June 28, 1949. P. J. GRAHAM 2,474,311

HINGED CASING STRUCTURE

Filed Oct. 25, 1947

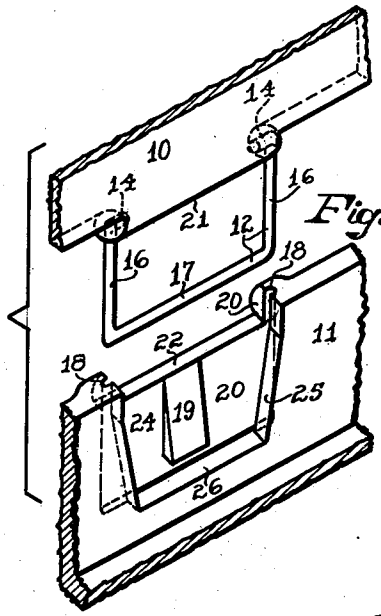

Fig. 1.

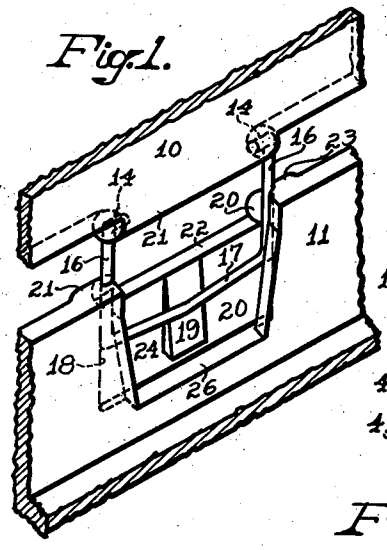

Fig. 2.

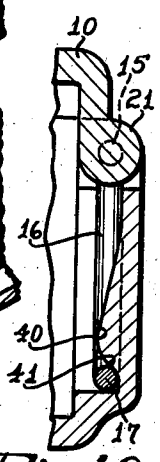

Fig. 10.

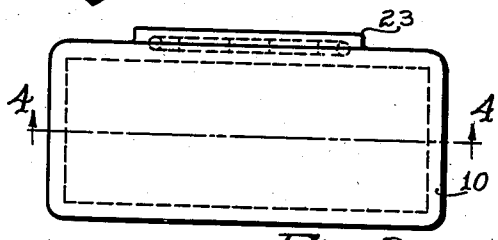

Fig. 3.

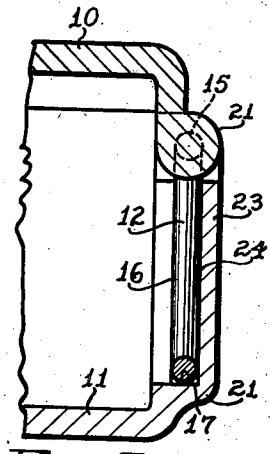

Fig. 5.

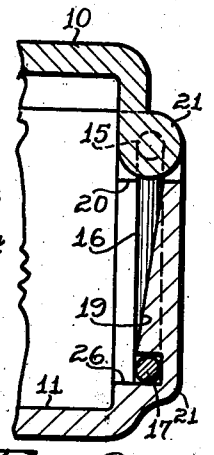

Fig. 6.

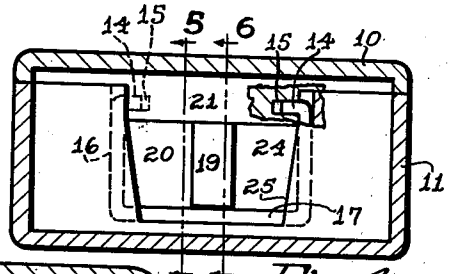

Fig. 4.

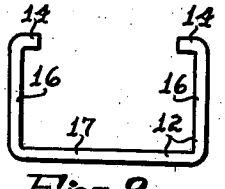

Fig. 8.

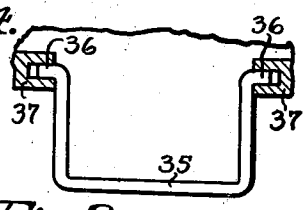

Fig. 9.

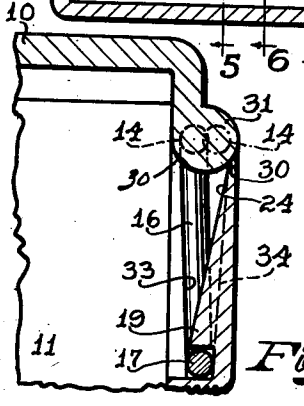

Fig. 7.

