Sept. 16, 1952 H. MENDELSON 2,610,763

COVER LATCH FOR PLASTIC RADIO CABINETS AND THE LIKE

Filed April 15, 1949 2 SHEETS—SHEET 1

Fig. 1.

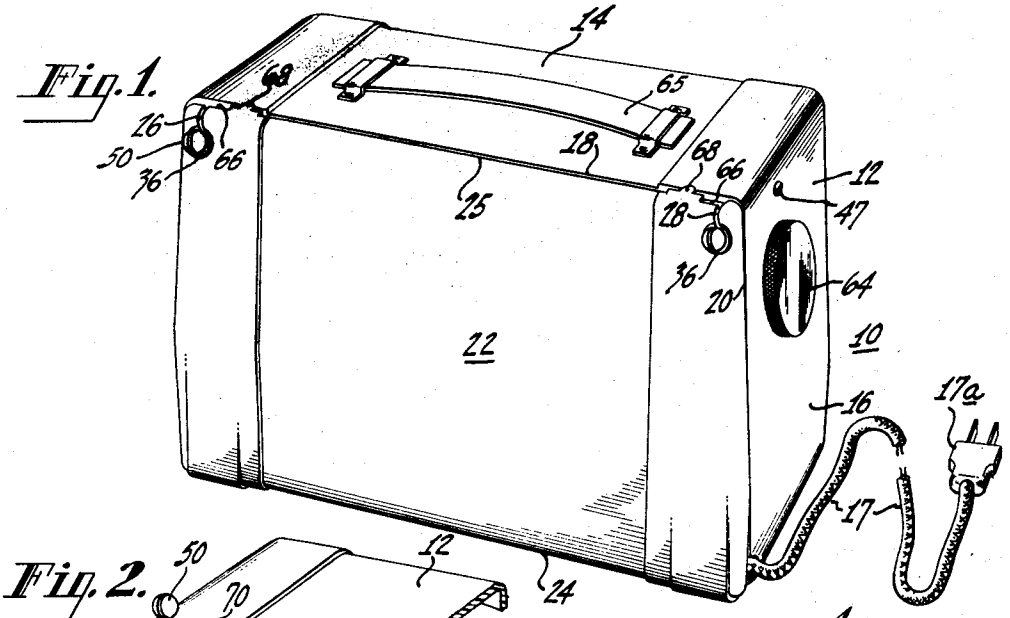
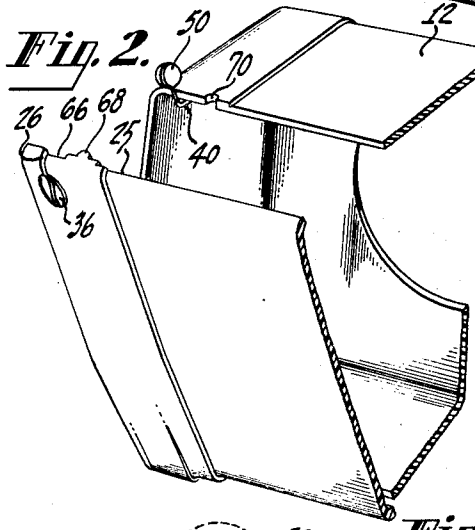


Fig. 2.



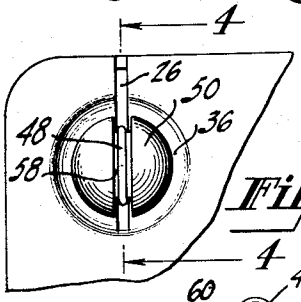


Fig. 3.

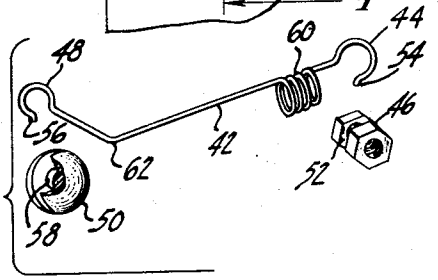


Fig. 5.

