

Description

BACKGROUND OF THE INVENTION

The present invention relates to an improvement in an antenna which is applicable to a paging receiver or like miniature portable communication apparatus.

Portable radio communication apparatuses such as paging receivers or pagers are extensively used today. This kind of apparatus mainly consists of an electric circuit arrangement including an antenna, a matching section, a radio section, and a decoder section, a battery, and a housing. In parallel with the rapid progress of microelectronics and integrated circuit technology, a demand for further miniaturization of such a portable radio communication apparatus is increasing. The key to the miniaturization is how to compound individual blocks of the apparatus. Especially, difficulty has been experienced in miniaturizing the antenna and, therefore, an elaborated construction, configuration and arrangement of the antenna would lead to the miniaturization. Although an antenna for the above application is disclosed in U.S. Patent No. 3,736,591 by way of example, it does not have a construction and configuration which promote the miniaturization of the whole communication apparatus.

A small antenna arrangement has previously been proposed in Japanese patent application No. 61-123303, which was published on June 11 1986. Reference to this earlier arrangement, which included the use of the tubular battery case as an antenna element, thereby avoiding the need for an exclusive antenna arrangement, is also to be found in Patent Abstracts of Japan, Vol. 10, No. 313 (E-448) (2369) published on October 24 1986.

In UK Patent Application No. 2,101,436, which was published on January 12 1983, there was proposed a radio receiver, e.g. a paging receiver, with a built-in loop antenna which is coupled in such a way that the aperture area of the antenna is, in effect, enlarged and its gain improved.

Improved antenna arrangements will be described below which provide a considerable contribution to the miniaturization of a portable radio communication apparatus.

In the arrangements to be described, at least a part of an antenna is constituted by a flat conductive sheath member of a battery.

A prior art arrangement, together with embodiments of the invention given by way of example, will now be described with reference to the accompanying drawings in which:

Fig. 1 is a diagram schematically showing a prior art portable radio communication apparatus together with an antenna thereof;

Fig. 2 is an external perspective view of an ultrathin lithium battery which is applicable to the present invention;

Fig. 3 is a sectional side elevation of the battery shown in Fig. 2;

Fig. 4 is a view showing a first embodiment of the antenna in accordance with the present invention and a radio communication apparatus in which the antenna is installed;

Fig. 5 is a sectional side elevation of a battery which is used with the apparatus of Fig. 4 and forms a part of the antenna;

Fig. 6 is a view showing a modification to the apparatus of Fig. 5;

Fig. 7 is a view showing a second embodiment of the antenna in accordance with the present invention and a radio communication apparatus in which it is installed; and

Fig. 8 is a view showing a third embodiment of the present invention and a radio communication apparatus in which it is installed;

DESCRIPTION OF THE PREFERRED EMBODIMENTS

To better understand the present invention, a brief reference will be made to an antenna of a prior art portable radio communication apparatus, shown in Fig. 1. The antenna of Fig. 1 is the antenna which is disclosed in U.S. Patent No. 3,736,591 as previously mentioned. As shown, the antenna 10 is generally formed in a letter U and made up of parallel flat conductive portions 12 and 14 and a conductive connecting portion 16 which electrically interconnects the flat portions 12 and 14. The ends 12a and 14a of the flat portions 12 and 14, respectively, are connected to a matching circuit 18 which includes a coil 20, capacitors 22 and 24, and a transistor 26. A radio section, a decoder and a battery and other circuit sections, not shown, are also connected to the matching circuit 18 and accommodated in a housing. A problem with such a prior art apparatus is that although the matching circuit 18, radio section, decoder and the like may be provided in a miniature configuration by integration, the whole apparatus cannot be miniaturized because no consideration is given to the antenna 10 itself, battery and housing.

The present invention contemplates to reduce the overall dimensions of a portable radio communication apparatus of the type described by improving the construction and configuration of an antenna itself.

