

[54] **CONCEALED LOCK MEANS FOR
TAMPERPROOF RECEIVER CASE**

[72] Inventors: Alfred R. Ditthardt, Skokie; Arthur W. Schmidt, Chicago, both of Ill.

[73] Assignee: Zenith Radio Corporation, Chicago, Ill.

[22] Filed: July 6, 1970

[21] Appl. No.: 52,319

[52] U.S. Cl.: 317/120, 325/353, 220/55 B, 220/55 K

[51] Int. Cl.: H04b 1/08, H02b 1/06

[58] Field of Search: 220/55 B, 55 K; 292/19, 86; 317/101 R, 120, 99; 325/119, 353, 355, 356

[56] **References Cited**

UNITED STATES PATENTS

3,289,085	11/1966	Leland	229/19 X
3,115,269	12/1963	Rasmussen	220/55 K
2,113,687	4/1938	Grace	292/86 X
3,070,748	12/1962	Worobey	317/101 R X

Primary Examiner—Lewis H. Myers

Assistant Examiner—Gerald P. Tolin

Attorney—John J. Pederson and R. A. Blackstone

[57]

ABSTRACT

A tamperproof housing for a portable battery-operated electronic device has an electronics-supporting chassis with an enclosed externally-accessible battery compartment to provide a concealed lock comprising a pair of cantilever spring members having their fixed ends attached to the chassis on the exterior of the battery compartment and their free ends each having a flange portion for engaging a corresponding notch in a housing cover to thereby secure the housing cover to the chassis. Two small openings are provided at the periphery of the interior end of the cylindrical battery compartment. The housing may be opened by use of a cylindrical tool having a shaft diameter slightly smaller than that of the battery compartment and further having a pair of prongs at the distal end of the shaft corresponding to the openings. The cover is detached from the chassis by inserting the tool into the battery compartment so that the prongs engage the openings and depress the two resilient cantilever latch members, thereby disengaging the flanges from the notches and releasing the cover from the chassis.