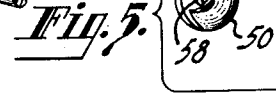


Fig. 4.

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Filed April 15, 1949 2 SHEETS—SHEET 2

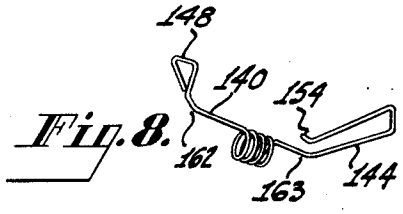


Fig. 8.

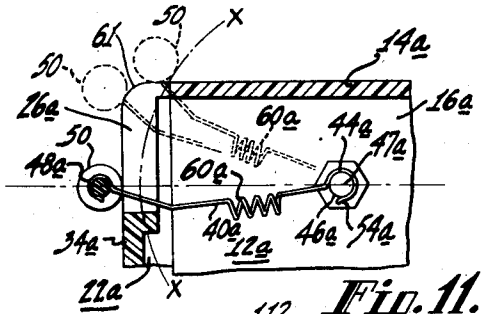


Fig. 11.

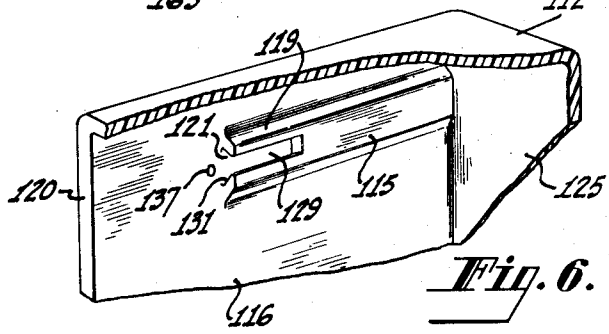


Fig. 6.

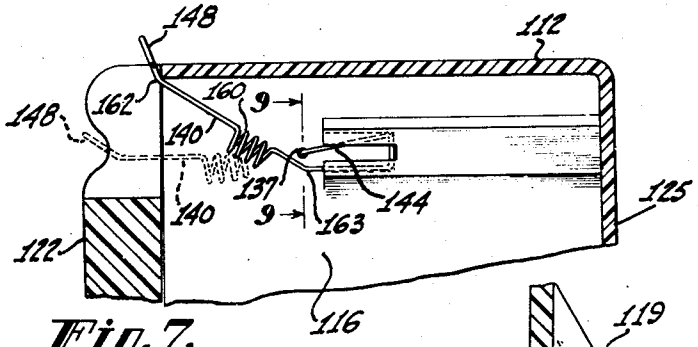


Fig. 7.

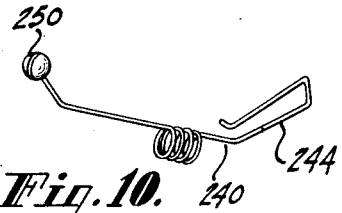


Fig. 10.

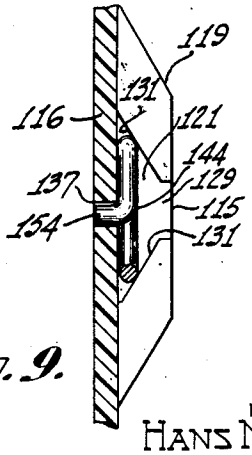


Fig. 9.

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2,610,763

COVER LATCH FOR PLASTIC RADIO CABINETS AND THE LIKE

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Application April 15, 1949, Serial No. 87,676

4 Claims. (Cl. 220—55)

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The present invention relates to a cover latching construction for plastic radio cabinets and the like, and more particularly to means for releasably securing cover members, such as removable backs, on small portable radio cabinets and the like which generally may be constructed of molded thermoplastic or thermosetting materials.