As shown in Figs. 2 and 3, a portable radio communication apparatus to which an antenna of the present invention is applicable is loaded with a flat ultrathin lithium battery (e.g. CS1634 available from TOSHIBA) 30. Fig. 2 shows the battery 30 in

an external view while Fig. 3 shows it in a sectional side elevation. As shown, the battery 30 is constituted by a first flat sheath portion 32 which serves as a positive terminal, a second flat sheath portion 34 which serves as a negative terminal, a positive polarity substance 38 and a negative polarity substance 40 individually received in a space 36 which is defined between the sheath portions 32 and 34, a separator 42 interposed between the two substances 38 and 40 and containing an electrolyte, and a seal member 44 sealing the opening which is defined between and along the edges of the sheath members 32 and 34.

In accordance with the present invention, the positive terminal sheath portion 32 or the negative terminal sheath portion 34 of the battery 30 is used as a part of the conductor which constitutes an antenna.

Referring to Fig. 4, a radio communication apparatus such as a pager 50 is shown which is implemented with a first embodiment of the antenna in accordance with the present invention. As shown, a battery used with the pager 50 is formed by bending the single lithium battery 30 of Figs. 2 and 3 substantially at its intermediate portion in the form of a letter U. Either one of the positive polarity and negative polarity sheath portions 32 and 34 of the battery 30 (negative polarity sheath portion 34 in this particular embodiment) is used as a loop antenna 52 itself, i.e., as a part of the conductor which constitutes the antenna 52. As shown in Fig. 4, antenna terminals 34a and 34b extend out from the negative polarity sheath portion 34 of the battery 30, or antenna 52, to serve as feed points. A coil 54 is connected between the antenna terminal 34b and ground to prevent a high frequency which is induced in the negative polarity sheath portion 34 from being coupled to ground of the apparatus 50. On the other hand, the positive polarity sheath portion 32 is provided with a positive terminal 55 of the battery 30 itself. A power switch 56 is connected to the positive terminal 55.

The combined battery and antenna 52 is connected to a circuit arrangement 58 which may be provided in an integrated configuration. The circuit 58 includes a matching circuit 60 which is connected to the antenna terminals 34a and 34b, a radio section 62, a wave-shaper 64, a decoder 66, a read only memory (ROM) 68 storing a paging number and like data, and a buffer 70. A loudspeaker 72 is connected to the circuit 58. The circuit 58 is integrated and accommodated in the space 46 (see Figs. 4 and 5) which is defined between two arms and the U-shaped antenna 52, i.e. battery 30. Such a configuration is successful in noticeably reducing the overall dimensions of the pager 50.

In operation, when the power switch 56 is closed, the pager 50 is brought into a waiting condition. Specifically, the U-shaped antenna 52 which is constituted by the negative polarity sheath portion 34 of the battery 30 is connected at its terminals 34a and 34b to the matching circuit 60 and thereby matched to the radio section 62. When an electromagnetic wave modulated by a signal of a desired frequency comes in through the antenna 52, it is demodulated by the radio section 62 and then converted into a digital signal by the wave-shaper 64. The digital signal is fed to the decoder 66. The decoder 66 compares the input digital signal with the paging number which is assigned to the pager 50 and, if they are coincident, drives the loudspeaker 72 via the buffer 70 to alert the user of the pager 50 to the reception of a call.

As shown in Fig. 6, the battery 30 which constitutes a part of the antenna 52 as shown in Fig. 4 may be used to back up a part of the circuit arrangement of the pager 50, e.g. decoder 66. In this case, a transistor 74 and a diode 76 are interposed between the positive terminal 32a of the battery 30 and the power switch 56. The power switch 56 is connected to ground through a battery 78. When the power switch 56 is open or when the battery 78 is not loaded with the switch 56 closed, power is fed from the combined antenna and battery 30 to the decoder 66 via the transistor 74. The rest of the construction and operation is the same as that of the embodiment shown in Fig. 4 and, therefore, will not be described to avoid redundancy.

Referring to Fig. 7, a radio communication apparatus (e.g. pager) 50A which is implemented by a second embodiment of the present invention is shown. The battery 30 used with this pager 50A is maintained flat as shown in Figs. 2 and 3 and not bent at its intermediate portion. Specifically, an antenna 52A shown in Fig. 7 is formed in a letter U by the flat battery 30, a flat plate of metal 80 located to face the battery 30, and a connecting member 82 connecting the positive polarity sheath portion 32 of the battery 30 and the metal plate 80. In this configuration, therefore, the terminal 32a included in the positive terminal sheath portion 32 of the battery 30 and a terminal 80a included in the metal plate 80 serve as antenna terminals, i.e. feed points of the antenna 52A. Again, the circuit arrangement 58 is integrated and received in a space 46A which is defined between the metal plate 80 and the battery 30. The pager 50A is operated in the same manner as the pager 50.

