June 12, 1962 H. PODDIG ET AL 3,038,567

TELESCOPING ANTENNA

Filed Nov. 17, 1959

FIG. 1

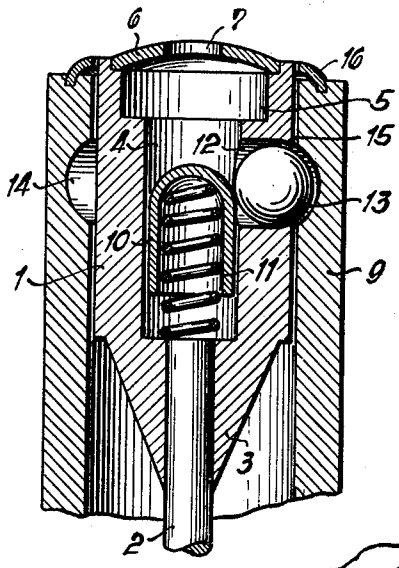


FIG. 3

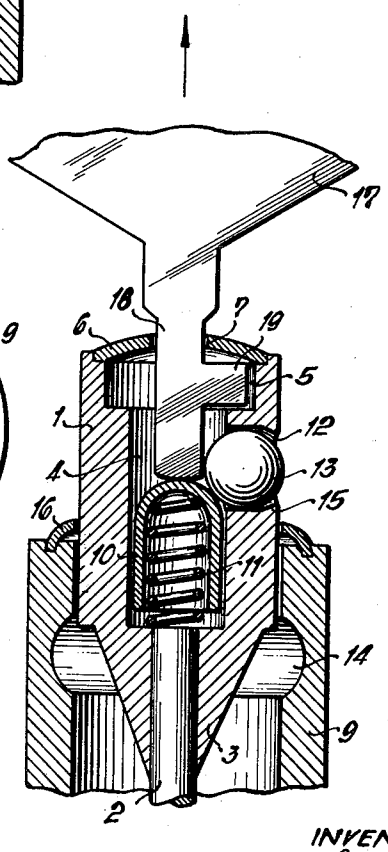
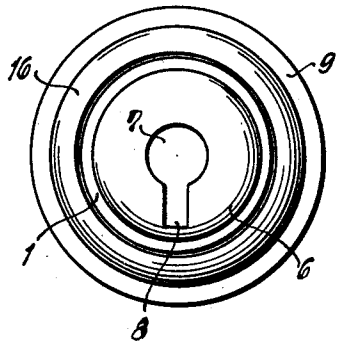


FIG. 2



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TELESCOPING ANTENNA

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The present invention relates to telescoping antennas.

More particularly, the present invention relates to a telescopic antenna for vehicles, especially for automobiles, in which the innermost telescoping section carries a head which is adapted to be engaged by a suitable key with which the head and the inner sections can be pulled out of the outermost telescope section or housing.

It is an object of the present invention to provide a telescoping antenna which can be pulled out only by means of the appropriate key, i.e., an antenna in which unauthorized expanding is prevented. This is a particularly desirable feature inasmuch it prevents vandalism or other intentional damage to the antenna.

It is another object of the present invention to provide a telescoping antenna which can be locked, but which requires but few parts each of which is itself simple and susceptible to mass-production techniques.

It is yet another object of the present invention to provide a telescoping antenna which can be built and assembled at low cost.

The objects of the present invention also include the provision of a telescoping antenna which is of rugged construction and which will give long periods of trouble-free service.

With the above objects in view, the present invention resides mainly in a telescoping antenna which comprises a tubular outer section formed in its inner surfaces with a recess, an inner antenna section arranged with the outer section, a head also arranged in the inner section and connected to the inner section, this bead being formed with a longitudinal bore and with a transverse bore communicating therewith, a holding member arranged in the longitudinal bore for longitudinal movement relative to the head, this holding member being spring-biased into a holding position, a locking member arranged in the transverse bore and cooperating with the holding member so as to be urged outwardly thereby, when the holding member is in its holding position, into a locking position wherein the locking member projects into the recess of the outer section, and key means adapted to be inserted into the longitudinal bore for moving the holding member longitudinally out of its holding position, thereby permitting the locking member to leave its locking position, and for pulling the head, and with it the inner section, out of the outer section.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a sectional view of a telescoping antenna according to the present invention, the parts being shown in their locked position;

FIG. 2 is a plan view of the construction shown in FIG. 1; and

FIG. 3 is a sectional view similar to FIG. 1 but showing the parts in their unlocked position and after the telescoping antenna has been partly pulled out, FIG. 3 also showing the keying means not illustrated in FIG. 1.

