Feb. 8, 1966 J. A. SMITH ETAL 3,233,713

COIN OPERATED LOCK

Filed March 3, 1964 2 Sheets-Sheet 1

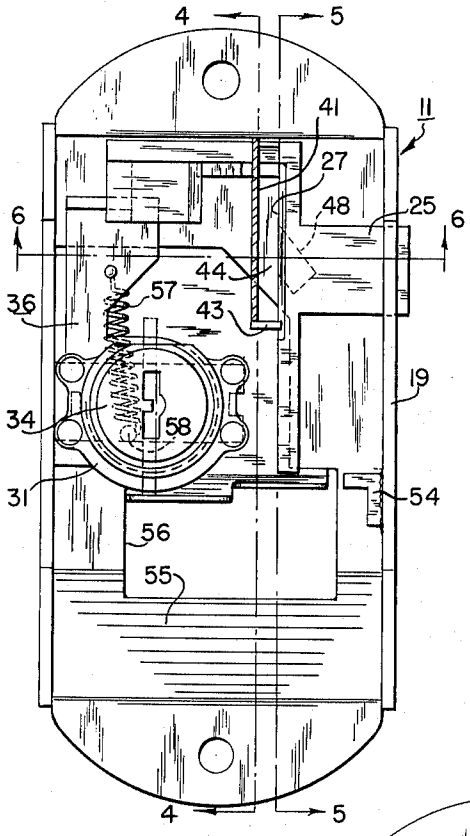


FIG. 1

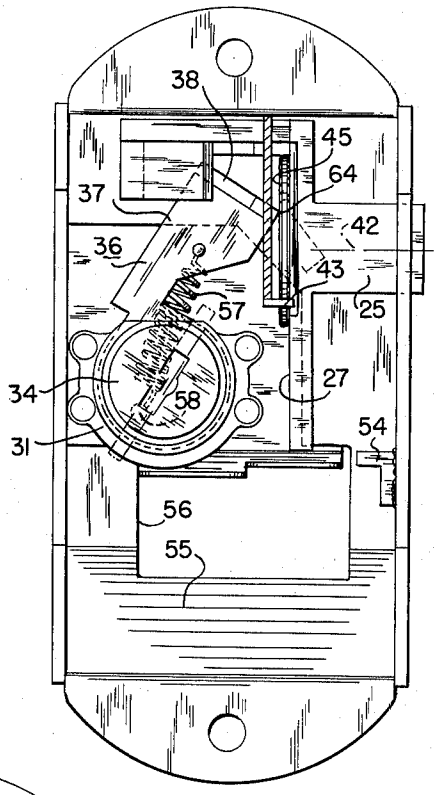


FIG. 2

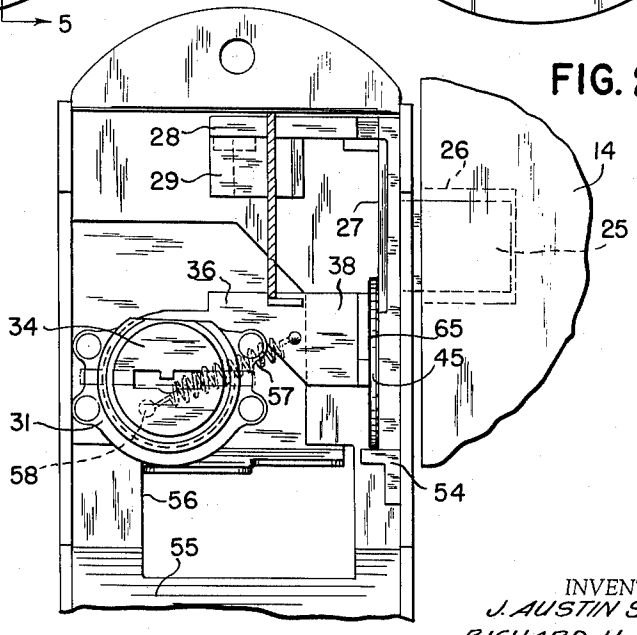


FIG. 3

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Feb. 8, 1966 J. A. SMITH ETAL 3,233,713

