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3,122,012

LOCK ASSEMBLY FOR A REFRIGERATED CABINET OR THE LIKE

Filed Jan. 14, 1963

2 Sheets-Sheet 1

FIG. 1

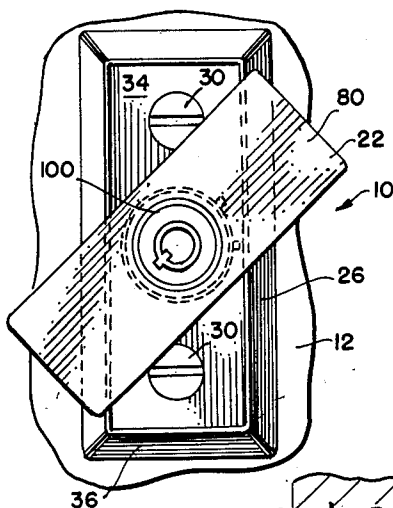


FIG. 3

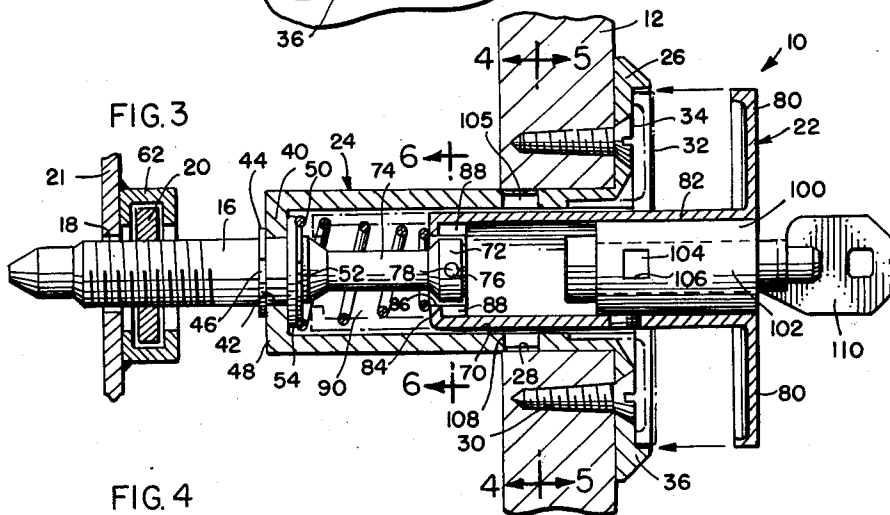
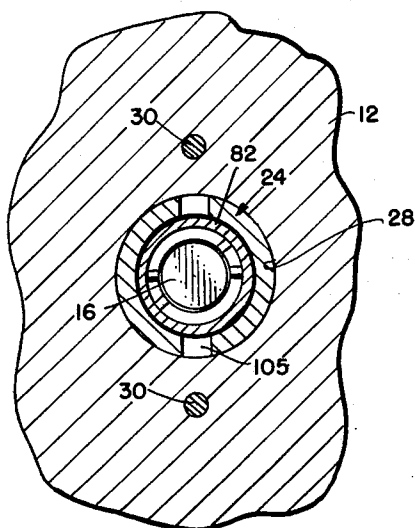