The invention is, however, adapted for use in connection with any cabinet structure having a removable cover element such as a back, side or other wall portion, for permitting the interior to be exposed for inspection, adjustment or the storage or removal of materials. The invention is particularly adapted for use in connection with portable radio cabinets and the like of the so-called A. C.-D. C.-battery type for operation by any of a plurality of different types of power supplies, including internally held batteries, and external current sources by way of the usual attachment plug and supply cord for connection with standard wall receptacle electric power outlets.

In the operation of such portable radio receiving and other apparatus, the back or other portion of the cabinet closure is generally made removable either through hinge and latch means or otherwise, to permit the extension cord or plug for the power supply to be folded and stored therein during battery operation and readily to be removed therefrom and extended for external power operation. At all times the cover portion or back must be held securely when in place and yet be readily detachable for operations of the type above referred to.

It is, therefore, a primary object of this invention, to provide an improved cover latching construction for plastic radio cabinets and the like, which provides positive locking features coupled with ready releasability, while at the same time being of relatively simple construction adapted for manufacture at low cost, as is necessary in the production of small portable radio receivers and the like.

It is also an object of this invention, to provide an improved closure and locking means for small portable plastic radio cabinets and the like, whereby a wall portion thereof such as the back, the side or the bottom, for example, may readily be detached and removed at will for inspection or other operation involving the interior thereof, and which may readily be replaced and releasably positively locked in position through simple manual operation, and which at the same time does not add appreciably to the cost of the

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cabinet or other structure to which it may be applied.

In the above-described type of battery operated portable radio receivers, the storing and removing of the attachment cord for alternating current or power operation, and the inspection, installation and removal of batteries, tubes and other replaceable parts may often be effected through the use of a detachable back wall portion or cover. This may normally be adapted to be held in place by attachment screws or the like, the operation of which requires the use of special tools and considerable time. For the ready removal and replacement of the attachment cord and plug, it is exceedingly desirable to have a suitable hinged door or cover or cover element which is entirely removable and which may be quickly attached and detached without the use of special tools, and it is to the solution of this problem in a most efficient manner that the present invention is particularly adapted, although it is adapted for other uses.

In accordance with the invention, a removable wall or cover portion of a cabinet, such as a small portable radio cabinet, is adapted to register with, and seat as a closure means over, an opening through which there can be effected a desired operation with respect to the interior thereof, such as the storage or removal of an extensible attachment plug and cord, battery and tube replacement, and the like. The cover may be releasably hinged or secured at one side to the cabinet, while being releasably attached at the opposite side, or may be wholly detachable and removable, being thereby held at a plurality of points as may be required.

In accordance with the invention, the cover element is slotted and/or perforated as at an edge thereof, to receive an elongated self-supporting resiliently extensible locking or latching element which is adapted to bear, through an outer enlarged head end, against an outer surface of the cover element. The latching element is secured at its opposite end within the cabinet to provide an anchor point from which it is resiliently extensible to apply a retracting force to the cover element. The resiliently extensible element is also readily deformable in all directions for permitting the registration of the locking portion or outer end with a locking surface as well as the slot or perforation on the cover element, regardless of variations in the position of the slot or perforation cooperating therewith due to mechanical or manufacturing tolerance inherent in the construction.

In general, it may be considered that the resiliently extensible locking element or arm is in the form of an anchored spring wire having a spring tension or retractile section and carrying an enlarged outer end or head element, which passes through an elongated slot or opening in the cover element. The arm is movable from an unlocked position in which it is substantially untensioned to a locked position in which it is somewhat tensioned and the enlarged head is in resilient locking engagement with the outside surface of the cover element bounding the slot. Between these two positions the arm is arranged to pass over a camming section of the cover element where it is tensioned to an extent greater than when in the locked position. The device is, therefore, operable in connection with cabinet surfaces which are either flat or provided with a locking depression as may be desired in some cases, where the locking portion or head is to be partially or completely concealed or recessed. When the head projects unduly, it may be subject to interference with surrounding objects and accidental operation, and it detracts considerably from the appearance of the finished article, particularly where it is a smooth, streamlined, plastic housing of a radio receiver for home use. Locking arms may be provided to releasably hold the cover in as many places as desired and may even be used to the exclusion of hinges.

