Sept. 21, 1937. F. G. THWAITS ET AL 2,093,624

CLOSURE

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Fig. 3.

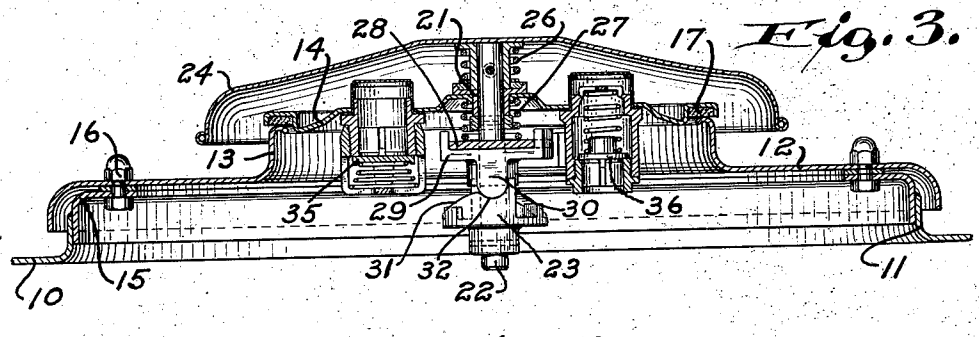
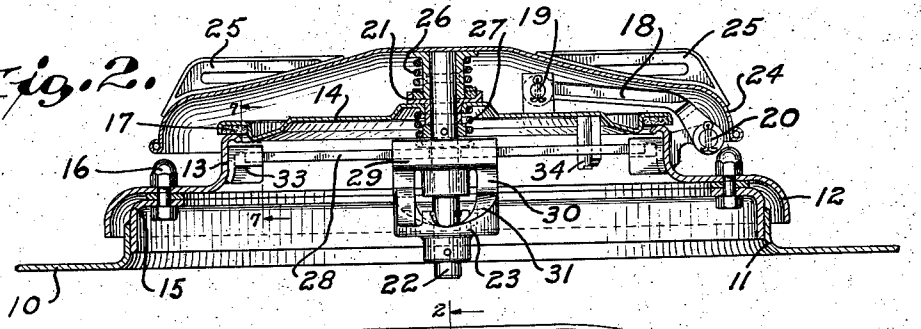


Fig. 2.



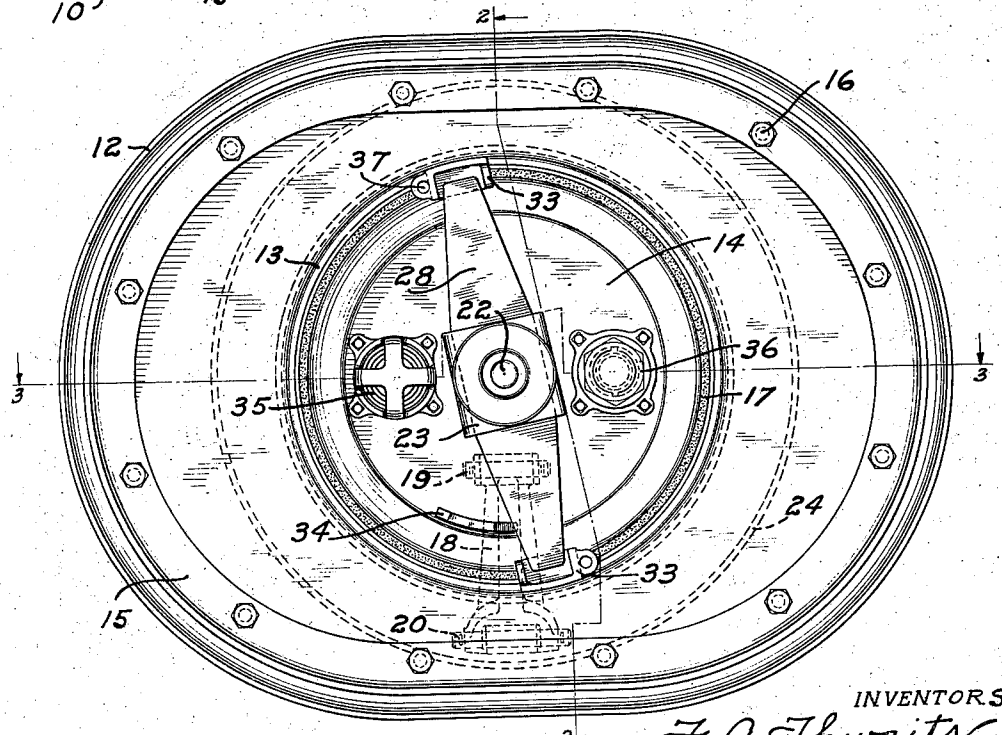


Fig. 1.