Referring now to the drawing, the same shows an outer tubular section 9, which may be of metal and form part of the antenna proper, or be made of insulating material and serve as a housing for the antenna, and the innermost or central antenna section 2 which is depicted as a solid rod. The other tubular antenna sections of successively larger diameter which comes between the central section 2 and the outermost section are not shown.

The rod 2 is welded, soldered or otherwise firmly connected to the downwardly tapering portion 3 of a head 1. The latter is formed with a longitudinal bore 4 having an enlarged open end 5. The bore 4, 5 is closed by a domed closure plate 6 which is formed with an opening allowing the introduction of key means 17 (FIG. 3) therethrough, this opening being composed of a central portion 7 through which the shank 18 of the keying means can pass and with a radial portion 8 through which the key bit 19 can pass.

When the parts occupy their locked position, as will be more fully explained below, the closure plate will prevent the manual withdrawing of the head without the proper keying means.

Within the longitudinal bore 4 there is arranged a holding member 10 which is shown as being tubular with the open end being directed toward the bottom of the bore 4. The other end of the holding member is a rounded portion which faces the open end of the bore 4, 5. The holding member has a cross-sectional configuration which is slightly smaller than that of the bore 4 so that the holding member fits into the bore with play and is free to move longitudinally relative to the head 1.

The holding member 10 is spring-biased upwardly, as viewed in FIG. 1, by a coil spring 11 which extends into the interior of the holding member and bears against the bottom of the bore 4.

The locking means for the antenna further comprise a locking member 13, in the form of a ball, which is arranged in a transverse bore 12 of the head 1. This ball is movable to an outermost position beyond which further movement is prevented by a crimped portion 15 which reduces the size of the bore 12. The axis of the bore 12 is so positioned as to be in alignment with the crest of the rounded portion of the holding member 10 when the latter occupies its holding position shown in FIG. 1. It is in this position that the ball is held in its locking position in which it projects outwardly of the transverse bore and into a recess 14 formed on the inner surface of the tubular section 9. This recess is preferably annular and has a cross-sectional configuration which mates with that of the locking member.

Preferably, the diameters of the longitudinal bore 4 and transverse bore 12 are substantially equal to each other, and the radii of curvature of the rounded portions of the holding member 10 and locking member 13 are likewise equal to each other. Moreover, the parts are so dimensioned that when the spring 11 is expanded, about ⅓ to ¼ of the diameter of the ball will project out of the bore 12.

The end face of the tubular section 9, if made of insulating material, may carry an annular guard ring 16 of metal or hard plastic. This guard ring has inner diameter substantially equal to the outside diameter of the head 1, so that when the antenna is telescoped inwardly after having been expanded, the ball 13 which projects outwardly beyond the outer surface of the head 1 will not damage the end face of the section 9.

FIG. 3 shows the parts in the unlocked position, with the head 1, and with it the central section 2, having been partly withdrawn from the section 9. Here the key 17 has been inserted to unlock the parts, and to effect this the shank 18 extends beyond the bit 19 a length sufficient to engage and depress the holding member 10 when the bit has been placed into the enlarged portion 5, the latter

having an axial length and diameter sufficient to accommodate the bit with enough clearance to allow twisting of the key without causing turning of the closure plate **6**. In this way, the locking member **13** is free to move inwardly and thus to leave its locking position. With the locking member being no longer spring-pressed into the recess **14**, the head **1** and with it the central section **2** may be withdrawn from the tubular section **9** and this is accomplished by rotating the key until the bit is no longer in registration with the radial opening portion **8**. The bit may then engage the undersurface of the closure plate **6**, so that a pulling force can be exerted on the key which will cause expansion of the antenna.