For a further understanding of the invention, however, attention is now directed to the accompanying drawings wherein various embodiments of the invention are shown in connection with plastic cabinet structures for portable receivers and the like, and the scope of the invention will more particularly be pointed out in the appended claims.

In the drawings:

Figure 1 is a view in perspective, and from the rear, of a portable radio receiver or the like, having a cover and latching construction embodying the invention;

Figure 2 is a fragmentary view of a portion of Figure 1 showing the cabinet structure with the back cover released and partially opened, further illustrating the present embodiment of the invention;

Figures 3, 4 and 5 are enlarged views showing certain details of construction in accordance with the invention, of the latching and cover arrangement for the cabinet shown in Figures 1 and 2, Figure 4 being a sectional view of the latch and cabinet construction, taken along the lines 4—4 of Figure 3;

Figures 6 and 7 are views in perspective and in elevation, respectively, of a portion of a cabinet showing a modification of latch construction exemplifying the invention;

Figures 8 and 9 are further views of the latching element of the modification of Figures 6 and 7, as shown more particularly in Figure 7;

Figure 10 shows another latch detail modification according to the invention; and

Figure 11 is a cross-sectional view on a reduced scale, similar to that in Figure 4, and illustrating a further modification of the invention with regard to a detail of the latching means.

Referring to Figure 1, a portable type A. C.—D. C.-battery type radio 10 is shown as having a two-part plastic cabinet case, a front part 12 being in the general form of an open receptacle or cabinet having horizontal walls one of which is shown at 14 and vertical walls one of which is shown at 16. The receptacle 12 provides a housing for apparatus such as a radio receiver chassis (not shown) including a power supply cord 17 and attachment plug 17a. The walls have edges 18, 20 which define a closure opening through which the chassis can be serviced for battery or tube replacement or be entirely removed and replaced, and for storing and removing the power cord and plug when changing from power to battery operation or vice versa.

The second part of the two-part case is shown as a back cover 22 providing a closure or lid hinged at a lower edge 24 to the front part 12, and having an upper edge 25 which can be brought into closing engagement with edge 18. The hinging details form no part of the present invention and are not illustrated. Any convenient hinging arrangement can be used.

The back cover 22 abuts against the edges 18, 20 and has slots 26, 28, one of which, 26, is more clearly shown in Figures 2, 3 and 4, extending in from lid edge 25. Each slot 26, 28 has an entrance portion or open end 30 at the edge 25, and at its inner end has a locking portion 32 around which the outer face 34 of the lid is hollowed to provide a depression or locking pocket 36. In the form shown the slot is enlarged at 38, the deepest part of the pocket, to eliminate any thin and fragile portions of the lid 22.

Inside the cabinet or case, a pair of closure fasteners or latch elements 40 are secured to the respective side walls 16. One of these fasteners is shown in Figure 4, and includes a spring wire arm 42 having formed ends. One hooked end 44 is bent around or looped and frictionally held on a fixed boss 46, while the other end 48 is similarly looped or hooked around a retainer or enlarged head 50. The boss 46 is shown in Figure 5 as an elongated nut having a peripheral groove 52 in which the hook end 44 of the resilient latch element is received to frictionally engage one or more of the surfaces bounding the groove.

The hook 44 may provide a resilient angular or arcuate loop having an inner dimension slightly smaller than the outer dimension of the groove floor so that it can be snapped in place in the groove and thereby provide an appreciable frictional grip on the boss while permitting pivotal rotation. The extreme end 54 of the bent loop 44 is shown as tapered outwardly to provide a cam type mounting flare permitting the simple mounting of the loop 44 by merely engaging the flared loop opening with the boss and then pushing the loop against the boss with the fingers till it snaps into place. A boss 46 is shown as held on each side 16 of the case as by screws 47, although if desired they may be secured in any other manner or mounted on the wall 14 or otherwise connected with the cabinet.

