United States Patent [19]

Massa

[11] **3,898,666**

[45] **Aug. 5, 1975**

[54] **ANTENNA MOUNTING ASSEMBLY**

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[22] Filed: **Jan. 21, 1974**

[21] Appl. No.: **434,819**

[52] **U.S. Cl.** **343/702;** 343/901

[51] **Int. Cl.**[2] **H01Q 1/24**

[58] **Field of Search** 343/702, 715, 805, 809, 343/881, 882, 889, 900, 912, 901

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[57] **ABSTRACT**

An integral antenna for use in receivers and/or transmitters includes a split swivel ball with a through bore for slidably receiving an extendible, telescopic antenna rod held by an internal spring. The antenna rod slides over a removable insert stud having stop pins which engage the swivel ball to normally prevent withdrawal of the rod. To replace the antenna rod without disassembly of or internal access to the swivel ball, the stop pins are manipulated through tortuous bayonet slots contiguous with the through bore to allow the stud and connected rod to be slid through the bore.

11 Claims, 5 Drawing Figures

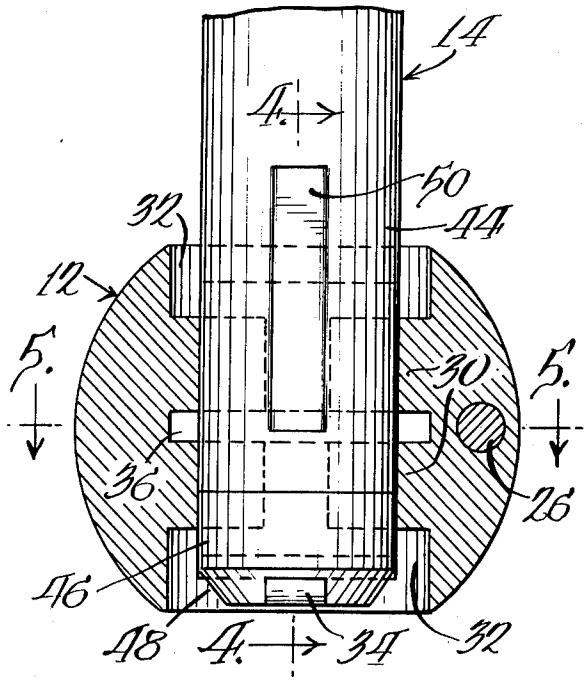


Fig. 1.

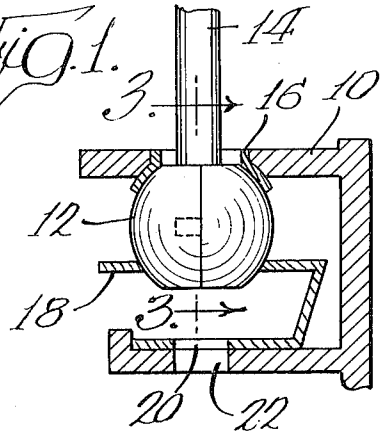


Fig. 2.