Fig. 8 shows a radio communication apparatus (e. g. pager) 50B which is implemented by a third embodiment of the present invention. The pager 50B, like the pager 50A of Fig. 7, uses the battery 30 in the flat configuration as shown in Figs. 2 and

3, the battery 30 constituting a part of the antenna 52B. Specifically, the antenna 52B includes the battery 30 and another battery 30A which replaces the metal plate 80 of Fig. 7. A conductor 82A is provided in place of the connecting member 82 of Fig. 7 for connecting the positive terminals and the negative terminals of the batteries 30 and 30A to each other. Hence, the antenna 52B is generally provided with a U shape as defined by the positive terminal sheath portion 32 of the battery 30, conductor 82A, and positive terminal sheath portion 32 of the battery 30A. The positive terminal sheath portions 32 of the batteries 30 and 30A are respectively provided with antenna terminals 32a and 32'a which define feed points. In this embodiment, the circuit 58 is also integrated and received in a space 48B between the batteries 30 and 30A. The operation of the pager 50B is the same as that of the pagers 50 and 50B previously stated.

While the illustrative embodiments of the present invention have been shown and described as using a flat ultrathin lithium battery of Figs. 2 and 3, the miniaturisation of a portable radio communication apparatus in accordance with the present invention is also achievable with a coin type or button type battery.

In summary, it will be seen that the present invention successfully miniaturizes a portable radio communication apparatus by using a conductive sheath portion of a flat thin battery as at least a part of a conductor which constitutes an antenna of the apparatus.

It will be understood that, although embodiments of the invention have been described by way of example, variations and modifications thereof, as well as other embodiments may be made within the scope of the invention as defined in the appended claims.

Claims

1. An antenna arrangement for a radio communication apparatus including a battery (30) having a case of which at least a part acts as an antenna element, characterised in that the part which acts as an antenna element is a flat conductive sheath portion (32) (34).
2. An antenna arrangement as claimed in claim 1, characterised in that the battery (30) and the flat conductive sheath portion (32) (34) are bent into the general shape of letter U in cross-section with parts of the flat conductive sheath portion (32) (34) in each arm of the letter U.
3. An antenna as claimed in claim 2, characterised in that the conductive sheath portion (32) (34) is one of a positive terminal and a negative terminal of the battery (30).
4. An antenna as claimed in claim 2, characterised in that an antenna terminal is provided at each of the opposite ends of the conductive sheath portion to define an antenna feed point (34a)(34b).
5. An antenna as claimed in any one of claims 2 to 4 characterised in that an electric circuit is arranged in a space (46) which is defined between opposite arms of the conductive sheath portion (32) (34).
6. An antenna as claimed in claim 5, characterised in that the conductive sheath portion (32) (34) is electrically connected to the electric circuit of the apparatus.
7. An antenna as claimed in any one of claims 4 to 6 characterised in that at least one of the antenna terminals (34a) (34b) is grounded to the apparatus via an element (54) having a high impedance to a received frequency.
8. An antenna as claimed in claim 7, characterised in that the element (54) includes a coil.
9. An antenna as claimed in claim 1, characterised in that the apparatus includes a single battery (30), the conductive sheath portion (32) having the form of a single flat plate which constitutes a flat part of the antenna (Fig. 7).
10. An antenna as claimed in claim 9, characterised in that the antenna includes a conductive sheath portion (32) of the battery (30), a flat conductor (80) facing and spaced from the conductive sheath portion (32), and a conductive connecting member (82) connecting one end of the sheath portion (32) and one end of the flat conductor (80) to each other, whereby the sheath portion (32), the flat conductor (80) and the connecting member (82) form a U-shape.
11. An antenna as claimed in claim 10, characterised in that the ends of the conductive sheath portion (32) and of the flat conductor (80) away from the connecting member (82) are each provided with an antenna terminal (32a) (80a) which defines a respective antenna feed point.
12. An antenna as claimed in claim 11, characterised in that an electric circuit (58) for the apparatus is accommodated in a space (46A)



