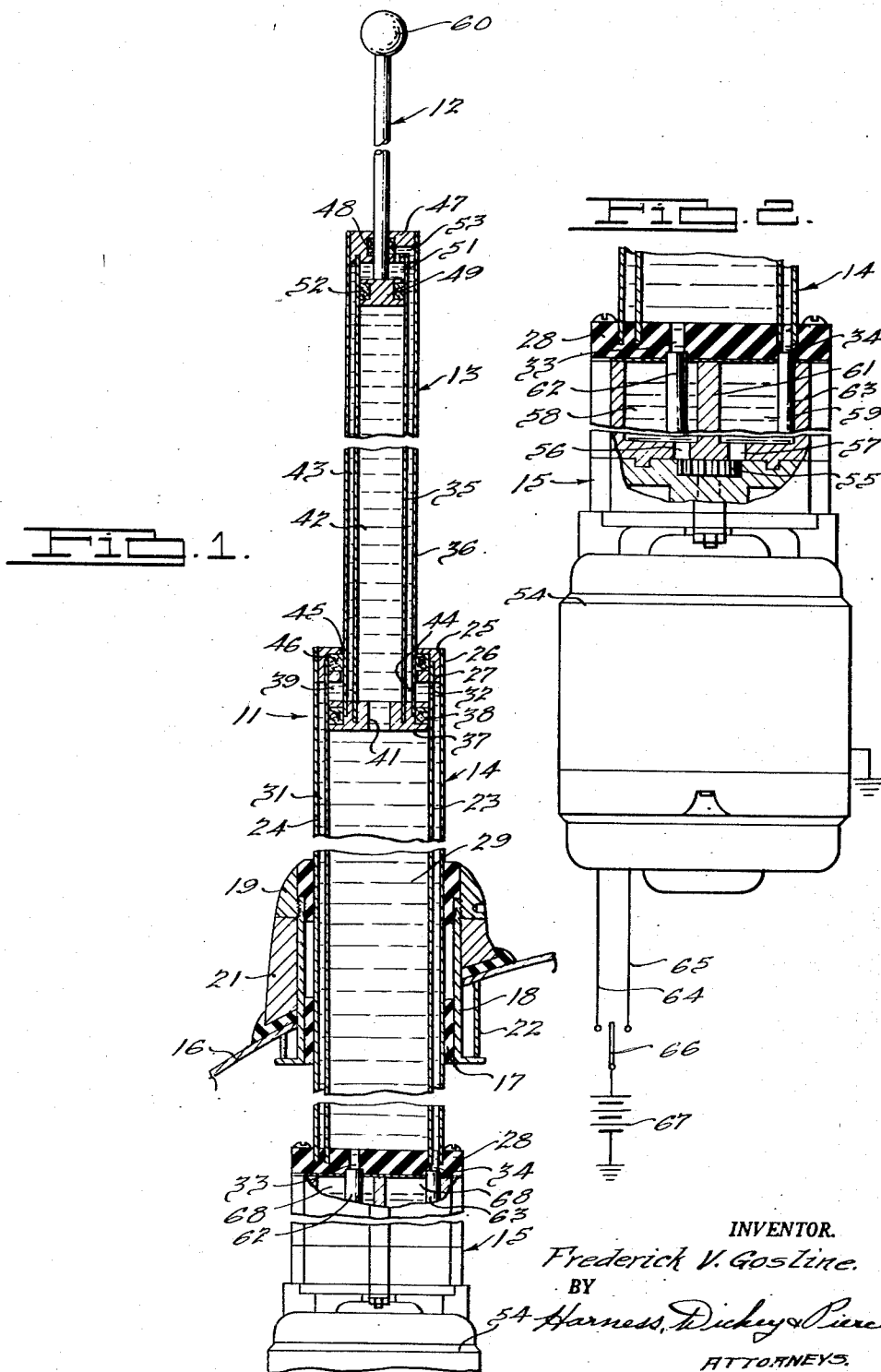


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EXTENSIBLE ANTENNA WITH TWO-WAY
ACTING FLUID DRIVING MEANS
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EXTENSIBLE ANTENNA WITH TWO-WAY
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This invention relates to extensible and retractable radio antennas and actuating means therefor, and more particularly to antennas adapted for installation in vehicles where it is desired to control the movement of the antenna from a point remote from its mounting.

It is an object of the present invention to provide such an antenna which is operable under the influence of control means located at a point remote from the antenna mounting and in which the actuating mechanism for the antenna is directly connected to the antenna proper and occupies a relatively small space. More particularly, it is an object to provide an improved antenna of the indicated character having a fluid pressure system for extending or retracting the antenna sections, in which the antenna sections themselves form a part of said fluid pressure system and in which the fluid pressure reacts directly upon these sections.

It is another object to provide an improved antenna comprising a plurality of sections which may be mounted on a vehicle body panel or the like, the antenna being actuatable by a fluid pressure system directly connected to the sections in a limited space below the mounting panel, and which may be controlled by electrical means remote from the mounting area.

