Feb. 17, 1959 C. F. RACE 2,874,205

ELECTRICAL CONNECTOR

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Fig. 1

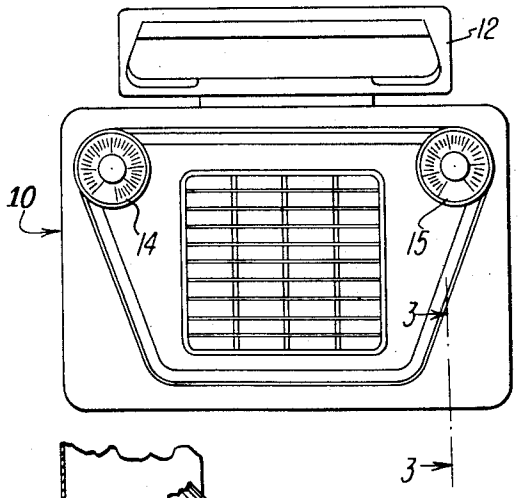
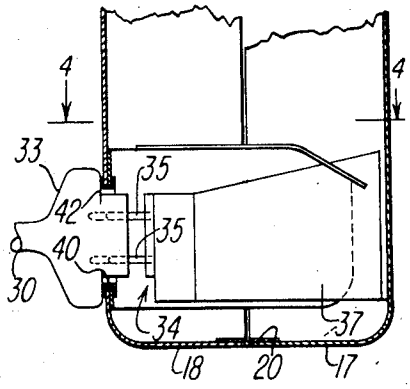


Fig. 3



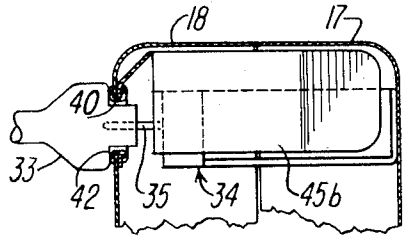


Fig 4

Fig. 5

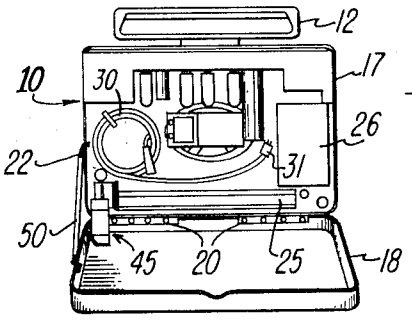


Fig. 2

INVENTOR.
Clarence F. Race
BY
Mueller & Aichele
Attys.

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ELECTRICAL CONNECTOR

Clarence F. Race, Wheaton, Ill., assignor to Motorola, Inc., Chicago, Ill., a corporation of Illinois

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1 Claim. (Cl. 174—52)

This invention relates generally to electrical connectors and more particularly to an interlocked power connector for a portable radio or the like.

Many of the present day portable radio receivers are housed in cabinets which the users may open for the purpose of replacing the batteries. Some of these radios are also operable from the 110 volt power mains and, since circuitry coupled to this power presents a dangerous shock hazard to persons unskilled in electrical practice, some provision is generally required for insuring that the apparatus is disconnected from the power line when the cabinet is opened.

An object of this invention is to provide a simple electrical connector for a radio of the type described above, to insure that no shock hazard will exist from power line energy when the cabinet is opened without first uncoupling the cord of the apparatus from the power main.

Another object is to provide an improved interlocked electrical connector for use with a radio cabinet which connector automatically uncouples an associated power cord when the cabinet is opened and which shields its exposed terminals while the receiver is so uncoupled.

Still another object of the invention is to provide an electric connector for a portable radio operable by batteries and house current which connector may not be connected to the receiver to energize the circuit thereof when the cabinet is open.

A feature of the invention is the provision of an improved electrical connecting device including a male connector exposed through an aperture in one hinged section of a cabinet for electrical apparatus, and a female connector secured to a power cord and including a shoulder adapted to bear against such cabinet section whenever the cabinet is opened to draw the connectors apart and uncouple them.