3. the battery 30 constituting a part of the antenna 52B. Specifically, the antenna 52B includes the battery 30 and another battery 30A which replaces the metal plate 80 of Fig. 7. A conductor 82A is provided in place of the connecting member 82 of Fig. 7 for connecting the positive terminals and the negative terminals of the batteries 30 and 30A to each other. Hence, the antenna 52B is generally provided with a U shape as defined by the positive terminal sheath portion 32 of the battery 30, conductor 82A, and positive terminal sheath portion 32 of the battery 30A. The positive terminal sheath portions 32 of the batteries 30 and 30A are respectively provided with antenna terminals 32a and 32'a which define feed points. In this embodiment, the circuit 58 is also integrated and received in a space 46B between the batteries 30 and 30A. The operation of the pager 50B is the same as that of the pagers 50 and 50B previously stated.

While the illustrative embodiments of the present invention have been shown and described as using a flat ultrathin lithium battery of Figs. 2 and 3, the miniaturisation of a portable radio communication apparatus in accordance with the present invention is also achievable with a coin type or button type battery.

In summary, it will be seen that the present invention successfully miniaturizes a portable radio communication apparatus by using a conductive sheath portion of a flat thin battery as at least a part of a conductor which constitutes an antenna of the apparatus.

It will be understood that, although embodiments of the invention have been described by way of example, variations and modifications thereof, as well as other embodiments may be made within the scope of the invention as defined in the appended claims.

Claims

1. An antenna arrangement for a radio communication apparatus including a battery (30) having a case of which at least a part acts as an antenna element, characterised in that the part which acts as an antenna element is a flat conductive sheath portion (32) (34).
2. An antenna arrangement as claimed in claim 1, characterised in that the battery (30) and the flat conductive sheath portion (32) (34) are bent into the general shape of letter U in cross-section with parts of the flat conductive sheath portion (32) (34) in each arm of the letter U.
3. An antenna as claimed in claim 2, characterised in that the conductive sheath portion (32) (34) is one of a positive terminal and a negative terminal of the battery (30).
4. An antenna as claimed in claim 2, characterised in that an antenna terminal is provided at each of the opposite ends of the conductive sheath portion to define an antenna feed point (34a)(34b).
5. An antenna as claimed in any one of claims 2 to 4 characterised in that an electric circuit is arranged in a space (46) which is defined between opposite arms of the conductive sheath portion (32) (34).
6. An antenna as claimed in claim 5, characterised in that the conductive sheath portion (32) (34) is electrically connected to the electric circuit of the apparatus.
7. An antenna as claimed in any one of claims 4 to 6 characterised in that at least one of the antenna terminals (34a) (34b) is grounded to the apparatus via an element (54) having a high impedance to a received frequency.
8. An antenna as claimed in claim 7, characterised in that the element (54) includes a coil.
9. An antenna as claimed in claim 1, characterised in that the apparatus includes a single battery (30), the conductive sheath portion (32) having the form of a single flat plate which constitutes a flat part of the antenna (Fig. 7).
10. An antenna as claimed in claim 9, characterised in that the antenna includes a conductive sheath portion (32) of the battery (30), a flat conductor (80) facing and spaced from the conductive sheath portion (32), and a conductive connecting member (82) connecting one end of the sheath portion (32) and one end of the flat conductor (80) to each other, whereby the sheath portion (32), the flat conductor (80) and the connecting member (82) form a U-shape.
11. An antenna as claimed in claim 10, characterised in that the ends of the conductive sheath portion (32) and of the flat conductor (80) away from the connecting member (82) are each provided with an antenna terminal (32a) (80a) which defines a respective antenna feed point.
12. An antenna as claimed in claim 11, characterised in that an electric circuit (58) for the apparatus is accommodated in a space (46A)



which is defined between the conductive sheath portion (32) and the flat conductor (80).

