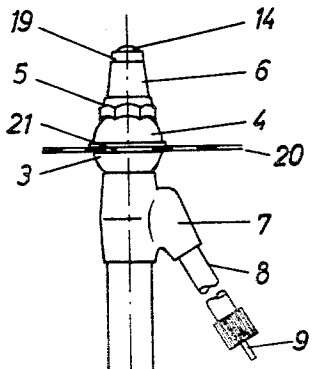
May 3, 1960 H. BURKHARDT 2,935,269

EXTENSIBLE TELESCOPIC ANTENNA WITH DRUM DRIVE AND EXCHANGEABLE TELESCOPE

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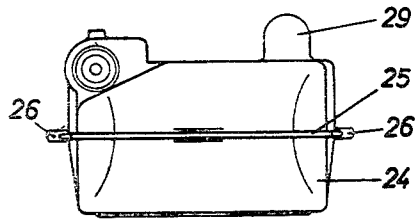


Fig. 2

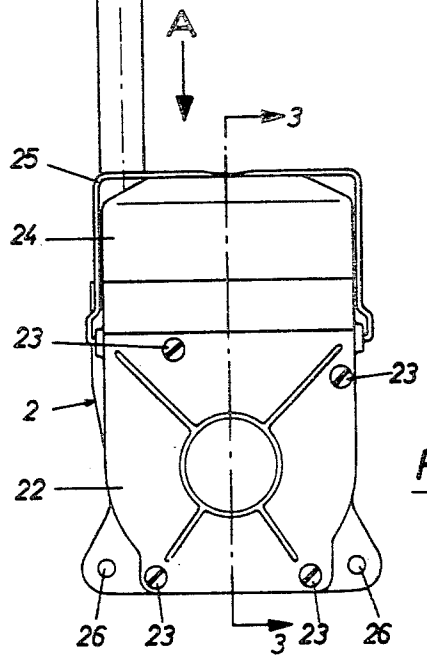


Fig. 1

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Murray Thorne

Fig. 3

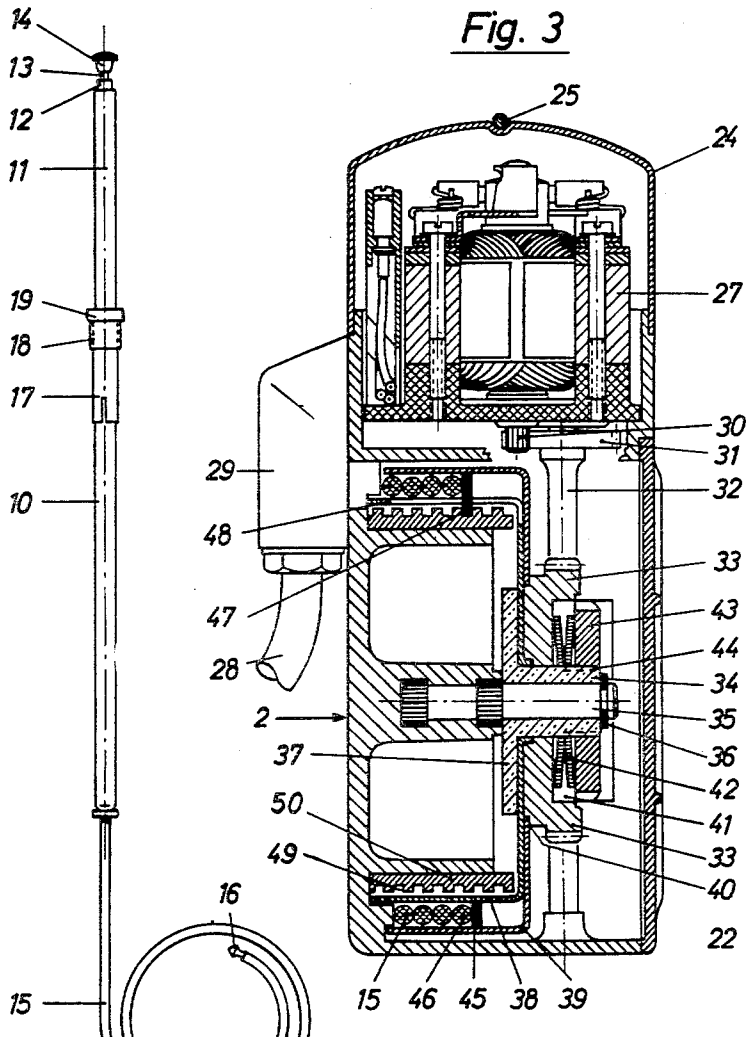


Fig. 4

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EXTENSIBLE TELESCOPIC ANTENNA WITH DRUM DRIVE AND EXCHANGEABLE TELESCOPE