The opposite hook end 48 of the element 42 is also looped and has a flaring terminus 56 for similarly securing it in a peripheral groove 58 in the retaining member, 50, shown as generally ball-shaped. It is preferred that the loop 48 does not bind in the groove 58 but permits fairly ready rotation of the ball 50 even though the wire holds the ball firmly, though resiliently, in the pocket 36.

Between the formed ends 44 and 48, the spring wire arm or latching element includes a resiliency-imparting coiled spring section 60. The spring section is of the extension type and permits resilient elongation of the fastener or latching element to an extent sufficient for the ball 50 to ride over the cam surface or projection formed by a corner 61 of the back surface 34, between

the pocket 36 and the entrance 30 of the slot 26.

Near the ball-carrying end 48, the wire is bent at an angle, as at 62, so that when the fastener is in the unlocked position, shown by dash lines in Figure 4, the ball 50 is held away from the hinged path of the back 22 and does not interfere with opening or closing of the back. At the same time the wall 14 of the case does not require a slot or other means to hold the ball in this non-interfering position.

To unlock the fastener from the position shown in full lines in Figure 4, the ball 50 is merely grasped by one finger while the top 14 adjacent the ball is grasped by another, and both fingers are squeezed together till the ball pops out of the pocket 36. This snaps the ball over the projection or cam section 61, carrying it into the unlocked position indicated by the dotted lines. The two actuating fingers required to move one ball may both be on one hand of the operator, making it very convenient to simultaneously unlock both fasteners, one with each hand. By reason of the partial recessing of balls 50 in the locked position inadvertent unlocking, as by engagement of a retainer ball with objects brushing by the ball, is prevented. In some conditions, the recessing may be sufficient to require the use of a relatively rigid thin object such as a coin or a fingernail to pry the ball out of the lock pocket for unlocking purposes.

The curved ball surfaces help objects brushing by, to ride over the ball without lifting it from the lock pocket. Furthermore a slight amount of looseness in the fit between the loop 48 and the ball permits rotation of the ball in the pocket under the influence of any but decisive unlocking operations and such rotation increases the ease with which engaging objects tend to roll past without unlocking the cabinet closure.

To lock the cabinet closed, the ball, in the dash-line position is merely urged downwardly, causing it to snap over the cam surface or element 61 and into the pocket. Both fasteners can be simultaneously locked, one with each hand. Inasmuch as the balls in the unlocked position do not rest in pockets but project from the case, they can be easily pushed into the locked position by urging them with any object. The camming action of the outer surfaces 61 which causes elongation of the spring as it moves from one position to the other, offers sufficient resistance to prevent inadvertent locking.

The tilting of the wire spring 42 between locked and unlocked position is effected in the arrangement of Figure 4 by frictional rotation of loop 44 over boss 46 but may also be provided, where non-yielding spring anchoring is used, by the yieldability of the spring wire itself, particularly the coiled section 60. In any event it is preferred that in the dash-line unlocked position in Figure 4, there be sufficient resistance to the downward tilting of the fastener under the influence of its own weight with or without the assistance of minor jarring forces.

The friction fitting of the loop 44 over the boss has been found adequate for this purpose if care is taken to make the wire 42 of spring material sufficiently resilient to permit the loop 44 to be snapped in place over the boss 46 without undergoing a permanent expansion or set.

The case 10 is preferably non-metallic and is molded from resins of the thermoplastic or thermosetting types. A feature of the invention is that in the operation of the cover latch or fastener means, the circular cross section of the retainer 50 causes it to ride over the cam section 61 and into the pocket with substantially no scratching or marring of any exposed surfaces. The retainer itself may be made of any suitable material, as for example metal such as anodized aluminum, or molded resin. The composition of boss 46 is also a matter of choice.