13. An antenna as claimed in claim 12, characterised in that the conductive sheath portion (32) is electrically connected to the electric circuit (58) of the apparatus. 5
14. An antenna as claimed in claim 13, characterised in that at least one of the antenna terminals (80a) (32a) is grounded to the apparatus via an element (54) having a high impedance to a received frequency. 10
15. An antenna as claimed in claim 14, characterised in that the element (54) is a coil. 15
16. An antenna as claimed in claim 1, characterised in that the apparatus has first (30) and second batteries (30A) having first and second flat conductive sheath portions (32) respectively, the first and second conductive sheath portions (32) each having the form of a single flat plate. 20
17. An antenna as claimed in claim 16, characterised in that there is provided a conductive connecting member (82A) connecting the poles of the batteries (30) (30A) with the same polarity to each other. 25
18. An antenna as claimed in claim 17, characterised in that the first and second conductive sheath portions (32) of batteries (30) (30A) are each provided with an antenna terminal (32a) (32a') which defines an antenna feed point. 30
19. An antenna as claimed in claim 18, characterised in that the electric circuit (58) of the apparatus is received in a space (46B) which is defined between the batteries (30) (30A). 35
20. An antenna as claimed in claim 19, characterised in that one of the first and second conductive sheath portions (32) of the batteries (30) (30A) is electrically connected to the circuit (58). 40
21. An antenna as claimed in claim 20, characterised in that at least one of the antenna terminals (32a) is grounded to the apparatus via an element (54) having a high impedance to a received frequency. 45
22. An antenna as claimed in claim 21, characterised in that the element (54) is a coil. 50
23. An antenna in a radio communication apparatus including a conductive sheath portion (32) of a first battery powering the apparatus characterised in that the conductive sheath portion (32) is flat and forms a part of the antenna and a part of a housing accommodating an electrical circuit (58) of the apparatus, and in that there is further provided connecting means (32a) for connecting the conductive sheath portion (32) to an antenna matching circuit (60) of the apparatus. 55
24. An antenna as claimed in claim 23, characterised in that the apparatus is further powered by a second battery (30A), and in that means is provided for connecting the first battery (30) to the apparatus so as to function as a back-up battery for the second battery.
25. A method of forming an antenna of a radio communication apparatus characterised in that it includes the steps of connecting positive and negative terminal sheath members (32) (34) of a flat thin battery (30) to positive and negative battery terminals of the apparatus (58), respectively, connecting one of the positive and negative sheath members to an antenna matching circuit (60) of the apparatus (58), and employing at least a part of the flat thin battery (30) to form at least one flat part of an antenna (32) (34) of the apparatus (58) and to define a space (46B) for accommodating an electrical circuit (58) of the apparatus therein.

Patentansprüche

1. Antennenanordnung für ein Funkkommunikationsgerät, die eine Batterie (30) mit einem Gehäuse aufweist, von dem mindestens ein Teil als Antennenelement wirkt, dadurch gekennzeichnet, daß der als Antennenelement wirkende Teil ein flacher leitfähiger Mantelabschnitt (32, 34) ist.
2. Antennenanordnung nach Anspruch 1, dadurch gekennzeichnet, daß die Batterie (30) und der flache leitfähige Mantelabschnitt (32, 34) in eine Gestalt von im allgemeinen U-förmigem Querschnitt gebogen werden, wobei in jedem Arm des U Teile des flachen leitfähigen Mantelabschnitts (32, 34) enthalten sind.
3. Antenne nach Anspruch 2, dadurch gekennzeichnet, daß der leitfähige Mantelabschnitt (32, 34) entweder ein positiver oder ein negativer Pol der Batterie (30) ist.