It is a further object to provide an extensible antenna as described, which is driven by a reversible fluid pressure system of which the antenna sections themselves form a part, the hydraulic system in no way interfering with the electrical functions of the antenna sections, and in which the sections may be stopped and positively held in any intermediate position.

Other objects, features, and advantages of the present invention will become apparent from the subsequent description taken in conjunction with the accompanying drawing.

In the drawing:

Figure 1 is an elevational view, partly in cross-section and with parts broken away, showing the operative portions of the antenna sections together with the hydraulic actuating means; and

Fig. 2 is a fragmentary elevational view, partly in cross-section, showing the details of the hydraulic actuating means and its connection to the antenna.

The antenna proper, generally indicated at 11, is of the telescopic type having a plurality of sections 12, 13 and 14. It will be understood that while only three sections are shown in the illustrated embodiment, the principles of the invention contemplate the use of any desirable

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number of sections. As will later appear, these sections form part of a fluid pressure system which is driven by a hydraulic pump, generally indicated at 15, to drive the sections into extended or retracted position. The outer antenna section 14 is secured to a panel 16 which may comprise a cowl, fender or other body panel of an automotive vehicle or the like. Conventional means may be employed for securing section 14 to the panel. In the illustrated embodiment, this securing means may comprise an insulating block 17 of annular shape which is secured to an intermediate portion of section 14 and in which the lead-in connection (not shown) may be mounted. This insulating block is held within a cylindrical shell 18 which extends through an opening (not designated) in the body panel, a dome-nut 19, neck piece 21 and spacer 22 securing shell 18 to the body panel.

Antenna section 14 comprises two cylindrical members 23 and 24 which are held in rigid concentric relation. Outer cylinder 24 is directly secured to the body panel 16 by the means above described, and extends above and below said panel. A head 25 is secured within the upper end 26 of outer cylinder 24 and this head is provided with an annular groove (not designated) in which is held the upper edge portion 27 of inner cylinder 23. The lower edge portions of these two cylindrical members are held in rigid relation by a head 28 of electrically insulative material, this head also being connected with the hydraulic pump mechanism to be later described. The lower chamber 29 formed by the inner cylindrical member 23 below its cooperating piston, serves to conduct the hydraulic fluid when the antenna sections are being moved to their extended position. The annular space 31 between cylindrical members 23 and 24 serves to conduct the hydraulic fluid when the sections are being retracted. For this purpose, inner cylinder 23 is provided with an aperture 32 immediately below head 25, and the lower head 28 is provided with an aperture 33 leading to chamber 29 and an aperture 34 connected with chamber 31. The purposes and functions of apertures 32, 33 and 34 will appear hereinafter in the description of the operation of the device.

Intermediate antenna section 13 is slidably mounted within outer section 14 and is of generally similar construction to the latter section. In particular, section 13 is provided with an inner cylindrical member 35 and an outer cylindrical member 36 in rigid concentric relation. The lower ends of these cylindrical members

support a piston 37 which is slidably disposed within cylinder 23. The piston 37 is preferably fabricated of a metallic or other electrically conductive material, and the fit of the piston in cylinder 23 is such that the peripheral surfaces thereof are in conductive contact with the cylinder. An annular packing member 38 is provided in piston 37 to prevent hydraulic fluid from passing the piston. It will be noted that piston 37 divides the cylinder 23 into lower chamber 29 and an upper chamber 39. The piston 37 is provided with a centrally located aperture 41 which connects chamber 29 to a lower chamber 42 formed by inner cylinder 35 of intermediate antenna section 13 and its cooperating piston. Chamber 42 thus also forms a part of the fluid pressure system for extending the antenna sections. The annular chamber 43 which is formed between cylinders 35 and 36 is connected to upper chamber 39 of the lower antenna section by an aperture 44 in cylinder 36 immediately above piston 37. Since, as stated previously, aperture 32 connects annular chamber 31 to chamber 39, it will be seen that chambers 31, 39 and 43 all form a part of the fluid pressure system for retracting the antenna. The head 25 is provided with a clearance aperture 45 through which antenna section 13 extends, and the fluid in chamber 39 is prevented from leaking past this aperture by a packing gland 46. It will be understood that while only one intermediate antenna section 13 is shown, the antenna may comprise a plurality of such sections.

The upper end of antenna 13 is provided with a head 47 which holds cylinders 35 and 36 in concentric relation. Upper antenna section 12, which is preferably of solid cylindrical construction, is slidably mounted within cylinder 35 and extends upwardly through head 47, a packing gland 48 being provided in the head to prevent leakage. A piston 49 is formed at the lower end of antenna section 12, and this piston is constructed of electrically conductive material similar to piston 37, having a sliding contacting fit with the cylinder 35. The piston 49 thus divides cylinder 35 into lower chamber 42 and an upper chamber 51, a packing 52 being provided in the piston to prevent leakage. Upper chamber 51 is connected to annular chamber 43 by means of a passageway 53 formed in head 47. The upper end of antenna section 12 may be provided with a knob 60 which acts as a stop when retracting the antenna sections.

