

Description

The present invention relates to electrical devices including an antenna assembly. The invention is particularly useful as an electrical transmitter-receiver for a CT2 cordless telephone, and is therefore described below with respect to such application.

Nearest prior art is GB-A-2 219 911 which discloses a RF-tranceiver with two radian sections and a movable antenna which is in contact with a first radio section when said antenna is extended.

A new type of telephone concept is now being developed utilizing a CT2 cordless telephone to make calls not only at home or in the office, but also from public access points. Such public access points will be provided at various locations, called telepoints, enabling users located within a predetermined range, e.g., about 100 metres, of a telepoint to make a call. When making a call, the caller enters a personal identification number (PIN), which is checked by the system and within seconds, assuming everything is in order, the system will produce a dial tone to the caller enabling the caller to make a call in the normal way. According to the present concept of this system, a caller may make only outgoing calls from a telepoint.

An object of the present invention is to provide an electrical device having a novel antenna assembly particularly useful as an electrical transmitter-receiver in the above-described CT2 cordless telephone system.

According to the aspect of the present invention, there is provided an electrical device comprising: a housing enclosing electrical circuitry of the electrical device; an antenna rod carried by the housing; and an antenna coil carried by one end of the antenna rod, said antenna rod is movably mounted through an opening in the housing to a retracted position wherein substantially only the antenna coil is disposed externally of the housing, or to an extended position wherein substantially the complete antenna rod and the antenna coil are disposed externally of the housing, said electrical device further includes electrical switching means effective when the antenna rod is in its retracted position to connect the antenna coil to the electrical circuit, and when the antenna rod is in its extended position to connect the antenna rod to the electrical circuit.

According to a more specific embodiment of the present invention, there is provided an electrical transmitter-receiver as described above but particularly useful as a CT2 cordless telephone, wherein the selectively enableable antenna coil and antenna rod are both of quarter wavelength.

The user may thus selectively condition the device, and particularly the antenna assembly, either for short range operation or longer range operation according to the particular location of the user with respect to the nearest telepoint. Thus, if the user is lo-

cated relatively close to a telepoint, the antenna rod may be moved to its retracted position thereby enabling the antenna coil for operation, but if the user is at a relatively large distance from the telepoint, the antenna rod may be moved to its extended position thereby enabling the antenna rod and accordingly providing higher gain than the antenna coil.

Further features and advantages of the invention will be apparent from the description below.

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Figs. 1 and 2 illustrate one form of electrical device constructed in accordance with the present invention, showing the extended and retracted positions, respectively, of the antenna; and Figs. 3 and 4 are fragmentary, sectional views, more particularly illustrating the internal construction of the antenna in its extended and retracted positions, respectively.

The electrical device illustrated in the drawings is an electrical transmitter-receiver unit particularly useful as a cordless telephone in the CT2 system. It includes a housing, generally designated 2, enclosing the electrical circuitry, schematically indicated as 4, of the telephone transmitter-receiver, and an antenna assembly, generally designated 6, which is adaptable for either short-range or long-range use, according to the location of the user with respect to the nearest telepoint.

Antenna assembly 6 comprises a straight antenna rod 10 and an antenna coil 12 carried at the outer end of the antenna rod. The antenna rod 10 is movably mounted through an opening 14 in the top wall of housing 2 either to an extended position as illustrated in Figs. 1 and 3, or to a retracted position as illustrated in Figs. 2 and 4. When the antenna rod is in its retracted position (Figs. 2 and 4), substantially only the antenna coil 12 is disposed externally of the housing 2; but when the antenna rod is moved to its extended position (Figs. 1 and 3), substantially the complete antenna rod 10 and the antenna coil 12 are disposed externally of the housing.

Both the antenna rod 10 and the antenna coil 12 are of one-quarter wavelength. The difference being that since antenna 12 is in coil form it is much more compact than antenna rod 10. Antenna coil 12 is embedded within a dielectric medium 16, whereas antenna rod 10 is enclosed within a dielectric sleeve 18. Antenna rod 10 may be a straight length of a stiff electrically-conductive rod, but preferably is of a stiff coiled configuration to enhance its flexibility without danger of breaking.