COIN OPERATED LOCK

Filed March 3, 1964 2 Sheets-Sheet 2

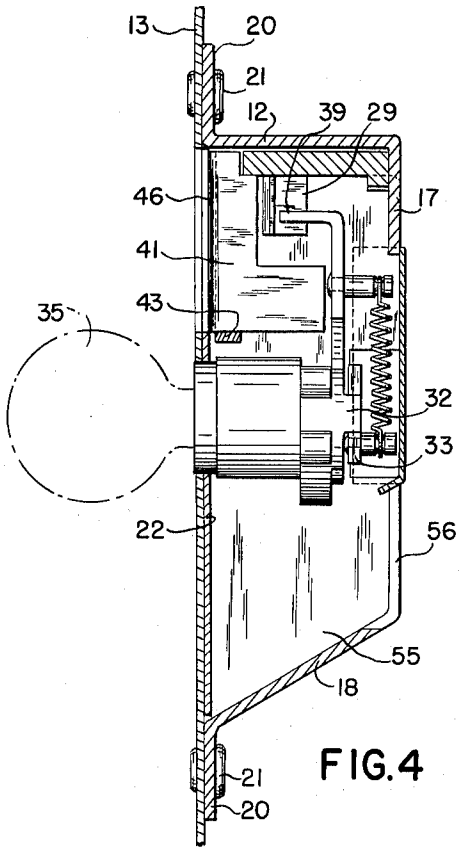


FIG. 4

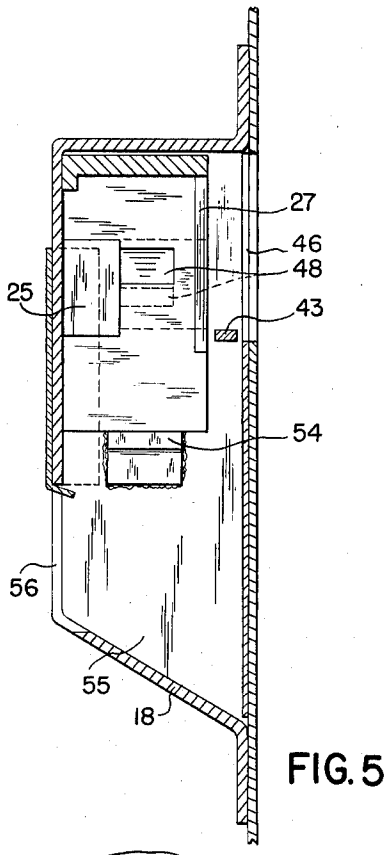


FIG. 5

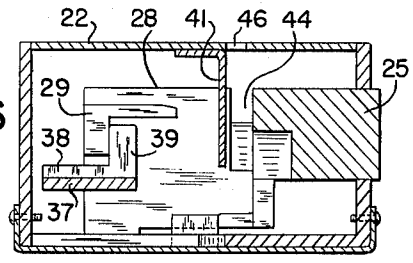


FIG. 6

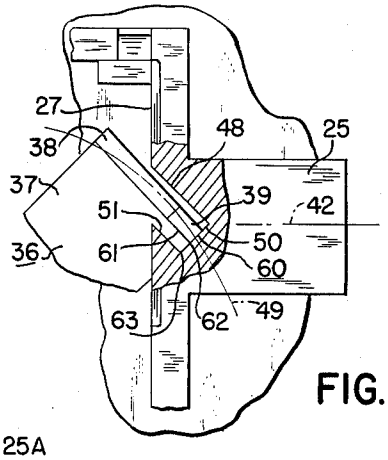


FIG. 7

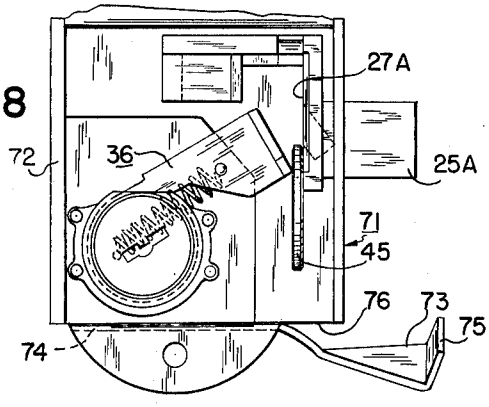


FIG. 8

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COIN OPERATED LOCK

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Filed Mar. 3, 1964, Ser. No. 348,948
25 Claims. (Cl. 194—74)

The invention relates in general to coin operated locks and, more particularly, to a combined coin and key operated lock.

The coin and key operated lock of the invention may be used in many environments and one particular environment is in the use of storage lockers with the lock mounted in the door to cooperate with the door frame. The lock is normally unlocked, that is with the lock bolt retracted, and manipulating the key will not lock the mechanism until a coin is inserted. After locking, the key may be withdrawn to lock the storage locker and the coin is retained as a deposit for return of the key. Upon return, the user manipulates the lock with the key to open the storage locker whereupon he may recover his articles stored therein and may also recover his coin deposit. Thus, the lock mechanism is a coin return lock providing free service.

An object of the invention is to provide a coin operated lock which will refund the coin to the operator.

Another object of the invention is to provide a combined coin and key operated lock wherein a coin is required before the key may be fully manipulated and yet the coin is returned to the user.

Another object of the invention is to provide a simple and reliable combined coin and key operated lock having a minimum of parts and a maximum of reliability.

Another object of the invention is to provide a coin and key operated lock wherein the presence of a coin is required for actuation of the lock by the key and the coin is not recoverable until the lock mechanism has again been returned to its initial position.

Another object of the invention is to provide a coin operated lock wherein thrust through opposite faces of the coin is provided for actuating the lock mechanism.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a front elevational view, with the cover removed, of a lock embodying the invention;

FIGURE 2 is a view similar to FIGURE 1 and showing a coin in place and the lock in a position ready for actuation;

FIGURE 3 is a view similar to FIGURE 1 and showing the lock actuated;

FIGURE 4 is a sectional view on line 4—4 of FIGURE 1;

FIGURE 5 is a sectional view on line 5—5 of FIGURE 1;

FIGURE 6 is a sectional view on line 6—6 of FIGURE 1;

FIGURE 7 is an enlarged partial view of the lock with no coin therein; and,

FIGURE 8 is a partial view similar to FIGURE 1 showing a modification.

FIGURES 1–7 show a lock mechanism 11 which is a preferred embodiment of the invention. The mechanism 11 is contained within a lock case 12 which may be mounted on a door 13 to cooperate with a door frame 14. The door 13 may be a door to a locker contained in the door frame 14. This may be a storage locker, for example, for storing articles therein.

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The lock case 12 has a rear wall 17, a sloping bottom wall 18, a side wall 19 and mounting ears 20. The mounting ears 20 may be riveted to the inside of the door 13 as shown at 21 in FIGURE 4. A cover 22 covers the front of the lock case 12 and normally abuts the inside wall of the door 13. This cover is shown in FIGURE 4 but is shown removed in the remaining FIGURES 1–3 for clarity.

A lock bolt 25 is mounted in the lock case 12 for reciprocal movement between a retracted position shown in FIGURE 1 and an extended position shown in FIGURE 3. In this extended position, it may extend into a locking aperture 26 in the door frame 14 or otherwise engage an abutment fixed to the door frame 14. The lock bolt 25 has a face wall 27 on an inner surface and has an inner extension 28 with an abutment 29 depending therefrom. A barrel 31 is fixed in the lock case 12 and, as shown, the barrel has rearward extensions 32 extending into a plate 33 fixed to the case 12. The front of the barrel is contained in an aperture in the cover 22 to retain the barrel 31 in place. A key cylinder 34 is journalled for rotation in the barrel 31 by a key 35. A lever 36 has a first leg 37 fixed to the rear of the key cylinder 34 to turn with this cylinder. In this embodiment the lever 36 has an arcuate movement of about 90 degrees from a first arcuate position shown in FIGURE 1 to a second arcuate position shown in FIGURE 3. A second leg 38 is provided on the outer end of the first leg at right angles to this first leg 37. An extending tongue 39 is provided on the outer end of the second leg 38. A fixed abutment 41 is fixed on the case 12 by being fastened to the cover 22. This fixed abutment has a first surface perpendicular to a first path of reciprocation 42 of the lock bolt 25. The abutment 41 also has a short extension 43 near the bottom thereof and near the cover 22 at right angles to the first surface. A first coin chute 44 is defined by the fixed abutments 41 and 43 and the face wall 27 of the lock bolt 25. FIGURE 2 shows a coin 45 disposed in this first coin chute 44. A second coin receiving chute 46 is provided in the front cover 22 and the door is to permit insertion of the coin 45 into the first coin chute 44. A coin of the proper denomination is prevented from falling downwardly out of the first coin chute 44 by the extension 43 but smaller coins will fall through. The first coin chute 44 is aligned with the second coin chute upon the lock bolt 25 being in the retracted or first position of FIGURE 1 and being misaligned when the lock bolt 25 is in the extended or second position shown in FIGURE 3.

