# United States Patent [19]

**Hall**

[11] **3,738,134**

[45] **June 12, 1973**


[54] **LOCK BOX CONSTRUCTION**


[75] Inventor: **Mitchell A. Hall,** Ft. Thomas, Ky.

[73] Assignee: **Monarch Tool & Manufacturing Company,** Covington, Ky.



[22] Filed: **Feb. 1, 1971**

[21] Appl. No.: **111,287**

[52] **U.S. Cl.** ..... **70/86,** 70/370, 70/417

[51] **Int. Cl.** ..... **E05b 15/16,** E05b 65/46

[58] **Field of Search** ..... 70/63, 85–88, 70/224, 370, 381, 417, 451, 452, 461, ; 312/107.5, 333; 109/50, 52



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,538,724 | 11/1970 | Davenbaugh | 70/86 |
| 3,276,835 | 10/1966 | Hall | 312/333 |
| 1,770,710 | 7/1930 | Prince | 70/168 |
| 977,085 | 11/1910 | Eros | 70/417 |



*Primary Examiner*—Robert L. Wolfe

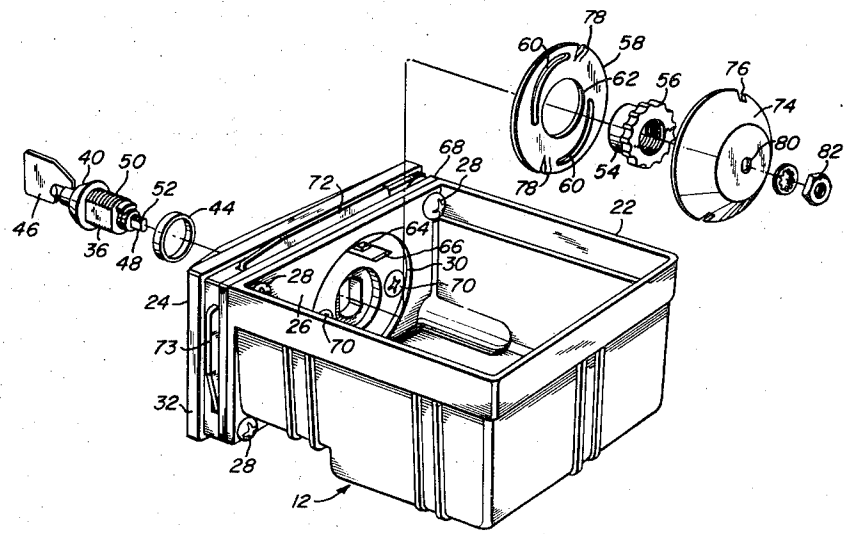
*Attorney*—J. Warren Kinney, Jr



[57] **ABSTRACT**

The lock box comprises a money receptacle upon which is detachably mounted a separate lockable face member carrying suitable bolt-work whereby the lock box may be secured within a vault opening or the like. The lockable face member is made as a universal part which is receptive of various kinds or styles of locks to control the bolt-work, and provision is made for changing or substituting locks without removing the money receptacle from the lockable face member; and further, the bolt-work is made to very simply avoid rattle or looseness of the lock box in the vault opening.