FIG. 4



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FIG. 5

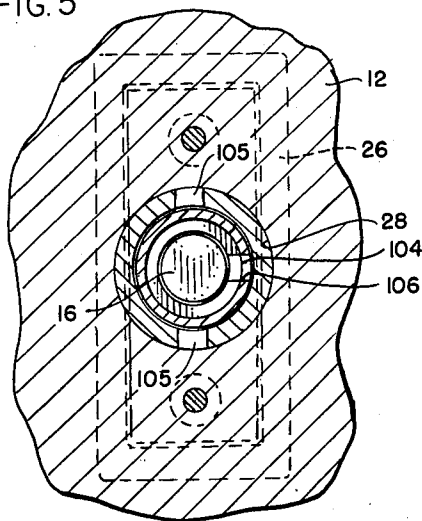


FIG. 2

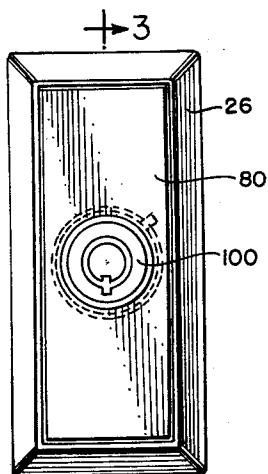


FIG. 6

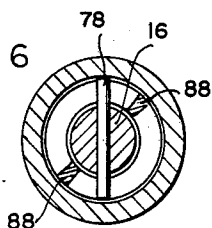
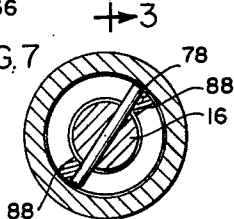


FIG. 7



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LOCK ASSEMBLY FOR A REFRIGERATED CABINET OR THE LIKE

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7 Claims. (Cl. 70-140)

The present invention relates generally to door lock assemblies for cabinets and has particular reference to a draw lock assembly of the nested handle type wherein the rotatable draw shaft is driven or turned by means of an operating leverage-applying handle which is located on the outside of the cabinet door and, when the door is in its locked condition, may be pushed manually into a recess where it is inaccessible for manipulation.

The cabinet door of a vending machine, particularly a refrigerated vending machine, is heavily gasketed and, upon closure thereof, it is necessary to compress the gasket tightly so that there will be no heat transfer around the door jamb. Considering the size of the average refrigerated vending machine door, the degree of pressure which must be exerted by the marginal region of a given door against its sealing gasket to effect the necessary hermetic seal is appreciable. For this reason, sufficient torque cannot be applied to the cam-equipped draw shaft through the medium of the key-operated lock cylinder of the door-locking mechanism to move the cam to its operative or locked position, or in the case of a screw-in type of locking element, to draw the door against the sealing gasket with any appreciable degree of force. To supply the added degree of torque necessary to turn the draw shaft, it has been customary to provide a leverage-applying handle which turns with the draw shaft, the handle being disposed on the outside of the cabinet door. To prevent unauthorized manipulation of the handle or attempts to manipulate it by forcing the same when the door is locked, a recess is provided in the lock housing and the handle and draw shaft are slidably keyed or otherwise connected together so that, when the door is in its locked condition, the handle may be aligned with the recess, moved thereinto and retained therein so that access to the handle for turning purposes is precluded.

A draw lock assembly of the type heretofore mentioned is possessed of one serious limitation arising from the fact that, in the case of a cam type lock, when the cam is in its home position against its cooperating locking shoulder, the handle is not necessarily in alignment with the handle-retaining recess in the door. Since the cam is in its home position, the handle cannot be further turned in the locking direction to effect the required alignment, and if the handle is backed up or turned away from the locking position, the cam will be moved away from its home position and the door may become insecurely locked or altogether unlocked. In the case of a screw-in type of draw shaft, after the gasket has become sufficiently compressed to effect the desired seal, the handle may or may not, depending on chance, be in alignment with the recess. If it is not in alignment, further turning of the handle in a locking direction to bring it into alignment with the recess can only be accomplished by the application of an inordinate amount of torque to the handle, sometimes of such magnitude that it is not within the capabilities of the operator to exert it. Backing off of the handle will, of course, reduce the pressure on the gasket and may destroy the seal.