Another feature of the invention is that substantially all of the locking details of the case can be provided without complicating the molding operations by which it is made. The back cover 22 may be completely molded in a single step with a simple mold. Using a molding direction perpendicular to the plane of the back, the simplest technique, all parts of the pockets 36 and slots 26 can be readily provided by correspondingly shaping the mold sections.

The front half or cabinet portion 12 of the case need have no special provision in the molding. The openings for receiving boss-securing screws 47 as well as other openings such as one for passing a volume control shaft for the volume control knob 64 shown in Figure 1, may be provided during the molding operation as by using additional side-acting molding cores arranged to project and retract laterally of the main molding direction. Such compound molding technique is well known. If desired these side openings may be drilled or punched through the case after the molding is completed, preferably in groups, as by a drilling jig. The screws 47 may be used to anchor a carrying handle instead of using a handle 65 secured to top wall 14, as shown. Alternatively the handle 65 may be secured by screws or rivets holding fastener receiving bosses. The handle 65 may be lengthened for this purpose so that the ends secured by the screws are nearer the side walls 16 of the case, where the radio chassis does not extend and there is more room for mounting the fasteners.

A still further feature of the invention is the fact that appreciable variation in fastener mounting or positioning can be tolerated. As shown, the lid edge 25 is shaped so that parts of this edge are spaced from edge 18. This not only provides the ventilation necessary for proper operation of the radio but parts of the spacing gap, shown at 66 in Figures 1 and 2 act as passageways for the projecting retainer wire arms 42. Thus when the back 22 is moved to the closed position, the wire arms 42 are received in gaps 66 and do not interfere with the closing. These gaps 66 when made about one-quarter or one-half inch long will receive the wires regardless of even major individual variations in the lateral fastener alignment such as frequently occur in the mass production of the fasteners and the case sections, or in the mass assembly of the parts. To assist in guiding the wires into the slots 26, 28, the slot openings 30 may be flared out somewhat.

Key projections 68 formed on the edge 25 are shown as engageable in socket stops 70 in edge 18 for not only providing the ventilation gap but also aligning the cover 22 and rigidifying it against twisting movements when in closed position.

The form of the invention shown in Figures 1 to 5 provides a neat and highly presentable construction which is inexpensive and substantially fool-proof and trouble-free in operation. When the lid is closed, the case is free of clothing-catching protuberances. If desired the locking pockets 36 may be deepened to completely recess the balls 50 away from the generally flat

outside surface of the cover, when it is locked in place, or may be eliminated if desired to reduce the manufacturing complications, as will hereinafter appear.

Figures 6, 7, 8 and 9 show a modification of the invention in which the fastener is directly anchored to the case and does not require an intervening mounting boss. The case is here shown as including a front or cabinet section 112 and a closure lid 122. The lid 122 may be identical with the closure 22 of Figure 1.

The cabinet section 112 is molded as a unit and includes a rib 115 which is tubular at its rear portion 119, to provide an internal mounting space 121 for receiving a lid fastener. The rib 115 as well as the mounting space 121 extend in the molding direction which is perpendicular to the front case wall 125. By prolonging the rib so that it extends to this wall, undercutting in the molding direction is avoided thereby simplifying the molding. The space 121 need not extend any further than is necessary to receive the fastener, due allowance being provided for manufacturing tolerance in the fastener dimensions. A slot 129 in the wall of rib 115, communicating with the space 121 further simplifies the molding operation as well as the mounting of the fastener.

As shown in Figures 6 and 9, the space 121 is bounded by internal rib walls 131 that taper together as they leave the side wall 116 of the case. A recess or hole 137 opens on the inner surface of wall 116 adjacent the open end of the hollow rib portion 119.

The fastener itself is shown in Figures 7 and 8 as a self-supporting spring wire arm 140 generally similar to the fastener 40 of Figures 4 and 5. It has formed ends including a mounting portion 144 which is bent back on itself and terminates in a short anchoring pin portion 154.