**16 Claims, 10 Drawing Figures**



PATENTED JUN 12 1973

3,738,134

SHEET 1 OF 2

FIG-1

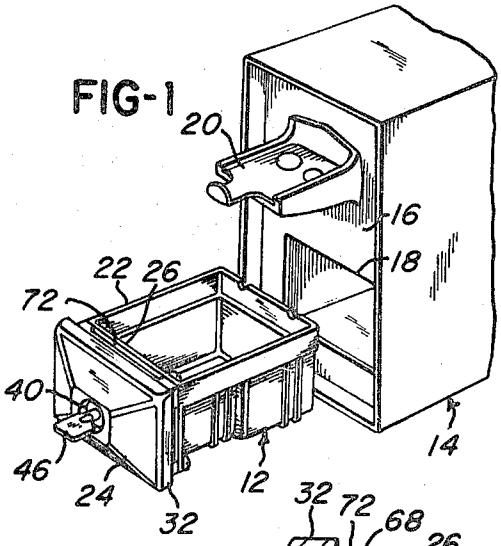



FIG-2

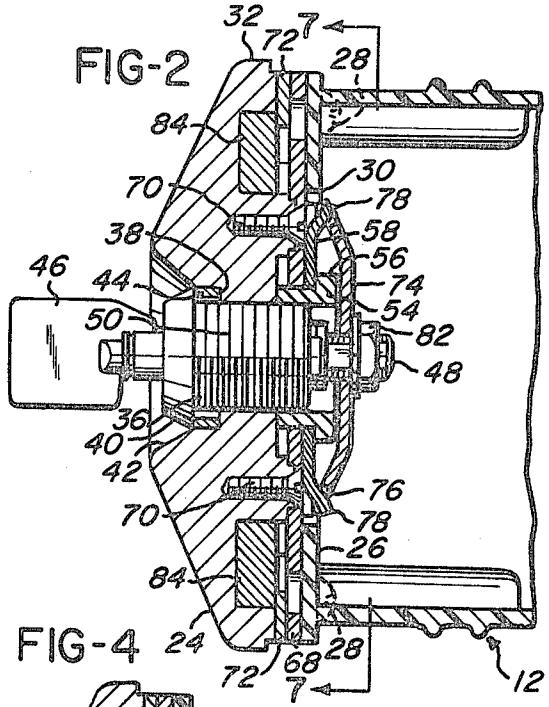



FIG-3

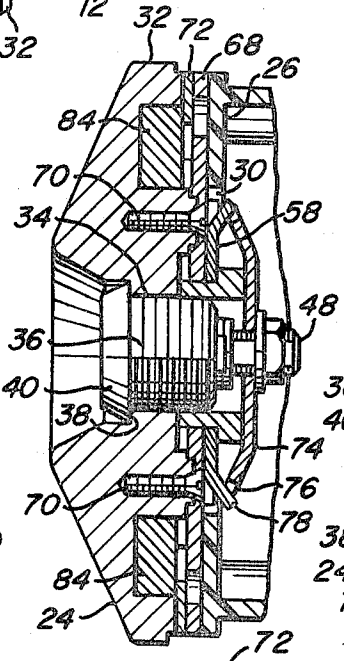