In an effort to overcome the above-noted limitation that is attendant upon the construction and use of a draw lock assembly employing a nested handle, there have been recently devised several forms of draw lock assemblies wherein a lost motion connection is provided between the

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handle and draw shaft, such connection establishing a positive drive between the handle and draw shaft during door tightening operations, but allowing for a limited degree of reverse movement of the handle after the tightening operation has been completed, such reverse movement being disassociated from the draw shaft so that the locking cam (in the case of a cam type lock), or the draw screw (in the case of a screw-in type lock), will remain in its home position. Thus, the handle may be backed up, so to speak, for the purpose of aligning it with the recess into which it is to be pushed without disturbing the home position of the draw shaft. One such lock assembly has been shown and described in copending United States patent application Serial No. 157,685, filed on December 7, 1961, and entitled "Lock Assembly for a Refrigerated Cabinet or the Like" (now Patent No. 3,089,329, dated May 14, 1963).

While such lost motion type draw lock assemblies have proven to be efficient in their operation and generally satisfactory from a mechanical standpoint, in commercial use it has been found that they are needlessly cumbersome, employ a large number of separate parts, many of which involve special machining operations, present difficulties in assembly and installation procedure, and require the use of different fittings for different width cabinet doors. For example, such lost motion type lock assemblies as have heretofore been designed employ certain parts that are installed on the outside door panel and other parts that are installed on the inside door panel. These two groups of parts, after positioning on their respective door panels, must be aligned with each other before they can be fastened in position, thus consuming much time and requiring the services of a skilled operator. Additionally, with such separate inner and outer groups of parts, the chance for inaccurate alignment after the installation has been completed and the door has been in use is ever present and, when this occurs, binding of the parts frequently leads to inoperativeness. Because of lack of unity, such locks present difficulty to the field operators who must carry a number of such locks to the various scenes of installation, it being a frequent occurrence that the parts of different locks become intermixed, or that individual parts become misplaced or lost. Finally, such locks are of unduly large proportions and consume considerable space in the carrying case of the field operator.

The present invention is designed as an improvement over locks of the type that is shown and described in aforementioned copending patent application Serial No. 157,685, as well as over various other draw locks having lost motion connections and, accordingly, it contemplates the provision of a greatly simplified form of lock assembly which utilizes an appreciably less number of parts, especially relatively movable parts and, therefore, may be manufactured at a low cost.

The provision of such a simplified lock assembly being among the principal objects of the invention, a further object is to provide an assembly which is extremely compact so that it consumes but little space both in the carrying case of an operator and in the installation to which it is applied.

A still further object of the invention is to provide a draw lock assembly which is of the lost motion type and in which the lost motion clutch connection between the handle and the draw shaft is of simplified construction, affords a wide freedom of rotative lost motion between the parts, and is so designed that there is little possibility of binding of the associated parts either during clutch engaging and disengaging operations or while the lost motion clutch connection is effective between the handle and the draw shaft.

Another object of the invention is to provide a lock assembly which is designed for installation in and support

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by only one of the cabinet door panels, namely, the front door panel, so that careful fitting operations are not required and installation procedure is simplified in the field.

The provision of a lock assembly which is more rugged and durable than has heretofore been the case with present day locks of the same general character is another desirable feature which has been borne in mind in the production and development of the present invention.

Numerous other objects and advantages of the invention not at this time enumerated, will readily suggest themselves as the following description ensues.

In the accompanying two sheets of drawings forming a part of this specification, one illustrative embodiment of the invention has been shown.

In these drawings:

FIG. 1 is a fragmentary front elevational view of a draw lock assembly constructed in accordance with the principles of the present invention, such assembly being operatively installed in a cabinet door with the draw screw in its home or locked position and the operating handle thereof in an overrun position with respect to the handle-receiving recess in the lock housing;

FIG. 2 is a front elevational view similar to FIG. 1 but showing the operating handle restored to a position of registry with the handle-receiving pocket, as permitted by the lost motion connection;

FIG. 3 is a sectional view taken on the line 3—3 of FIG. 2;

FIG. 4 is a sectional view taken on the line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken on the line 5—5 of FIG. 3;

FIG. 6 is a sectional view taken on the line 6—6 of FIG. 3; and

FIG. 7 is a sectional view similar to FIG. 6 but showing the parts after the handle has been shifted forwards and turned into a position wherein it is in driving relation with the draw shaft.