1 Claims, 5 Drawing Figures

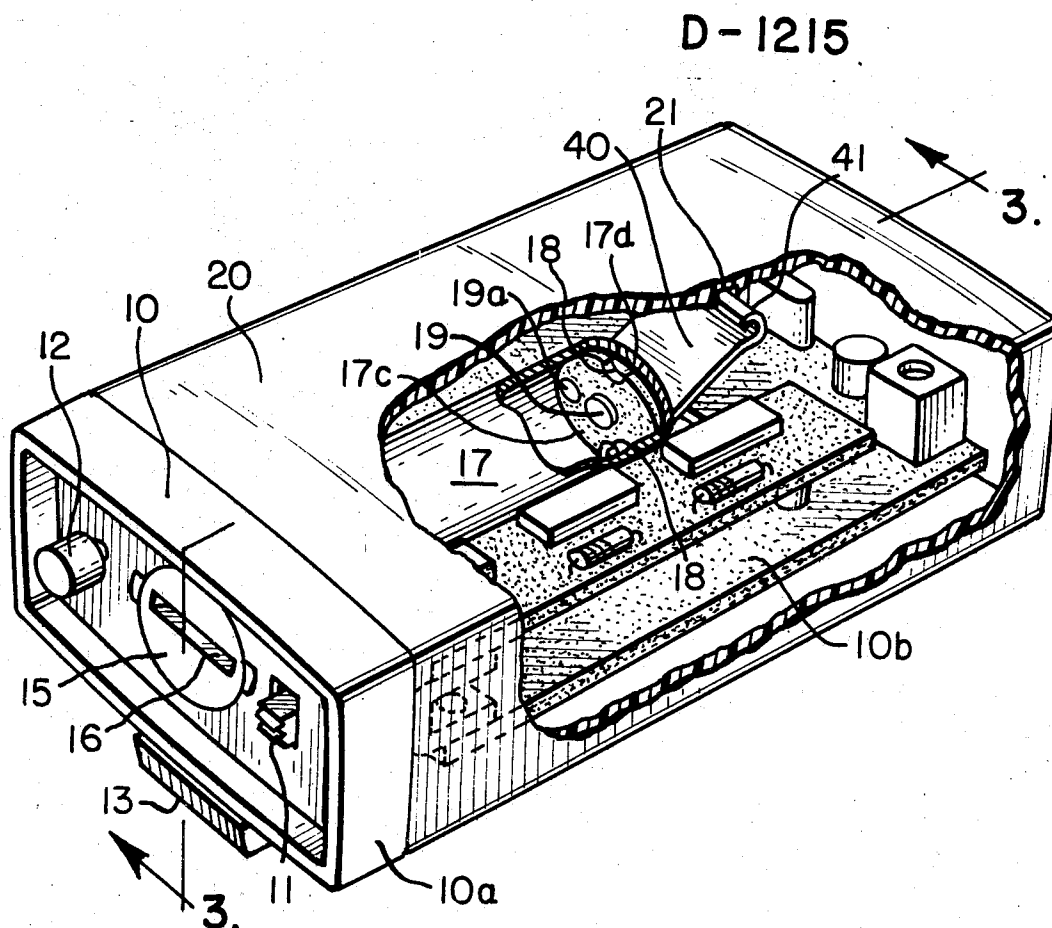


FIG. 1

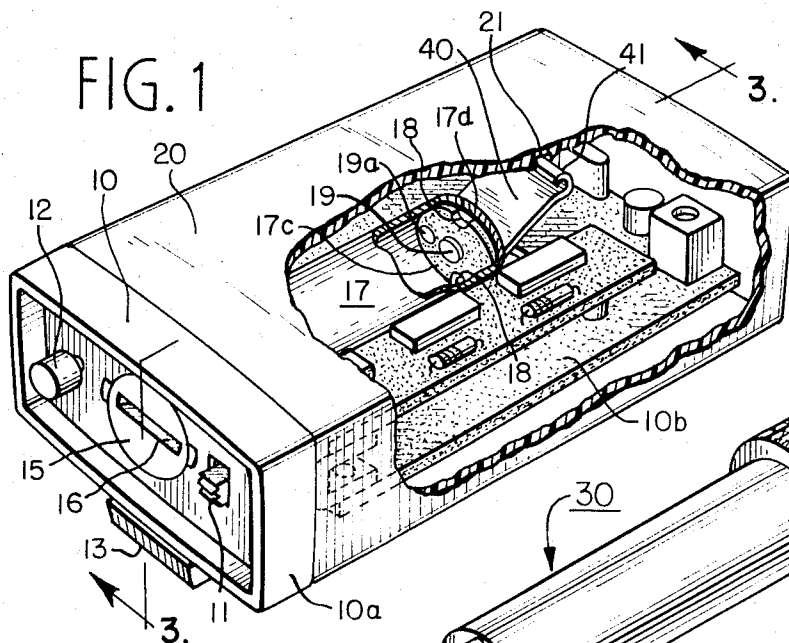


FIG. 2

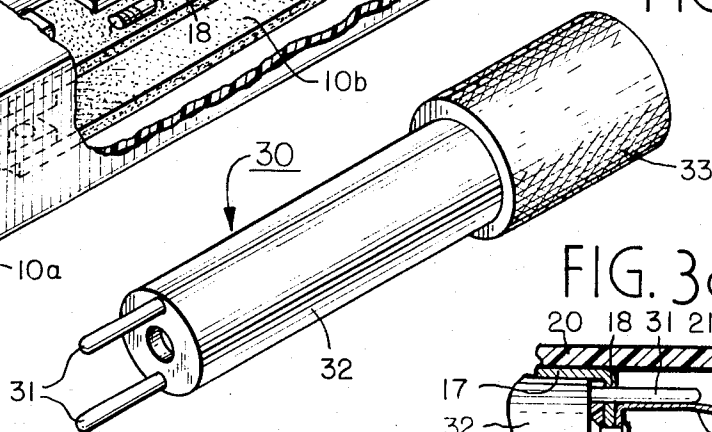


FIG. 3a

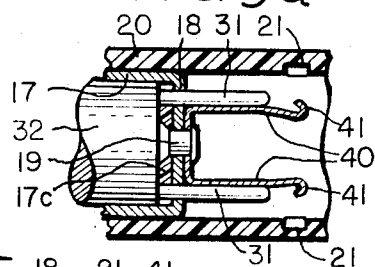


FIG. 3

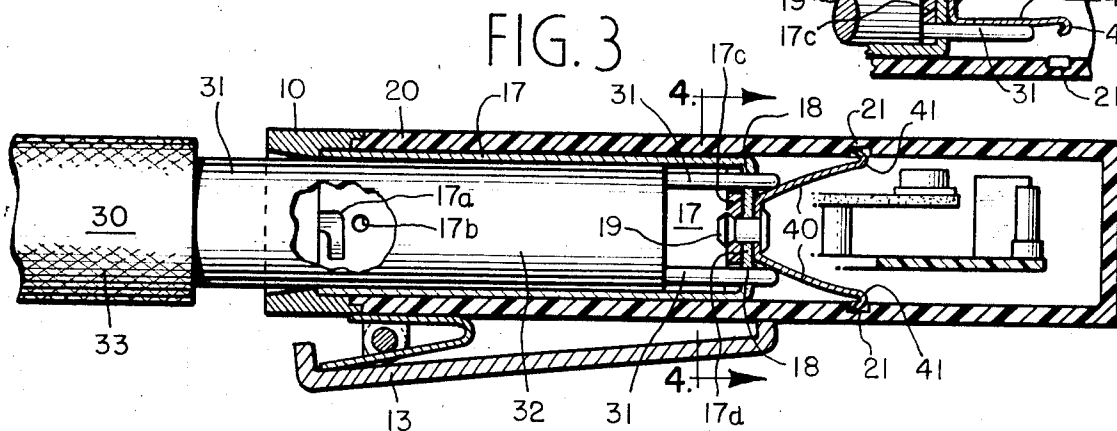
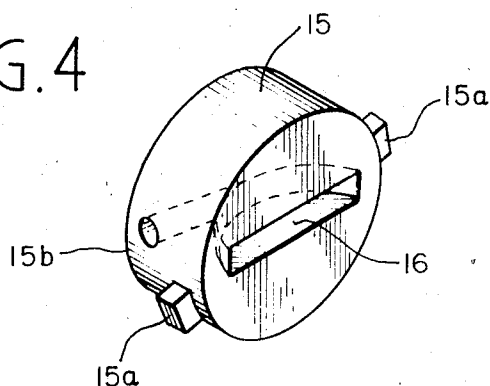


FIG. 4



Inventors
Alfred R. Ditthardt
Arthur W. Schmidt

By *R. A. Blackstone*
Agent

CONCEALED LOCK MEANS FOR TAMPERPROOF RECEIVER CASE

BACKGROUND OF THE INVENTION

Portable battery-operated devices are extensively employed for various purposes. The most common of these, of course, is the transistorized AM radio receiver which is typically owned by the user. Some receivers, however, such as those used for selective paging systems, are not owned by the typical user. Instead, because of economic considerations, individual receivers are normally leased to individual users by an owner-operator of the complete system. Hence, an individual may subscribe to such a service and thereby merely pay a relatively small periodic rental instead of buying a transmitter-receiver system.

Quite obviously, the owner of a paging system desires the receiver to be extremely rugged, easy to operate, and reliable. To this end, paging receivers are typically provided with a minimum number of external user controls; normally, only an on/off switch, a reset button, and a removable cap to provide access to the battery compartment for replacement of batteries. Sometimes, such as with two-way receivers, the unit is further provided with a push-to-talk switch and even an external antenna.