An arcuate slot 48 is cut into the face wall 27 of the lock bolt 25 on an arc of movement of the lever second end 38. This lever second end 38 moves in an arcuate path which is a second path of movement 49 which intersects the first path 42 at an acute angle. This is better shown in FIGURE 7. The arcuate slot 48 may be considered an angled slot and may be formed with straight walls for ease of manufacture and disposed along a tangent to the arcuate path 49. This slot 49 has a bottom wall 50 and a re-entrant wall 51.

A shelf abutment 54 is fixed on the wall of the case 12 below the face wall 27 of the lock bolt 25. A coin return receptacle 55 is connected to and made part of the case 12 below the shelf abutment 54. A coin opening 56 is provided in the rear wall 17 of the case 12 so that the operator's finger may be inserted to withdraw a coin resting on the sloping bottom wall 18. A coil spring 57 is connected between the lever 36 and a post 58 on the case 12 which is off center relative to the pivot axis of the key cylinder 34. Thus the spring 57 acts as a detent urging the lever 36 toward either the first or second arcuate position.

Operation

The lock mechanism **11** has been shown as being a key and coin operated mechanism with a coin return provision. The lock mechanism **11** may thus be used in a locker to lock a door **13** to a frame **14**. The lock mechanism may be mounted on the inside of the door **13** with only the face of the key cylinder **34**, the key **35** and the coin slot **46** visible from the exterior of the locker. The environment shown is a parcel checking locker or similar use wherein a coin, for example a quarter, is required to actuate the lock to the locked position shown in FIGURE 3 to lock the door **13** but the coin is returned when the key is reactuated to open the door **13**. The key is captive in the key cylinder **34** when in the normal position shown in FIGURE 1. Thus the key cannot be removed from the lock without deposit of the required coin and also the key **35** may serve as a handle so that one may pull open the door **13**. The operator may place the parcels to be checked within the locker and then reclose the door. When the coin is inserted through the second coin chute **46**, then the key cylinder **34** may be turned to the position shown in FIGURE 3 which extends the lock bolt **25** to lock the door. In this position, the key **35** may be removed from the key cylinder so that the person's articles are securely locked in the locker.

If no coin is in the first coin chute **44**, such as the condition shown in FIGURE 1, the key **35** is unable to actuate the lock. In this condition of absence of a coin, the lever second end **38** will pass completely through the first coin chute **44** into the arcuate slot **48**. In this position, the surface **60** of the lever second end **38** will strike the bottom wall **50** of the slot **48**. Continued urging of the lever **36** in a clockwise direction as viewed in FIGURES 1 and 7 will provide a component of force parallel to the first path **42** which will extend the lock bolt **25** very slightly toward the extended or second position shown in FIGURE 3. This extensile movement is very short and will terminate when the surface **61** engages the re-entrant wall **51** of the arcuate slot **48**. This engagement of these two surfaces **60** and **61** with the slot walls **50** and **51** will provide a primary component of force from the lever **36** to the lock bolt **25** which is essentially perpendicular to the first path **42**. Further, the component of force from the lever **36** to the lock bolt **25** which is parallel to the first path **42** will be insufficient to move this lock bolt **25** outwardly. The re-entrant wall **51** effectively locks the lock bolt in a position essentially at the retracted position of FIGURE 1 and prevents extension of this lock bolt **25**. This is a safeguard mechanism to prevent anyone tampering with the lock such as trying to extend the lock bolt to the extended position by inserting the point of a knife through any crack between the door **13** and door frame **14** and digging the point of the knife into the lock bolt to try to extend it. Further, the detent spring **57** will retain the lock bolt in the retracted position when in the position of FIGURE 1 despite such tampering activities.

If the corner **62** on the lever second end between the surfaces **60** and **61** is more rounded than the corner **63** between the slot walls **50** and **51**, then this corner **62** will not engage the corner **63**. In this case the lever **36** may only be rotated clockwise until surface **60** engages slot wall **50** and surface **61** engages slot wall **51**. This will establish two engagements each at about a 45 degree angle relative to the horizontal, considering that the lock **11** is presumed to be mounted vertically on the inside of a vertical door. Thus, the force from the lever **36** to the lock bolt **25** will be along two lines each at about a 45 degree angle on opposite sides of a vertical and thus the primary component of force will be vertically downward. This component of force is thus perpendicular to the horizontal first path **42** to prevent extension of the lock bolt **25**. This will be true even though the lever **36** is not proportioned or positioned to strike the lock bolt **25** at a 45 degree angle. If the corner **63** is more rounded

than the corner **62** on the lever **36**, then the lever **36** may be rotated clockwise to a position whereat the more pointed corner **62** strikes a generally horizontal portion of the rounded corner **63**. In this case also, the primary component of force will be generally vertically downward and generally perpendicular to the first path **42** to preclude outward movement of the lock bolt **25**. Since the lock bolt may not be extended fully without a coin in place, the key remains captive in the lock.

If a coin of smaller diameter than the proper denomination is inserted through the second coin chute **46** into the first coin chute **44**, then it will fall behind the abutment extension **43** and thus fall into the coin return receptacle **55**. With a coin **45** of the proper denomination inserted, it will remain in the first coin chute **44** as supported by the abutment extension **43**. This first coin chute **44** is defined by the abutment surfaces **41** and **43** and by the face wall **27** when the lock bolt **25** is in the first or retracted position of FIGURE 1. The key **35** may now be rotated clockwise to move the lever **36** clockwise whereupon an edge **64** of the lever second end **38** will engage the coin **45**. This is the position shown in FIGURE 2. The coin **45** thus covers the entrance to the aperture or slot **48** so that the lever **36** will not enter this slot **48**. A continued clockwise rotation of the lever **36** from the position shown in FIGURE 2 to the position shown in FIGURE 3 creates a lateral thrust through the opposite faces of the coin **45** to extend the lock bolt **25** to the position shown in FIGURE 3. For this embodiment, this is an arcuate rotation from about a 30 degree position to about a 90 degree position. In this position of FIGURE 3, the lever **36** extends generally horizontally and parallel to the first path **42**. The coin **45** is carried downwardly along the face wall **27** by the frictional engagement with the edge **64** of the lever **36**. The coin **45** slides down this face wall **47** until the lower edge of the coin rests on the shelf abutment **54** as shown in FIGURE 3. In this position the coin is pinched between the lower end of the face wall **27** and an outer surface **65** of the lever second end **38**. This securely retains the coin in this position shown in FIGURE 3 since the coin is also retained between the rear wall **17** of the case **12** and the front cover **22**.