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Fig. 5

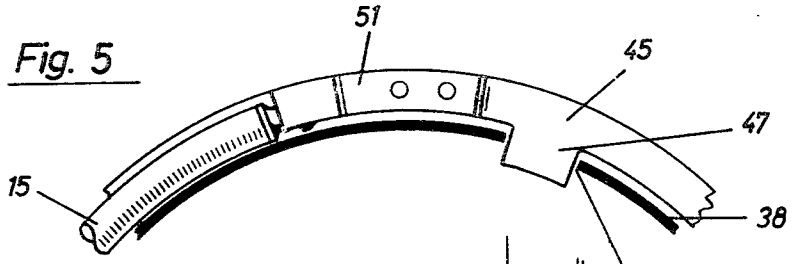


Fig. 6

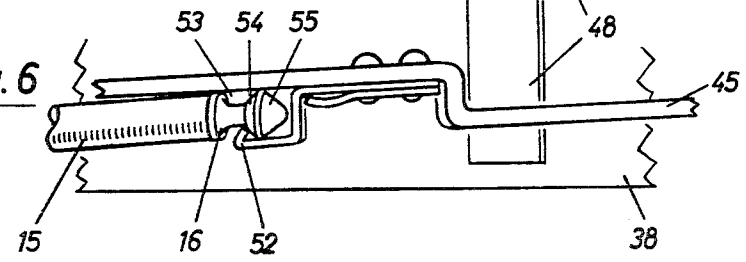


Fig. 7

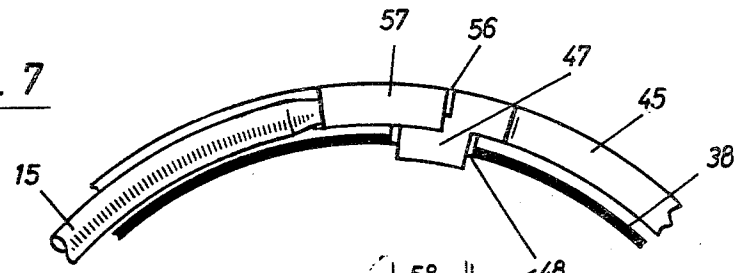
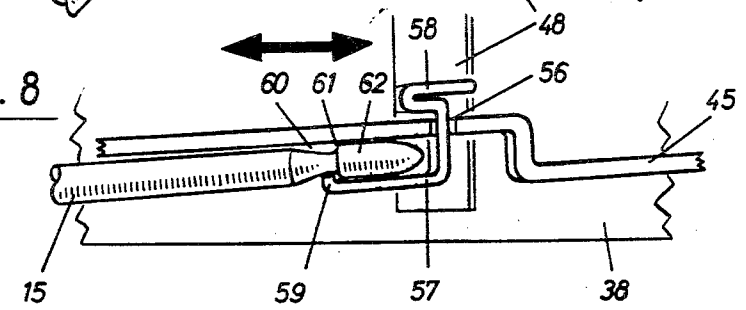


Fig. 8



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Marion Hare

United States Patent Office

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EXTENSIBLE TELESCOPIC ANTENNA WITH DRUM DRIVE AND EXCHANGEABLE TELESCOPE

Hermann Burkhardt, Reutlingen-Betzingen, Germany, assignor to Firm of Richard Hirschmann Radiotechnisches Werk, Esslingen, Neckar, Germany

Application July 19, 1957, Serial No. 673,007

Claims priority, application Germany July 21, 1956

3 Claims. (Cl. 242—54)

The invention concerns an extensible telescopic antenna with drum drive and exchangeable telescope, preferably for motor vehicles whose telescope can be pulled out and pushed in by a motor-driven driving aggregate.