The illustrated device further includes electrical switching means effective, when the antenna rod 10 is in its retracted position (Figs. 2, 4), to connect the antenna coil 12 to the electrical circuit 4, and thereby to condition the device for short range use. When the

device is to be used for longer range, the antenna rod 10 is moved to its extended position, whereupon the electrical switching means connects the antenna rod to the electrical circuit 4.

As shown in Figs. 3 and 4, the electrical switching means comprises an electrical connector in the form of a metal spring clip 20 fixed within a bushing 22 circumscribing opening 14 formed in the top wall of the housing 2. When the antenna assembly 6 is in its retracted position, as illustrated in Figs. 2 and 4, the fixed connector 20 engages a movable electrical connector 24 located at the juncture of the antenna coil 12 with the antenna rod 10. When the antenna assembly 6 is in its extended position, as illustrated in Figs. 1 and 3, the fixed electrical connector 20 engages a movable electrical connector 26 located at the end of antenna rod 10 opposite to that carrying the antenna coil 12.

The lower surface of antenna coil 12, particularly its dielectric casing 16, is flat to define a shoulder 30 engageable with the upper surface of bushing 22, and thereby to limit the retracted position of antenna assembly 10. Housing 2 further includes an apertured member 32 receiving the lower end of antenna rod 10, for guiding its movement within the housing 2, and also serving as a stop engageable with a shoulder 34 located at the lower end of the antenna rod for limiting it to its extended position.

The manner of using the device illustrated in the drawings will be apparent from the above description.

Thus, whenever the user is located relatively close to a telepoint, the antenna assembly 10 may be moved to its retracted position as illustrated in Figs. 2 and 4, whereupon the fixed electrical connector 20 engages the movable electrical connector 24 to thereby connect the antenna coil 12 to the electrical circuit 4. This disables the antenna rod 10 and enables the antenna coil 12 for use in the relatively short range.

However, when the user is located relatively far from the nearest telepoint, antenna assembly 10 may be moved to its extended position, as illustrated in Figs. 1 and 3, whereupon the fixed connector 20 engages movable connector 22 to connect the antenna rod 10 to the electrical circuit 4. This disables the antenna coil 12 and enables the antenna rod for use.

Claims

1. An electrical device, comprising:
 - a housing enclosing electrical circuitry of the electrical device;
 - an antenna rod carried by said housing;
 - an antenna coil carried by one end of said antenna rod;
 - said antenna rod being movably mounted through an opening in the housing to a retracted position wherein substantially only the antenna

coil is disposed externally of the housing, or to an extended position wherein substantially the complete antenna rod and the antenna coil are disposed externally of the housing;

and electrical switching means effective when the antenna rod is in its retracted position to connect the antenna coil to said electrical circuit, and when the antenna rod is in its extended position to connect the antenna rod to said electrical circuit.

2. The device according to Claim 1, wherein said electrical switching means comprises:
 - a fixed electrical connector fixed to said housing;
 - a first movable electrical connector electrically-connected to said antenna coil and carried by said antenna rod so as to be engageable by said fixed electrical connector when the antenna rod is in its retracted position to connect the antenna coil to said electrical circuit;
 - and a second movable electrical connector connected to and carried by said antenna rod so as to be engageable by said fixed electrical connector when the antenna rod is in its extended position to connect the antenna rod to said electrical circuit.
3. The device according to Claim 2, wherein said fixed electrical connector is located adjacent said opening in the housing through which the antenna rod is movable to its retracted and extended positions.
4. The device according to Claim 3, wherein said first movable electrical connector is located at the juncture of the antenna coil with the antenna rod.
5. The device according to Claim 4, wherein said second movable electrical connector is located at the end of the antenna rod opposite to that carrying the antenna coil.
6. The device according to Claim 5, wherein said opposite end of the antenna rod carries a shoulder engageable with a stop fixed within the housing adjacent said opening for limiting the movement of the antenna rod when moved to its extended position.
7. The device according to Claim 6, wherein said housing opening is circumscribed by an insulating bushing engageable with a stop carried by said antenna coil for limiting the movement of the antenna rod when moved to its retracted position.
8. The device according to any one of Claims 1-7, wherein said antenna rod and said antenna coil



device is to be used for longer range, the antenna rod 10 is moved to its extended position, whereupon the electrical switching means connects the antenna rod to the electrical circuit 4.