One major problem with conventional paging receiver construction, however, is that although it is relatively rugged, and therefore minimizes damage resulting from dropping, etc., it provides rather easy access to the receiver interior; thereby subjecting it to abuse by unauthorized and untrained hands which may disturb or alter the internal circuitry. Consequently, proper operation of the receiver may be prevented or even undesirable interference signals may be produced which interfere with the operation of nearby electronic equipment.

It is therefore a primary object of the present invention to provide a new and improved tamperproof housing for enclosing a portable battery-operated electronic device.

It is a further object of the invention to provide such a new and improved tamperproof housing the interior of which is readily accessible only to authorized personnel.

SUMMARY OF THE INVENTION

In accordance with the invention, a tamperproof housing of the type suitable for enclosing a portable battery-operated electronic device comprises a chassis member for supporting the electronics of the device and having an enclosed externally-accessible battery compartment having an interior surface remote from the external access, with the remote surface having one or more minimal-sized openings therein. A cover member adapted to mate with the chassis member to thereby enclose the device is provided. Concealed locking means mounted on one of the members and having a captivating portion for engaging the other member to secure the cover member to the chassis member and further having an actuating portion accessible only through the opening(s) are also provided whereby the cover member may be freed from the chassis member only by an external tool adapted to project through the opening(s) and operate the actuating portion.