Another feature is the provision of such a connecting device for a cabinet having hinged sections and which includes a pair of connectors adapted to engage one another and a shield structure secured in one corner of the cabinet to enclose the connectors and prevent them from being intercoupled to energize the receiver, unless the cabinet is closed.

Further objects, features and the attending advantages thereof will be apparent upon consideration of the following description when taken in conjunction with the accompanying drawing in which:

Fig. 1 is a front elevational view of a portable radio receiver;

Fig. 2 is a rear view with the cabinet of the receiver in open position;

Fig. 3 is a sectional view along the line 3—3 of Fig. 1 showing the electrical connector of the present invention;

Fig. 4 is a sectional view taken along a line 4—4 of Fig. 3; and

Fig. 5 is a sectional view corresponding to the view of Fig. 3 with the cabinet of the receiver in open position.

This invention provides an interlocked electrical connector for a radio cabinet or the like, for connection to the electric power line and which includes an electric circuit adapted to be uncoupled automatically when the cabinet is opened for any purpose, such as changing batteries contained in the cabinet. In the preferred form of the invention a male electrical connector is secured in one section of a hinged cabinet in alignment with an aperture in the other cabinet section. A female connector on the end of a line cord for the apparatus is adapted to be coupled to the male connector through the aperture. A shoulder on the female connector engages the outside of the apertured cabinet section so that when the cabinet is open the connectors are pried apart to uncouple the cord from the radio apparatus and obviate the shock hazard if the other end of the line cord remains coupled to the power line.

A shield is preferably secured to the apertured cabinet section in such a manner that this shield, surrounds and covers the contacts of the male connector when the cabinet is opened, thus making it impossible for the female connector to be engaged with the male connector to energize the receiver when the cabinet is open. A suitable chain limits the amount by which the cabinet sections may be opened and assures that the shield structure will prevent access to the male connector.

Fig. 1 illustrates the front panel of a portable radio receiver **10** which includes a handle **12** and tuning and volume knobs **14, 15**. Fig. 2 is a back view of the receiver **10** which is housed in front cabinet section **17** and rear cabinet section **18**, both hinged along the bottom sides thereof by hinges **20**. A chain **22** limits the amount by which the cabinet sections **17, 18** may be opened. Batteries **25, 26** operate the receiver for portable use and the provision of hinged cabinet sections of course permits access to the batteries so that a user of the receiver may conveniently replace them whenever necessary. Furthermore, the receiver may also be energized when coupled to the power mains, such as those providing 110 volts alternating or direct current. For this purpose a power line cord **30** is used and when this cord is not in use, it may be stored in the cabinet as shown in Fig. 2. A common arrangement familiar to those skilled in this art is the provision of a plug **31** at one end of the line cord **30** which is plugged into the usual wall receptacle when the receiver is to be operated from the power mains. A socket in the receiver is also provided for this plug and it must be inserted therein to operate the receiver on batteries. Such an arrangement of course insures that the receiver will be disconnected from the power mains before it may be battery operated.

Line cord **30** also includes, on the other end thereof, a female connector **33** which engages a male connector **34** contained within cabinet sections **17, 18**. (Figs. 3 and 4.) Male connector **34** includes pins **35**, which are supported by a bracket **37** mounted on the front panel of the receiver which is integral with cabinet section **17**. Pins **35** are in alignment with an aperture **40** in the back panel of the receiver which is a part of section **18**. A portion of the female connector **33** extends through aperture **40** and makes electrical connection with pins **35** thus supplying power from the line cord **30** to the radio circuit connected to these prongs. A shoulder **42** of the connector **33** engages the outside of the back panel of the cabinet when the connectors **33, 34** are intercoupled and the cabinet is being opened. Thus it may be seen that when the cabinet is opened, the connectors **33** and **34** will be separated and uncoupled. Accordingly, if a user of the receiver were to open the cabinet while the plug **31** (Fig. 2) remained connected to the power mains, the circuit would be automatically broken obviating the shock hazard which might otherwise exist if the cabinet were opened and still connected to the power mains.