After the antenna has been partly expanded, the key is withdrawn and the antenna may be fully expanded.

In order to collapse the antenna, it is recommended that the key be reinserted into the position shown in FIG. 3. The head may then be lowered into the section **9** until the locking member **13** is in registration with the annular groove **14**. The key is then withdrawn, and the locking member will be moved outwardly into the groove **14** under the influence of the spring **11** and the camming action between the rounded portions of the members **12** and **13**.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of locking devices differing from the types described above.

While the invention has been illustrated and described as embodied in a locking arrangement for telescoping antenna, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a telescopic antenna movable between a collapsed and extended position, in combination, a tubular outer section formed in its inner surface with a recess; an inner antenna section arranged in the collapsed position of the antenna entirely in said outer section and slidable in longitudinal direction thereof to an extended position; a head also arranged in the collapsed position of the antenna in said outer section and being connected to said inner section for movement therewith, said head being formed with a stepped longitudinal bore having an inner small diameter portion and at its outer end a large diameter portion, and said head being formed with a transverse bore communicating with said small diameter portion of said longitudinal bore; a closure plate fixed to said head and extending transversely over said large diameter bore portion, said closure plate being formed with a keyhole-shaped opening therethrough; a holding member arranged in said small diameter bore portion for longitudinal movement relative to said head, said holding member being spring biased into holding position; a locking member arranged in said transverse bore portion and cooperating with said holding member so as to be urged outwardly thereby, when said holding member is in said holding position thereof, into a locking position wherein said locking member projects into said recess of said outer section; and key means having a stem portion and a bit portion projecting radially from said stem portion spaced from the free end of the latter, said key means being movable between an active position in which said stem portion thereof is located in said small diameter bore portion and engages said holding member for moving the same longitudinally out of said holding position, thereby permitting said locking member to leave said locking position and in which said bit portion is out of alignment with said keyhole-shaped opening and engages said closure plate to hold said key means in said active position and to permit pulling of said head and with it said inner section out of said outer section, and an inactive position in which said bit is aligned with said keyhole-shaped opening so that said key means may be withdrawn from said longitudinal bore.

2. In a telescopic antenna movable between a collapsed and extended position, in combination, a tubular outer section formed in its inner surface with a recess; an inner antenna section arranged in the collapsed position of the antenna entirely in said outer section and slidable in longitudinal direction thereof to an extended position; a head also arranged in the collapsed position of the antenna in said outer section and being connected to said inner section for movement therewith, said head being formed with a stepped longitudinal bore having an inner small diameter portion and at its outer end a large diameter portion of a given height and forming a shoulder with said small diameter portion, and said head being formed with a transverse bore communicating with said small diameter portion of said longitudinal bore; a closure plate fixed to said head and extending transversely over said large diameter bore portion, said closure plate being formed with a keyhole-shaped opening therethrough; a holding member arranged in said small diameter bore portion for longitudinal movement relative to said head, said holding member having a rounded portion facing said outer end; spring means engaging said holding member for urging the same into a holding position in which the apex of said rounded portion is spaced a selected distance from said shoulder; a locking member arranged in said transverse bore portion and cooperating with said holding member so as to be urged outwardly thereby, when said holding member is in said holding position thereof, into a locking position wherein said locking member projects into said recess of said outer section; and key means having a stem portion and a bit portion of a width substantially equal to said given height of said large diameter bore portion and projecting radially from said stem portion spaced from the free end of the latter a distance greater than said selected distance, said key means being movable between an active position in which said stem portion thereof is located in said small diameter bore portion and engages said holding member for moving the same longitudinally out of said holding position, thereby permitting said locking member to leave said locking position and in which said bit portion is out of alignment with said keyhole-shaped opening and engages said closure plate to hold said key means in said active position and to permit pulling of said head and with it said inner section out of said outer section, and an inactive position in which said bit is aligned with said keyhole-shaped opening so that said key means may be withdrawn from said longitudinal bore.

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