FIG-4

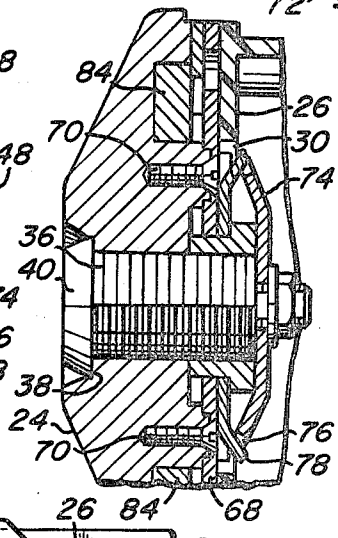



FIG-5

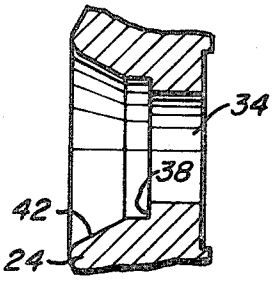



FIG-7

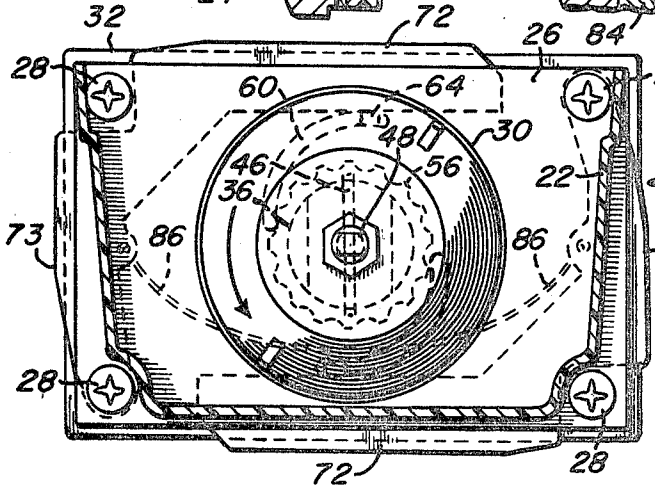
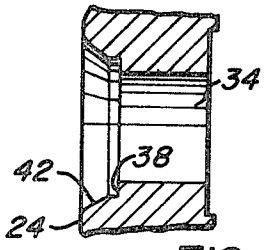
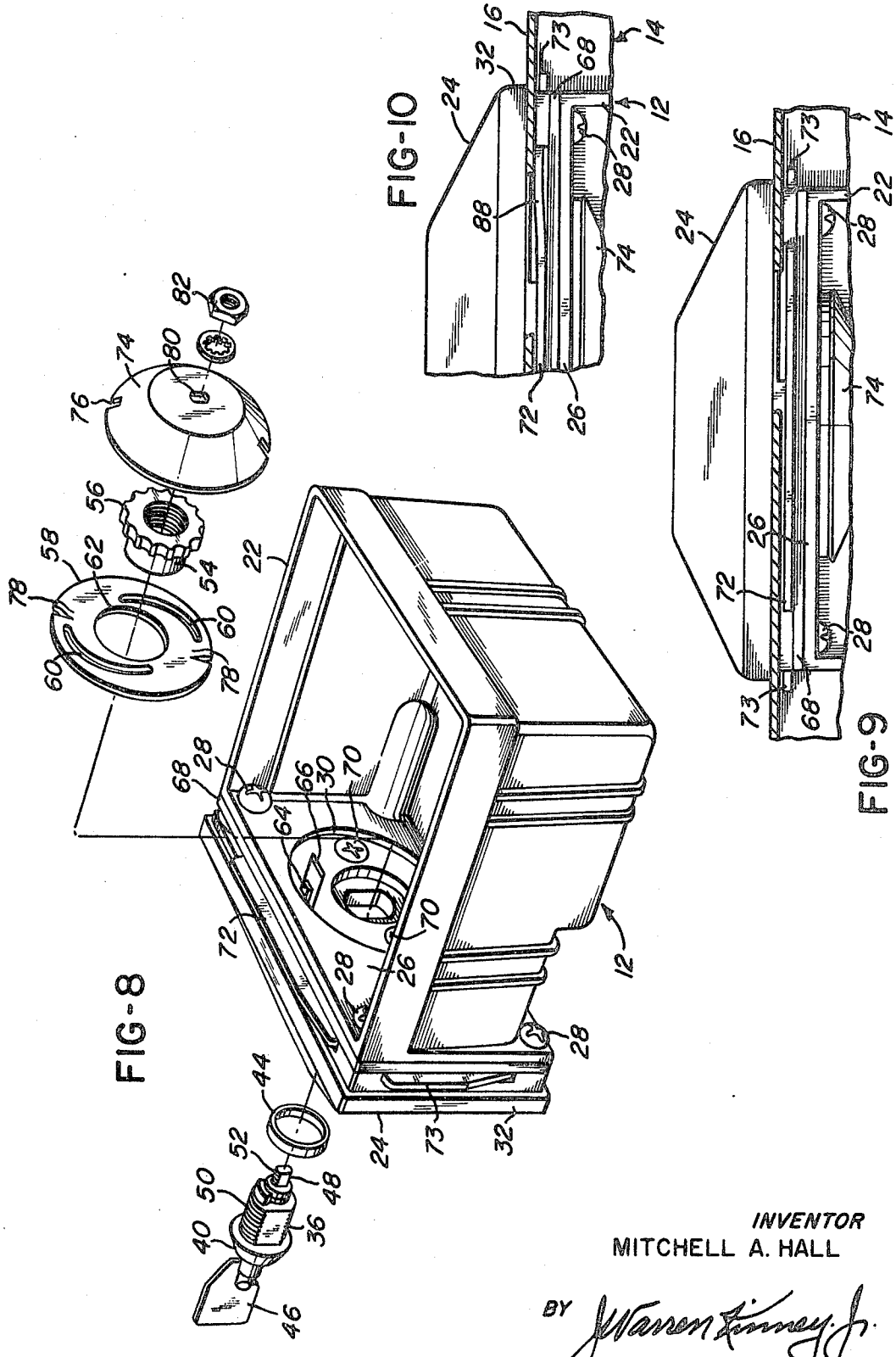