As shown in Figs. 3 and 4, the electrical switching means comprises an electrical connector in the form of a metal spring clip 20 fixed within a bushing 22 circumscribing opening 14 formed in the top wall of the housing 2. When the antenna assembly 6 is in its retracted position, as illustrated in Figs. 2 and 4, the fixed connector 20 engages a movable electrical connector 24 located at the juncture of the antenna coil 12 with the antenna rod 10. When the antenna assembly 6 is in its extended position, as illustrated in Figs. 1 and 3, the fixed electrical connector 20 engages a movable electrical connector 26 located at the end of antenna rod 10 opposite to that carrying the antenna coil 12.

The lower surface of antenna coil 12, particularly its dielectric casing 16, is flat to define a shoulder 30 engageable with the upper surface of bushing 22, and thereby to limit the retracted position of antenna assembly 10. Housing 2 further includes an apertured member 32 receiving the lower end of antenna rod 10, for guiding its movement within the housing 2, and also serving as a stop engageable with a shoulder 34 located at the lower end of the antenna rod for limiting it to its extended position.

The manner of using the device illustrated in the drawings will be apparent from the above description.

Thus, whenever the user is located relatively close to a telepoint, the antenna assembly 10 may be moved to its retracted position as illustrated in Figs. 2 and 4; whereupon the fixed electrical connector 20 engages the movable electrical connector 24 to thereby connect the antenna coil 12 to the electrical circuit 4. This disables the antenna rod 10 and enables the antenna coil 12 for use in the relatively short range.

However, when the user is located relatively far from the nearest telepoint, antenna assembly 10 may be moved to its extended position, as illustrated in Figs. 1 and 3, whereupon the fixed connector 20 engages movable connector 22 to connect the antenna rod 10 to the electrical circuit 4. This disables the antenna coil 12 and enables the antenna rod for use.

Claims

1. An electrical device, comprising:
 - a housing enclosing electrical circuitry of the electrical device;
 - an antenna rod carried by said housing;
 - an antenna coil carried by one end of said antenna rod;
 - said antenna rod being movably mounted through an opening in the housing to a retracted position wherein substantially only the antenna

coil is disposed externally of the housing, or to an extended position wherein substantially the complete antenna rod and the antenna coil are disposed externally of the housing;

and electrical switching means effective when the antenna rod is in its retracted position to connect the antenna coil to said electrical circuit, and when the antenna rod is in its extended position to connect the antenna rod to said electrical circuit.

2. The device according to Claim 1, wherein said electrical switching means comprises:

a fixed electrical connector fixed to said housing;

a first movable electrical connector electrically-connected to said antenna coil and carried by said antenna rod so as to be engageable by said fixed electrical connector when the antenna rod is in its retracted position to connect the antenna coil to said electrical circuit;

and a second movable electrical connector connected to and carried by said antenna rod so as to be engageable by said fixed electrical connector when the antenna rod is in its extended position to connect the antenna rod to said electrical circuit.

3. The device according to Claim 2, wherein said fixed electrical connector is located adjacent said opening in the housing through which the antenna rod is movable to its retracted and extended positions.

4. The device according to Claim 3, wherein said first movable electrical connector is located at the juncture of the antenna coil with the antenna rod.

5. The device according to Claim 4, wherein said second movable electrical connector is located at the end of the antenna rod opposite to that carrying the antenna coil.

6. The device according to Claim 5, wherein said opposite end of the antenna rod carries a shoulder engageable with a stop fixed within the housing adjacent said opening for limiting the movement of the antenna rod when moved to its extended position.