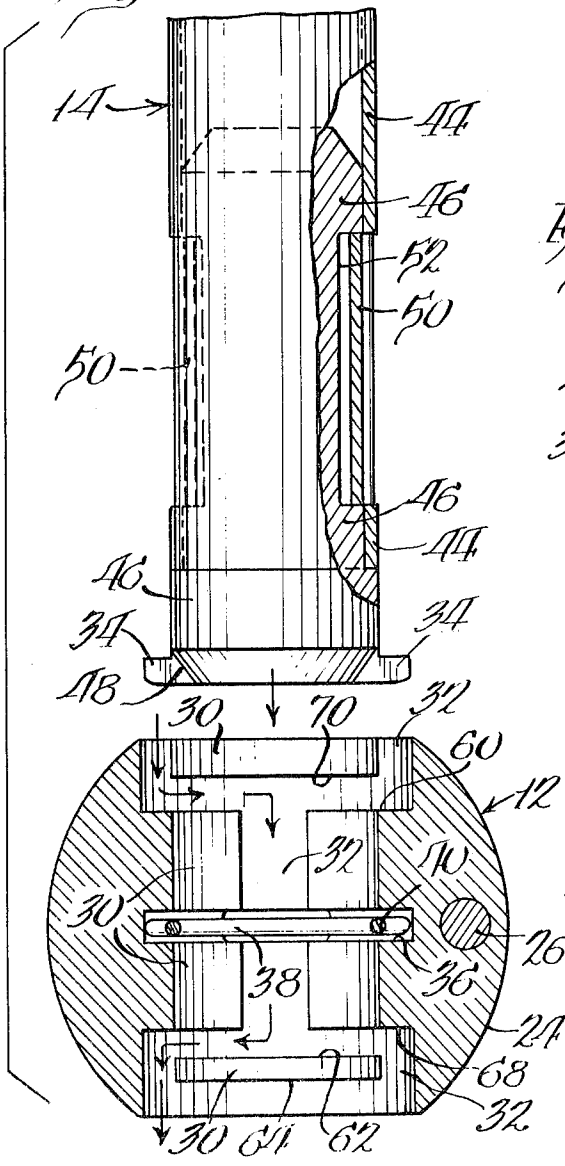


Fig. 3.

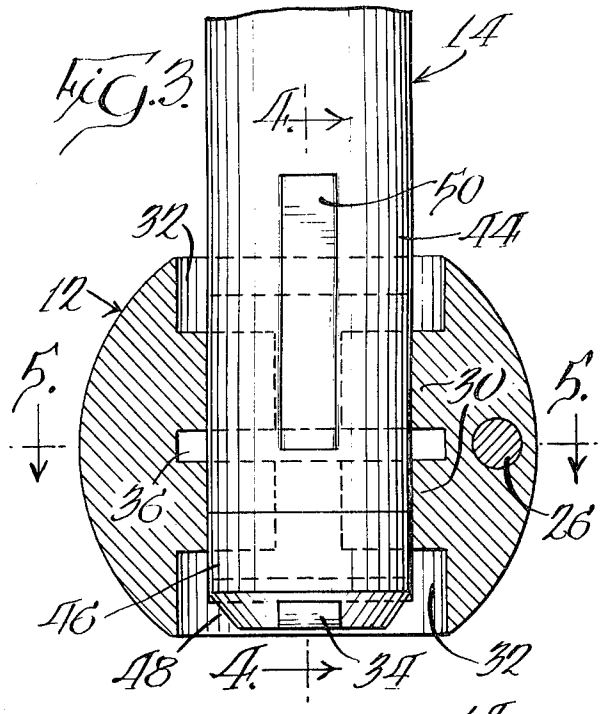


Fig. 4.

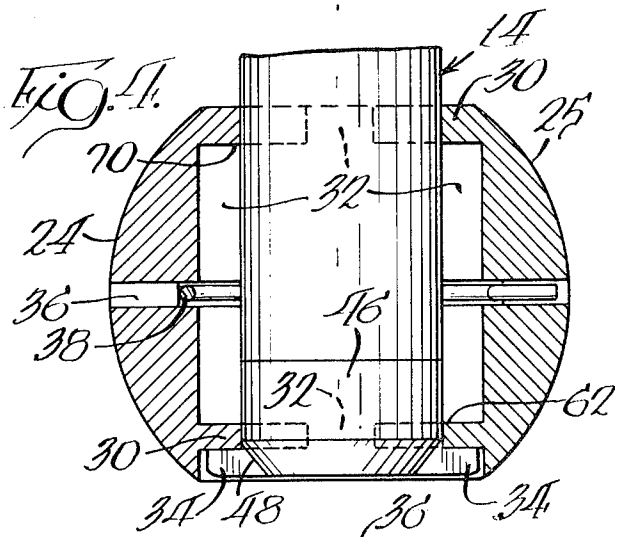
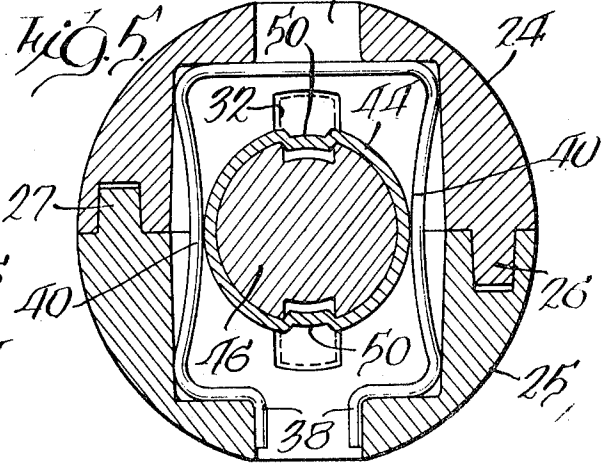


Fig. 5.