FIG-6




INVENTOR
MITCHELL A. HALL

BY J. Warren Kinney, Jr.
ATTORNEY




INVENTOR
MITCHELL A. HALL

BY J. Warren Kinney, Jr.
ATTORNEY

# LOCK BOX CONSTRUCTION

## BACKGROUND OF THE INVENTION

The prior art is well represented by U.S. Pat. No. 3,276,835, issued Oct. 4, 1966, to M. A. Hall, wherein is disclosed a money receptacle upon which is demountably supported a separate lockable face member carrying bolts extendable by turning a key in the lock carried by the face member. The device of the patent emphasizes quick detachability of the face member from the receptacle, whereas in the device of the present invention, detachment of the face member is an incidental feature of little consequence or importance.

In the prior art devices, any necessary or desirable replacement of locks involves substantial disassembly of the lock box, including removal of the money receptacle from the lockable face member, and the skilful disassembly and reassembly of the boltwork mechanism. In fact, lock replacement cannot be achieved in the prior art devices, without first disassociating the face member from the money receptacle. This limitation is particularly undesirable in structures wherein the face member is secured to the money receptacle using a plurality of fasteners, some of which may be quite inaccessible.

In the issued Hall patent, bolts actuated by the key lock engage behind a flange of a vault opening, to preclude withdrawal of the money box. Although the bolts project from all sides of the lock plate or face member of the box, no provision is made for preventing noisy vibration or rattle of the box within the vault opening when the vault is subjected to vibration such as may occur when a motor-driven dispenser or the like is operating within or upon the vault structure.

In the effort to eliminate noise from vibration it has been common practice to cushion the money box or the face member with rubber gaskets or rubber pimples insulating these parts from the vault structure. Such cushioning means is expensive to apply due to the labor involved; and in time the rubber parts deteriorated or became detached, so that servicing was a continuing item of expense and annoyance.

## SUMMARY OF THE INVENTION

The present invention is directed to the provision of a face member or lock plate for money boxes, designed to facilitate and expedite the changing or substitution of locks, and moreover, to accommodate different kinds and sizes of locks currently in use upon lock boxes. Otherwise stated, the improved face member or lock plate is practically universal in character, so that it may be supplied at low cost to users or fabricators of various types of money boxes and locks therefor.

In addition to the foregoing objective, it is an object of the present invention to provide for expediting and facilitating very materially the substitution of locks, and to accomplish this without disassembling the boltwork and without detaching the face member from the money receptacle of the lock box assembly. This results in substantial savings of time and labor, and eliminates the possibility of reassembly errors on the part of the serviceman resulting in malfunction of the lock box contituents.

Another object of the invention is to provide simple, durable and inexpensive means for precluding vibration and accompanying noise or rattle of the lock box structure while supported upon a motor-driven machine, such as a coin-controlled dispenser of goods or services. Such means is designed to require no servicing or replacement of parts, and is very simply incorporated in the boltwork of the face member without the use of rubber gaskets, bumpers, or the like.



Further, in accordance with the present invention, the face member may be a die casting of metal properly armored against cutting or drilling, yet easily machineable when necessary to support locks of different types or sizes. The boltwork is case hardened and treated to resist corrosion, and has a 30 to 1 ratio of movement with the locking key, to ensure ease of boltwork manipulation without risk of key damage. The money receptacle is formed of high-impact plastic, and will not therefore induce electrolysis with coins deposited therein.

Another objective achieved by the present invention involves eliminating a security ring at the lock face, by recessing the lock barrel in the outer surface of the face member. The face member being a casting, it can advantageously be made thick enough and cored to permit recessing of the longest as well as the shortest of lock barrels currently in use for money box purposes.