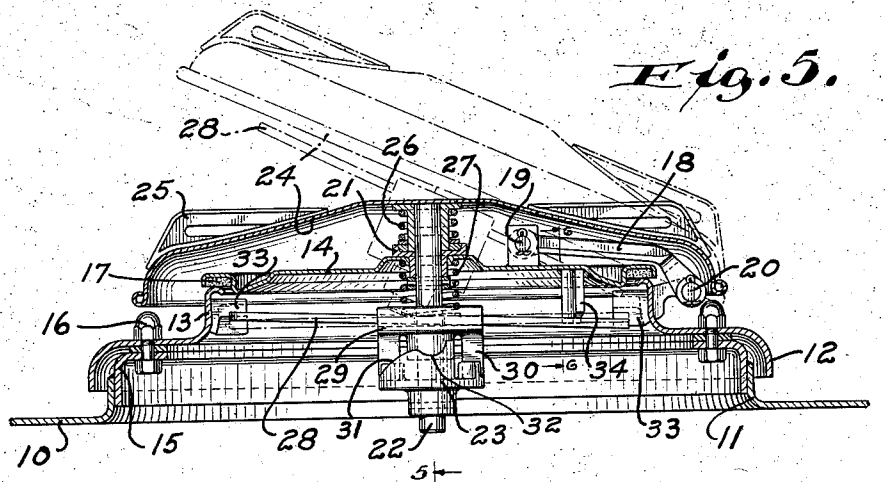
INVENTORS
F. G. Thwaits
BY R. Rieboldt
Monsell, Lieber & Monsell
ATTORNEYS.

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Fig. 5.



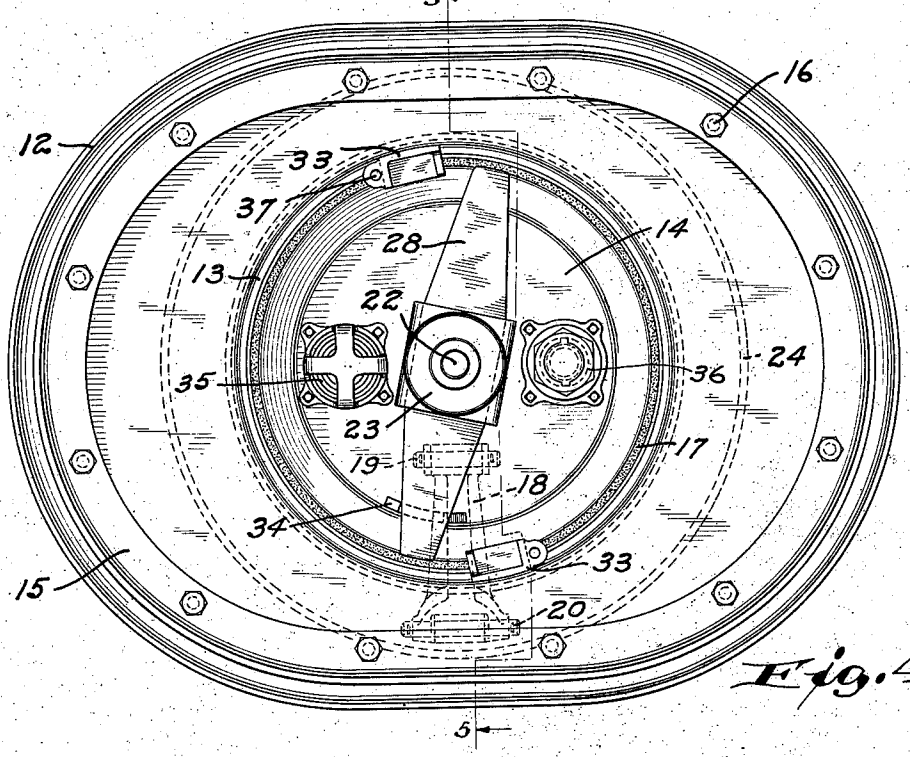


Fig. 4.