Referring now to the drawings in detail and in particular to FIGS. 1 to 3, the draw lock assembly of the present invention has been designated in its entirety by the reference numeral 10 and, for exemplary purposes, the assembly has been illustrated as being operatively installed upon the front or outside panel 12 of a refrigerator door. The door, when in its closed position, is adapted to be drawn against a flexible rubber or other elastomeric sealing strip or door gasket (not shown) which is mounted on the door jamb (also not shown) so that the gasket is adapted to become compressed between the marginal regions of the door and the jamb, as is customary with such refrigerator door assemblies. The pressure necessary to draw the door against the sealing gasket is attained by means of a rotatable draw shaft 16. The latter has at its rear end a threaded portion 18 which is designed for cooperation with a cage nut 20 on a fixed bracket 21 of the refrigerator cabinet. The draw shaft 16 is held against axial shifting and is adapted to be rotated in opposite directions under the control of a handle 22 which is shiftable into and out of clutching engagement with the draw shaft in a manner that will be made clear presently.

The draw lock assembly 10 includes a generally cylindrical housing 24 the front or outer end of which is formed with an integral rectangular rim flange 26. Such flange fits flush against the outside face of the door panel 12 when the lock assembly is placed on the refrigerator door. The cylindrical housing 24 projects through an opening 28 in the panel 12 and two mounting screws 30 extend through countersunk openings in the end portions of the rim flange and into the door panel and serve to clamp the rim flange 26 against the door panel. The lock assembly 10 is thus entirely supported on the door panel 12 and the mounting screws 30 constitute the sole means for holding the assembly in place.

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The rim flange 26 has an appreciable vertical extent and a small width. The front face of this rim flange is provided with a shallow rectangular recess 32 for reception therein of the handle 22. The recess 32 has a bottom wall 34 and continuous marginal confining side wall 36 which is shaped correspondingly to the handle 22 and encompasses the handle when the latter is nested within the recess.

The cylindrical housing 24 projects an appreciable distance rearwards of the panel 12 and the extreme rear rim thereof is provided with an integral inturned bearing flange 40. The latter defines a central circular bearing opening 42 through which the draw shaft 16 projects and within which the shaft is rotatable. A split snap ring 44 within an annular groove 46 in the central portion of the draw shaft bears against the rear end face 48 of the housing 24 and prevents forward shifting of the draw shaft 16 with respect to the housing 24. A similar snap ring 50 in an annular groove 52 in the draw shaft bears against a washer 54 in abutment with the flange 40 and prevents rearward shifting of the draw shaft with respect to the housing. The draw shaft 16 is thus held against axial shifting in either direction but is allowed freedom of rotation within the circular opening 42.

The draw shaft 16 projects into the central longitudinal bore 70 in the cylindrical housing 24. The front end of the draw shaft is formed with an enlarged cylindrical clutch head 72 which is connected to the threaded region of the shaft 16 by a reduced section 74. The clutch head 72 is provided with a transverse bore 76 therethrough and a clutch pin 78 is loosely and slidably received through the bore and has its opposite ends projecting outwardly beyond the cylindrical confines of the clutch head.

The handle 22 embodies a pair of oppositely extending lever arms 80 which project radially outwardly on opposite sides of a central axially extending generally cylindrical tubular hub portion 82. The hub portion is of elongated tubular design and the cylindrical wall thereof is rotatably and slidably disposed, in telescopic fashion, within the internal longitudinal bore 70 which is afforded by the cylindrical wall of the housing 24. The rear rim of the tubular hub portion 82 is provided with an inturned radial flange 84 which defines a circular central opening 86 and from which there extends forwardly a pair of diametrically opposed clutch lugs 88, these lugs being in longitudinal alignment with the lever arms 80 of the handle 22.

