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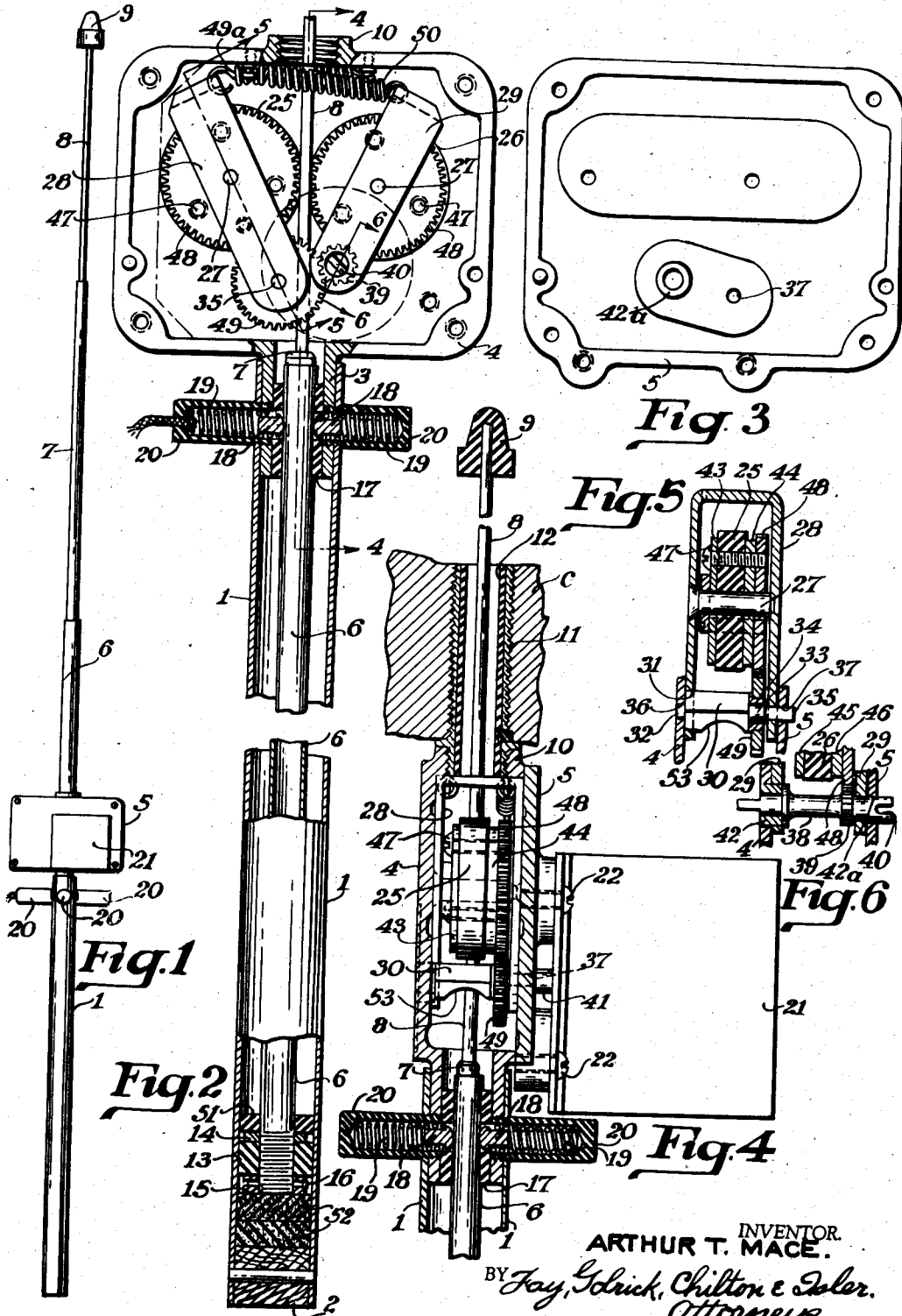
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2,384,631