Inventor

Philip J. Graham

By

Clayton L. Jenks

Attorney

Patented June 28, 1949

2,474,311

UNITED STATES PATENT OFFICE

2,474,311

HINGED CASING STRUCTURE

Philip J. Graham, Worcester, Mass., assignor to Trig Corporation, Worcester, Mass., a corporation of Massachusetts

Application October 25, 1947, Serial No. 782,159

1 Claim. (Cl. 220—31)

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This invention relates to a hinged casing structure, and more particularly to a box or casing having a hinge that is especially adapted for assembling and holding a cover on a molded plastic receptacle.

Various types of hinged structures, such as the casing of a portable radio, have presented problems in the matter of manufacturing the parts of molded plastic material and providing a hinge which can be readily assembled and will give satisfactory and efficient service in holding the cover in proper position on the casing. One form of portable radio casing has some of the electrical parts mounted within the receptacle and other parts premounted on the cover which hamper the assembly of the hinge parts. The hinge structure should, therefore, be such that the hinge parts may be made by simple molding operations and the cover with its assembled parts may be readily put into a final position without requiring the use of mechanical devices or great skill on the part of the operator.

The primary object of this invention is to satisfy such ends and to provide a satisfactory hinge structure which may be assembled readily by merely pushing the parts together into their final operative positions.

Another object is to provide a hinge structure in which the associated parts of the receptacle and cover may be made of plastic by simple molding operations and the molded parts may be fixedly locked in position by means of a readily assembled hinge device. Further objects will be apparent in the following disclosure.

Referring to the drawings, which illustrate preferred embodiments of this invention as applied to a portable radio casing:

Fig. 1 is a fragmentary perspective view, partly broken away, of the inside of a radio casing in which the cover and associated hinge parts are partially assembled;

Fig. 2 is a similar view with the parts positioned for assembly;

Fig. 3 is a top plan view of a casing having a single hinge;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary section on the line 5—5 of Fig. 4;

Fig. 6 is a similar view on the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary section similar to Fig. 6, showing a modification in which the cover is held resiliently in position with its knuckle riding in a molded plastic recess in the receptacle wall;

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Fig. 8 is a view of the lock and hinge wire employed in these constructions;

Fig. 9 is a fragmentary modification showing a wire with out-turned ends interfitting in the grooves of two spaced knuckles; and

Fig. 10 is a fragmentary detail of a modified form of wedge.

In accordance with this invention, a cover 10 is secured on a receptacle 11 by means of a substantially U-shaped resilient locking member 12, made preferably of wire, which has axially aligned pivot ends 14 engaging sockets 15 in one of the parts. The pivots of the locking member are formed as the ends of two arms 16 of desired shape and angular arrangement which will provide the desired resiliency, preferably made parallel and connected by a cross bar 17. The arms are slidably mounted in opposed channels 18 on the other parts of the casing, and the cross bar or bottom of the U-member is locked in position by a wedge shaped lug 19 between the channels. The pivot ends, arms and the cross bar lie substantially in a plane that is parallel with the hinge axis.

The casing is shown as having its cover secured on the receptacle by a single hinge structure, but it will be understood that two or more similar hinges may be employed for the purpose. The edge of the hinge wall of one of the parts, such as the receptacle shown in the drawings, is molded to form a lateral recess 20 which is cut away at its top portion to provide space for an interfitting knuckle 21 integrally molded on the other part, such as the cover. The knuckle may ride on the top surface 22 of the recessed wall, or it may be spaced slightly therefrom. As shown in Figs. 1 to 6, inclusive, there may be a clearance between the knuckle and the surface 22; and in that case the hinge is formed primarily by the axially aligned cylindrical pivot ends 14 mounted in the pivot sockets 15 formed in the ends of the knuckle. These sockets are axially aligned with the hinge axis and are substantially concentric with the cylindrical contour of the knuckle. The pivot ends 14 fit snugly in the cylindrical recesses 15 of the knuckle so as to prevent unnecessary play of the cover endwise of the knuckle.