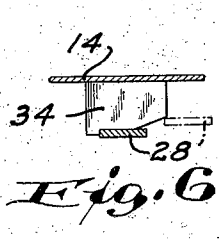


Fig. 6.

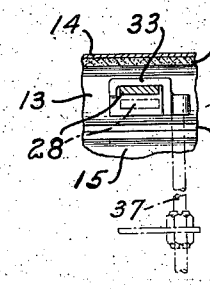


Fig. 7.

INVENTORS
F. G. Thwaits
BY R. S. Rieboldt
Morsell, Lieber & Morsell
ATTORNEYS.

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CLOSURE

Frederick G. Thwaits, Wauwatosa, and Russell Rieboldt, Milwaukee, Wis., assignors to The Heil Co., Milwaukee, Wis., a corporation of Wisconsin

Application June 27, 1935, Serial No. 28,596

15 Claims. (Cl. 220—57)

The present invention relates in general to improvements in the construction and operation of closures for the inspection openings of receptacles such as tanks.

An object of the invention is to provide an improved closure which is simple and compact in construction, and which is moreover highly efficient in operation and use.

Another object of the invention is to provide an improved manhole cover for metal tanks or the like, which can be conveniently removed to permit inspection of the tank interior, but which is capable of being firmly locked in closed position.

A further object of the invention is to provide an improved latch mechanism for the manhole closures of tank structures, which is durable in construction and readily manipulable.

Still another object of the invention is to provide an improved manhole and closure assemblage which is especially adapted for application to vehicular tanks for transporting and dispensing liquids such as oil and gasoline.

An additional object of the invention is to provide an improved rotary fastener and protective housing for manhole covers wherein the housing serves the dual purpose of guarding the cover and its supporting hinge, and as a means for effecting manipulation of the clamping and release mechanism.

Another object of the invention is to provide a vented closure assembly for the upper inspection openings of tanks, which can be manufactured and installed at moderate cost, and which is especially adapted to augment the streamlined appearance of vehicular tanks.

These and other objects and advantages will be apparent from the following detailed description.

A clear conception of an embodiment of the present invention, and of the mode of constructing and of manipulating manhole closures built in accordance with the improvement, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a bottom view of the improved closure assembly looking at the same from within the tank, and showing the latch bar thereof in clamping position;

Fig. 2 is a transverse vertical section through the assemblage of Fig. 1, taken along the irregular line 2—2, and likewise showing the latch bar in clamping position;

Fig. 3 is a longitudinal central vertical section through the closure assemblage of Fig. 1, taken along the line 3—3 and again showing the latch bar in clamping position;

Fig. 4 is another bottom view of the closure assembly, showing the latch bar swung into released position;

Fig. 5 is a transverse vertical section through the assemblage of Fig. 4, taken along the irregular line 5—5, showing the latch bar released and also showing the closure cover in dot-and-dash lines swung into partially opened position;

Fig. 6 is a fragmentary sectional view of a detail of the closure structure, the section being taken along the line 6—6 of Fig. 5; and

Fig. 7 is another fragmentary sectional view of a detail of the improved closure, the section having been taken along the line 7—7 of Fig. 2.

While the invention has been shown and described herein as being specifically applied to a vehicular tank manhole or inspection opening closure, it is not the intent to thereby unnecessarily restrict the scope, since some of the improved features may be advantageously applicable to other types of closure assemblages.

Referring to the drawings, the sheet metal receptacle or tank 10 is provided with an upper substantially elliptical opening which is bounded by an upwardly projecting flange 11, and this flange 11 provides a support for a sheet metal manhole frame 12 having an annular seating 13 with which a closure plate 14 is adapted to coact. The flange 11 may be formed integral with the shell of the tank 10, and has a flanged element 15 rigidly attached thereto as by welding; and the frame 12 has a peripheral depending apron which projects downwardly over the flange 11, and is detachably secured to the element 15 by means of bolts and nuts 16. The upstanding annular seating 13 which is formed integral with the frame 12, has an inwardly turned or beaded seating portion which materially strengthens and stiffens the seating 13, and with which the sealing ring 17 of the closure plate 14 is adapted to coact so as to produce tight sealing.