As previously stated, the draw shaft 16 is held against axial shifting with respect to the housing 24 within which it is rotatable. The front end region of the draw shaft projects through the central opening 86. A compression spring 90 surrounds the draw shaft 16 and bears at its rear end against the washer 54 which, in turn, bears against the inturned flange 40 on the rear end of the housing 24. The front end of the spring 90 bears against the inturned flange 84 on the hub portion 82, thus normally and yieldingly urging the entire handle 22 as a unit bodily forwardly and causing the handle proper, i.e., the two lever arms 80, to be projected forwardly and out of the recess 32 in the rim flange 26 of the housing 24.

In this forwardly projected position of the handle 22, the clutch pin 78 bears against the inturned rim flange 84 of the hub portion 82 and limits the extent of forward movement of the handle. At the same time, the enlarged head 72 and the pin 78 are in radial alignment with the two clutch lugs 88 as shown in full lines in FIG. 3, so that upon turning of the handle 22 in a clockwise direction as viewed in FIGS. 1, 6 and 7, the lugs 88 will move into driving engagement with the projecting ends of the pin 78 and cause the draw shaft 16 to be rotatively driven by the handle 22 in a direction to tighten the draw shaft in the cage nut 20 and thus draw closed the door of which the panel 12 forms a part.

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When the two lever arms 80 are in radial register with the elongated recess 32, the handle 22 may be pushed rearwardly so that the lever arms 80 thereof enter the recess 32, while at the same time the hub portion 82 slides rearwardly in the cylindrical wall of the housing 24 against the yielding action of the compression spring 90. The clutch head 72 and its associated loosely mounted pin 78 will, upon rearward movement of the hub portion 82, remain in their axially fixed position, while the inturned rim flange 84 and the adjacent clutch lugs 88 will move rearwardly and out of radial register with the pin 78, the parts assuming the dotted line position thereof shown in FIG. 3.

In order to maintain the various parts in their position of clutch disengagement as described above, a conventional lock unit, including a cylindrical barrel 100 and a rotatable tumbler-equipped cylinder 102, is removably disposed within the forward region of the tubular hub portion 82. A locking pin 104 projects radially outwardly of the barrel 100, extends completely through a rectangular opening 106 (see FIGS. 3 and 5) in the hub portion 82 and is designed for locking cooperation with an edge of either of two rectangular holes 108 (see FIG. 5) in the wall of the cylindrical housing 24 at diametrically opposed regions. Projection and retraction of the locking pin 104 is effected under the control of a key 110 which is receivable in the usual key-receiving annulus in the lock unit.

In the operation of the herein described lock assembly 10, when the handle is unlocked and maintained in its forwardly projected position as viewed in FIGS. 1 to 3, inclusive, the handle may be turned in a clockwise direction as viewed in FIG. 2 at which time the clutch pin 78 will move into driving engagement with the lugs 88 to thus establish a positive driving connection between the handle 22 and the draw shaft 16. Continued turning movement of the handle 22 in such clockwise direction will cause the threaded portion 18 of the draw shaft 16 to be screwed into the cage nut 20, assuming of course that the door has initially been pushed toward its closed position. Threading of the draw shaft 16 into the cage nut 20 will effect a gasket-compressing operation and, when the resistance of the gasket is such that further turning of the handle cannot be accomplished by the application of moderate torque, the door may be assumed to be in its fully closed condition. At this time, the angular position of the handle 22 may or may not be in a position of register with the elongated rectangular recess 32 in the front face of the rim flange 26. Assuming for purposes of discussion that when the draw shaft 16 is thus tightened in the cage nut 20 the handle 22 assumes the position of non-register in which it is shown in FIG. 1, it is obvious that in order to bring the handle and recess into register for door locking purposes a reverse turning movement of the handle will be required. Ordinarily, and in the absence of a lost motion connection between the handle and draw shaft, such reverse turning movement of the handle would serve to effect loosening of the draw shaft 16 in the cage nut 20 and a consequent loss of gasket pressure at the door seal. However, in the present instance, the handle may be turned in a counterclockwise direction as viewed in FIG. 1 until such time as the handle 22 and recess 32 are in accurate angular register. During this reverse turning movement of the handle 22, the clutch pin 78 will move away from the lugs 88 and assume the position in which it is shown in FIG. 6, no reverse turning movement of the draw shaft 16 taking place by reason of the lost motion connection afforded by the pin 78 and the cooperating lugs 88.