The foregoing and other objects and advantages are attained by the means described herein and illustrated upon the accompanying drawings.

## DETAILED DESCRIPTION OF THE INVENTION

In the accompanying drawings:

FIG. 1 is a perspective view of the improved lock box of the present invention, showing its relationship to a vault or casing carrying a coin slide which delivers coins to the open top of the coin receptacle of the lock box.

FIG. 2 is a cross-section taken through the lock and receptacle of FIG. 1, on a horizontal plane.

FIGS. 3 and 4 are cross-sections similar to FIG. 2, showing the incorporation of locks having short and long cylinders.

FIGS. 5 and 6 are fragmentary cross-sections of the face member as formed to accommodate the different kinds and sizes of lock cylinders shown by FIGS. 3 and 4, respectively.

FIG. 7 is a cross-section taken on line 7—7 of FIG. 2, with the boltwork shown projected.

FIG. 8 is an exploded perspective view of the lock box construction.

FIG. 9 is a fragmental sectional view of the vault front panel supporting a lock box, the boltwork thereof being shown conventionally in locking relationship with marginal surfaces of the front panel opening.

FIG. 10 is a view similar to FIG. 9, but showing one of the locking bolts sprung to one side of its normal operating plane, to cam resiliently against the vault opening margin for the purpose of eliminating play and rattle.

In the drawings is represented generally, at 12, a lock box embodying the present invention, and at 14 is indicated a vault, machine cabinet, or other enclosure having an upright wall or panel 16 in which is formed an opening 18 loosely receptive of the lock box. The cabinet 14 may be furnished with a coin slide 20 above opening 18, adapted to deliver coins into the lock box from time to time. The coil slide may be in control of a dispensing machine or the like, for dispensing goods or services in accordance with common practice.

The lock box comprises a coin receptacle 22 formed preferably of a high impact moldable plastic, and a forward lockable face member or face plate 24 which is fabricated as a relatively thick metal casting, such as a die casting, which is dimensioned to cover the entire outer face of the forward wall 26 of receptacle 22. Receptacle 22 of course has a rear wall, side walls, a bottom wall, and an open top.

The forward wall 26 of receptacle 22 may be apertured at various marginal locations to receive screws or other fasteners 28 adapted to enter tapped holes in the back of face member 24, whereby the receptacle may be rigidly mounted upon the face member, subject to demounting if desired. The screws are accessible only when the lock box assembly is displaced from cabinet opening 18. Receptacle 22 is provided also with a central enlarged aperture 30, later referred to.

Face member 24 is preferably a metal casting of substantial mass, which is quite thick at its central portion and may taper outwardly to a thinner peripheral edge 32. The mass of metal at the central portion of the casting is sufficient in amount to permit the formation of a transverse bore or passageway 34 therein, which bore or passageway may be larger or smaller in diameter or effective length, to accommodate different sizes and makes of lock cylinders 36. In this connection, a comparison of lock cylinder sizes is evident by referring to FIGS. 2, 3 and 4.

When casting the face member 24, any one of several cores may be incorporated in the die to establish the size of bore 34 to be formed, this being determined by the size and type of lock to be installed. At present, there are three or four major forms of locks to be considered for incorporation into the face member. One lock has a very long cylinder (FIG. 4), one a very short cylinder (FIG. 3), and one other has a cylinder of intermediate length, FIG. 2. The several lock cylinders may or may not be standardized as to diametral dimension, but in any event the die core to be used in casting of the face member will complement the lock cylinder to be installed. In this way, the face member may be formed in a single die common to all face members generally required, so that the face member produced in the common die may be considered a universal product, and as such it is manufacturable at low cost.

The cylinder bore 34, in the light of the foregoing explanation, may be short or long to accommodate any of the several forms of locks, and will usually include an annular internal seat 38 providing an abutment determining the extent to which the lock cylinder may be advanced into the bore from the front of the face member. Seat 38 preferably is recessed in the bore as shown, to ensure a recessed protected condition of the lock cylinder head 40 at all times, thereby eliminating the need for the customary security ring.