BRIEF DESCRIPTION OF THE DRAWING

The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, in the several figures of which like reference numerals identify like elements, and in which:

FIG. 1 is a perspective view of a tamperproof housing, partially broken away, for enclosing a portable battery-operated electronic device and embodying the principles of the present invention;

FIG. 2 is a perspective view of a tool used for gaining access to the interior of the housing shown in FIG. 1;

FIG. 3 is a longitudinal sectional view taken along line 3—3 of FIG. 1;

FIG. 3a is a fragmentary sectional view similar to FIG. 3; and

FIG. 4 is a perspective view of the battery cap for the housing shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to FIG. 1, there is shown a perspective view of a tamperproof housing, consisting of a chassis member 10 and a cover member 20, for a portable electronic battery-operated device constructed in accordance with the present invention. For purposes of discussion and illustration, the device shown in FIG. 1 is of the type used for one of the remote receivers employed in a selective paging system. When it is desired to signal a particular person carrying one of these receivers, a coded signal is transmitted which activates only this person's receiver. The activated receiver then alerts the particular individual by means of an audio or visual signal and the individual responds in a predetermined manner (e.g., he telephones his office). A light may be mounted on the front of chassis member 10 for receivers used in an environment where audio signals are undesirable, such as in a hospital, whereas a small loudspeaker may be mounted behind an opening in the front of chassis member 10 for receivers used in environments where audio signals are preferred.

An alternative method for providing an audio alert signal is employed in the receiver shown in FIG. 1 and comprises a slot 16 in battery cap 15 for conducting the audio signal from an internal audio transducer (not shown) to the receiver exterior. Slot 16 extends into cap 15 part way and the combines with an internal cap passageway 15b (see FIG. 4) which coincides with a corresponding chassis passageway 17b (see FIG. 3) in chassis member 10 to complete the audio signal-conduction path. This construction permits a simple and economical volume control to be obtained by merely rotating cap 15 slightly so that cap passageway 15b is only partially coincident with chassis passageway 17b, thereby reducing the amount of audio signal conducted to the outside. A spring (not shown) may be attached to the interior surface of cap 15 to establish a bias for frictionally holding the cap in the position to which it is rotated.

The only other external features of the paging receiver shown in FIG. 1 are an on/off switch 11, a reset button 12 and a spring-loaded clip 13. On/off switch 11 enables the user to conserve battery power by turning the receiver off when not in use and reset button 12 is provided to enable the user to reset the paging receiver after he has received an alert signal. Spring-loaded clip 13 is attached to cover member 20 to enable the user to releasably secure the receiver to his shirt pocket, for example.

From time to time it becomes necessary for the battery to be replaced. To facilitate this operation, the receiver has an enclosed battery compartment 17 which, in the illustrated embodiment, is integral with chassis member 10 and is externally accessible by means of battery cap 15. Upon removal of cap 15, the old battery may be slipped out and a new one placed therein. By making the compartment rather long and narrow and extending it toward the center of the housing, it is rather difficult to see the internal surfaces of the compartment when the battery is removed. Moreover, by placing two minimal-sized openings 18 at the periphery to the remote interior compartment surface 17d, they're almost completely unnoticeable and therefore escape detection by all but the most observant eye. Even if they were detected by an unauthorized person, it is rather unlikely he would be able to figure out that they are in some way associated with disassembling the cover of the receiver, much less the exact procedure for removing the cover as hereinafter described in greater detail.

In accordance with the invention, a concealed locking means is mounted on chassis member 10 and has a captivating portion in the form of a flange 41 for engaging a correspond-

ing notch 21 in cover member 20 to secure the cover member to the chassis member. The locking means further has an actuating portion comprising a pair of cantilever spring members 40 accessible only through openings 18, whereby the cover member may be freed from the chassis member only by an external tool adapted to project through openings 18 (such as tool 30 shown in FIG. 2) and operate the actuating portion. Cantilever spring members 40 have their fixed ends attached to the exterior of battery compartment 17 by means of a rivet 19 and their free ends formed into the above-mentioned flange portions 41. A piece of nonconductive material 17c is provided at the remote surface of compartment 17 to insulate the battery terminals from the compartment. Terminal contact may be established by rivet 19 and contact 19a. It should be noted that, although in the illustrated embodiment chassis member 10 is a two-piece construction (an escutcheon portion 10a and a circuit board portion 10b), chassis member 10 may be constructed entirely from one piece of material where desired. Furthermore, the mounting of the concealed locking means may be reversed so that spring members 40 are attached to cover member 20 and notches 21 are in chassis member 10.