As soon as the handle 22 has been turned so that it is in angular register with the recess 32, the handle together with its hub portion 82, may be pushed rearwardly so that the handle proper enters the recess. At the same time the clutch pin 78 will move out of radial register with the lugs 88 and the parts will assume the dotted line position illustrated in FIG. 3. During such reverse movement of

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the handle 22, the outer end of the locking pin 104 will bear against the inside face of the cylindrical wall of the outer housing 24 and slide circumferentially thereon without function. After the handle has been pushed rearwardly as previously described and caused to enter the recess 32, the locking pin 104 will move into register with one or the other of the two rectangular holes 108 in the housing 24 and snap into position therein in the event that the key 110 has been removed from the lock cylinder 102. Otherwise, turning of the key 110 will effect projection of the locking pin 104 into the hole 108. With the locking pin 104 disposed within the hole 108, the handle 22 cannot be shifted forwardly and the cabinet door is thus effectively maintained in its closed and locked condition.

It is to be noted at this point that because the clutch pin 78 is loosely disposed within the transverse bore 76 in the enlarged cylindrical clutch head 72, the pin is free to shift radially with respect to the draw shaft 16 and thus any possibility of binding of the pin against the inner cylindrical face of the clutch head 72 is averted. It also is to be observed that the present draw lock assembly 10 is capable of extreme ease of dismantling, it being necessary merely to force the locking pin 104 inwardly until the extreme outer end thereof clears the rectangular opening 106, after which the entire lock assembly, including the barrel 100, may be slid endwise and forwardly from the hub portion 82. Thereafter, the snap ring 44 may be removed and the draw shaft 16 will be free to be slid forwardly and out of the housing 24. Such removal of the draw shaft may be accomplished by pulling the handle 22 forwardly so that the draw shaft and attached handle will be separated bodily as a unit from the housing. Then, with the lock barrel 100 previously removed from the hub portion 82 of the handle 22, the draw shaft may be forced forwardly and out of the front open end of the hub portion. The spring 90 may be then slid rearwardly and removed from the draw shaft 16. Finally, the snap ring 50 may be dislodged from the groove 52. Assembly operations may be accomplished by a reversal of the dismantling operations outlined above.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of the invention. Only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a draw lock for a sealed cabinet door, in combination, an open-ended tubular cylindrical housing provided at its front end with a radial rim flange and at its rear end with an inturned bearing flange presenting a central bearing opening, said rim flange being provided with a shallow elongated recess in the forward end face thereof, an operating handle shaped conformably to the shape of said recess, positioned forwardly of said housing and having a tubular hub portion projecting rearwardly through the rim flange and received in telescopic fashion slidably and rotatably in said housing, said handle and hub portion being movable bodily as a unit between a retracted rearward position wherein the handle assumes a position nested within said recess and an extended forward position wherein the handle is projected out of the recess, a draw shaft projecting through said bearing flange and in axial alignment with said hub portion, the forward end of said draw shaft terminating within the confines of said housing, a first clutch element on the forward end of said draw shaft forwardly of said bearing opening, and a second clutch element on the rear end of said hub portion rearwardly of the rim flange, said second clutch element being disposed rearwardly of the first clutch element when the handle is in its retracted position and being movable forwardly into cooperating

engagement with the first clutch element as the handle is moved forwardly to its extended position.

2. In a draw lock for a sealed cabinet door, the combination set forth in claim 1 and including, additionally, a circumferential lost motion connection between said first and second clutch elements.

