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Portable transceiver apparatus, in particular radiomobile telephone set, with low irradiation of the user.

The present invention relates to a portable transceiver apparatus, in particular radiomobile telephone set, with low irradiation of the user including a handset and an antenna mounted on said handset. Since said apparatuses (AC) during use by a user, are placed near the user's head (U), a great amount of electromagnetic waves pass through it; in particular with the continuous increase in the frequency used and the consequent decrease in the antenna's dimension, the irradiation of the user's head is and will become a serious problem.

The aim of the present invention is to provide a portable transceiver apparatus such as to minimize the irradiation of its user.

By placing the antenna in a suitable position such as to be far away from the user's head, a greatly reduced irradiation can be obtained.

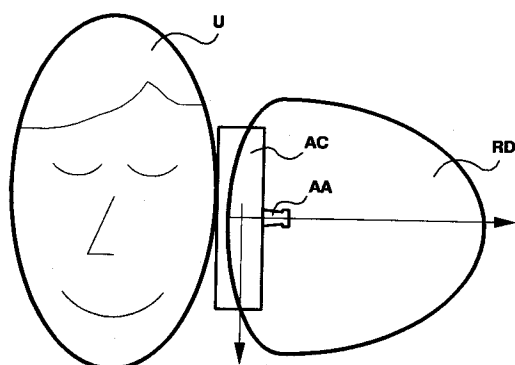


Fig.9

The present invention relates to a portable transceiver apparatus, in particular to a radiomobile telephone set, with low irradiation of the user comprising a handset and an antenna applied to said handset.

In Figs. 1 and 2 there are illustrated schematically in a side view two of such sets nowadays extensively used on the market, in particular in Fig. 1 the Motorola 8800X model and in Fig. 2 the 9800X one; however the schematic side view of Fig. 1 is the view of all portable transceiver apparatuses. Such apparatuses basically comprise a handset AC and an antenna AA applied to the handset. Located inside said handset generally are a loudspeaker AL, a microphone AM, a control panel AK and the circuitry for operating the apparatus.

The antenna AA of a radiomobile telephone set and, more in general, of a portable transceiver apparatus is placed in the upper portion of the handset AC.

Since such apparatuses, when in use are placed alongside the user's head, a great amount of electromagnetic waves pass through it; in particular with the continuous increase in the frequency used for transmission (at present a 900 MHz frequency is used but the trend is to reach 60 GHz in the future) the dimension of the antenna decreases and therefore the distance between the antenna and the user's head will become practically null. Irradiation of the user's head is and will become a serious problem, actually not solved, particularly if the increase in transmission frequency is taken into account.

It is an object of the present invention to provide a portable transceiver apparatus such as to minimize the irradiation of its user.

This object is reached by the portable transceiver apparatus having the features set forth in claim 1; further advantageous aspects of the present invention are set forth in the subclaims.

By placing the antenna in a suitable position so as to be far away from the user's head a large reduction in the irradiation can be obtained.

The invention will become more apparent from the description of some embodiments thereof, chosen by way of example, viewed in conjunction with the attached drawings in which:

- Figs. 1 and 2 represent schematic side views of two embodiments of prior art apparatuses,
- Figs. 3 and 4 represent schematic side views of two embodiments of apparatus in accordance with the present invention,
- Figs. 5 and 6 represent schematic side views of two further embodiments of apparatus in accordance with the present invention with the antenna mounted on an orientable joint,

- Figs. 7 and 8 represent schematic side views of two further embodiments of apparatus, in accordance with the present invention, having the antenna mounted on a telescopic leg with the leg in a completely drawn out position, and
- Fig. 9 is a possible radiation pattern of the handset-antenna assembly in accordance with the present invention, represented in overlap to an apparatus and to the user's head.

From Figs. 1 and 2, two schematic side views of two prior art portable transceiver apparatuses can be seen; for the purpose of describing the present invention it will suffice to say that such apparatuses comprise a handset AC and an antenna AA applied to the handset AC.