A locking portion in the form of an angular loop 148 extends in a transverse plane perpendicular to the anchoring portion 144. Bends are provided at 162 and 163 to normally orient the fastener into the full line position shown in Figure 7. The fastener resiliency is sufficient to permit its deformation into the dashed-line position shown in this figure, where the locking loop 148 resiliently engages the outer surface of cover 122 and locks it in place.

In this form of the invention, the fastener arm 140 is mounted in place by merely pushing the mounting portion 144 into the mounting space 121 until the anchoring pin 154 enters the anchor socket 137. By transversely dimensioning the mounting portion 144 slightly larger than the distance between rib walls 131, 131 where they are engaged by the mounting portion, a yieldably stressed highly firm and stable mounting is provided.

Where the shape of the fastener 140 or the position of the anchor socket 137 is such that the pin 154 does not normally come into register with the socket upon insertion of the mounting portion 144, it is a simple matter to deform the inserted portion, as by manipulating the pin 137 into alignment so that the fastener resiliency snaps it into place. Although only one fastener is shown in the embodiment of Figures 6, 7, 8 and 9, it is clear that any suitable number can be used to hold the closure cover in as many places as desired.

According to the present invention the closure construction need not involve a hinging of the closure member to the walls defining the closure opening. Thus, for example, in the construction of Figures 1 and 2, the lower edge 24 of the lid 22 may merely be received in a position-fixing portion of the container section 12, such as by a tongue-and-groove fit. By providing the lower edge 24 with a tongue projecting downwardly in the general plane of the lid, and a matching groove in the lower wall of the container section 12, the lid 22 can be made readily removable and the fastener mechanism will function to releasably lock it in place in the same manner described in connection with Figure 1.

The position-fixing portions of the container need not be limited to just one edge of the lid, but may extend in the form of an alignment shoulder, for example, along two or more of the lid edges. For securing the lid in place with such a construction fasteners such as those shown in Figures 4, 8, or 10 may be applied to all four lid corners.

The locking and unlocking action with loop 148 is effected in the same simple manner as with ball 50 of the construction of Figure 1 although not quite so readily. The locking construction of Figures 7 and 8 however, is simpler to manufacture and assemble, and can be completely recessed more readily so that the locking loop 148 does not project from the lid, when in locked position.

Figure 10 shows another modification of the locking fastener or latch member according to the invention. Here the fastener 240 is in the general form of the fastener 140, but includes a ball lock 250 as in the construction of Figures 4 and 5. The ball 250 may be held in place in the same manner as shown in Figures 4 and 5. A mounting portion 244 of the fastener 240 corresponds to the mounting portion 144 of the fastener 140.

The construction of Figure 10 is used with a case as shown in Figures 6 and 7, and combines the ease of mounting of the construction of Figure 8 with the ready operability of the fastener of Figure 5.

According to a further phase of the invention, the locking pocket may be diminished in size or completely dispensed with, without significantly affecting the effective operation of a locking mechanism. As long as the pivot point for the extensible locking member 42 is positioned to provide a locking length (full lines in Figure 4) longer than the length when unlocked (dash lines in Figure 4) while the locking length is shorter than the distance from the pivot to the cam section 61, the advantageous locking functions of the invention will be provided. This result is available whether or not the lock pocket is used, by suitably locating the pivot point for the fastener arm.

Figure 11 shows a latch closure construction similar to that of Figures 1 to 5, but with the locking pocket omitted. Corresponding parts are designated by similar reference characters. In Figure 11 the travel path of the fastener arm 40*a* is illustrated by the two dash-line representations, the upper one showing the unlocked position and the lower one showing the position of greatest tension, at which the head 50 engages the camming protuberance 61.

At X—X there is diagrammatically indicated an arc of a circle drawn about the fastener arm pivot-point with a radius equal to that of the fastener length up to the engaging portion of the head 50, when in unlocked position. This clearly shows the relative increases in fastener arm length at the locked position (full lines) and at

the intermediate cam-engaging position. It is noted that even though no locking pocket is provided, the arm tension increases as it moves from the locked position toward the cam protuberance **61**. Inasmuch as the ball **50** will readily move across the outside cover face **34***a*, the equilibrium locking position will generally be the one in which it is closest to the pivot point. Any movement of the head from the locking position will accordingly be resisted by the spring action of the fastener arm. The termination of slot **26***a* also limits movement of the fastener in the slot away from the unlocked position.