In this position of FIGURE 3 the locker is locked and the key **35** may be removed to securely check the person's articles in the locker. In this locked position of FIGURE 3, the lever **36** is substantially horizontal and parallel to the first path **42**. Accordingly, as this extended position of FIGURE 3 is approached, the lever **36** acts as toggle lever means maintaining the lock bolt **25** in the extended position and also progressively increases the leverage acting on the lock bolt as this second arcuate position of the lever **36** is approached. This toggle lever action prevents anyone tampering with the lock from retracting the lock bolt as by using the point of a knife in any opening between the door **13** and door frame **14**. Additionally, the detent spring **57** retains the lever **36** in this second arcuate position.

When the locker is locked, the abutment extension **28** on the lock bolt **25** is moved to a position to close the coin receiving chute **46**, so that no second coin may be inserted.

When the person returns to the locker and inserts the key **35** in the key cylinder **34**, then the key may be rotated counterclockwise toward the first arcuate position shown in FIGURE 1. In so doing, the lever outer surface **65** is first moved away from the coin **45**. After arcuate movement of about 70 degrees, in this embodiment of the invention shown, the extending tongue **39** of the lever will engage the abutment **29** on the inner end of the lock bolt **25** and thus move the lock bolt to the retracted position of FIGURE 1. As this movement occurs, the face wall **27** pushes the coin **45** off the shelf abutment **54** and thus the coin falls into the coin return receptacle **55**.

The fact that the coin **45** is retained between the surface **65** and the face wall **27** when the lock bolt is extended, is an anti-tampering feature. The lock bolt must be extended in the position of FIGURE 3 before the key may be withdrawn. The fact that the coin **45** is securely retained within the lock mechanism **11** at this time is assurance that a coin deposit has been made to assure safe return of the key **35**. It is only when the key is returned, inserted in the key cylinder **34** and then turned to the initial position of FIGURE 1 that the coin **45** may be retrieved. In the position of FIGURE 1 the key **35** is not removable from the lock.

The second end **38** of the lever **36** is a hook end which may enter an angled slot or aperture in the lock bolt in the absence of a coin and this entrance into this aperture or slot **48** creates a condition as described above wherein insufficient force may be transmitted from the lever **36** to the lock bolt **25** to extend this lock bolt. However, upon the presence of a coin in the first coin chute **44**, lateral thrust may be transmitted through the opposite faces of this coin to extend the lock bolt.

The face wall **27** is transverse to the first path of movement **42** and, as shown, is preferably perpendicular to this path. It will be noted that there is no confining coin chute which confines both faces of the coin **45** in all positions of the lock bolt. The first coin chute **44** is defined on one side by the face wall **27** on the lock bolt **25** and defined on the other side by abutment surface **41** fixed on the case. Thus, there is no surface of a coin chute impeding movement of the lever second end **38**. Further, it is the edge **64** of the lever **36** which engages the coin **45** to retain it in place against the face wall **27** during arcuate clockwise movement of the lever **36**. As shown, the friction between edge **64** and the coin **45** is greater than the friction between coin **45** and the face wall **27**, however, this may be reversed, if desired, so that the coin **45** is not moved downwardly along the face wall **27** as the lock bolt is extended.

If desired, the coin opening **56** may be omitted from the lock case **12** in which case the lock mechanism will become a coin retained mechanism rather than a coin return mechanism.

The lever second end **38** may be characterized as a thrust member movable in the case along the second path **49** to intersect the first path **42** at an acute angle. This thrust member will engage the wall means **50** and **51** of the aperture or slot **48** as thrust wall means. These thrust wall means are disposed effectively on a line parallel to the first path **42** since it may be considered that the effective points of contact of surfaces **60** and **61** with the walls **50** and **51** will be on a generally horizontal line. Thus, this gives a primary component of force generally vertically downwardly to establish no movement of the lock bolt **25**. It may also be considered that the edge **64** of the lever **36**, as viewed in FIGURE 2, when acting through the coin **45**, will establish a component of force to extend the lock bolt **25**. In the absence of a coin in the first coin chute **44**, the corner **62** of the lever **36** exerts a force on the lock bolt **25** which is generally vertically downwardly to prevent extension of the lock bolt **25**.

FIGURE 8 shows a modification of the invention wherein a lock mechanism **71** may be generally similar to the lock mechanism **11** shown in FIGURES 1–7. This lock mechanism **71** may include a lock case **72** which may be smaller physically than the lock case **12**. One reason for this is that a coin return receptacle **73** is formed generally exterior to the lock case **72**. The lock case **72** may be made of heavy gauge sheet metal for example and the coin receptacle **73** may be formed as an extension of the bottom wall **74** of the case **72**. A hook end **75** on this coin receptacle **73** retains the coin **45** when a coin falls out of a coin opening **76** in the bottom wall **74**. The lock case **72** is adapted to be mounted on the inside wall of a door such as the door **13** and this would be a vertical surface retaining the coin in the coin return receptacle **73**. The sheet metal part forming the coin receptacle **73** may be twisted or warped to aid in this retention of the coin.

The lock mechanism **71** of FIGURE 8 is shown in the partly extended position of the lock bolt **25A** which is similar to the lock bolt **25** except for a shortened face wall **27A**. Because of this shortening, the coin **45** is retained in engagement with the face wall **27A** throughout a majority of the arcuate clockwise movement of the lever **36** but is then released. This releasing is near the end of the 90 degree arc of movement and the coin **45** thus drops through the opening **76** into the coin receptacle **73**. The teachings of FIGURES 1 and 8 may be combined if it is desired to construct a lock mechanism having a case smaller than that shown in FIGURE 1 yet still having the coin retaining feature of FIGURE 1 when the lock bolt is extended. In this case a shelf abutment **54** might be provided in the lock case **72** with a long face wall **27** so that the coin **45** would be retained in the extended position of the lock bolt **25**. Then upon return arcuate movement of the lever **36**, the face wall **27** would push the coin off the shelf abutment **54** to have it drop through the coin opening **76** into the coin return receptacle **73**.

Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts many be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a first path between first and second positions,

thrust means movable in said case in a second path at an angle to said first path,

a movable face wall at least partially defining a coin chute,

means connecting said face wall to move said lock bolt in said first path upon movement of said face wall,

wall means defining an aperture in said face wall to receive said thrust means in the absence of a coin in said coin chute whereby said thrust means moving in said second path into said aperture establishes insufficient force to move said lock bolt from said first to said second position,

the presence of a coin in said coin chute covering the entrance to said aperture whereby said thrust means moving on said second path against said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said thrust means is moved in a first direction,

and said thrust means engaging said coin to retain same in engagement with said face wall throughout a major portion of the movement of said thrust means.

2. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a first path between first and second positions,

a lever arcuately movable in said case from a first to a second arcuate position in a second path at an angle to said first path,

a movable wall at least partially defining a coin chute,

means connecting said face wall to move said lock bolt in said first path upon movement of said face wall,

thrust means moved by said lever,

wall means defining an aperture in said face wall to receive said thrust means in the absence of a coin in said coin chute whereby said thrust means estab-

lishes insufficient force to move said lock bolt from said first to said second position,

the presence of a coin in said coin chute covering the entrance to said aperture whereby said thrust means moving against said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said lever is rotated in a first direction,

said thrust means engaging said coin to retain said coin in engagement with said face wall throughout a major portion of the arcuate movement of said lever as said lever approaches said second arcuate position,

and said second arcuate position of said lever being substantially parallel to said first path to act as toggle lever means maintaining said lock bolt in said second position.

3. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a first path between first and second positions,

a lever arcuately movable in said case from a first to a second arcuate position in a second path at an angle to said first path,

a movable face wall at least partially defining a coin chute,

means connecting said face wall to move said lock bolt in said first path upon movement of said face wall,

wall means defining an aperture in said face wall to receive said lever in the absence of a coin in said coin chute whereby said lever moving in said second path into said aperture establishes insufficient force to move said lock bolt from said first to said second position,

the presence of a coin in said coin chute covering the entrance to said aperture whereby said lever moving in said second path against said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said lever is rotated in a first direction,

said arcuate movement of said lever retaining said coin in engagement with said face wall throughout a major portion of the arcuate movement of said lever and moving said coin along said face wall as said lever approaches said second arcuate position,

and said second arcuate position of said lever being substantially parallel to said first path to act as toggle lever means maintaining said lock bolt in said second position.

4. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a first path between first and second positions,

a lever arcuately movable in said case in a second path from a first to a second arcuate position,

a face on an inner surface of said lock bolt transverse to said first path of movement of said lock bolt,

a coin chute defined at least partially by said face upon said lock bolt being in said first position,

will means defining an aperture in said chute defining face of said lock bolt to receive said lever in the absence of a coin in said coin chute whereby said lever moving on said second path at an angle to said first path against said wall means has a primary component of force substantially perpendicular to said first path and establishes along said first path a force on said lock bolt insufficient to move same from said first to said second position,

the presence of a coin in said coin chute covering the entrance to said aperture whereby said lever moving on said second path at an angle to said first path against said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said lever is rotated in a first direction,

said arcuate movement of said lever retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and moving said coin along said face as said lever approaches said second arcuate position,

and said second arcuate position of said lever being substantially parallel to said first path to act as a toggle lever means maintaining said lock bolt in said second position.

5. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a first path between first and second positions,

a lever arcuately movable in said case in a second path from a first to a second arcuate position,

said lever having a hook on the outer end thereof,

a face on an inner surface of said lock bolt and being substantially perpendicular to said first path of movement of said lock bolt,

a coin chute defined at least partially by said face upon said lock bolt being in said first position,

slot wall means defining an angled slot in said chute defining face of said lock bolt at an acute angle to said first path to receive said lever hook end in the absence of a coin in said coin chute whereby said hook end moving at an angle to said first path against said slot wall means has a primary component of force perpendicular to said first path and establishes along said first path a force on said lock bolt insufficient to move same from said first to said second position,

the presence of a coin in said coin chute covering the entrance to said angled slot whereby said lever hook end moving at an angle to said first path against said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said lever is rotated in a first direction,

said arcuate movement of said lever hook end retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and sliding said coin along said face as said lever approaches said second arcuate position,

and said second arcuate position of said lever being substantially parallel to said first path to act as toggle lever means maintaining said lock bolt in said second position and to progressively increase the leverage acting on said lock bolt as said second arcuate position is approached.

6. A coin and key operated lock, comprising in combination, a lock case,

a lock bolt in said case reciprocable in a first path between first and second positions,

a key cylinder rotatable in said case,

a lever arcuately movable by said key cylinder in a second path from a first to a second arcuate position,

said lever having a hook on the outer end thereof,

a face on an inner surface of said lock bolt and being substantially perpendicular to said first path of reciprocation of said lock bolt,

a first coin chute defined at least partially by said face upon said lock bolt being in said first position,

a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,

slot wall means defining an angled slot in said chute

defining face of said lock bolt at an acute angle to said first path to receive said lever hook end in the absence of a coin in said first coin chute whereby said hook end moving at an angle to said first path against said slot wall means has a primary component of force perpendicular to said first path and establishes along said first path a force on said lock bolt insufficient to move same from said first to said second position,

the presence of a coin in said first coin chute covering the entrance to said angled slot whereby said lever hook end moving at an angle to said first path against said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said key cylinder and lever is rotated in a first direction,

said arcuate movement of said lever hook end retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and sliding said coin downwardly along said face as said lever approaches said second arcuate position,

said second arcuate position of said lever being substantialy parallel to said first path to act as toggle lever means maintaining said lock bolt in said second position and to progressively increase the leverage acting on said lock bolt as said second arcuate position is approached,

a shelf abutment fixed on said case to engage the lower edge of any said coin and retain said coin between said lever second end and said face in the second arcuate position of said lever,

a coin opening in said lock case below said chute defining face of said lock bolt,

and an abutment on the inner end of said lock bolt engageable by said lever upon opposite arcuate movement thereof to return said lock bolt to said first position and to have said face push said coin off said shelf abutment to have said coin drop toward said coin opening.

7. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable along a first path between first and second positions,

a thrust member movable in said case along a second path intersecting said first path at an acute angle,

a face on an inner surface of said lock bolt and being transverse to said first path,

a coin chute defined at least partially by said face upon said lock bolt being in said first position,

thrust wall means in said chute defining face of said lock bolt disposed effectively on a line parallel to said first path to receive said thrust member in the absence of a coin in said coin chute with said thrust member moving along said second path against said thrust wall means to have the primary component of force generally perpendicular to said first path and thus establishing no movement of said lock bolt,

and the presence of a coin in said coin chute covering said face whereby said thrust member moving in said second path against any said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said thrust member is moved in a first direction.

8. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable along a first path between first and second positions,

a thrust member movable in said case along a second path intersecting said first path at an acute angle,

a face on an inner surface of said lock bolt and being transverse to said first path,

a coin chute defined at least partially by said face upon said lock bolt being in said first position,

wall means defining an aperture in said chute defining face of said lock bolt and including thrust wall means disposed effectively on a line parallel to said first path to receive said thrust member in the absence of a coin in said coin chute with said thrust member moving approximately at said acute angle to said first path against said thrust wall means to have the primary component of force generally perpendicular to said first path and thus locking said lock bolt against movement,

the presence of a coin in said coin chute covering the entrance to said aperture whereby said thrust member moving in said second path against any said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said thrust member is moved in a first direction,

and an abutment on said lock bolt engageable by said thrust member upon opposite movement thereof to return said lock bolt to said first position.

9. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable along a first path between first and second positions,

a thrust member movable in said case along a second path intersecting said first path at an acute angle,

a face on an inner surface of said lock bolt and being substantially perpendicular to said first path,

a coin chute defined at least partially by said face upon said lock bolt being in said first position,

a wall defining an angled slot in said chute defining face of said lock bolt substantially at said acute angle to said first path to receive said thrust member in the absence of a coin in said coin chute with said thrust member moving at said acute angle to said first path against said slot wall to have the primary component of force perpendicular to said first path and thus locking said lock bolt against movement,

and the presence of a coin in said coin chute covering the entrance to said angled slot whereby said thrust member moving in said second path against any said coin has a component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position.

10. A coin and key operated lock, comprising in combination, a lock case,

a lock bolt in said case movable along a first path between first and second positions,

a key cylinder rotatable in said case,

a thrust member connected to be moved by said key cylinder along a second path intersecting said first path at an acute angle in the order of 30 to 60 degrees,

a face on an inner surface of said lock bolt and being substantially perpendicular to said first path,

a coin chute defined at least partially by said face upon said lock bolt being in said first position,

a wall defining an angled slot in said chute defining face of said lock bolt substantially at said acute angle to said first path to receive said thrust member in the absence of a coin in said coin chute with said thrust member moving at said acute angle to said first path against said slot wall to have the primary component of force perpendicular to said first path and thus locking said lock bolt against movement,

and the presence of a coin in said coin chute covering the entrance to said angled slot whereby said thrust member moving at an acute angle to said first path against any said coin has a primary component of

force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said key cylinder is rotated in a given direction.

11. A coin and key operated lock, comprising in combination, a lock case,

a lock bolt in said case movable along a first path between first and second positions,

a key cylinder rotatable in said case,

a thrust member connected to be moved by said key cylinder along a second path intersecting said first path at an acute angle in the order of 30 to 60 degrees,

a face on an inner surface of said lock bolt and being substantially perpendicular to said first path,

a first coin chute defined at least partially by said face upon said lock bolt being in said first position,

a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,

a wall defining an angled slot in said chute defining face of said lock bolt substantially at said acute angle to said first path to receive said thrust member in the absence of a coin in said first coin chute with said thrust member moving at said acute angle to said first path against said slot wall to have the primary component of force perpendicular to said first path and thus locking said lock bolt against movement,

the presence of a coin in said first coin chute covering the entrance to said angled slot whereby said thrust member moving at an acute angle to said first path against any said coin has a primary component of force parallel to said first path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said key cylinder is rotated in a first direction,

and an abutment on said lock bolt engageable by said thrust member upon opposite arcuate movement of said key cylinder to return said lock bolt to said first position.

12. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable between first and second positions,

a lever arcuately movable in said case,

said lever having a hook on the outer end thereof,

a face on an inner surface of said lock bolt and being substantially perpendicular to the path of movement of said lock bolt,

a first coin chute defined at least partially by said face upon said lock bolt being in said first position,

a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,

a wall defining an angled slot in said chute defining face of said lock bolt at an acute angle to said path to receive said lever hook end in the absence of a coin in said first coin chute with said hook end moving at an angle to said path against said slot wall to have the primary component of force perpendicular to said path and thus locking said lock bolt against movement,

the presence of a coin in said first coin chute covering the entrance to said angled slot whereby said lever hook end moving at an angle to said path against any said coin has a primary component of force parallel to said path and creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said lever is rotated in a first direction,

and said arcuate movement of said lever hook end retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and moving said coin along said face.

13. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a path between first and second positions,

a lever arcuately movable in said case,

said lever having first and second legs substantially at right angles with said first leg pivoted relative to said case,

a face on an inner surface of said lock bolt and being substantially perpendicular to the path of movement of said lock bolt,

a first coin chute defined at least partially by said face upon said lock bolt being in said first position,

a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,

an angled slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against movement from said first position,

and the presence of a coin in said first coin chute covering the entrance to said angled slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said key cylinder and lever is rotated in a first direction.

14. A coin operated lock, comprising in combination, a lock case,

a lock bolt in said case movable in a path between first and second positions,

a lever arcuately movable in said case,

said lever having first and second legs substantially at right angles with said first leg pivoted relative to said case,

a face on an inner surface of said lock bolt and being substantially perpendicular to the path of movement of said lock bolt,

a first coin chute defined at least partially by said face upon said lock bolt being in said first position,

a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,

an angled slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against movement from said first position,

the presence of a coin in said first coin chute covering the entrance to said angled slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to move said lock bolt from said first to said second position as said key cylinder and lever is rotated in a first direction,

a coin opening in said lock case below said chute defining face of said lock bolt,

said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and moving said coin downwardly along said face toward said coin opening,

and an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to return said lock bolt to said first position.