The outer end of bore 34 may be outwardly flared as at 42. In some instances, it may be desirable to interpose a spacer ring 44 (FIG. 2) between head 40 and seat 38.

The lock head 40 may have the usual keyhole to receive a key 46 which when properly inserted therein may be rotated, for imparting rotation to a lock shaft 48 projecting from the inner end of the lock cylinder. The cylinder and said shaft may be provided with diametral flats as suggested by FIG. 8. The cylinder is provided with external screw threads 50, and screw threads 52 are provided on the free end portion of lock shaft 48.

A nut 54, preferably one of the 12-point variety with a long body, is adapted to be screw-threaded onto the threads 50 of the lock cylinder, to draw the cylinder head 40 tightly against seat 38. The nut will be seen to include a serrated flange 56 (FIG. 8) to be gripped in rotating the nut onto and off the cylinder threads.

The smooth shank of nut 54 adjacent to flange 56, supports for rotation thereon a centrally apertured cam plate or disc 58, which has a pair of spiral slots 60, 60 disposed between the disc periphery and central aperture 62 thereof. Each of the slots 60 is adapted to slidingly accommodate a cam follower 64 which may be in the form of a laterally extended lug that projects through an opening 66 formed in a back plate 68. Back plate 68, as best shown in FIGS. 2 and 9, may be a protective hard steel plate secured against the rear surface of face member 24 in any suitable manner, as by means of screws 70, 70.

Each cam follower 64 may be a lug integrally formed on a lock bolt 72, FIG. 7, wherein it is explained that the bolt 72 at the top of FIG. 7 is L-shaped, having one arm which is horizontal, and a second arm 73 depending therefrom along the left side of FIG. 7. The lower end of the depending arm is pivoted upon part 24 at the approximate axis of that screw 28 which appears at the lower left corner of FIG. 7. Accordingly, a counterclockwise rocking of bolt 72 upon its axis, as in FIG. 7, results in an outward projection of outer marginal portions of said bolt arms beyond the peripheral edges of the face member; and conversely, a clockwise rocking of said bolt about its pivot results in an inward retraction of the bolt arms within the limits of the face member periphery.

The foregoing description is applicable to both of the L-shaped bolts 72, 72. The cam follower lug 64 of each bolt reposes in one spiral cam slot 60 of the cam disc. Accordingly, rotation of the cam disc or plate 58 enforces displacement of the follower lugs and their bolt arms toward or from the axis of shaft 48, depending upon the direction of rotation imparted to plate 58 by the lock shaft under the control of key 46.

Rotation of the lock shaft may be imparted to cam plate 56 through the agency of a connecting means in the form of a drive plate or disc 74 fixed in driving relation upon the lock shaft. Part 74 may be notched at 76 to receive a tongue 78 on plate 58, whereby the parts are caused to move in unison. A central opening 80 in plate 74 is adapted to receive the free end of shaft 48, and includes a flat cooperating with the flat of the shaft whereby said plate is keyed for rotation with the shaft. A nut 82 and accompanying lock washer are applied to the threaded end of shaft 48, for detachably mounting the plate 74 thereon.

For any further detailed explanation of the boltwork, reference may be had to the aforesaid Hall U.S. Pat. No. 3,276,835.

It may here be pointed out that the enlarged aperture 30 of receptacle wall 26 is of a size such as to encompass the cam plate 58, and to permit passage of the cam plate and the connecting plate or driver 74 therethrough, in the event that screws 28 are removed to demount the coin receptacle from face member 24. In practice, however, demounting of the coin receptacle is not ordinarily resorted to. But the enlarged aperture 30 serves another purpose, as explained below.

Assuming that the lock 36 of FIG. 2 requires replacement with another lock of the same type, the serviceman will merely remove nut 82 and drive plate 74, thereby gaining access to cylinder jamb nut 54. Removal of nut 54 takes with it the cam plate 58 which is loose thereon, and releases lock cylinder 36 for bodily withdrawal of the cylinder forwardly through the central bore of face member 24, leaving intact the boltwork confined by back plate 68 and requiring no demounting of coil receptacle 12. Quite obviously, the installation of a substitute or replacement lock involves merely a reversal of the procedure.