In general, the fastener arm pivot point for the construction of Figure 11 will, for corresponding performance, be further removed from wall **14***a* but closer to lid **22***a*, than the construction of Figure 4 which includes the locking pocket **36**.

The pivot point for the fastener **40** of Figures 1 to 5 and 11 corresponds to the center of the circle defined by bosses **46** and **46***a*. With the construction of Figures 6 to 10, however, most of the pivoting is effected at the coiled portion **160** due to the increased yieldability there provided. Compensation for such yielding is accordingly made in the selection of the anchor point for the fastener.

The expression "self-supporting" as used herein is intended to describe the property of having a degree of rigidity sufficient to retain a normal shape regardless of the applications of small forces such as those due to gravity.

While several exemplifications of the invention have been indicated and described above, it will be apparent to those skilled in the art that other modifications may be made without departing from the scope of the invention as set forth in the appended claims.

What is claimed is:

1. The combination with a portable radio cabinet structure formed with an opening and an externally openable cover therefor, of cover latch means for releasably holding said cover in place over said opening, said cover latch means comprising an elongated, extensible spring wire arm having one end anchored within said cabinet structure, an opposite end extending through said opening adjacent an edge of said cabinet structure defining said opening, and a coil spring portion intermediate said ends, said opposite end having an anchoring head, said cover portion being formed with an elongated slot extending to an edge of said cover and through which said opposite end extends, and an external surface on said cover for engagement by said head to impart a tension on said coil spring portion for retaining said cover element in position over said opening, said cover including cam surface portions on said external surface on both sides of said slot adjacent the edge of said cover for engagement by said head to increase the coil spring tension as said head is moved over said cam surface portions.

2. The combination as defined in claim 1 wherein said cover is formed with a recess in the external surface thereof, on both sides of said slot, and spaced from the edge of said cover, for retaining the head of said spring wire arm at least partially within the confines of said cabinet structure when said cover latch means is in cover anchoring position, thereby reducing accidental release of said cover.

3. The combination with a container formed with an opening at one end thereof and the cover therefor, of cover latch means for releasably holding said cover in place over said opening, said cover latch means comprising a single, elongated, extensible spring wire having a hooking means portion at one end thereof detachably anchored within said container, a coil spring portion within said cabinet extending from said hooking means portion toward said opening, a first wire portion within said cabinet extending from said coil spring portion toward said opening, a second wire portion forming an angle with said first wire portion, and extending through said opening adjacent an edge of said container, and locking means on the end of said second wire portion outside of said container, said cover being formed with an elongated slot extending to an edge of said cover and through which said second wire portion extends, and a recess in the outer surface of said cover on both sides of said slot and spaced from the edge of said cover, said locking means having an overall greater transverse width than the width of said slot, measured in the same direction, said second wire portion being movable through said slot, and said coil spring portion being tensioned, when said locking means is held in engagement in said recess, for locking the cover in place.

4. The combination as defined in claim 3, in which the locking means comprise a ball formed with a centrally disposed angular groove, and a wire loop extending from said second wire portion and having a relatively larger radius of curvature than said groove, and loosely disposed within said groove, whereby said ball may roll on said outer surface of said cover when said second wire portion is moved through said slot, said hooking means portion comprising a loop, retaining means on the inside of said cabinet for supporting said loop of said hooking means portion, said last mentioned loop being in frictional engagement with said retaining means and rotatable thereabout.

HANS MENDELSON.

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2,378,683	Buchanan	June 19, 1945

FOREIGN PATENTS

Number	Country	Date
30,078	Great Britain	1910
622,757	France	Mar. 7, 1927