ANTENNA MOUNTING ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to a swivel ball antenna mounting assembly which allows simple replacement of an extensible antenna rod without disassembly of the mounting structure and without requiring internal access to the housing which mounts the swivel ball.

Integral antennas for portable radio transmitters and/or receivers often include a ball and socket assembly which allows an extendible antenna rod to be swiveled in all directions. The swivel ball may have an axially extending through bore for slidably receiving a tubular antenna rod formed of telescoping sections. The base tubular rod can be axially pushed through the swivel ball to retract the antenna into the equipment housing.

Existing swivel ball antenna mounting assemblies cannot be serviced easily when one of the telescoping antenna sections is broken and the extendible antenna must be replaced. In present portable television receiver antenna mounting structures, for example, it is necessary to remove the cabinet or back cover, and may be necessary to partially disassemble the antenna mounting assembly, in order to replace the broken off antenna rod with a new antenna rod.

SUMMARY OF THE INVENTION

In accordance with the present invention, an improved swivel ball antenna mounting assembly allows replacement of an extendible antenna rod without disassembly of the antenna mounting structure, and without requiring access to the interior of the cabinet. The antenna rod has stop pins which normally prevent withdrawal of the antenna rod. An internal spring located within the split swivel ball frictionally holds the antenna rod in any extended position and provides electrical continuity between rod and ball. When the antenna is to be replaced, the antenna rod is manipulated to allow the stop pins to slide through tortuous bayonet slots and out of engagement with the swivel ball. Preferably, the telescoping antenna rod slides over a removable insert stud which forms a bayonet base for mating engagement with the bayonet slots.

One object of the present invention is the provision of a swivel ball antenna mounting assembly which allows an extendible antenna rod to be replaced easily without requiring disassembly of or internal access to the mounting structure.

Other objects and features of the invention will be apparent from the following description and from the drawings. While an illustrative embodiment of the invention is shown in the drawings and will be described in detail herein, the invention is susceptible of embodiment in many different forms and it should be understood that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side view, partly in section, of the antenna mounting assembly of the present invention;

FIG. **2** is an exploded view partly in section, of the swivel ball and tubular antenna rod shown in FIG. **1**;

FIG. **3** is a sectional view of the swivel ball, taken along lines **3—3** of FIG. **1**, showing the whole antenna rod located in the through bore;

FIG. **4** is another sectional view of the swivel ball taken along lines **4—4** of FIG. **3**, showing the whole antenna rod located in the through bore; and

FIG. **5** is a plane sectional view taken along lines **5—5** of FIG. **3**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning to FIG. **1**, a cabinet or housing **10** for electronic equipment, such as a portable television receiver, has an integral antenna consisting of a capture member, here illustrated as a swivel ball assembly **12** for slidably and swivelably holding an antenna rod **14** formed of a plurality of thin walled tubular sections which are coaxially internested inside one another. Electric connection can be made to the swivel ball **12** by any conventional method to allow the antenna rod **14** to form a pole of an antenna. A seat gasket **16**, formed of a friction material, is located within a circular opening in the cabinet. A leaf spring **18** urges the swivel ball into frictional engagement with the gasket **16** to maintain the extended antenna at any desired angle relative to the housing **10**. The antenna rod **14** can be slidably pushed through a through bore in the swivel ball **12**, a circular opening **20** in the leaf spring, and a coaxial circular opening **22** in an extending arm of the housing **10** for retention within the housing **10**, as when the electronic equipment is being transported.

The swivel ball **12** and antenna rod **14** are shown in detail in the remaining FIGS. **2–5**. Swivel ball **12** is split and consists of two hemispheres **24** and **25** having alignment pins **26** and **27**, respectively, which mate with alignment holes in the opposite hemisphere for assembly of the split swivel ball. An axial through bore **30** is formed by semicylindrical recesses in each hemisphere **24** and **25**. Into the sides of the semicylindrical recesses, deeper grooves **32** form a tortuous bayonet slot which allows axial passage of a pair of stop pins **34** of wider diameter than the diameter of antenna rod **14**. Within the swivel ball, a center opening **36** holds a spring **38** having biased inward sides **40** for frictional engagement with the antenna rod **14** when located in the through bore **30**.