15. A coin and key operated lock, comprising in combination, a lock case,

a lock bolt in said case reciprocable between first and second positions,
a key cylinder rotatable in said case,
a lever arcuately moved by said key cylinder,
said lever having a hook on the outer end thereof,
a face on an inner surface of said lock bolt and being substantially perpendicular to the path of reciprocation of said lock bolt,
a first coin chute defined at least partially by said face upon said lock bolt being in said first position,
a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,
a wall defining an angled slot in said chute defining face of said lock bolt at an acute angle to said path to receive said lever hook end in the absence of a coin in said first coin chute with said hook end moving at an angle to said path against said slot wall to have the primary component of force perpendicular to said path and thus locking said lock bolt against movement,
the presence of a coin in said first coin chute covering the entrance to said angled slot whereby said lever hook end moving at an angle to said path against any said coin has a primary component of force parallel to said path and creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said key cylinder and lever is rotated in a first direction,
a coin opening in said lock case below said chute defining face of said lock bolt,
said arcuate movement of said lever hook end retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever,
and an abutment on the inner end of said lock bolt engageable by said lever upon opposite arcuate movement thereof to return said lock bolt to said first position.

16. A coin and key operated lock, comprising in combination, a lock case,
a lock bolt in said case reciprocable between first and second positions,
a key cylinder rotatable in said case,
a lever arcuately moved by said key cylinder,
said lever having first and second legs substantially at right angles with said first leg connected to said cylinder,
a face on an inner surface of said lock bolt and being substantially perpendicular to the path of reciprocation of said lock bolt,
a coin chute defined at least partially by said face upon said lock bolt being in said first position,
an angled slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said coin chute and thus locking said lock bolt against movement from said first position,
the presence of a coin in said coin chute covering the entrance to said angled slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said key cylinder and lever is rotated in a first direction,
and an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to return said lock bolt to said first position.

17. A coin operated lock, comprising in combination, a lock case,
a lock bolt in said case reciprocable between first and second positions,
a lever arcuately movable in said case,

said lever having first and second legs at right angles with said first leg pivoted relative to said case,
a face on an inner surface of said lock bolt and being substantially perpendicular to the path of reciprocation of said lock bolt,
a coin chute defined at least partially by said face upon said lock bolt being in said first position,
an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said coin chute and thus locking said lock bolt against movement from said first position,
the presence of a coin in said coin chute covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said lever is rotated in a first direction,
a coin opening in said lock case below said chute defining face of said lock bolt in an intermediate position thereof,
said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and moving said coin downwardly along said face toward said coin opening,
and an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to return said lock bolt to said first position.

18. A coin operated lock, comprising in combination, a lock case,
a lock bolt in said case reciprocable between first and second positions,
a lever arcuately movable in said case,
said lever having first and second legs at right angles with said first leg pivoted relative to said case,
a face on an inner surface of said lock bolt and being substantially perpendicular to the path of reciprocation of said lock bolt,
a fixed abutment fixed on said case,
a first coin chute defined by said face and said fixed abutment upon said lock bolt being in said first position,
a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,
an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against movement from said first position,
the presence of a coin in said first coin chute covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said lever is rotated in a first direction,
a coin opening in said lock case below said chute defining face of said lock bolt in an intermediate position thereof,
said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and moving said coin downwardly along said face toward said coin opening,
and an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to return said lock bolt to said first position.

19. A coin and key operated lock, comprising in combination, a lock case,

a lock bolt in said case reciprocable between first and second positions,
a key cylinder rotatable in said case from a first to a second arcuate position,
a lever arcuately moved by said key cylinder,
said lever having first and second legs at right angles with said first leg connected to said cylinder,
a face on an inner surface of said lock bolt and being perpendicular to the path of reciprocation of said lock bolt,
a fixed abutment fixed on said case,
a first coin chute defined by said face and said fixed abutment upon said lock bolt being in said first position,
a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,
an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against movement,
the presence of a coin in said first coin chute covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said key cylinder and lever is rotated from an intermediate arcuate position to said second arcuate position.

20. A coin and key operated lock, comprising in combination, a lock case,
a lock bolt in said case reciprocable between first and second positions,
a key cylinder rotatable in said case from a first to a second arcuate position,
a lever arcuately moved by said key cylinder,
said lever having first and second legs at right angles with said first leg connected to said cylinder,
a face on an inner surface of said lock bolt and being perpendicular to the path of reciprocation of said lock bolt,
a fixed abutment fixed on said case,
a first coin chute defined by said face and said fixed abutment upon said lock bolt being in said first position,
a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said first position and being misaligned upon said lock bolt being in said second position,
an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against movement,
the presence of a coin in said first coin chute covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt from said first to said second position as said key cylinder and lever is rotated from an intermediate arcuate position to said second arcuate position,
said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of the arcuate movement of said lever and moving said coin downwardly along said face,
a coin opening near the bottom of said lock case below said chute defining face of said lock bolt in an intermediate position thereof,
an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to return said lock bolt to said first position,
and arcuate movement of said lever in one of said directions permitting said coin to drop into said coin opening.

21. A coin and key operated lock for a lockable locker having a door and door frame, comprising in combination, a lock case mountable on the inside of said door,
a lock bolt in said case reciprocable between retracted and extended positions with said extended position extendable through an aperture in said door frame to lock the door closed,
a barrel fixed in said case,
a key cylinder rotatable in said barrel,
a lever arcuately moved by said key cylinder,
said lever having first and second legs at right angles with said first leg connected to said cylinder,
a face on an inner surface of said lock bolt and being perpendicular to the path of reciprocation of said lock bolt,
a fixed abutment fixed on said case and having a first surface perpendicular to the path of reciprocation of said lock bolt and having a second surface at right angles to said path,
a first coin chute defined by said face and said first and second abutment surfaces upon said lock bolt being in said retracted position,
a second coin receiving chute in said case aligned with said first coin chute upon said lock bolt being in said retracted position and being misaligned upon said lock bolt being in said extended position,
an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against extension,
a coin in said first coin chute being retained therein by said fixed abutment and covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of any said coin to reciprocate said lock bolt in extension from said case as said key cylinder and lever is rotated from about a 30 degree position to about a 90 degree position,
said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt throughout a major portion of said arcuate movement of said lever and moving said coin downwardly along said face,
a coin return opening in the bottom of said lock case positioned below said chute defining face of said lock bolt in an intermediate position thereof,
an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to retract said lock bolt into said lock case,
and one of said extensile and return arcuate movements of said lever permitting said coin to drop into said coin return opening.