7. The device according to Claim 6, wherein said housing opening is circumscribed by an insulating bushing engageable with a stop carried by said antenna coil for limiting the movement of the antenna rod when moved to its retracted position.

8. The device according to any one of Claims 1-7, wherein said antenna rod and said antenna coil



are both of quarter wavelength.

9. The device according to any one of Claims 1-8, wherein said antenna coil is embedded within a dielectric medium, and said antenna rod is enclosed within a dielectric sleeve.
10. The device according to any one of Claims 1-9, wherein said electrical circuitry is a transmitter-receiver, particularly useful as a CT2 cordless telephone.

Patentansprüche

1. Elektrische Vorrichtung, umfassend:
 - ein Gehäuse, das eine elektrische Schaltungsanordnung der elektrischen Vorrichtung umschließt;
 - einen von dem Gehäuse getragenen Antennenstab;
 - eine Antennenspule, die von einem Ende des Antennenstabs getragen wird;
 - wobei der Antennenstab so befestigt ist, daß er durch eine Öffnung in dem Gehäuse in eine eingeschobene Position, in der im wesentlichen nur die Antennenspule außerhalb des Gehäuses angeordnet ist, oder in eine ausgezogene Position, in der im wesentlichen der vollständige Antennenstab und die Antennenspule außerhalb des Gehäuses angeordnet sind, bewegbar ist;
 - und eine elektrische Schalteinrichtung, die eine Verbindung der Antennenspule mit der elektrischen Schaltung bewirkt, wenn der Antennenstab in seiner eingeschobenen Position ist, und eine Verbindung des Antennenstabs mit der elektrischen Schaltung bewirkt, wenn der Antennenstab in seiner ausgezogenen Position ist.
2. Vorrichtung nach Anspruch 1, wobei die elektrische Schalteinrichtung umfaßt:
 - ein festes elektrisches Anschlußstück, das an dem Gehäuse befestigt ist;
 - ein erstes bewegliches elektrisches Anschlußstück, das elektrisch mit der Antennenspule verbunden ist und von dem Antennenstab so getragen ist, daß es mit dem festen elektrischen Anschlußstück in Eingriff bringbar ist, wenn der Antennenstab in seiner eingeschobenen Position ist, um die Antennenspule mit der elektrischen Schaltung zu verbinden;
 - und ein zweites bewegliches elektrisches Anschlußstück, das mit dem Antennenstab verbunden ist und von ihm so getragen ist, daß es mit dem festen elektrischen Anschlußstück in Eingriff bringbar ist, wenn der Antennenstab in seiner ausgezogenen Position ist, um den Antennenstab mit der elektrischen Schaltung zu ver-

binden.

3. Vorrichtung nach Anspruch 2, wobei das feste elektrische Anschlußstück an der Öffnung in dem Gehäuse angeordnet ist, durch die der Antennenstab in seine eingeschobene und ausgezogene Position bewegbar ist.
4. Vorrichtung nach Anspruch 3, wobei das erste bewegliche elektrische Anschlußstück an der Verbindung der Antennenspule mit dem Antennenstab angeordnet ist.
5. Vorrichtung nach Anspruch 4, wobei das zweite bewegliche elektrische Anschlußstück an dem Ende des Antennenstabs angeordnet ist, welches entgegengesetzt ist zu dem, das die Antennenspule trägt.
6. Vorrichtung nach Anspruch 5, wobei das entgegengesetzte Ende des Antennenstabs eine Schulter trägt, die mit einem Anschlag in Eingriff bringbar ist, welcher in dem Gehäuse an der Öffnung zur Begrenzung der Bewegung des Antennenstabs, wenn er in seine ausgezogene Position bewegt wird, befestigt ist.
7. Vorrichtung nach Anspruch 6, wobei die Gehäuseöffnung durch eine Isolierbüchse umschlossen ist, die mit einem von der Antennenspule getragenen Anschlag zum Begrenzen der Bewegung des Antennenstabs, wenn er in seine eingeschobene Position bewegt wird, in Eingriff bringbar ist.
8. Vorrichtung nach einem der Ansprüche 1-7, wobei sowohl der Antennenstab als auch die Antennenspule eine Viertelwellenlänge haben.
9. Vorrichtung nach einem der Ansprüche 1-8, wobei die Antennenspule in ein dielektrisches Medium eingebettet ist und der Antennenstab in einer dielektrischen Büchse eingeschlossen ist.
10. Vorrichtung nach einem der Ansprüche 1-9, wobei die elektrische Schaltungsanordnung ein Sender-Empfänger ist, der insbesondere als ein schnurloses CT2-Telefon verwendbar ist.