A considerable difficulty in the practical application of such antennae lies in the fact that the telescope has a relatively high incidence of trouble.

It must be very thin, so as to look smart in the car, and it may not rattle during travel, but its comparatively thin tubes, which slide into one another with little play, are exposed to the rain and the mud of the streets during travel. Even if the tubes are filled with grease and are sealed off at the free ends as well as possible, the telescope occasionally can be pushed only with difficulty due to the unavoidable fouling. It may even get stuck altogether if it was bent inadvertently, for example when driving into the garage.

The drive, so as not to be damaged when the telescope is movable only with difficulty or not at all, contains a friction clutch which slides through if the admissible load on the motor has been exceeded. Since the telescope has to be exchanged occasionally because of its great incidence of trouble, it is desirable that the antenna then does not have to be dismounted from the vehicle.

With the known antennae a polyamide string (perlon or nylon) fastened to the inner telescope element serves as pushing means for pulling the telescope out and for pushing it in. It is either taken along by rotating cylinders pressed against it or it is wound and unwound on a driven drum to which the end of the string is fastened so that the force of pull or push can be transmitted from the drum to the string.

Antennae with cylinder drive can, wtihout difficulty, be provided with a telescope which, together with the pushing means, can be exchanged from the outside if the antenna is mounted in the vehicle. All that is necessary for this purpose is that the head of the protective tube in which the pushed-in telescope is submerged be provided with a collet, instead of a collar, as the telescope guide. The pushing means may then be readily pulled out and pushed in between the driving cylinders.

Antennae with cylinder drive whose telescope, together with the pushing means, can be exchanged from the outside are already known. The cylinder drive, however, has the drawback that the pushing means wears out comparatively fast between the driving cylinders and after a comparatively short time of use can transmit only too small a force of push, so that even slight hindrances prevent the telescope from being pulled out. The drum drive already mentioned, on the other hand, is much more sturdy and dependable. With the known antennae with drum drive, however, it is not possible to exchange the telescope from the outside of the vehicle body because the connection between the driving drum and the end of the pushing means cannot be disengaged and reengaged from the outside.

With the antenna according to the invention such a possibility was created by using connecting means between the pushing means and the driving drum which automatically engage or disengage when the telescope is pushed in or pulled out.

In an expedient embodiment of the object of the invention this is accomplished by resilient fastening means which engage one another when the pushing means is introduced into the drive through the protective tube. Their cohesion is greater than the force of pull that engages at them when the telescope is pushed in, but it can be overcome by intermittent pulling at the pushing means, for the purpose of dismounting the telescope.

Another expedient fastening means is a lever arrangement which detains the end of the pushing means at the driving drum only while the telescope is pushed in, when a force of pull is transmitted from the driving drum to the pushing means.

The method of operation of the antenna according to the invention is illustrated in the following description of an embodiment.

In the drawings:

Fig. 1 is a side elevation and

Fig. 2 is a top view in direction A of an embodiment of the antenna according to the invention;

Fig. 3 is a sectional view on an enlarged scale, along the dash-dotted line 3—3 in Fig. 1;

Fig. 4 is a view showing the dismounted telescope with the pushing means;

Figs. 5 to 8 are detail views which show different connecting means between the pushing means and the driving drum.

Referring to the drawing in detail, Fig. 1 shows the antenna with submerged telescope so that only the dome of the terminal stud 14 can be seen. The protective tube 1, fastened to the motor housing 2, is put through the bore 21 in plate 20 of the vehicle body, which plate is clamped between the shims 3 and 4 by means of the hexagon nut 5. The insulating stud 6, projecting from the hexagon nut, insulates the telescope from the vehicle body. The perforated lugs 26 at the motor housing serve for a further fastening of the antenna in the motor vehicle.

The receiver's connecting cable 8 with the plug 9 is located at the metal stud 7.

Fig. 4 shows the dismounted telescope 10, consisting of the two tubes 11 and 12 and the metal rod 13 with the terminal stud 14.