The closure plate 14 may also be formed of sheet metal, and is swingably supported upon the seating 13 of the frame 12 by means of parallel links 18 the swinging ends of which are attached to lugs on the plate 14 by a pivot pin 19, and the opposite ends of which are likewise attached to brackets on the frame 12 by a pivot pin 20. These links 18 and the pivot pin 20 permit the closure plate 14 to be swung bodily toward and away from the seating 13, and the pivot pin 19 also permits

the plate 14 to be swung relative to the links 18. The central portion of the closure plate 14 is provided with a rigid bearing sleeve 21 within which a shaft 22 is rotatably and slidably confined, and the lower extremity of the shaft 22 carries a latch bar actuator 23 while the upper shaft end is secured to a combined housing and latch actuating member 24. Both the latch actuator 23 and the member 24 are rigidly attached to the shaft 22 so that both of these elements partake of either rotary or axial movement of the shaft; and the cover or housing member 24 which may also be formed of sheet metal, normally conceals the closure plate 14 and its hinge, and is preferably provided with radial external gripping portions 25 for facilitating rotation of the shaft 22 and swinging of the closure plate 14 about its pivot pins 19, 20.

The portion of the shaft 22 located above the cover plate 14 is embraced by a coil spring 26 one end of which bears against the housing member 24 and the opposite end of which reacts against a sealing ring coacting with the sleeve 21, and the portion of the shaft 22 disposed on the opposite side of the plate 14 is likewise embraced by another coil spring 27 one end of which bears directly against a latch bar 28 and the opposite end of which also reacts against the sleeve 21. These springs 26, 27 oppose each other, and the upper spring 26 merely serves to prevent leakage while the lower spring 27 functions to facilitate actuation of the latch bar 28 which is carried by a bracket 29 slidably mounted upon the medial portion of the shaft 22. The latch bar 28 and the bracket 29 are secured to each other, and are therefore simultaneously slidable upon and movable to a limited extent about the axis of the shaft 22, and the bracket 29 has depending lugs 30 which are constantly maintained in contact with the latch actuator 23 by the spring 27. The actuator 23 has oppositely disposed helical surfaces 31 and notches 32 which are adapted to engage the adjacent lugs 30 of the bracket 29 in a manner which will be described later. The extreme ends of the latch bar 28 are cooperable with socketed members 33 secured to the seating 13 of the frame 12, to lock the closure plate 14 in closed position; and the plate 14 carries a latch stop 34 which is adapted to limit the angular displacement of the latch bar 28 about the shaft 22 when the bar has been released from the members 33.

The cover plate 14 may also be provided with vent valves 35, 36 of usual construction as shown in Figs. 1, 3, and 4, but these valves constitute no part of the present invention. One or both of the socketed members 33 may be provided with a measuring gage 37 as shown in dot-and-dash lines in Fig. 7, for determining the quantity of liquid within the tank 10, but this gage mechanism is optional. The entire assemblage may be finished or decorated to present a highly attractive appearance, and the manhole frame 12 may be disposed either longitudinally or transversely of the tank 10.

When the latch bar 28 is in clamping position as illustrated in Figs. 1, 2, 3, and 7, the opposite ends thereof are snugly confined within the sockets of the members 33 and the lugs 30 of the bracket 29 are disposed within the notches 32 of the latch actuator 23 so that the inner spring 27 is substantially compressed while the outer spring 26 is expanded. The sealing ring 17 is then pressed into snug engagement with the annular seating 13 of the manhole frame 12, and is firmly locked in this position both by the socketed members 33 and the notches 32.

If it becomes desirable to open the manhole, it is only necessary to grasp the gripping portions 25 and to simultaneously revolve the housing member 24, shaft 22, and latch actuator 23, so as to cause the notches 32 to move out of engagement with the lugs 30. The compressed spring 27 will subsequently become effective to cause the lugs to slide downwardly along the helical surfaces 31 during continued rotation of the actuator 23, thereby permitting the spring 27 to force the extreme ends of the latch bar 28 out of the sockets in the fixed members 33. Further rotation of the actuator 23 by the member 24, will thereafter be imparted to the bar 28 through the bracket 29, and will cause the latch bar 28 which has previously been released from the sockets in the members 33, to swing and ride along the stop 34 to the position shown in Figs. 4, 5, and 6, thus positively interrupting the rotation of the member 24 and shaft 22, and unlocking the cover. The gripping portions 25 may thereafter be utilized to swing the closure plate 14 open as indicated in dot-and-dash lines in Fig. 5, this swinging being permitted by the links 18 and the pivot pins 19, 20.