Revendications

1. Dispositif électrique comprenant un boîtier enfermant un circuit électrique du dispositif électrique, une tige d'antenne portée par le boîtier, une bobine d'antenne portée par une extrémité de la tige d'antenne, cette tige d'antenne étant montée mobile, à travers une ouverture dans le boîtier, vers une position rétractée dans laquelle pratique-



- ment seule la bobine d'antenne se trouve située à l'extérieur du boîtier, ou bien vers une position déployée dans laquelle la tige d'antenne et la bobine d'antenne sont situées pratiquement en totalité à l'extérieur du boîtier, et un moyen de commutation électrique intervenant, lorsque la tige d'antenne se trouve dans sa position rétractée, pour connecter la bobine d'antenne au circuit électrique et, lorsque la tige d'antenne se trouve dans sa position déployée, pour connecter cette tige d'antenne au circuit électrique.
2. Dispositif suivant la revendication 1 caractérisé en ce que le moyen de commutation électrique comprend un connecteur électrique fixe fixé au boîtier, un premier connecteur électrique mobile connecté électriquement à la bobine d'antenne et porté par la tige d'antenne de manière à venir en contact avec le connecteur électrique fixe lorsque la tige d'antenne se trouve dans sa position rétractée, afin de connecter la bobine d'antenne au circuit électrique, et un second connecteur électrique mobile connecté à la tige d'antenne et porté par celle-ci, de manière à venir en contact avec le connecteur électrique fixe lorsque la tige d'antenne se trouve dans sa position déployée, afin de connecter la tige d'antenne au circuit électrique.
3. Dispositif suivant la revendication 2 caractérisé en ce que le connecteur électrique fixe est monté adjacent à l'ouverture dans le boîtier à travers laquelle la tige d'antenne peut se déplacer vers ses positions rétractée et déployée.
4. Dispositif suivant la revendication 3 caractérisé en ce que le premier connecteur électrique mobile est situé à la jonction de la bobine d'antenne avec la tige d'antenne.
5. Dispositif suivant la revendication 4 caractérisé en ce que le second connecteur électrique mobile est situé à l'extrémité de la tige d'antenne qui est opposée à celle portant la bobine d'antenne.
6. Dispositif suivant la revendication 5 caractérisé en ce que l'extrémité opposée de la tige d'antenne porte un épaulement pouvant venir en contact avec une butée fixée à l'intérieur du boîtier en étant adjacente à l'ouverture, afin de limiter le mouvement de la tige d'antenne lorsque celle-ci se déplace vers sa position déployée.
7. Dispositif suivant la revendication 6 caractérisé en ce que l'ouverture du boîtier est entourée par un manchon isolant pouvant être rencontré par une butée portée par la bobine d'antenne, afin de limiter le mouvement de la tige d'antenne lorsque celle-ci est déplacée vers sa position rétractée.
8. Dispositif suivant l'une quelconque des revendications 1 à 7 caractérisé en ce que la tige d'antenne et la bobine d'antenne sont toutes les deux du type quart d'onde.
9. Dispositif suivant l'une quelconque des revendications 1 à 8 caractérisé en ce que la bobine d'antenne est noyée dans une masse diélectrique et la tige d'antenne est enfermée dans une gaine diélectrique.
10. Dispositif suivant l'une quelconque des revendications 1 à 9 caractérisé en ce que le circuit électrique est un émetteur-récepteur utilisable plus particulièrement en tant que téléphone sans fil du type CT2.