- Antenne nach Anspruch 2, dadurch gekennzeichnet, daß an jedem der gegenüberliegenden Enden des leitfähigen Mantelabschnitts ein Antennenanschluß vorgesehen ist, um einen Antennenspeisepunkt (34a , 34b) festzulegen. 5
5. Antenne nach einem der Ansprüche 2 bis 4, dadurch gekennzeichnet, daß in einem Raum (46), der zwischen gegenüberliegenden Armen des leitfähigen Mantelabschnitts (32 , 34) eingegrenzt ist, eine elektrische Schaltung angeordnet ist. 10
6. Antenne nach Anspruch 5, dadurch gekennzeichnet, daß der leitfähige Mantelabschnitt (32 , 34) mit der elektrischen Schaltung des Geräts elektrisch verbunden ist. 15
7. Antenne nach einem der Ansprüche 4 bis 6, dadurch gekennzeichnet, daß mindestens einer der Antennenanschlüsse (34a , 34b) über ein Element (54) mit hoher Impedanz gegenüber einer empfangenen Frequenz mit der Masse des Geräts verbunden ist. 20 25
8. Antenne nach Anspruch 7, dadurch gekennzeichnet, daß das Element (54) eine Spule aufweist. 30
9. Antenne nach Anspruch 1, dadurch gekennzeichnet, daß das Gerät eine einzelne Batterie (30) aufweist, wobei der leitfähige Mantelabschnitt (32) die Form einer einzelnen flachen Platte hat, die einen flachen Teil der Antenne bildet (Fig. 7). 35
10. Antenne nach Anspruch 9, dadurch gekennzeichnet, daß die Antenne einen leitfähigen Mantelabschnitt (32) der Batterie (30), einen dem leitfähigen Mantelabschnitt (32) gegenüberliegenden und von diesem beabstandeten flachen Leiter (80) und ein leitfähiges Verbindungsglied (82) aufweist, das ein Ende des Mantelabschnitts (32) mit einem Ende des flachen Leiters (80) verbindet, wodurch der Mantelabschnitt (32), der flache Leiter (80) und das Verbindungsglied (82) eine U-Form bilden. 40 45
11. Antenne nach Anspruch 10, dadurch gekennzeichnet, daß die von dem Verbindungsglied (82) entfernten Enden des leitfähigen Mantelabschnitts (32) und des flachen Leiters (80) jeweils mit einem Antennenanschluß (32a , 80a) versehen sind, der einen entsprechenden Antennenspeisepunkt definiert. 50 55
12. Antenne nach Anspruch 11, dadurch gekennzeichnet, daß in einem zwischen dem leitfähigen Mantelabschnitt (32) und dem flachen Leiter (80) eingegrenzten Raum (46A) eine elektrische Schaltung (58) für das Gerät untergebracht ist.
13. Antenne nach Anspruch 12, dadurch gekennzeichnet, daß der leitfähige Mantelabschnitt (32) mit der elektrischen Schaltung (58) des Geräts elektrisch verbunden ist.
14. Antenne nach Anspruch 13, dadurch gekennzeichnet, daß mindestens einer der Antennenanschlüsse (80a , 32a) über ein Element (54) mit hoher Impedanz gegenüber einer empfangenen Frequenz mit der Masse des Geräts verbunden ist.
15. Antenne nach Anspruch 14, dadurch gekennzeichnet, daß das Element (54) eine Spule ist.
16. Antenne nach Anspruch 1, dadurch gekennzeichnet, daß das Gerät eine erste (30) und eine zweite Batterie (30A) mit einem ersten bzw. einem zweiten flachen leitfähigen Mantelabschnitt (32) aufweist, wobei der erste und der zweite leitfähige Mantelabschnitt (32) jeweils die Form einer einzelnen flachen Platte hat.
17. Antenne nach Anspruch 16, dadurch gekennzeichnet, daß ein leitfähiges Verbindungsglied (82A) vorgesehen ist, das die gleichnamigen Pole der Batterien (30), (30A) miteinander verbindet.
18. Antenne nach Anspruch 17, dadurch gekennzeichnet, daß der erste und der zweite leitfähige Mantelabschnitt (32) der Batterien (30 , 30A) jeweils mit einem Antennenanschluß (32a , 32a') versehen ist, der einen Antennenspeisepunkt definiert.
19. Antenne nach Anspruch 18, dadurch gekennzeichnet, daß in einem zwischen den Batterien (30 , 30A) eingegrenzten Raum (46B) die elektrische Schaltung (58) des Geräts untergebracht ist.
20. Antenne nach Anspruch 19, dadurch gekennzeichnet, daß der erste oder der zweite leitfähige Mantelabschnitt (32) der Batterien (30 , 30A) mit der Schaltung (58) elektrisch verbunden ist.
21. Antenne nach Anspruch 20, dadurch gekennzeichnet, daß mindestens einer der Antennen-



anschlüsse (32a) über ein Element (54) mit hoher Impedanz gegenüber einer empfangenen Frequenz mit der Masse des Geräts verbunden ist.