RADIO ANTENNA FOR AUTOMOBILES AND THE LIKE

Filed Jan. 24, 1944

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

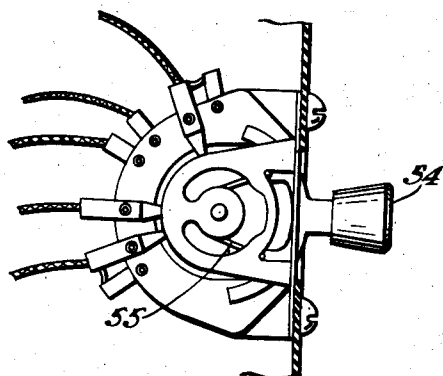


Fig. 8

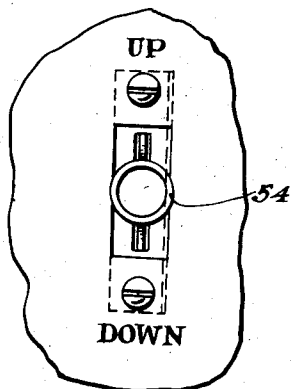


Fig. 9

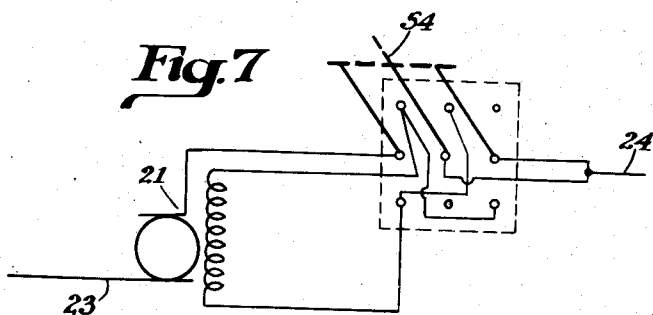


Fig. 7

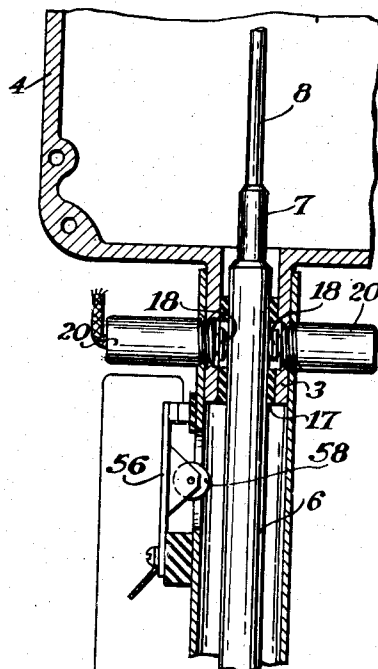
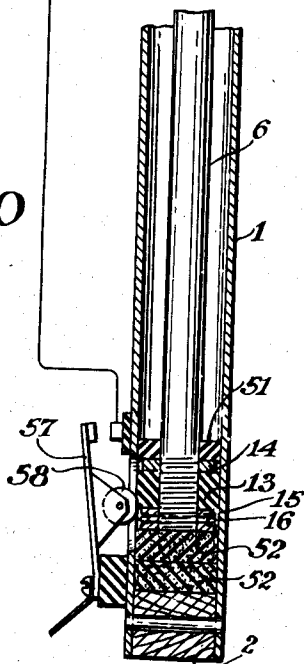


Fig. 10



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UNITED STATES PATENT OFFICE

2,384,631

RADIO ANTENNA FOR AUTOMOBILES AND
THE LIKE

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Application January 24, 1944, Serial No. 519,432

8 Claims. (Cl. 250—33)

This invention relates, as indicated, to an automobile radio antenna, but has reference more particularly to an antenna of the telescopic or extensible-retractable type, which is adapted for operation by power means.

A primary object of the invention is to provide an antenna of the character described which is adapted to be extended or retracted by the direct engagement of the walls of the antenna sections by power driven means.

Another object of the invention is to provide an antenna of the character described, having a compact and efficient power unit for extending and retracting the antenna.

A further object of the invention is to provide an antenna of the character described in which means are incorporated for centralizing the antenna rod during extension and retraction thereof.

A still further object of the invention is to provide a power-driven antenna of the character described having means associated therewith for instantaneously stopping the antenna at any desired point in the extension or retraction thereof.

A still further object of the invention is to provide a motor-driven antenna of the character described having means associated therewith for automatically stopping the motor at the limits of extension and retraction, so as to prevent injury or damage to the antenna parts.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same.

Fig. 1 is a front elevation of an antenna embodying the novel features of the invention;

Fig. 2 is a view on an enlarged scale of the antenna, some parts being shown in elevation and some in section;

Fig. 3 is an elevational view of the gearbox cover;

Fig. 4 is a fragmentary cross-sectional view, taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary cross-sectional view, taken on the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary cross-sectional view, taken on the line 6—6 of Fig. 2;

Fig. 7 is a diagram of the circuit for operating the motor which extends or retracts the antenna;

Fig. 8 is a side elevation of a preferred form of switch which is used in the circuit of Fig. 7;

Fig. 9 is a front elevation of the switch, and

Fig. 10 is a view similar to Fig. 2, but showing a modification in which limit switches are employed for automatically stopping the antenna-operating motor.