FIG. 2 shows a perspective view of a tool 30 for opening a tamperproof housing constructed in accordance with the invention. Tool 30 comprises a cylindrical shaft 32 having a diameter slightly smaller than that of the inside of battery compartment 17. At one end of shaft 32 an enlarged and knurled portion 33 is provided to enable a person to easily grasp the tool. At the other end of shaft 32 a pair of prongs 31 are provided which correspond to and project through the above-mentioned pair of openings 18 in the remote surface 17d of battery compartment 17 and release the concealed locking means as further described below. Of course, this is only one form which tool 30 may take and obviously any tool which provides means similar to prongs 31 which are capable of projecting through openings 18 and engaging spring members 40 will do the job.

FIG. 3 is a longitudinal sectional view of the receiver shown in FIG. 1 taken along line 3—3. Note, however, that in order to more clearly illustrate the invention tool 30 has been partially inserted into battery compartment 17 with prongs 31 projecting through openings 18 and beginning to engage spring members 40. Prior to engagement by prongs 31, spring members 40 have their respective flange portions 41 disposed within a corresponding pair of notches 21 in cover members 20. As tool 30 is pushed further into battery compartment 17, spring members 40 are forced together by prongs 31 to thereby remove flange portions 41 from notches 21 and free cover member 20 from chassis member 10.

The effect of complete tool engagement is shown in fragmentary sectional view 3a wherein shaft 32 of tool 30 has been driven all the way home in battery compartment 17 so that prongs 31 fully depress spring members 40 and completely remove flange portions 41 from notches 21. By making the tension of the spring members 40 rather strong, not only does this increase the holding power of flange portions 41 but it also provides enough frictional force against prongs 31 to retain tool 30 within battery compartment 17 after cover

member 20 is removed. In general, recoupling cover member 20 to chassis member 10 is accomplished by simply inserting chassis member 10 within cover member 20 until the two mate to completely enclose the device and then withdrawing tool 30 from battery compartment 17, thereby releasing spring members 40 and reinserting flange portions 41 into notches 21. By slanting flange portions 41 as shown, however, recoupling may be effected without a tool by simply inserting chassis member 10 into cover member 20 until they lock together.

FIG. 4 is a perspective view of the battery cap 15 for battery compartment 17. A slot 16 is provided in cap 15 for two purposes, the first is for permitting means such as a screwdriver to be inserted therein to rotate cap 15 so that detent means 15a may disengage their respective slots 17a in chassis member 10 (see FIG. 3) and permit cap 15 to be removed. Secondly, rotating cap 15 by means of slot 16 permits cap passageway 15b to be misaligned from chassis passageway 17b to thereby reduce the volume of the alert signal as described above.

Thus there has been described a new and improved tamperproof housing for enclosing a portable battery-operated electronic device. The housing is rather simple to construct yet is rather difficult to open by anyone other than an informed authorized person having a suitable tool. While the preferred embodiment of the invention is described and illustrated with reference to a selective paging receiver, the housing is obviously not limited to such a device and may be used in any portable electronic battery-operated device in which a tamperproof feature is desired.

While a particular embodiment of the invention has been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects, and, therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

We claim:

1. A tamperproof housing of the type suitable for enclosing a portable battery-operated electronic device, comprising:
 - a chassis member for supporting the electronic circuitry of the device and having an enclosed battery compartment with an external access and having an interior surface remote from said external access, said remote surface having one or more minimal-sized peripheral openings therein;
 - a cover member having a pair of notches in the internal side thereof mating with said chassis member to thereby enclose the electronic device;
 - and concealed locking means comprising a pair of cantilever spring members each having the fixed end attached to said chassis member and a flange portion formed at the free end removably engaging a corresponding one of said notches in said cover member to thereby secure said cover member to said chassis member, said cantilever spring members being adapted to be actuated by a dual-pronged tool for bending said cantilever members and thereby disengaging said flange portion from said notches to free said cover member from said chassis member.

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