The connector device of the present invention also

includes a shield 45 which is mounted on the back panel of the cabinet adjacent aperture 40 and which extends substantially to the front panel thereof when the cabinet is closed. A portion *45a* of shield 45 is disposed between the side of connector 34 facing the nearer end of the cabinet and a further portion *45b* extends across the top of connector 34. Fig. 5 shows the cabinet sections 17, 18 moved to the fully open position with an angle of approximately 90° (or an angle less than obtuse) therebetween and with the chain 22 restraining further angular separation of the sections. In this view it may be observed that the end of portion *45b* of shield 45 is bent downwardly and that the contour of portion *45b* therefore roughly corresponds to the arcuate path traveled by pins 35 as the cabinet sections are opened. Furthermore, this downwardly bent end remains near enough the pins when the sections are completely opened that connector 33 may not be coupled thereto at this time. Therefore, further safety for the user of the radio apparatus is afforded in that he may not energize the receiver from the power lines when the cabinet is open by connecting the power cord to the receiver in the usual manner. To further insure that the connectors are not joined when the cabinet is opened, it is contemplated that chain 22 be fastened to cabinet sections 17 and 18 at the ends of these sections in which the connector device is installed. Such construction will limit any bending or deformation of the cabinet which could uncover pins 35 and make them available for electrical contact. With chain 22 so positioned within the cabinet it is also desirable to cover this chain with a suitable flexible insulating material, such as sleeve 50, in order that it will not become electrified when the cabinet is closed or partly opened if it should happen to come in contact with any of the radio circuitry.

The shield 45, as well as the bottom and ends of the cabinet sections, additionally provides an enclosure for the connectors 33, 34 as they are being separated rendering it quite unlikely that any foreign object could possibly reach pins 35 until completely uncoupled from connector 33. That is, there are no exposed portions of the connector device which are electrified in any normal use of the apparatus described so that complete safety is provided.

This invention provides, therefore, a simple power connector for a radio cabinet or the like to minimize the shock hazard existing when a power cord for the apparatus is not unplugged from the power main when the cabinet is opened. The device incorporates simply formed component parts which may be readily constructed using production techniques. Furthermore the device furnishes automatic protection for the user of the apparatus when the cabinet is being opened as well as when it is fully opened so that one who would attempt to operate the receiver when it is in a dangerous condition is discouraged. The connector device thus described is accordingly particularly suitable for use with a portable radio, the cabinet of which is constructed to be opened by the user for replacement of batteries.

What is claimed is:

A radio receiver permanently mounted in a portable cabinet and powered alternatively by internal batteries and an external power source, said cabinet having a front cabinet portion and a back cabinet portion and being hinged at junction portions intermediate and spaced substantially midway between the front and back portions to be movable to closed and open positions to facilitate changing the batteries, said back portion having an aperture therein, and interlocking power connector apparatus including male connector means having projecting pins permanently connected to the radio receiver, bracket means mounted on the front cabinet portion and extending therefrom beyond the junction portion, said male connector means being mounted on said bracket means with said pins in closely spaced aligned relation with the aperture in the back cabinet portion when the cabinet is in the closed position and with said pins being subject to exposure when the cabinet is in the open position, female connector means having a reduced coupling portion for insertion through the aperture for receiving and engaging said projecting pins when the cabinet is closed, said female connector means having a shoulder engageable with the exterior of the back cabinet portion for uncoupling said male and female connector means when the cabinet is opened, a shield including first and second mutually perpendicular sections supported on the back cabinet portion, said shield having a mounting portion affixed to the back cabinet portion, said first section extending substantially perpendicularly from the back cabinet portion and extending therefrom beyond the junction portions when the cabinet is closed and assuming a blocking position alongside and closely spaced from said pins when the cabinet is open, said second section extending from the back portion of the cabinet and beyond the junction portion when the cabinet is closed and having an end bent toward the junction portion which assumes a blocking position over and closely spaced from the tips of said pins when the cabinet is open for further blocking access to said pins, and means for limiting the open position of the cabinet to one at which said first section and said bent end of said second section effectively cover the exposed portions of said pins of said male connector means, thereby preventing application of power to the radio receiver by connection of a female connector thereto.

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