3. In a draw lock for a sealed cabinet door, the combination set forth in claim 2 and wherein the first clutch element is in the form of a clutch pin extending through said draw shaft adjacent to the forward end thereof and having its opposite ends projecting radially outwardly beyond the shaft, and the second clutch element is in the form of a clutch lug formed internally of said hub portion and positioned in circumferential register with said pin when the handle is in its rearward retracted position.

4. In a draw lock for a sealed cabinet door, the combination set forth in claim 2 and wherein the first clutch element is in the form of a clutch pin extending through said draw shaft adjacent to the forward end thereof and having its opposite ends projecting radially outwardly beyond the shaft, and the second clutch element is in the form of a pair of diametrically opposed clutch lugs formed internally of said hub portions and positioned in circumferential register with said pin when the handle is in its rearward retracted position.

5. In a draw lock for a sealed cabinet door, in combination, an open-ended tubular cylindrical housing provided at its front end with a radial rim flange and at its rear end with an inturned bearing flange presenting a central bearing opening, said rim flange being provided with a shallow elongated recess in the forward end face thereof, an operating handle shaped conformably to the shape of said recess, positioned forwardly of said housing and having a tubular hub portion projecting rearwardly through the rim flange and received in telescopic fashion slidably and rotatably in said housing, the rear end of said tubular hub portion presenting a circular open rim, said handle and hub portion being movable bodily as a unit between a retracted rearward position wherein the handle assumes a position nested within said recess and an extended forward position wherein the handle is projected out of the recess, a draw shaft projecting through said bearing flange and in axial alignment with said hub portion, the forward end of said draw shaft terminating within the confines of said housing and being provided with a transverse bore therethrough, a clutch pin slidably in said transverse bore and of greater axial extent than the axial extent of the bore in which it is slidable whereby the ends of said clutch pin project outwardly beyond the lateral confines of the draw shaft, and a pair of clutch lugs formed internally of said hub portion adjacent to the rear end thereof, said clutch lugs being disposed rearwardly of said clutch pin when the handle is

in its retracted position, said clutch lugs being movable forwardly into transverse register with the projecting ends of said clutch pin when the handle is moved forwardly to its extended position.

6. In a draw lock for a sealed cabinet door, in combination, an open-ended tubular cylindrical housing provided at its front end with a radial rim flange and at its rear end with an inturned bearing flange presenting a central bearing opening, said rim flange being provided with a shallow elongated recess in the forward end face thereof, an operating handle shaped conformably to the shape of said recess, positioned forwardly of said housing and having a tubular hub portion projecting rearwardly through the rim flange and received in telescopic fashion slidably and rotatably in said housing, said handle and hub portion being movable bodily as a unit between a retracted rearward position wherein the handle assumes a position nested within said recess and an extended forward position wherein the handle is projected out of the recess, a draw shaft projecting through said bearing flange and in axial alignment with said hub portion, the forward end of said draw shaft terminating within the confines of said housing, a first clutch element on the forward end of said draw shaft forwardly of said bearing opening, a second clutch element on the forward end of said hub portion rearwardly of the rim flange, said second clutch element being disposed rearwardly of the first clutch element when the handle is in its retracted position and being movable forwardly into cooperating engagement with the first clutch element as the handle is moved forwardly to its extended position, said housing being provided with a pair of diametrically opposed holes in the cylindrical wall thereof medially of its ends, a cylindrical lock assembly removably disposed in the forward end of said tubular hub portion and including a radially shiftable locking pin, there being a hole in the wall of said hub portion through which the locking pin normally projects and in which it is slidable, said latter hole being movable into transverse register with the holes in the wall of said housing when the handle is in its retracted position to the end that said locking pin may be projected selectively into said latter holes.

7. In a draw lock for a sealed cabinet door, the combination set forth in claim 6 and including, additionally, a circumferential lost motion connection between said first and second clutch elements.

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