The manhole cover may obviously be closed by merely reversing the opening operations, and locking of the closed cover may be effected by utilizing the gripping portions to rotate the shaft 22 and actuator 23 in the opposite direction. When the actuator is thus rotated, the helical surfaces 31 are forced beneath the lugs 30 of the bracket 29, thus acting as wedges to force the latch bar toward the closure plate 14 after the end of the bar has been swung clear of the stop 34, and compressing the spring 27. As the closing rotation of the member 24 is continued, the lugs 30 eventually snap into the notches 32 and the ends of the latch bar 28 simultaneously enter the sockets of the members 33, whereupon the spring 27 again becomes effective to lock the closure in sealed position. During such opening and closing of the manhole cover, the outer spring 26 merely serves to restrain the action of the inner spring 27 and to hold the latch bar 28 in position against the stop 34 when the latch is released. An important feature of the present improvement, is the provision of means, comprising the hinge links 18, which prevent relative rotation of the sealing ring 17 and seating 13, during opening and closing of the cover 14, and when locking is being effected, these coacting elements are subjected only to direct pressure without sliding upon each other.

From the foregoing description it will be apparent that the present invention provides an improved closure which is extremely simple, compact and durable in construction, and which is moreover highly efficient in actual operation. The outer member 24 serves not only as a means for actuating the latch bar 28 from the exterior of the tank 10, but also conceals and protects the closure plate 14, the valves 35, 36 and the hinge links 18. The socketed members 33 and the lugs 30 coacting with the notches 32, firmly lock the closure covers in closed position, and the stop 34 functions to effectively hold the latch bar 28 against undesirable displacement when the lock has been released, thereby insuring effective closing whenever desired. The improved assemblage besides presenting a neat and attractive appearance, can be conveniently operated, and may be manufactured and installed at moderate cost. The improvement has been found

highly satisfactory in actual commercial operation especially when applied to streamlined vehicular tank structures.

It should be understood that it is not desired to limit the invention to the exact details of construction herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In combination, a tank having an inspection opening therein, a closure plate swingably supported by said tank and cooperable with said opening, a shaft journalled in said plate, a latch bar carried by said shaft and cooperable with said tank, said bar being movable in one direction about the shaft axis to lock said plate in closed position, a member carried by said shaft and movable relative to said bar for urging the latter into locking position, and a stop on said closure plate for positively limiting the reverse movement of said bar about said axis.

2. In combination, a tank having an inspection opening therein, a closure plate swingably supported by said tank and cooperable with said opening, a shaft journalled in said plate, a latch bar carried by said shaft and cooperable with said tank, said bar being swingable in one direction about the shaft axis to lock said plate in closed position, a member rotatable by said shaft relative to said bar for initially moving the latter and for subsequently forcing the same into locking position, and a stop on said closure plate for positively limiting the reverse swinging of said bar about said axis.

3. In combination, a receptacle having an opening provided with a peripheral seating, a closure for said opening, a shaft journalled in said closure, a latch bar freely slidable along and rotatable relative to said shaft, said latch bar being engageable with sockets on said receptacle, and a member secured to the end of said shaft within said receptacle and rotatable by said shaft relative to said bar for urging the ends of the latter into said sockets to hold said closure against said seating.

4. In combination, a seating, a closure cooperable with said seating, a shaft journalled in said closure, a member for moving said shaft forming a cover for said closure, a latch bar freely slidable along and rotatable about said shaft and operable by said member to lock said closure against said seating, and stops on said seating and on said closure for limiting the rotary motion of said bar.

5. In combination, an annular seating, a closure plate cooperable with said seating, hinge means for swingably supporting said plate, a shaft slidably journaled in said plate, a member for sliding and rotating said shaft forming a cover for said plate and for said hinge means, a latch bar carried by said bar and operable by said member to lock said plate against said seating, and a spring coacting with said closure plate and with said bar to constantly urge said shaft along its axis.