Referring more particularly to the drawings, and especially to Figs. 1 to 9 inclusive, the antenna will be seen to comprise a tubular metallic housing 1, closed at the bottom, as by means of a wooden plug 2, and having secured within its upper end the tubular extension 3 of a gear box 4, provided with a removable cover 5.

Disposed centrally within the tubular housing 1 is the lowermost section 6 of an antenna comprising the tubular section 6, an intermediate tubular section 7, which is slidable in the section 6, and an upper section in the form of a solid rod 8, which is slidable in the intermediate section 7. The rod 8 is provided at its upper end with a cap element 9.

The box 4 is also provided with an internally threaded boss 10, which is in axial alignment with the tubular extension 3 of the box and which has threadedly secured thereto an externally threaded member 11, whereby the antenna may be threadedly secured to the cowl or other body portion of an automobile, diagrammatically represented by the reference character C in Fig. 4. The member 11 is lined with a sleeve 12 of a suitable insulating material.

For the purpose of guiding and maintaining the section 6 of the antenna centrally of the tubular housing 1 during the upward and downward movements of such section, an annular collar or spacer 13 is secured to the lower end of the section 6 and substantially fills the space between such action and the inner wall of the housing 1, being maintained against axial displacement from such section by means of metallic washers 14 and 15, which are threadedly secured to the section 6 and disposed in engagement with the opposite ends of the spacer 13. The washer 15 is also secured against rotation about the section 6 by means of a cotter pin 16. The spacer 13 is made of a suitable insulating material, such as hard rubber, Bakelite, or the like.

Maintenance of the section 6 centrally of the tubular housing 1 is further assured by a sleeve or spacer 17, also made of an insulating material and which substantially fills the space between the section 6 and the inner wall of the extension 3. In order to insure free vertical movement of the section 6 in the housing 1, substantial clearance is provided between the spacer 17 and the section 6, but any tendency of the section 6 to move laterally as the result of providing such clearance is entirely obviated by the provision of two pairs of buttons 18, one of said pairs being spaced circumferentially of the section 90 degrees from the other pair. Each pair of buttons extends transversely through the sleeve 17, and engages the section 6 at diametrically-opposite points, and the two pair serve to centralize the section 6 with respect to the housing 1 during the upward and downward movement of such section

and provide a frictional load on section 6. The buttons 18 are resiliently urged against the section 6 by means of coil springs 19, which are housed in cup-like caps or housings 20 of insulating material, which are threadedly secured to the tubular housing 1 and extension 3 of the gear box. An antenna lead (not shown) may be taken off one of the springs 19 through its cap 20, the cap being suitably shielded for this purpose.

Means are also provided for extending or lengthening and retracting or shortening the antenna. Such means comprises a small electric motor 21, which is secured, as by screws 22, to the cover 5 of the gear box 4. The motor is a direct current motor of the reversing type, and is adapted to be driven by the ordinary 6-volt battery of the automobile, a circuit for such drive being diagrammatically shown in Fig. 7. In this circuit, the main lines from the battery to the motor are indicated by the reference numerals 23 and 24. The operation of this circuit will be presently described.

Located within the gear box 4 is a pair of rolls 25 and 26 of rubber or other yielding material, these rolls being revolutely mounted on shafts or pins 27, the ends of which are rigidly secured to the arms of inverted U-shaped brackets 28 and 29.

The bracket 28 has non-rotatably mounted in the arms thereof, near the extremities of the latter, a shaft 30 of generally square cross-section which corresponds with a square opening 31 in one of the bracket arms. This shaft is provided at one end with a short circular trunnion 32, which projects beyond one arm of the bracket and at its other end with a reduced portion 33 mounting a bearing 34 and with a circular trunnion 35 which is somewhat longer than the trunnion 32 and projects through and beyond the other arm of the bracket 28. The projecting portions of the trunnions 32 and 35 are disposed in circular openings 36 and 37 in the gear box 4 and cover 5, respectively, so that the bracket is free to rock about the axes of the trunnions.