To provide for a ready assembly of this hinge wire on the receptacle wall and form a permanent hinge or permit removal as desired, I mould the hinge wall of the receptacle so as to form two opposed vertical channels 18 which open near the hinge axis, the channels being preferably parallel or shaped for sliding the wire arms 16 endwise therein. The receptacle wall may be somewhat thickened on the inside or the outside, as shown

at 23 in Fig. 3. Each channel is located between the rear wall 24 of the recess 20 and a front flange 25. The latter is preferably provided with a sloping edge, so that the channel is deeper at the bottom and prevents escape of the wire during assembly. The rear wall 24 lies in a vertical plane bounding or located behind the rear wall of each channel, and it is so shaped that clearance is provided for the lateral movement of the cross bar 17 when the hinge lock is assembled. The recess 20 is formed on either side of the hinge wall, and, preferably, on the inside of the casing, so that nothing shows on the outside except the projection 23 of plastic material. This projection 23 may be omitted or located on the inside of the box, or the whole box wall may be made thick enough, so that it lies in a plane.

The rear wall of the recess 20 is molded to form the vertically tapering wedge-shaped locking lug 19. The thicker end of the wedge is spaced from a stop, preferably formed by the bottom 26 of the recess 20, (Fig. 6) by a distance equal to or slightly greater than the thickness of the cross bar 17 of the locking wire. This provides a groove beneath the wedge in which the cross bar 17 may lie when in a locking position. The arms 16 have such lengths that when the cross bar locks under the wedge lug, the knuckle and the recess surface 22 are either substantially in contact or have a slight clearance. The top or apex of the wedge merges with the vertical wall near or below the top surface 22 of the recess wall 24, so that the wedge does not interfere with the assembly of the wire in the channels 18. The slope of the wedge may be as desired, such as an angle of 10°. The lower end of the wedge preferably extends beyond the center of the cross bar in the channel and may be thicker than the width of the channel 18. Hence, as the wire arms 15 are forced downwardly, the resilient cross bar 17 is bent outwardly by the wedge, as shown in Fig. 1. But when the bar 17 reaches the bottom of the wedge, it springs back into a straight condition and snaps into the groove under the wedge and thus locks the U-shaped wire in place. To remove the hinge wire, one may use a wedge shaped tool to force the wire bar 17 out of that groove and onto the sloping surface of the wedge. It, however, is ordinarily unnecessary to remove the wire, and the construction of Figs. 1 to 6, inclusive, may be considered as a permanent installation.

The length of each arm 15 is such that the hinge wire may be easily assembled in place, and the bar 17 will spring beneath the wedge by the time that or before the knuckle touches the top surface 22 of the recess 20. If a slight clearance is provided, the assembly of the parts is facilitated, and in that case the pivot ends 14 constitute the sole bearing for the box cover 11. If, on the other hand, the arms 15 are made slightly shorter, then the knuckle may be brought down into a bearing engagement onto the top surface 22 of the box wall recess, in which case the knuckle and the surface 22 form the sole hinge, and the wire 12 is merely a lock to hold the hinge together and position the parts. The surface 22 may be suitably shaped as a concave to provide a bearing, but it may lie in a horizontal plane, since the knuckle is forced to ride on that surface by the fact that the grooves 18 hold the wire arms 16 rigidly positioned and prevent any lateral movement of the knuckle.

In the modification shown in Fig. 7, the lower receptacle 11 is provided with a concave bearing surface 30 at the top of the recess, which corresponds with the surface 22 of Fig. 1. The knuckle 31 is cylindrical and fits in the partial cylindrical concave 30 and thus constitutes the sole hinge for the cover on the receptacle. Each side arm 16 of the wire is made of such a length that the cross bar 17 is held under tension after it has snapped into place beneath the wedge 19 and thus resiliently urges the hinge parts together. In this case, the bar 17 need not touch the bottom of the groove beneath the wedge. The pivot ends 14 of the wire may be concentric with the axis of the hinge, as above described; but, as shown in Fig. 7, the socket 15 may be eccentric to the hinge axis, so that when the cover is lifted from its closed position, the pivot ends 14 pass from the left to the right and across dead center, as shown by the dotted circles 14 in Fig. 7. The resiliency of the cross bar 17 permits this slight upward movement of the pivot ends, and thus serves either to draw the cover down into a closed position or to hold it in an open position. The channels may have parallel side walls, in which case the bearing surface 30 is made as a horizontal plane according to Fig. 1, so that the knuckle may slide across the plane top during opening or closing the cover. The channels insure that the knuckle and cover are correctly positioned when closed. If the concave bearing 30 is employed, the channel is shaped to provide sloping walls 33 and 34 so arranged that the wire arms 16 may swing across the slight distance required by the eccentric mounting of the pivot ends 14.