As is best seen in Fig. 2, the fluid driving means for the hydraulic system reacts directly on the antenna structure and is mounted immediately below fixed antenna section 14. It will be understood that while the particular fluid driving means shown in the illustrated embodiment is that which is preferred, other and similar driving means and mounting arrangements are contemplated by the principles of the invention. The illustrated system is reversible and comprises in general an electric motor 54 which drives pump 15 in either direction. The pump may be of a conventional positive displacement type comprising rotary gears 55, the pump chamber being connected by passageways 56 and 57 to a reservoir comprising two chambers 58 and 59. These chambers are sealed from each other by a parting wall 61, passageway 56 being connected to chamber 58 and passageway 57 to chamber 59. Chamber 58 is connected by a standpipe 62 to port 33 which, as previously stated, leads to antenna-extending chamber 29. Cham-

ber 59 is likewise connected by a standpipe to port 34, leading to antenna-retracting chamber 31. The motor 54 is preferably of the reversible type and is connected by leads 64 and 65 to a reversible switch 66 connected to a battery 67. Since it may be desirable to ground the motor casing, head 28 as stated previously is preferably constructed of material having electric insulating properties so as to prevent grounding of the antenna.

In operation, assuming an initial position in which the antenna 11 is fully extended, the antenna sections may be retracted by actuating pump 15 in such a direction as to force fluid upwardly through port 34 into chamber 31. The hydraulic fluid will pass upwardly through annular chamber 31, through aperture 32 and into upper chamber 39 of antenna section 14. Simultaneously with this action, hydraulic fluid will be withdrawn from chamber 29 through port 33. Air spaces 68 are preferably left in chambers 58 and 59 to allow for differences in volume of fluid flow. The fluid entering chamber 39 will react on the upper side of piston 37 to force antenna section 13 downwardly within section 14. At the same time, the fluid will pass through aperture 44, upwardly through annular chamber 43 and through aperture 53 into upper chamber 51 of the antenna section 13. This fluid will force piston 49 of antenna section 12 downwardly, the fluid in chamber 42 passing into chamber 29 through aperture 41. This action will continue until both antenna sections 12 and 13 are fully retracted within section 14. At this time, piston 37 will abut head 28 and knob 60 will abut head 47, stopping the retracting movement. When it is desired to extend the antenna sections, the switch 66 will be reversed, driving fluid upwardly through port 33 and downwardly through port 34. The fluid will thus be forced into chambers 29 and 42, reacting against the undersides of pistons 37 and 49 to extend antenna sections 12 and 13. It will be noted that due to the arrangement of the parts the fact that the antenna sections are part of the hydraulic system will in no way interfere with their electrical functions. It will also be observed that by stopping motor 64 the antenna sections may be stopped in any intermediate position, and will be held in such position by friction as well as by the effect of the trapped fluid. It is important to observe that because of the continuous electrical contact between heads 37 and 49 and their corresponding cylinders, no impairment of the electrical function of the antenna will occur in any of its intermediate positions.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

I claim:

1. An antenna of the extensible type comprising a section secured to a stationary support, said section comprising concentric inner and outer spaced cylinders forming an annular chamber therebetween, a movable section slidably mounted within said stationary section, said movable section having a piston slidable within the inner cylinder of said stationary section and dividing said inner cylinder into upper and lower chambers, said movable section further comprising a pair of concentric inner and outer spaced cyl-

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inders forming an annular chamber therebetween, an upper section slidable within said movable section, said upper section having a piston within the inner cylinder of said movable section and dividing said cylinder into upper and lower chambers, a fluid connection between the lower chambers of said stationary and movable sections, additional fluid connections leading from the upper chamber of said stationary section to the annular chambers of said stationary and movable sections, an apertured portion forming a passage connecting the annular and upper chambers of said movable section, and means for connecting a source of fluid pressure to the lower and annular chambers of said stationary section, whereby fluid pressure may be selectively applied to either the upper or lower sides of said pistons.

2. The combination according to claim 1, further provided with a head secured to said stationary section, said head being constructed of electrically insulative material, said reservoir being mounted directly against said head and in coaxial relation with said antenna sections.

3. An antenna of the extensible type comprising a first section secured to a stationary support, said section comprising concentric inner and outer spaced cylinders forming an annular chamber therebetween, a movable section slidably mounted within said first section, said movable section having a piston slidable within the inner cylinder of said first section and dividing

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said inner cylinder into upper and lower chambers, a fluid connection between said annular chamber and said upper inner chamber, a head secured to and enclosing the lower ends of said annular chamber and said lower inner chamber, a reversible pump with a motor therefor supported directly by and depending below said head in substantial alignment with said stationary and movable antenna sections, a fluid connection from one side of said pump extending through said head to said lower inner chamber, and a fluid connection from the other side of said pump extending through said head to said annular chamber.

4. The combination according to claim 3, further provided with a reservoir comprising two separate chambers secured to the underside of said head, said pump being secured to the underside of said reservoirs and adapted to pump fluid in either direction between said pump chambers, the fluid connections which extend through said head connecting said reservoir chambers with said lower inner chamber and said annular chamber.

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