A polyamide string (perlon or nylon) serving as a pushing means 15 is fastened to rod 13. In the protective tube 1 the telescope is fastened with the guide bushing 17, which latter is inserted in the stud 6 and is screwed in there by the screw 18 until only the shoulder 19 is visible above the stud 6. The pushing means 15 is then inserted in the driving elements in the housing 2.

The motor 27 is mounted in the top part of the housing 2 and is covered by the cap 24 which is kept in place by the clamp 25. It is connected, through a suitable contactor, to the vehicle battery by a cable 28 which is carried through the stud 29.

The bottom part of the housing 2, containing the mechanical driving elements, is closed by the cover 22 which is fastened by the screws 23. The pinion 30 on the motor axis drives, through the gear wheel 31, a worm (not shown) on the shaft 32. The worm wheel 33, driven by the worm is shoved upon the cylinder 34 which is pivoted on the axis 35, rigidly fixed in the motor housing 2, and which is kept in place by the locking washer 36. The inner winding drum 38 is clamped between the flange 37 on the cylinder 34 and the worm wheel 33. The pushing means 15 is wound up between the inner winding drum 38 and the outer winding drum 39, which latter lies loosely between the inner drum 38

and the shoulder 40 on the worm wheel 33. Cup springs 42, lying in the recess 41 of the worm wheel 33, are pressed against the worm wheel 33 by operating the tightening nut 43 which is screwed on the screw 44 that is threaded at the end of the cylinder 34. Hereby the inner winding drum 38 is so tightly clamped between the flange 37 and the worm wheel 33 that it is carried along against the telescope's resistance to being pushed in and pulled out, but slides through if the telescope in the terminal position is pushed against a lug.

In order to make the telescope 10 with the pushing means 15 detachable from the drive, so that it can be exchanged without opening the motor housing 2, a small metal ear 16 is fixed at the bottom end of the pushing means 15. With the antenna according to the invention this metal ear is fastened, in a suitable manner, to the sliding ring 45 which lies between the two winding drums 38 and 39 behind the last coil 46 of the pushing means. It engages with three cams 47 (one of which can be seen in Fig. 3), through three slots 48 in the inner winding drum 38, the rectangular screw 49 on the guide cylinder 50 which is rigidly fastened to the motor housing 2.

The sliding ring 45, thus, rotates with the inner winding drum 38 and, owing to a suitably chosen pitch of the guide screw 49, narrows the space for the coils of the pushing means to the required size. This is necessary because in too large a space the pushing means 15 might be twisted and bent in view of the comparatively large resistance of the telescope to being pulled out.

Figs. 5 to 8 show two possibilities of detachably fastening the pushing means 15 to the sliding ring 45. Figs. 5 and 7 each show a side elevation, and Figs. 6 and 8 each show a top view. In Fig. 5, next to the guide cam 47, engaging the inner winding drum 38 through the slot 48, a resilient yoke 51 is riveted to the sliding ring. This yoke envelopes the metal ear 16 fixed at the end of the pushing means 15 and with a tongue 52 obliquely sloping inwardly, engages in the notch 53 of trapezoidal cross section recessed in the ear and abuts against the rearward cone-shaped surface 54 of the ear tip if a pull is exerted on the pushing means 15. The elastic force of the spring yoke 51 is adjusted in such a way that the ear tip is sure not to be pulled out of the yoke 51 by the force of the pull engaging at the ear tip when the antenna is pushed in. If, however, the telescope is completely pulled out and the guide bushing 17 is screwed out of the stud 6 of the protective tube, the tip of the ear 16 can be pulled out of the spring yoke 51 by a vigorous jerk and then the telescope 10 with the pushing means 15 can be removed from the protective tube 1. For inserting the telescope, the driving drum 38 must also be in the position "telescope completely pulled out." Then the pushing means 15 is introduced into the protective tube 1 and pressed against the spring yoke 51 with cone-shaped tip 55 of the ear 16 until the tongue 52 snaps in the notch 53 of the ear. After the guide bush 17 has been screwed in again into the stud 6 of the protective tube, the antenna is again ready for operation. The device described thus offers the possibility of exchanging the telescope of an antenna mounted in the vehicle.

Figs. 7 and 8 show another way of connecting the pushing means with the driving drum.