The bracket 29 has journaled in the arms thereof near the extremities of the latter, a shaft 38, a portion of which is formed to provide a pinion 39 and one end of which is recessed, as at 40, for the reception of a tenon on the shaft 41 of the motor 21, whereby the shaft 38 is driven. The end portions of the shaft form trunnions, one of which is disposed in a bearing 42 mounted in the gear box and one arm of the bracket 29, and the other of which is disposed in an opening 42a in the cover 5, so that the bracket is free to rock about the axis of the shaft 38.

Each of the rolls 25 and 26 is secured between a pair of disks 43 and 44, the roll and both discs being secured together as a unit by means of screws 47. These screws also have secured thereto gears 48.

The gear 48 which is associated with the roll 25 is adapted to be driven by a smaller gear 49 which is journaled on the bearing 34, and which, in turn, is driven by the pinion 39 of the shaft 38. The gear 48 which is associated with the roll 26 is adapted to be driven directly by the pinion 39.

The rolls 25 and 26 are biased toward the antenna rod by means of coil springs, one of such springs 49a connecting the bracket 28 to the gear box 4, and the other of such springs 50, connecting the bracket 29 to the gear box.

It will be apparent from the foregoing that as the shaft 38 is rotated, the rolls 25 and 26 will be rotated in opposite directions to extend or re-

tract the antenna, depending upon the direction of rotation of the motor 21. If it be assumed that the antenna is substantially completely retracted, as shown in Fig. 2, and that the motor 21 is rotated in a direction to extend the antenna, the rotation of the rolls 25 and 26 will, due to the frictional yielding engagement of such rolls with the antenna section 8, first fully extend such section. Thereafter the rolls, by their continued rotation, will extend the section 7 of the antenna, the brackets 28 and 29 moving outwardly against the tension of the springs 49a and 50 to accommodate the larger diameter of the section 7. Then, after the section 7 has been fully extended, the rolls, by their continued rotation will extend the section 6 of the antenna, the brackets 28 and 29 moving still further outwardly against the tension of the springs to accommodate the larger diameter of the section 7.

When the antenna has been thus extended to its maximum effective length, a rubber washer 51, mounted on the washer 14, will engage the lower end of the tubular extension 3 of the gear box 4, and thus prevent the antenna from being fed completely out of the housing 1. The rubber washer 51, moreover, will prevent shock and injury to the parts. Since the rolls 25 and 26 may slip on the antenna section 6 after the rubber washer 51 comes into engagement with the extension 3, injury to the operating mechanism is thus definitely precluded. If desired, however, a clutch such as shown in my U. S. Patent No. 2,329,404, or in my copending application, Serial No. 401,174, may be incorporated in the operating mechanism.

In order to retract the antenna, the motor 21 will be operated to reverse the direction of rotation of the rolls 25 and 26, and this causes the sections 6, 7 and 8 to be successively retracted into the housing 1. In order to cushion the impact of the section 6 when it is fully retracted, cushions 52 of sponge rubber or the like are provided in the bottom of the housing 1, above the plug 2.

It may be noted that the shaft 30 is recessed at 53 in order to accommodate the passage of the antenna sections through the gear box.

In order to operate the motor 21 in a direction to cause the desired movement of the antenna, a switch of the type shown in Figs. 8 and 9 is preferably used, being suitably mounted on the dashboard of the automobile. This switch provides an up and down position, and the motor will operate as long as the switch is held in the up or down position. When the desired movement of the antenna has been effected, the handle 54 of the switch is released, and a spring 55 returns the switch to the neutral or off position shown in Figs. 7, 8 and 9, stopping the motor 21. The motor 21 is thus stopped instantaneously whenever desired by merely releasing the handle.

In order to cause the motor 21 to be stopped at the extreme limits of extension or retraction of the antenna, even though the operator should forget to release the switch handle, limit switches 56 and 57, such as shown in Fig. 10, may be utilized, such switches being mounted on the housing 1, in suitable insulated relation to the latter. Each of these limit switches is normally closed, and each is provided with a roller 58 which is adapted to be engaged by the annular spacer 13 to thereby open the switch, as indicated at the lower end of Fig. 10.

It is to be understood that the form of my invention, herewith shown and described, is to be

taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In an antenna of the character described, a tubular housing having, a gear box mounted on said housing, an antenna rod comprising a plurality of telescoped sections of varying diameter normally disposed in said housing, power driven rolls in said gear box, said rolls adapted by their rotation to engage said sections successively, beginning with the section of smallest diameter and ending with the section of largest diameter, and thereby extend the antenna rod, and means for driving said rolls, said means comprising gears rigidly attached to said rolls at one side of said rolls, a pinion for driving one of said gears and the other of said gears being driven in the opposite direction by said pinion through the intermediary of a third gear.