As already mentioned, the solution according to the present invention to limit the irradiation of the user's head by a portable transceiver apparatus consists in placing antenna AA on handset AC in a suitable position so as to be far away from the user's head; this different positioning affects doubly the limitation of irradiation: first of all the increase in distance reduces, as well known, the power per unit area, secondly since the radiation pattern of an antenna is anything but uniform in all directions, a suitable positioning of the antenna may have the effect that the directions of less radiation are turned toward the user's head. In Fig. 9, e.g., there is shown a radiation pattern RD of the assembly formed by handset AC and antenna AA in accordance with the present invention, represented in overlap to an apparatus and to its user's head U, obtained by placing antenna AA on the back of housing AC and by orienting it in a direction perpendicular to the handset itself. In many instances the contribution to the radiation pattern due to handset AC is negligible or can be easily made negligible by screening the handset itself.

A particularly advantageous choice is to place antenna AA on the bottom portion of handset AC: Figs. 3 and 4 show the schematic side elevational views of two different embodiments of the present invention which implement such choice.

A further possibility consists in placing antenna AA in such a position that the handset AC acts as an electromagnetic shield: an example of such positioning has been already shown with relation to Fig. 9; antenna AA has its intrinsic radiation pattern; by placing in its neighbourhood any kind of object, particularly a metallic one, the global radiation pattern is changed and choosing suitably the shape of handset AC and the distribution of its metallic masses a reduction of the irradiation in direction of the user can be obtained. If, by acting upon such parameters, the desired effect is not obtained, or anyway not in a satisfactory manner, there is still

the possibility of adding further elements which act as a more effective electromagnetic shield; such additional elements can be either passive metallic elements or active elements, e.g. structures realized through microstrips.

It may occur very easily that a position is found which is satisfactory from the user radiation viewpoint but very uncomfortable for the use of the apparatus by the user: then it is advantageous to mount the antenna AA on a joint OJ which allows its orientation. Figs. 5 and 6 show the schematic side views of two different embodiments of the present invention which implement this solution: in both cases antenna AA is arranged vertically if the apparatus is not active and horizontally when the apparatus is active; in the embodiment of Fig. 5, the handset AC can easily act as an electromagnetic shield.

Since, as said, the distance of antenna AA from the user plays an important role, such distance can be easily increased by providing the apparatus with a not radiating telescopic leg TL arranged longitudinally inside or outside the handset AC and by mounting the antenna AA at one end of the leg TL. Figs. 7 and 8 show the schematic side views of two different embodiments of the present invention which implement such a solution: in both cases leg TL is represented in a completely drawn out solution, as usual when the apparatus is active; when, on the contrary, the apparatus is not active, the leg TL is hidden inside the handset AC; in the embodiment illustrated in Fig. 8, the leg TL is further mounted on a joint OJ to improve the orientation of the radiation pattern and/or to cause handset AC act as an electromagnetic shield.

In order to prevent telescopic leg TL from radiating itself, there is a first possibility of inserting inside it means for transferring signals from antenna AA to handset AC and viceversa from handset AC to antenna AA; such means can be constituted e.g. by a coaxial cable.

A second possibility is to place inside the leg TL another telescopic leg having a diameter smaller than the first one so that both telescopic legs form by themselves a coaxial cable capable of realizing the above-mentioned signal transfers.

As already illustrated above, these different elements (a suitable positioning of antenna AA, the electromagnetic shield, the orientable joint OJ, the telescopic leg TL) can be then combined in several ways to give rise to an apparatus with low irradiation of the user in accordance with the present invention.

Claims

1. Portable transceiver apparatus, in particular radiomobile telephone set, with low irradiation

of the user, including a handset and an antenna applied to said handset, characterized in that said antenna is disposed on said handset in such a position as to be far away from the head of the person using said apparatus.

2. Apparatus according to claim 1, characterized in that said antenna is placed in the lower portion of said handset.

3. Apparatus according to claim 1, characterized in that said antenna is placed in such a position that said handset acts as an electromagnetic shield.

4. Apparatus according to claim 1, characterized in that an electromagnetic shield is mounted on said handset.

5. Apparatus according to claim 1, characterized in that said antenna is mounted on an orientable joint that allows its orientation.

6. Apparatus according to claim 1, characterized in that it further comprises a non-radiating telescopic leg disposed longitudinally, internally or externally, to said handset and in that said antenna is mounted at one end of said telescopic leg.

7. Apparatus according to claim 6, characterized in that means for transferring signal from said antenna to said handset and from said handset to said antenna are provided inside said telescopic leg.

8. Apparatus according to claim 6, characterized in that placed inside said telescopic leg is another telescopic leg, and in that both said telescopic legs form a coaxial cable capable of transferring signals from said antenna to said handset and from said handset to said antenna.