22. Antenne nach Anspruch 21, dadurch gekennzeichnet, daß das Element (54) eine Spule ist.

23. Antenne in einem Funkkommunikationsgerät mit einem leitfähigen Mantelabschnitt (32) einer ersten Batterie, die das Gerät mit Strom versorgt, dadurch gekennzeichnet, daß der leitfähige Mantelabschnitt (32) flach ist und einen Teil der Antenne sowie einen Teil eines Gehäuses bildet, in dem eine elektrische Schaltung (58) des Geräts untergebracht ist, und daß ferner eine Anschlußeinrichtung (32a) vorgesehen ist, um den leitfähigen Mantelabschnitt (32) mit einer Antennenanpassungsschaltung (60) des Geräts zu verbinden.

24. Antenne nach Anspruch 23, dadurch gekennzeichnet, daß das Gerät ferner durch eine zweite Batterie (30A) gespeist wird und daß eine Einrichtung vorgesehen ist, um die erste Batterie (30) so an das Gerät anzuschließen, daß sie als Reservebatterie für die zweite Batterie arbeitet.

25. Verfahren zur Ausbildung einer Antenne eines Funkkommunikationsgeräts, gekennzeichnet durch die folgenden Schritte: Verbinden des positiv bzw. des negativ gepolten Mantelglieds (32) bzw. (34) einer flachen, dünnen Batterie (30) mit dem positiven bzw. negativen Batterieanschluß des Geräts (50), Anschließen des positiven oder des negativen Mantelglieds an eine Antennenanpassungsschaltung (60) des Geräts (50) und Verwendung zumindest eines Teils der flachen, dünnen Batterie (30), um zumindest einen flachen Teil einer Antenne (32), (34) des Geräts (50) zu bilden und darin einen Raum (46B) zur Aufnahme einer elektrischen Schaltung (58) des Geräts einzugrenzen.

Revendications

1. Disposition d'antenne pour un appareil de radiocommunication comportant une batterie (30) ayant un boîtier dont au moins une partie agit comme un élément d'antenne, caractérisé en ce que la partie qui agit comme un élément d'antenne est une portion d'enveloppe plate conductrice (32) (34).

2. Disposition d'antenne selon la revendication 1, caractérisé en ce que la batterie (30) et la

portion d'enveloppe conductrice plate (32) (34) sont courbées en général sous la forme d'une lettre U en section transversale avec des parties de la portion d'enveloppe conductrice plate (32) (34) dans chaque jambe de la lettre U.

3. Antenne selon la revendication 2, caractérisée en ce que la portion d'enveloppe conductrice (32) (34) est une borne parmi les bornes positive et négative de la batterie (30).

4. Antenne selon la revendication 2, caractérisée en ce qu'une borne d'antenne est prévue à chacune des extrémités opposées de la portion d'enveloppe conductrice de façon à définir un point d'alimentation d'antenne (34a) (34b).

5. Antenne selon l'un quelconque des revendications 2 à 4, caractérisée en ce qu'un circuit électrique est disposé dans un espace (46) qui est défini entre les jambes opposées de la portion d'enveloppe conductrice (32) (34).

6. Antenne selon la revendication 5, caractérisée en ce que la portion d'enveloppe conductrice (32) (34) est électriquement connectée au circuit électrique de l'appareil.

7. Antenne selon l'une quelconque des revendications 4 à 6, caractérisée en ce qu'au moins une des bornes d'antenne (34a) (34b) est mise à la masse de l'appareil par l'intermédiaire d'un élément (54) ayant une haute impédance à une fréquence reçue.

8. Antenne selon la revendication 7, caractérisée en ce que l'élément (54) comporte une bobine.

9. Antenne selon la revendication 1, caractérisée en ce que l'appareil comporte une seule batterie (30), la portion d'enveloppe conductrice (32) ayant la forme d'une seule plaque plate qui constitue une partie plate de l'antenne (figure 7).

10. Antenne selon la revendication 9, caractérisée en ce que l'antenne comporte une portion d'enveloppe conductrice (32) de la batterie (30), un conducteur plat (80) en regard et espacé de la portion d'enveloppe conductrice (32), et un élément de connexion conducteur (82) connectant une extrémité de la portion d'enveloppe (32) et une extrémité du conducteur plat (80) l'un à l'autre, d'où il résulte que la portion d'enveloppe (32), le conducteur plat (80) et l'élément de connexion (82) forment une disposition en forme de U.