In this embodiment a notch 56 is cut in the sliding ring 45 above the cam 47 that engages in the notch 48 of the inner winding drum 38. Fitted therein is a rigid yoke 57 which on one side engages the drum slot 48 with a hook-shaped lug 58, and on the other side engages, with a tongue 59 bent in a right angle to the sliding ring 45, in an annular recess 60 behind the perpendicular shoulder 61 of the tip 62 of the pushing means. The loop-shaped lug 58 on the yoke 57 is somewhat wider than the cam 47. Therefore, the tongue 59 is pressed into the notch 60 at the end of the pushing means by the lever action of the yoke 57 if the drum 38 is rotated (to the right in the drawing) for pushing in the telescope.

If the drum 38 is rotated (to the left in the drawing) for pulling out the telescope, the tip 62 of the pushing means is released. Thus, the telescope 10 with the pushing means 15 can be readily exchanged if the drum 38 is in the position "completely pulled out." If the driving drum 38 is set in motion for pushing the telescope in, the yoke 56 automatically engages the tip 62 of the pushing means if only this pushing means lies with the notch 60 under the tongue 59.

This embodiment has the special advantage that the cohesion, acting at the tip 62 of the pushing means and exerted by the yoke 57, grows with the force of the pull that engages at the pushing means when the telescope is pushed in.

The invention has been described in detail for the purpose of illustration but it will be obvious to those skilled in the art that numerous modifications and variations may be resorted to without departing from the spirit of the invention as set forth in the accompanying claims.

I claim:

1. A telescopic antenna extensible and retractable by a driving motor and particularly adapted for use with automotive vehicles, comprising a telescope including multi-sectioned inner and outer telescopic members, a protective tube to receive the retracted telescopic members, quickly detachable means for fastening the telescope in said protective tube, pushing means therefor secured to the inner end of the inner telescopic member, a motor driven drum for winding and unwinding the pushing means, a sliding ring in said winding and unwinding drum, which during the winding and unwinding of the pushing means is caused to move up and down in the space within said drum that receives said pushing means, in such a way that a part of said space in front of said sliding ring which contains the wound up pushing means, is substantially completely filled by said sliding ring, and detachable fastening means automatically engaging and disengaging each other for connecting one end of said pushing means to said sliding ring.

2. A telescopic antenna extensible and retractable by a driving motor and particularly adapted for use with automotive vehicles, comprising a telescope including multi-sectioned inner and outer telescopic members, a protective tube to receive the retracted telescopic members, quickly detachable means for fastening the telescope in said protective tube, pushing means therefore secured to the inner end of the inner telescopic member, a motor driven drum for winding and unwinding the pushing means, a sliding ring in said winding and unwinding drum, which during the winding and unwinding of the pushing means is caused to move up and down in the space within said drum that receives said pushing means, in such a way that a part of said space in front of said sliding ring which contains the wound up pushing means, is substantially completely filled by said sliding ring, and detachable fastening means automatically engaging and disengaging each other for connecting the free end of said pushing means to said sliding ring, said fastening means including a spring secured to said drum having a suitably limited retaining power and a detent secured to one end of said pushing means, both being associated and arranged in such a way that a catch provided at said end of the spring engages rearwardly of said detent.

3. A telescopic antenna extensible and retractable by a driving motor and particularly adapted for use with automotive vehicles, comprising a telescope including multi-sectioned inner and outer telescopic members, a protective tube to receive the retracted telescopic members, quickly detachable means for fastening the telescope in said protective tube, pushing means therefor secured to the inner end of the inner telescopic member, a motor driven drum for winding and unwinding the pushing means, a sliding ring in said winding and unwinding drum, which during the winding and unwinding of the pushing

means is caused to move up and down in the space within said drum that receives said pushing means, in such a way that a part of said space in front of said sliding ring which contains the wound up pushing means, is substantially completely filled by said sliding ring, and detachable fastening means automatically engaging and disengaging each other for connecting the free end of said pushing means to said sliding ring, said fastening means including a lever secured to said drum and a detent secured to one end of said pushing means, both being associated and arranged in such a way that a catch provided at said end of the lever engages rearwardly of said detent only upon retracting said telescope, whereas the detent

rests against said lever only upon extension of said telescope.

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