Antenna rod **14** includes a lowermost thin-walled tube **44** into which a plurality of upper nested tubes (not illustrated) may be telescoped in a conventional manner to allow telescopic extension of the antenna. The lower tube **44** is forceably urged over a neck of an insert stud **46** having a head portion with a guide bevel **48** from which extends the pair of bayonet prongs or pins **34**. The lower tube **44** has a pair of elongated indents **50** formed by pressing inward the thin-walled tube to form generally rectangular detents. On the extending neck of the stud **46**, a pair of mating rectangular recesses **52** are provided into which the indents **50** are snap fit. Insert stud **46** can be removed from the lower tube **44** by grasping the stud head and pulling apart the stud **46** relative to the tube **44**.

The antenna element **14** may be inserted through the swivel ball **12** by aligning the bayonet pins **34** with the tortuous bayonet slot **32** in the through bore. The antenna rod is then urged downwardly until the bayonet pins **34** engage a shoulder **60** which defines a cavity to allow the pins **34** to be rotated 90° for continued movement downward through a center portion of the bayonet slots **32** until engaging a shoulder **62**. The antenna rod is again rotated 90° to align the bayonet pins with

the final portion of the bayonet slots **32.** The antenna rod may then be pushed downwardly through the coaxial apertures **20** and **22,** see FIG. **1.** As the bayonet pins pass beyond the swivel ball **12,** the antenna rod **14** should be rotated 90° to prevent withdrawal of the antenna, as will be described.

When the integral antenna is to be extended for normal use, the telescoping sections located within the tube **44** may be extended and the lower tube **44** may be raised upwardly through the coaxial apertures **22** and **23** until the bayonet stop pins **34** engage a shoulder **64** formed by the walls of the through bore **30.** Shoulder **64** forms a stop surface which prevents the antenna from being inadvertently pulled out of the swivel ball, except when the antenna is to be replaced. The central spring **38** frictionally engages the tube **44** and retains the antenna rod in any elevation within the swivel ball **12.** When the antenna rod is extended so that the bayonet pins **34** engage the stop shoulder **64,** the swivel ball **12** can be swivelled or rotated so as to orient the extending antenna at a variety of angles with respect to the housing **10.**

Should any of the telescoping sections of the antenna be broken, the antenna rod **14** can be withdrawn from the swivel ball **12** without disassembly of the mounting structure and without requiring access to the interior of the housing **10.** Because insert stud **46** is solid, the antenna structure will break beyond the insert stud and a sufficient length of the tube will be left to allow easy grasp of the antenna. The antenna is then elevated so that the bayonet pins **34** engage the stop shoulder **64,** and then the antenna rod is rotated until the bayonet pins **34** align with the bayonet slot **32.** The rod is then lifted upwardly until the pins engage a shoulder **68,** and then is rotated 90° for alignment of the pins with the central bayonet slots **32.** The rod is then lifted upwardly until the pins **34** engage an upper stop shoulder **70,** and the rod is again rotated 90° to allow the entire antenna rod **14** to be lifted out of the swivel ball **12.** The tube **44** can then be pulled out of its snap fit connection with the insert stud **46,** and a new antenna rod can be inserted into the stud. The antenna rod can then be reinserted through the swivel ball in the same manner as previously described.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

Having described the invention, the embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An antenna mounting assembly comprising:

a capture member having an axial through bore,

an extendible antenna element slidably movable within the through bore for extension outward from the capture member, the antenna element having adjacent an end thereof a projection which engages a surface of the capture member to prevent disengagement of the antenna element from the capture member and wherein at least one groove extends through the surface and the through bore for mating engagement with the projection to allow slidable axial movement of the antenna element through the bore,

a socket for mounting the capture member, and

release means for allowing the projection to be axially moved through the at least one groove to disengage the antenna element from the capture member.

2. The antenna mounting assembly of claim **1** wherein the projection comprises bayonet pins extending from the antenna element, and said at least one groove comprises bayonet receiving slots for mating engagement with the bayonet pins.