9. Apparatus according to claim 8, characterized in that said telescopic leg is mounted on an orientable joint.

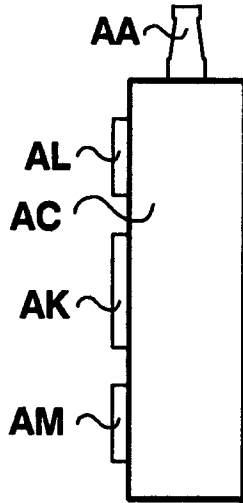


Fig.1

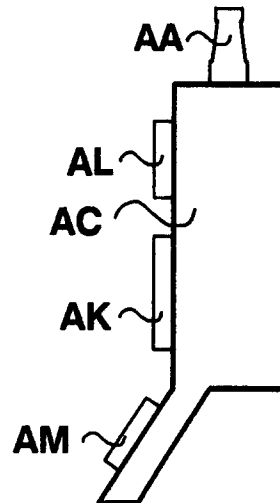


Fig.2

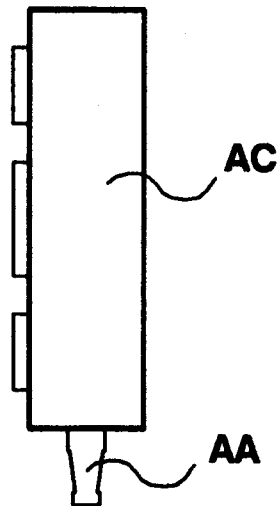


Fig.3

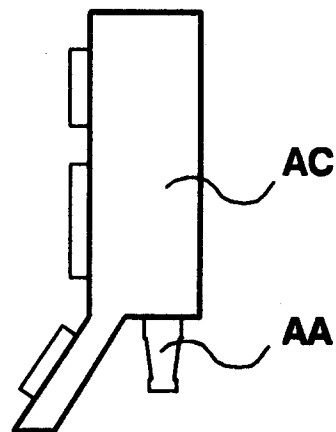


Fig.4

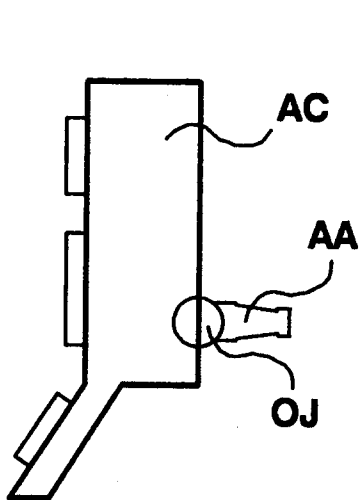


Fig.5

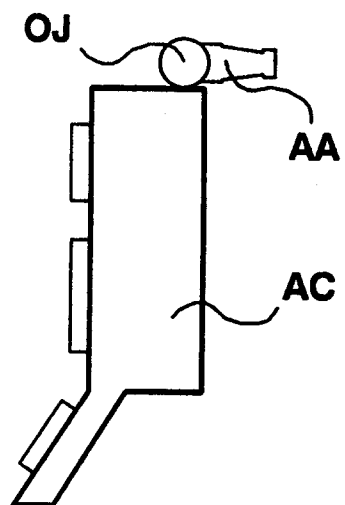


Fig.6

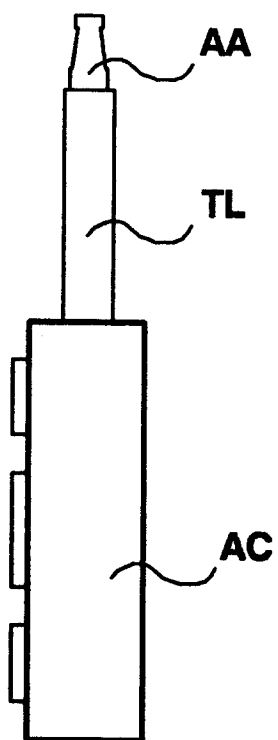


Fig.7

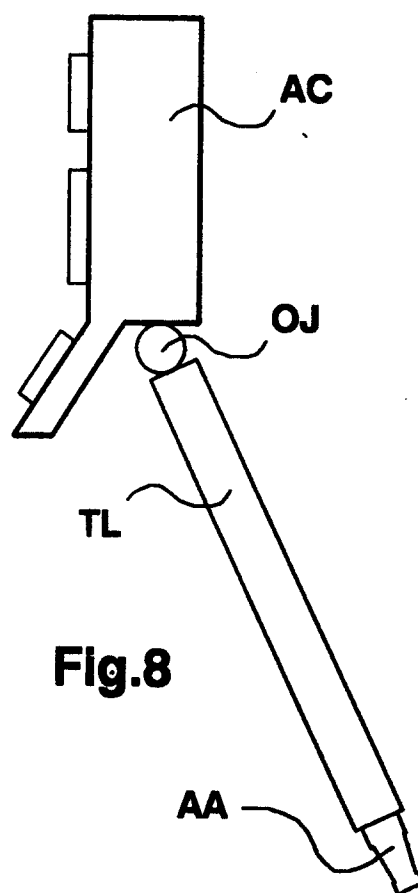


Fig.8

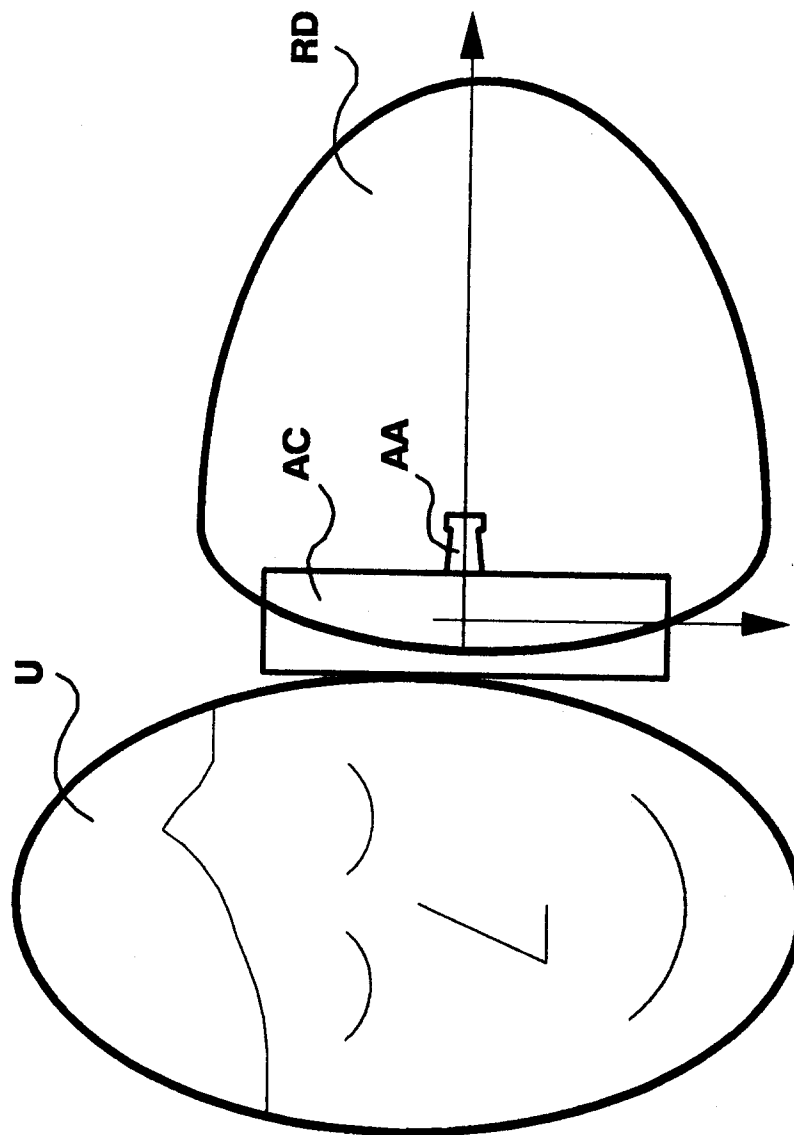


Fig.9



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 5026

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	EP-A-0 339 629 (MOTOROLA) * page 3, line 6 - line 35; figures 1-3 *	1,3	H04B1/38 H01Q1/24
A	---	2,4-9	
X	EP-A-0 214 806 (NEC) * page 9, line 1 - line 13; figure 3C *	1,3	
A	---	2,4-9	
X,P	EP-A-0 532 960 (SIEMENS) * the whole document *	1,5-9	
X,P	FR-A-2 679 086 (MATRA) * abstract; figure 1 *	1,2	

			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			H04B H01Q
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 December 1993	Examiner Andersen, J
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document	