1. Antenne selon la revendication 10, caractérisée en ce que les extrémités de la portion d'enveloppe conductrice (32) et du conducteur plat (80) opposées à l'élément de connexion (82) sont chacune prévues avec une borne d'antenne (32a) (80a) qui définit un point d'alimentation d'antenne respectif.

12. Antenne selon la revendication 11, caractérisée en ce qu'un circuit électrique (58) pour l'appareil est reçu dans un espace (46A) qui est défini entre la portion d'enveloppe conductrice (32) et le conducteur plat (80).

13. Antenne selon la revendication 12, caractérisée en ce que la portion d'enveloppe conductrice (32) est électriquement connectée au circuit électrique (58) de l'appareil.

4. Antenne selon la revendication 13, caractérisée en ce qu'au moins une des bornes d'antenne (80a) (32a) est mise à la masse de l'appareil par l'intermédiaire d'un élément (54) ayant une haute impédance à une fréquence reçue.

15. Antenne selon la revendication 14, caractérisée en ce que l'élément (54) est une bobine.

16. Antenne selon la revendication 1, caractérisée en ce que l'appareil comporte des première (30) et seconde (30A) batteries ayant des première et seconde portions d'enveloppe conductrices plates (32), respectivement, les première et seconde portions d'enveloppe conductrices (32) ayant chacune la forme d'une seule plaque plate.

17. Antenne selon la revendication 16, caractérisée en ce qu'il est prévu un élément de connexion conducteur (82A) connectant les pôles des batteries (30) (30A) ayant la même polarité l'un avec l'autre.

18. Antenne selon la revendication 17, caractérisée en ce que les première et seconde portions d'enveloppe conductrices (32) des batteries (30) (30A) sont chacune munies d'une borne d'antenne (32a) (32a') qui définit un point d'alimentation d'antenne.

19. Antenne selon la revendication 18, caractérisée en ce que le circuit électrique (58) de l'appareil est reçu dans un espace (46B) qui est défini entre les batteries (30) (30A).

20. Antenne selon la revendication 19, caractérisée en ce qu'une portion des première et seconde portions d'enveloppe conductrices (32) des

batteries (30) (30A) est électriquement connectée au circuit (58).

21. Antenne selon la revendication 20, caractérisée en ce qu'au moins une des bornes d'antenne (32a) est mise à la masse de l'appareil par l'intermédiaire d'un élément (54) présentant une haute impédance à une fréquence reçue.

22. Antenne selon la revendication 21, caractérisée en ce que l'élément (54) est une bobine.

23. Antenne dans un appareil de radiocommunication comportant une portion d'enveloppe conductrice (32) d'une première batterie alimentant l'appareil, caractérisée en ce que la portion d'enveloppe conductrice (32) est plate et forme une partie de l'antenne et une partie d'un boîtier recevant un circuit électrique (58) de l'appareil, et en ce qu'il est de plus prévu un moyen de connexion (32a) pour connecter la portion d'enveloppe conductrice (32) à un circuit d'adaptation d'antenne (60) de l'appareil.

24. Antenne selon la revendication 23, caractérisée en ce que l'appareil est de plus alimenté par une seconde batterie (30A), et en ce qu'un moyen est prévu pour connecter la première batterie (30) à l'appareil de façon à fonctionner comme une batterie de secours pour la seconde batterie.

25. Procédé pour former une antenne d'un appareil de radiocommunication, caractérisé en ce qu'il comporte les étapes consistant à connecter des éléments d'enveloppe de bornes positive et négative (32) (34) d'une batterie mince plate (30) à des bornes de batterie positive et négative de l'appareil (58), respectivement, connecter un des éléments d'enveloppe positif et négatif à un circuit d'adaptation d'antenne (60) de l'appareil (58) et employer au moins une partie de la batterie mince plate (30) pour former au moins une partie plate d'une antenne (32) (34) de l'appareil (58) et pour définir un espace (46B) pour recevoir un circuit électrique (58) de l'appareil dans celui-ci.