2. In an antenna of the character described, a tubular housing, a gear box mounted on said housing, an antenna rod comprising a plurality of telescoped sections of varying diameter normally disposed in said housing, power driven rolls in said gear box adapted by their rotation to engage said sections successively, beginning with the section of smallest diameter and ending with the section of largest diameter, and thereby extend the antenna rod, and means for centralizing the antenna rod in said housing and for yieldingly resisting movement of one of said sections including, a pair of spring pressed members disposed on opposite sides of said antenna and being resiliently urged against said antenna.

3. In an antenna of the character described, a tubular housing, an extensible and retractable antenna rod in said housing, means for extending and retracting said antenna rod, an electric motor for driving said means, and means for automatically stopping said motor when said antenna has been fully extended or fully retracted, said automatic stopping means comprising switches mounted on said housing adjacent the upper and lower ends thereof and having switch actuating members normally projecting into said housing and being engageable by a cam-like element carried by said antenna rod.

4. In an antenna of the character described, an antenna rod comprising a plurality of telescoped sections of different diameters, a housing for said antenna; and means for withdrawing and returning said antenna rod to said housing, including a pair of brackets, each bracket having a gear rotatably mounted thereon and a roller driven by the gear and engageable with said antenna, two driving gears meshing with one another, one of said driving gears meshing with the gear on one of said brackets and the other driving gear meshing with the gear on the other of said brackets, said one bracket being mounted for movement in an arc whose center coincides with the center of the driving gear meshing with the gear carried by said one bracket, a device for resiliently urging said one bracket in a direction for urging the gear carried by said one bracket toward the gear carried by the other of said brackets, and a device for driving one of said driving gears.

5. In an antenna of the character described, an antenna rod comprising a plurality of telescoped sections of different diameters, a housing

for said antenna; and means for withdrawing and returning said antenna rod to said housing, including a pair of brackets, each bracket having a gear rotatably mounted thereon and a roller driven by the gear and engageable with said antenna, two driving gears meshing with one another, one of said driving gears meshing with the gear on one of said brackets and the other driving gear meshing with the gear on the other of said brackets, said one bracket being mounted for movement in an arc whose center coincides with the center of the driving gear meshing with the gear carried by said one bracket, and a device for driving one of said driving gears.

6. In an antenna of the character described, an antenna rod comprising a plurality of telescoped sections of different diameters, a housing for said antenna; and means for withdrawing and returning said antenna rod to said housing, including a pair of brackets, each bracket having a gear rotatably mounted thereon and a roller driven by the gear and engageable with said antenna, two driving gears meshing with one another, one of said driving gears meshing with the gear on one of said brackets and the other driving gear meshing with the gear on the other of said brackets, each of said brackets being mounted for movement in an arc having its center coinciding with the center of the driving gear meshing with said gear carried by the respective brackets, and a device for driving one of said driving gears.

7. In an antenna of the character described, an antenna rod comprising a plurality of telescoped sections of different diameters, a housing for said antenna; and means for withdrawing and returning said antenna rod to said housing, including a pair of brackets, each bracket having a gear rotatably mounted thereon and a roller driven by the gear and engageable with said antenna, two driving gears meshing with one another, one of said driving gears meshing with the gear on one of said brackets and the other driving gear meshing with the gear on the other of said brackets, each of said brackets being mounted for movement in an arc having its center coinciding with the center of the driving gear meshing with said gear carried by the respective brackets, a device for resiliently urging said brackets toward one another, and a device for driving one of said driving gears.

8. In an antenna of the character described, an antenna rod comprising a plurality of telescoped sections of different diameters, a housing for said antenna; a gear box mounted on said housing; a pair of brackets pivotally mounted in said gear box, said brackets each carrying a roller engageable with said antenna, said rollers being on opposite sides of the antenna for extending and retracting said antenna from said housing; means resiliently urging said brackets about their pivots and toward one another for causing frictional engagement between said rollers and antenna; a gear carried by each of said brackets and connected in driving relation with the roller carried by the respective brackets; a driving gear carried by each bracket, said driving gears meshing with one another and with the roller driving gear carried by the respective brackets, said driving gears having their axes coincident with the axes of the pivots for the respective brackets; and means for driving one of said driving gears.

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