3. The antenna mounting assembly of claim **2** wherein the bayonet slots form a tortuous passageway defined by first bayonet slots, an interior shoulder in the capture member, a pair of second bayonet slots radially offset from the first bayonet slots, and an interior cavity for connecting the first and second bayonet slots so that twisting movement of the antenna element is required in order to manipulate the antenna element through the capture member.

4. An antenna mounting assembly comprising:

a capture member comprised of at least two mating sections which can be disassembled for access to an interior cavity which holds a spring urged into the path of an axial through bore,

an extendible antenna element slidably movable within the through bore for extension outward from the capture member, the spring being urged into the path of the bore for frictional retention of the extended antenna element,

the antenna element having adjacent an end thereof a stop member which engages the capture member to prevent withdrawal of the antenna element through the bore;

a socket for mounting the capture member, and

release means for allowing the stop member to be axially moved through the bore to disengage the antenna element from the capture member.

5. The antenna mounting assembly of claim **4** wherein the socket includes a seat for frictionally engaging the capture member and spring means for biasing the capture member against the seat.

6. An antenna mounting assembly comprising:

a capture member having an axial through bore extending from a stop surface to an exterior surface,

an extendible antenna element slidably moveable within the through bore for extension outwardly from the capture member, said element comprising a tubular member engaging a removable insert stud, said stud having adjacent an end thereof a pair of pins which extend radially beyond the tubular member and which engage the stop surface of the capture member to prevent withdrawal of the antenna element through the bore;

a socket for mounting the capture member, and

recesses formed in the bore for allowing the stop member to be axially moved past the stop surface and through the bore to disengage the antenna element at the exterior surface of the capture member.

7. An antenna mounting assembly comprising:

a capture member having an axial through bore extending from a stop surface to an exterior surface,

an extendible antenna element slidably moveable within the through bore for extension outwardly from the capture member, said element comprising a tubular member engaging a removable insert stud, said stud having adjacent an end thereof a pair of pins which extend radially beyond the tubular member and which engage the stop surface of

the capture member to prevent withdrawal of the antenna element through the bore;

a socket for mounting the capture member, and release means for allowing the stop member to be axially moved past the stop surface and through the bore to disengage the antenna element at the exterior surface of the capture member, and

wherein the tubular member has an internally extending detent, said insert stud comprising a head carrying the stop member and an axially extending neck for insertion within the tubular member, said neck including at least one recess for mating engagement with the internally extending detent to form a snap fit connector for releasibly holding the tubular member to the insert stud.

8. An antenna mounting assembly comprising:

a swivel ball having a through bore,

a hollow tubular antenna section slidable within the through bore for extension outward from the swivel ball,

an insert stud having a neck insertable into the hollow interior of the tubular antenna section and a head extending from the neck and carrying an extending pin which abuts a surface of the swivel ball to prevent withdrawal of the antenna section through the bore, and

a release groove contiguous with the through bore to allow sliding movement of the tubular section and the extending pin through the bore and release groove for disengagement of the tubular antenna section and insert stud from the swivel ball.

9. An antenna mounting assembly comprising:

a swivel ball having a through bore and an interior cavity retaining a spring which extends into the through bore,

a hollow tubular antenna section slidable within the through bore for extension outward from the swivel ball, the spring extending into the bore for engagement with the tubular section, and

an insert stud having a neck insertable into the hollow interior of the tubular antenna section and a head extending from the neck for engagement with the swivel ball to prevent withdrawal of the tubular antenna section through the through bore.

10. The antenna mounting assembly of claim **9** wherein the swivel ball comprises a pair of sections each having an axially extending bore alignable with the axially extending bore of the opposite section to form the through bore, and a pair of central apertures alignable to form the interior cavity for the spring.

11. An antenna mounting assembly comprising:

a swivel ball having a through bore and first bayonet grooves contiguous with the through bore, second bayonet grooves contiguous with the through bore and radially offset from the first bayonet grooves, an interior chamber joining the first and second bayonet grooves,

a hollow tubular antenna section slidable within the through bore for extension outward from the swivel ball, and

an insert stud having a neck insertable into the hollow interior of the tubular antenna section and a head extending from the neck with bayonet pins extending therefrom for engagement with the swivel ball to prevent withdrawal of the tubular antenna section through the through bore, the bayonet pins being matingly engagable with the bayonet grooves to allow the antenna section and insert stud to be slid through the bore for disengagement with the swivel ball.

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