6. In combination, an annular seating having sockets adjacent the opposite sides thereof, a closure plate cooperable with said seating, a shaft disposed centrally of said plate, a shaft actuating member secured to an end thereof, a latch bar movably supported by a medial portion of said shaft between said plate and the opposite shaft end and having ends cooperable with said sockets, a latch bar actuator carried by said opposite end of said shaft, and resilient means interposed between said plate and said latch bar for urging said bar away from said sockets when said actuator is inactive.

7. In combination, a seating, a closure plate cooperable with said seating, a shaft penetrating said plate, a shaft actuating member secured to an end thereof on one side of said plate, a latch bar movably supported by said shaft at the opposite side of said plate and cooperable with sockets adjacent said seating, resilient means interposed between said plate and said latch bar for urging said bar away from said sockets, and a latch bar actuator associated with the opposite end of said shaft for forcing said bar into said sockets in opposition to said resilient means.

8. In combination, a seating, a closure plate cooperable with said seating, a shaft penetrating said plate, a shaft actuating member secured to an end thereof on one side of said plate, a latch bar movably supported by said shaft at the opposite side of said plate and cooperable with sockets adjacent said seating, resilient means interposed between said plate and said latch bar for urging said bar away from said sockets, a latch bar actuator associated with the opposite end of said shaft for urging said bar into said sockets in opposition to said resilient means, and means for holding said latch bar against movement when released from said sockets.

9. In combination, a seating, a closure plate cooperable with said seating, a shaft penetrating said plate, a shaft actuating member secured to an end thereof, a spring interposed between said plate and said member for preventing leakage along said shaft, a latch bar supported by a medial portion of said shaft, a second spring interposed between said plate and said bar for urging said bar away from said plate, and a latch bar actuator secured to the opposite end of said shaft for moving said bar to latching position in opposition to said second spring.

10. In combination, a seating, a closure plate cooperable with said seating, a shaft mounted centrally of said plate, an actuating member secured to the outer end of said shaft, a leakage preventing spring embracing said shaft between said plate and said member, a latch bar movably supported by said shaft, a second spring embracing said shaft between said plate and said bar for urging said bar away from said plate, and means carried by the inner end of said shaft for urging said bar into clamping position in opposition to said second spring when said actuating member is manipulated.

11. In combination, a seating, a closure plate cooperable with said seating, a shaft mounted centrally of said plate, an actuating member secured to the outer end of said shaft, a leakage preventing spring embracing said shaft between said plate and said member, a latch bar movably supported by said shaft, a second spring embracing said shaft between said plate and said bar for urging said bar in one direction, means carried by the inner end of said shaft for urging said bar in the opposite direction into clamping position when said actuating member is manipulated, and a stop carried by said plate for holding said latch bar in inactive position.

12. In combination, a frame having a continuous annular seating, a closure plate cooperable with said seating, a shaft journalled in said plate, a latch bar movably supported by said shaft and cooperable with sockets on said frame, a latch bar actuator secured to said shaft and having

helical surfaces for urging said latch into said sockets upon rotation of said shaft, means for rotating said shaft to operate said actuator, and means on said actuator for locking said bar within said sockets.

13. In combination, a frame having a continuous annular seating, a closure plate cooperable with said seating, a shaft journalled in said plate, a latch bar movably supported by said shaft and cooperable with sockets on said frame, a latch bar actuator secured to said shaft and having helical surfaces for urging said latch into said sockets upon rotation of said shaft, means for rotating said shaft to operate said actuator, means on said actuator for locking said bar within said sockets, and stop means on said plate for holding said bar in inactive position.

14. In combination, a frame having a fixed seating, a closure plate cooperable with said seating, means for permitting movement of said plate toward and away from said seating while preventing relative rotation of said plate and seating, means providing sockets adjacent said seating, a latch bar carried by said plate and cooperable with said sockets to lock said plate against said seating, and means journaled in said plate for initially revolving said bar and for subsequently forcing the ends thereof into said sockets.

15. In combination, a frame having a fixed seating, a closure plate cooperable with said seating, a hinge for permitting swinging of said plate toward and away from said seating while preventing rotation of said plate about the axis of said seating, means providing fixed sockets adjacent said seating, a latch bar cooperable with said sockets, actuating means for forcing the ends of said bar into said sockets, said actuating means being carried by said plate, and resilient means coacting with said actuating means for assisting said actuating means in urging said latch bar toward said sockets.

FREDERICK G. THWAITS.
RUSSELL RIEBOLDT.