22. A coin and key operated lock for a lockable locker having a door and door frame, comprising in combination, a lock case mountable on the inside of said door,
a lock bolt in said case reciprocable between retracted and extended positions with said extended position extendable to cooperate with said door frame to lock the door closed,
a barrel fixed in said case,
a key cylinder rotatable in said barrel from a first position to a second position,
a key turning the key cylinder being captive in the key cylinder in said first position and removable in said second position,
a lever arcuately moved by said key cylinder,
said lever having first and second legs at right angles with said first leg connected to said cylinder,

a face on an inner surface of said lock bolt and being perpendicular to the path of reciprocation of said lock bolt,

a fixed abutment fixed on said case and having a first surface perpendicular to the path of reciprocation of said lock bolt and having a second surface at right angles to said first surface,

a first coin chute defined by said face and said first and second abutment surfaces upon said lock bolt being in said retracted position,

said abutment second surface to be of a shape to arrest a coin if proper denomination between said second surface and the rear wall of said case and permitting smaller coins to drop through said first coin chute to prevent operation of said lock,

a second coin receiving chute in asid case aligned with said first coin chute upon said lock bolt being in said retracted position and being misaligned upon said lock bolt being in said extended position,

an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said first coin chute and thus locking said lock bolt against extension,

said arcuate slot being so formed to stop said lever second leg from further movement before said key cylinder has reached said second position thus precluding said key from being removed from said key cylinder,

a coin in said first coin chute being retained therein by said fixed abutment and covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of the coin to reciprocate said lock bolt in extension from said case as said key cylinder and lever is rotated from about a 30 degree position to about a 90 degree position,

said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt throughout the arcuate movement from about a 30 degree position to about said 90 degree position and sliding said coin downwardly along said face,

a shelf abutment carried on said lock case below said chute defining face of said lock bolt in said extended position thereof to engage the lower edge of any said coin and retain said coin in said lock case between said lever second leg and said chute defining face in the extended position of said bolt lock,

a coin return receptacle in said lock case below said shelf abutment,

a lock bolt abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to retract said lock bolt into said lock case,

a leg on said lock bolt abutment having a dimension along the path of reciprocation of said lock bolt to close said second coin receiving chute in the extended position of said lock bolt to prevent insertion of a coin while said locker is in use and locked,

and said return arcuate movement of said lever moving said lever second end away from one face of any said coin and the retractile movement of said lock bolt pushing said coin off said shelf abutment to have same drop into said coin return receptacle.

23. A coin and key operated lock for a lockable locker having a door and door frame, comprising in combination,

a lock case mountable on the inside of said door,

a reciprocable lock bolt in said case and extendable through an aperture in said door frame to lock the door closed,

a barrel in said case,

a key cylinder rotatable in said barrel,

a level arcuately moved by said key cylinder,

said lever having first and second legs at right angles with said first leg connected to said cylinder,

a coin chute in said case to receive a coin,

a chute defining face on the inner end of said lock bolt defining one side of said coin chute and being perpendicular to the direction of reciprocation of said lock bolt,

an arcuate slot in said chute defining face of said lock bolt to receive said lever second leg in the absence of a coin in said coin chute and thus locking said lock bolt against extension,

the presence of a coin in said coin chute covering the entrance to said arcuate slot whereby said lever second leg creates a lateral thrust through the opposite faces of a coin to reciprocate said lock bolt in extension from said case as said key cylinder and lever is rotated from about a 30 degree position to about a 90 degree position,

said arcuate movement of said lever second leg retaining said coin in engagement with said chute defining face of said lock bolt until nearly the end of said 90 degree arc of movement and then releasing said coin from between said lever second leg and said chute defining face,

a coin discharge opening in the bottom of said case positioned below said chute defining face of said lock bolt in the extended position thereof to receive any said coin in the extended position of said lock bolt,

first and second detent recesses in said lock bolt,

an abutment on the inner end of said lock bolt engageable by said lever second leg upon opposite arcuate movement thereof to retract said lock bolt into said lock case,

and a ball bearing detent carried in said lock case and cooperating with said first and second detent recesses in said lock bolt to yieldingly retain said lock bolt in both said extended and retracted positions.

24. A coin operated lock comprising, in combination,

a lock case,

a lock bolt in said case movable in a first path between first and second positions,

thrust means movable in said case in a second path at an angle to said first path,

a movable face wall at least partially defining a coin chute,

means connecting said face wall to move said lock bolt in said first path upon movement of said face wall,

wall means defining aperture means in said face wall and disposed along said second path with said lock bolt positioned at said first position but not disposed along said second path with said lock bolt positioned at said second position,

said thrust means entering said aperture means and being inoperative to move said lock bolt from said first to said second position thereof upon the absence of a coin adjacent said face wall,

and means including the presence of a coin adjacent said face wall obstructing movement of said thrust means into said aperture means to establish a component of force to move said lock bolt from said first position to said second position.

25. A coin operated lock comprising, in combination,

a lock case,

a lock bolt in said case movable in a first path between first and second positions,

thrust means movable in said case in a second path at an angle to said first path,

a movable face wall at least partially defining a coin chute,

means connecting said face wall to move said lock bolt in said first path upon movement of said face wall,

wall means defining aperture means in said face wall and disposed along said second path with said lock bolt positioned at said first position but not disposed

along said second path with said lock bolt positioned at said second position,

said thrust mean entering said aperture means and being inoperative to move said lock bolt from said first to said second position thereof upon the absence of a coin adjacent said face wall,

means including the presence of a coin adjacent said face wall to establish a component of force to move said lock bolt from said first position to said second position,

and means including said thrust means to retain any said coin in engagement with said face wall during

movement of said thrust means along said second path at least until said lock bolt has moved along said first path to a point whereat said second path no longer intersects said aperture means.

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