The aforesaid reassembly of the lock box structure is accomplished with a minimum of time and labor, and affords the servicemen no opportunity to improperly reassemble the structure and thereby cause malfunction.

In each of FIGS. 2, 3 and 4, the reference numerals 84 indicate hard metal inserts placed or embedded in the cast material of the face member at its rear surface. If desired, the inserts may be deposited in pockets preformed in the face member incident to the casting operation. In any event, the inserts are highly resistant to penetration by cutting tools, and are strategically located to protect vital elements of the bolting and locking elements. The inserts may flank the central bore of the face member, to preclude use of a hole saw in the effort to isolate the lock and disassociate it from the face member. Protection is afforded also by the hard metal back plate 68.

In FIG. 7, the reference numerals 86 indicate wire or leaf springs acting constantly to urge the bolts 72, 72 outwardly to an operative bolting position, thereby ensuring a bolted condition of the lock box even though the bolt extending and retracting mechanism may be destroyed or rendered inoperative.

As will be understood, according to FIG. 1, the lock box structure comprising the elements 12 and 24, may be inserted into the opening of wall 16 with bolts 72, 72 retracted by means of key 46. After the bolts pass beyond wall 16, the peripheral edge 32 will limit insertion of the face member into the wall opening, whereupon key 46 may be manipulated to extend the bolts 72, 72 to locked position behind marginal portions of wall opening 18.

If bolts 72, 72 do not bear firmly upon the inner surface of wall 16 when extended (see FIG. 9), the box structure may vibrate and rattle in the opening 18 particularly if cabinet or vault 14 supports motor-driven equipment.

To eliminate rattle and noise resulting from circumstances such as are mentioned above, the initially flat metal bolts are subjected to lateral bending out of their normal initial plane, along the outer margins thereof as at 88, FIG. 10, in order to endow the bolts with a camming or wedging action against the inner surface of wall 16. Because the bolts are formed of a material such as steel sheet, they have a degree of inherent resiliency which assists in maintaining a firm though somewhat yielding contact of the bolt outer margins against the inner face of wall 16, thereby to eliminate or at least minimize any tendency of the assembly to rattle or produce noise when subjected to vibration.

The elimination of noise and rattle in accordance with the foregoing teaching, can be achieved almost instantly, on the job, and at no expense. Once the bolts have been deformed slightly as taught, to achieve the advantage stated, they will never require future servicing such as is always necessary when rubber bumpers or resilient gaskets are used in dampening noise or vibration.

The above described treatment may be applied to one or more bolts of the lock box structure, as may be required. It is possible to apply the bending treatment to both arms of both bolts shown in FIG. 7, if that be necessary, or adopted as a regular practice.

What is claimed is:

1. A lock box mountable in an aperture of a cabinet wall, and comprising in combination; an open-topped coin receptacle dimensioned for passage through said aperture, said receptacle having a front upright wall, side walls and a back wall, said front wall having inner and outer faces, said front wall having an opening therethrough, a transversely bored forward face member having a rear surface and peripheral edges; means for mounting said face member upon the receptacle in substantial covering relation with said outer face of said receptacle front wall; a lock normally supported within the transverse bore of the face member, said lock including an elongate cylinder having at one end an enlarged head, and at the other end a shaft rotatable by means accessible at the head end of the lock cylinder, the other end of the shaft extending through the front wall and into the receptacle, a seat within said bore providing an abutment for the lock cylinder head, to limit projection of the cylinder inwardly through said bore; bolt means carried by said face member, including at least one bolt movable to extended and retracted position relative to a peripheral edge of the face member, to engage a marginal portion of the cabinet wall aperture incident to extension of the bolt means; connecting means adjacent the opening in the inner face of the front wall and detachably mounted upon the lock shaft for moving said bolt means incident to rotation of said shaft; the connecting means being of a dimension slightly smaller than the opening but still substantially cover the same, a displaceable lock cylinder anchor means adjacent the opening for normally holding the lock cylinder head stationary relative to the seat aforesaid; the lock cylinder being bodily withdrawable forwardly from said bore upon displacement of said anchor means and said connecting means inwardly into said receptacle, leaving intact the coin receptacle mounted on the face member.

