proper.

In Figure 6 I have shown a modified form of drive means and connection between the operating parts of the mechanism. The antenna rod supporting plug 74' may be fitted within the lower end of slotted sleeve 76 and soldered, brazed or welded along the edges of the slot as at 78. A rivet pin 77 may extend through the sleeve 76 and into the plug 74' for further securing it in place. The lower end of the plug 74' is enlarged so that its peripheral upper edge abuts against the lower end of the sleeve 76 and may be provided with a fin 79 adapted to engage a slot 80 in sleeve 81. Secured to the sleeve 81 is a bevel gear 82 arranged to mesh with a bevel gear 83 disposed on shaft 84 in a suitable bearing 85, the end of said shaft being provided with a crank or suitable motive means 86.

In Figure 7 a still further modified form of the invention is shown. In this figure the sleeve 90 has a longitudinal slot 91 and a spirally slotted member 92 is disposed within the sleeve. The end of an antenna rod 95 is secured to a plug 93 having a pin 94 extending outwardly through the spiral slot of member 92 and into the longitudinal slot 91 of member 90. In order to drive the sleeve 90 from the lower end a bushing 96 is disposed

within the same and firmly secured thereto as by soldering or brazing the two parts at their points of contact within the slot, as indicated at 78'. The bushing 96 is provided with a fin 96' fitting into the driving member 97 in a manner similar to that previously described. Member 97 may be provided with an extension 98 within which is secured the upper end of a flexible shaft 99, the lower end of which is secured to a crank 100 suitably mounted for rotational movement. In both Figures 6 and 7 the metallic parts of the assembly are insulated from the body of the vehicle and connected to the radio set of an automobile by suitable insulated or shielded lead-in wires.

Having thus described my invention, I claim:

1. An antenna comprising a housing having a slot extending lengthwise of its interior, said slot being enclosed from the outside of the housing, a spirally slotted sleeve within said housing, a member within said sleeve, said member having a projecting portion cooperating with both of said slots, and means for rotating said sleeve relative to said member.

2. An antenna comprising a housing, a sleeve within said housing and having a slot extending lengthwise thereof, a spirally slotted sleeve within said longitudinally slotted sleeve, a member within said spirally slotted sleeve, said member having a projecting portion cooperating with both of said slots, and means for rotating said spirally slotted sleeve relative to said member.

3. An antenna structure comprising a mullion having a longitudinal slot disposed interiorly of said mullion and enclosed from the exterior thereof, a spirally slotted rotatable sleeve disposed within said mullion, a member disposed within said sleeve, said member having a projecting portion cooperating with both of said slots, and means for rotating said sleeve relative to said member.

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