Many other modifications may be made within the scope of this invention. For example, as shown in Fig. 9, the lock wire 35 may have outwardly turned ends 36 fitting into two spaced knuckles 37 suitably formed on the box cover. It will also be appreciated that the recess 20 and the wedge structure may be located on the outside of the box, if it is required that the inner wall of the box be smooth or unbroken. It is furthermore immaterial as to whether the part 10 or 11 constitutes the receptacle or the cover, since they may be reversed in position, as would be had by turning the illustrated structure upside down.

The above described constructions provide a substantially permanent hinge assembly, since the wire cannot be accidentally removed, nor can the hinge arm be forcibly pulled from beneath the wedge, if the latter projects beyond the center of the bar 17 and preferably as far as the inside wall of the channel, as shown in Fig. 6. For a semi-permanent assembly, the wedge may be shaped as shown in Fig. 10. The wedge has a curved surface forming a rounded bump 40 and an upwardly and inwardly sloping shallow groove 41 therebeneath. The wire cross bar 17 is normally held beneath the bump by the walls of the channels 18 and because of the resiliency of the bar. But if it is desired to remove the wire and disassemble the hinge, a strong pull on the cover will cause the bar 17 to bend and ride up the under wedge surface 41 and pass over the bump.

The assembly of this construction is simple and quick. Various structures may be mounted in the receptacle 11 and on the cover 10. Then the operator springs the pivot ends 14 of the U-shaped wire into the pivot sockets 15 of the knuckle. The wire is then held in alignment with the channels 18, as shown in Fig. 2, and moved downwardly (Fig. 1). The walls of the channels and the wedge cause the wire bar 17 to bend as it is forced to ride up over the wedge 19, until it

springs off the end of the wedge or lug 19 and snaps into the clamping groove under the wedge. At this time, the knuckle is either in contact with the surface 22 or it may be separated therefrom by a slight distance. In the latter case, the operator has merely to thrust the wire downwardly in the channels as far as possible or until he becomes aware of the fact that the wire bar 17 has snapped into the clamping groove; and it is not necessary that this operation be seen such as where the assembled parts in the receptacle would prevent it.

It will be appreciated that the open recess 20, the parallel walled channels and the locking lug of the receptacle and the knuckle of the cover may be formed by standard moulding operations of suitable moldable plastic material. The locking member is easily shaped of a suitable resilient metal of desired size, such as a steel wire of about 0.05 inch diameter. This one metal part is all that is required to form a hinge and hold the casing parts assembled. The hinge parts are concealed within the casing, and even if located on the outside, only a part of the cross bar would be seen, as is indicated in Fig. 4. Also, the hinge may be assembled without the aid of tools or of accessory locking parts. Other advantages, as well as modifications of the construction, will be readily apparent to one skilled in the art.

I claim:

A hinged casing comprising a receptacle and a cover formed of moulded plastic material having opposed hinge walls, one of the walls having a projection moulded thereon which is provided with axially aligned pivot sockets, and the other

wall having a moulded wall portion interfitting with the projection and having a laterally opening recess, ribs at the opposite ends of the recess forming with said wall portion opposed open-ended channels which face towards the pivot sockets, a substantially U-shaped resilient locking member having straight arms slidably mounted in the channels and terminating in axially aligned pivot ends bearing in said sockets and a resilient crossbar integrally connecting said arms which is positioned laterally by the arms in the channels, said pivot ends, arms and bar lying substantially in a plane parallel with the axis of the sockets, and a wedge-shaped lug tapering towards the pivots and projecting laterally from the inner face of the recess beyond the center of and in the path of movement of the crossbar as located by the channels, the end of the lug forming a locking shoulder spaced from the pivot sockets by substantially the length of an arm, so as to cause the central portion of the crossbar to spring laterally when moved along the channels and then to snap into a locking position under the lug shoulder and hold the parts assembled.

PHILIP J. GRAHAM.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,936,465	Whitlock	Nov. 21, 1933
2,243,065	Barrett	May 27, 1941
2,435,272	Graham	Feb. 3, 1948