2. The combination as defined by claim 1, wherein the face member is formed as a metallic casting of substantial mass and thickness such that transverse bores of different sizes may be formed therein to receive locks having differing length or diametral dimensions.

3. The combination as defined by claim 1, wherein the face member is formed as a metallic casting of substantial mass and thickness such that the lock cylinder head seat may be formed therein at selected distances from the rear surface of the face member.

4. The combination as defined by claim 1, wherein the enlarged head of the lock cylinder is recessed in the bore of the face member.

5. The combination as defined by claim 1, wherein said connecting means mounted upon the lock shaft extends laterally from said shaft and describes a circle arc while rotating with said shaft; and the opening is dimensioned to encompass said circle arc.

6. The combination as defined by claim 5, wherein the face member is formed as a casting of substantial

mass and thickness such that the lock cylinder head seat may be formed therein at selected distances from the rear surface of the face member.

**7.** The combination as defined by claim **6,** wherein the enlarged head of the lock cylinder is recessed in the bore of the face member.

**8.** The combination as defined by claim **2,** wherein is embedded in the mass of the metallic casting one or more hardened metal inserts highly resistant to penetration by cutting tools.

**9.** The combination as defined by claim **8,** wherein the hardened insert or inserts are embedded in the mass flanking the transverse bore of the face member.

**10.** A lock box mountable in an aperture of a cabinet wall, and comprising in combination: an open-topped coin receptacle dimensioned for passage through said aperture, said receptacle having a front upright wall, side walls and a back wall, said front wall having inner and outer faces, said front wall having an opening therethrough, a transversely bored forward face member having a rear surface and peripheral edges; removable fastening means displaceably mounting said face member upon the receptacle in substantial covering relation with said outer face of said receptacle front wall; a lock normally supported within the transverse bore of the face member, said lock including an elongate cylinder having at one end an enlarged head, and at the other end a shaft rotatable by means accessible at the head end of the lock cylinder, the other end of the shaft extending through the front wall and into the receptacle, bolt means carried by said face member, including at least one bolt movable to extended and retracted positions relative to a peripheral edge of of the face member, to engage a portion of the cabinet wall incident to extension of the bolt means; connecting means adjacent the opening in the inner face of the front wall and detachably mounted upon the lock shaft for moving said bolt means incident to rotation of said shaft; the connecting means being of a dimension slightly smaller than the opening but still substantially cover the same, a lock cylinder anchor means adjacent the opening for normally holding the lock cylinder head stationary within the bore aforesaid: the dimension of the opening in relation to the size of the connecting means being such as to allow passage of the connecting means through the opening upon removing the fastening means mounting the frame member to the front wall of the receptacle.

**11.** The combination as defined by claim **10,** wherein the extendable and retractable bolt is formed initially of flat sheet metal, and a portion thereof is bent laterally from the normal plane thereof to cam against said engageable portion of the cabinet wall when the bolt is extended.

**12.** The combination as defined by claim **10,** wherein the face member is formed as a casting of substantial mass and thickness such that transverse bores of different sizes may be formed therein to receive locks having differing dimensions of length or diameter.

**13.** The combination as defined by claim **12,** wherein the enlarged head of the lock cylinder is recessed in the bore of the face member.

**14.** The combination as defined by claim **12,** wherein is embedded in the mass of the casting one or more hardened metal inserts highly resistant to penetration by cutting tools, said inserts being in flanking relationship to the transverse bore of the face member.

**15.** The combination as defined by claim **13,** wherein the extendable and retractable bolt is formed initially of flat sheet metal, said bolt having an outer cam portion bent laterally from the normal plane thereof to wipe and bear against said engageable portion of the cabinet wall as the bolt is extended.

**16.** The combination as defined by claim **1,** wherein the extendable and retractable bolt is formed initially of flat sheet metal, and a portion thereof is bent laterally from the normal plane thereof to cam against said engageable portion of the cabinet wall when the bolt is extended.

* * * * *