Feb. 21, 1956 A. L. PELCIN 2,735,706

MULTIPLE-BOLT FLUSH DOOR LOCK

Filed April 8, 1953

2 Sheets-Sheet 1

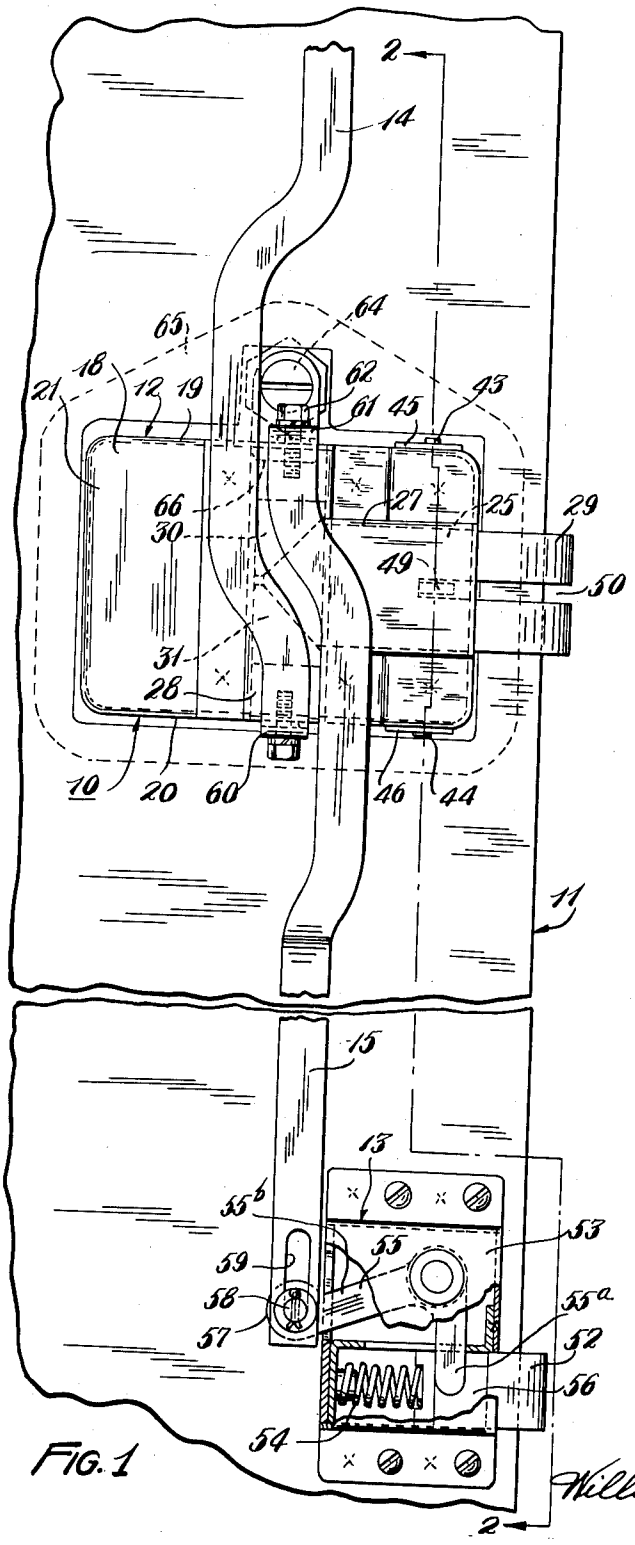


FIG. 1

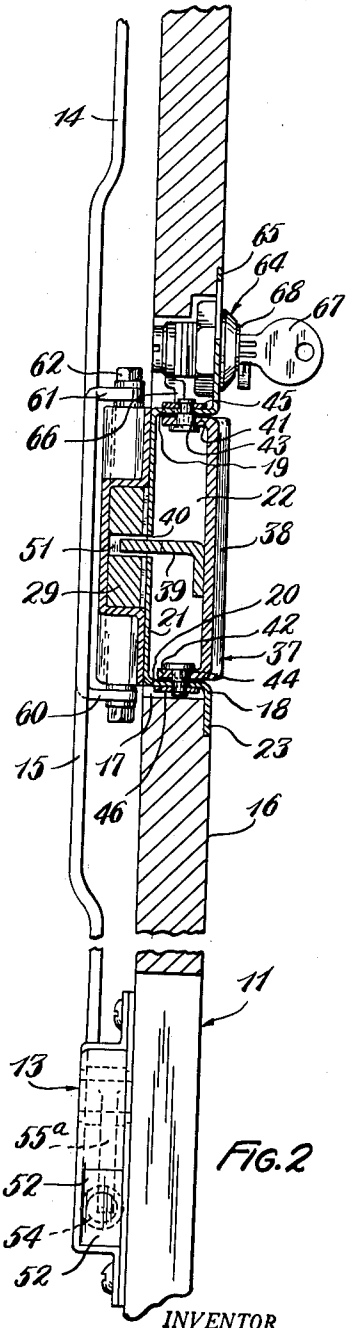


FIG. 2

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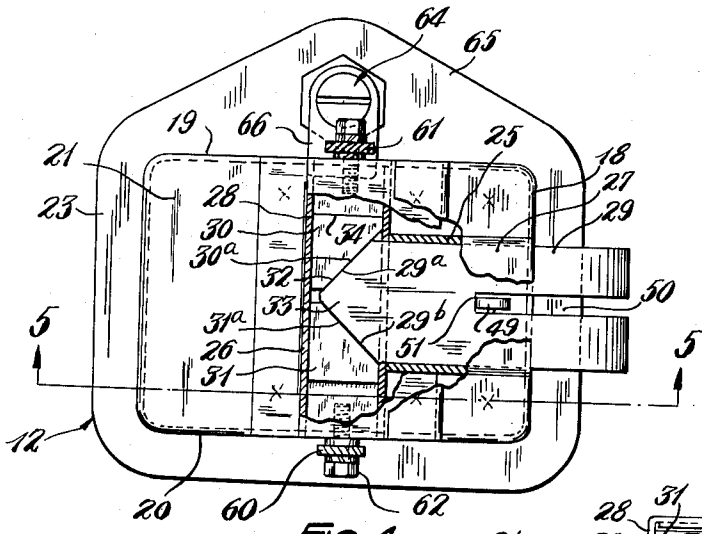


FIG. 4

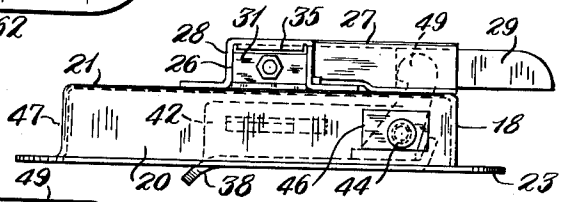


FIG. 6

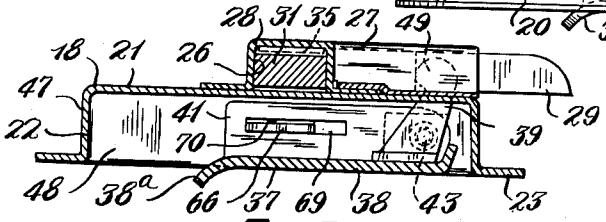


FIG. 5

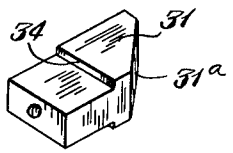


FIG. 7

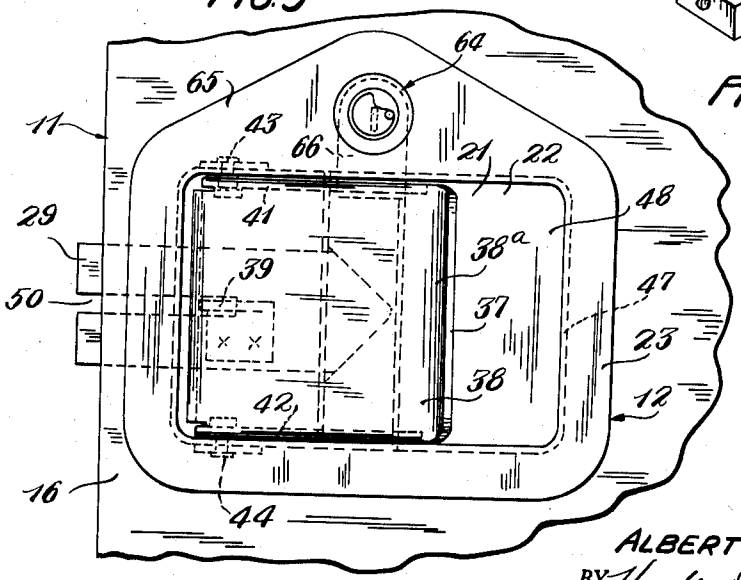


FIG. 3

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2,735,706

MULTIPLE-BOLT FLUSH DOOR LOCK

Albert L. Pelcin, Maple Heights, Ohio, assignor to The Eastern Malleable Iron Company, Cleveland, Ohio, a corporation of Connecticut

Application April 8, 1953, Serial No. 347,505

10 Claims. (Cl. 292—34)

This invention relates to lock mechanisms for doors and the like and, more particularly, to a novel lock mechanism of the multiple-bolt type.

An object of the invention is to provide a novel lock mechanism of the multiple-bolt type having cooperating wedge means between the bolts and effective to cause movement of one bolt in response to actuation of another of the bolts.

Another object of the invention is to provide a novel lock mechanism of the multiple-bolt type in which the lock body has intersecting guideways and in which a first bolt slidable in one of the guideways and a pair of plungers slidable in the other guideway have wedge elements in cooperating engagement such that movement of the first bolt along its guideway wedgingly imparts outward movement to the plunger along the other guideway.

Still another object is to provide a novel lock mechanism of this character in which the lock body is of a substantially pan-like shape adapted for substantially flush mounting in an opening of a door surface and in which a movable actuating handle supported by the body for pivotal movement has a plate portion disposed in and forming a partial cover for the pan recess, the flush type lock construction thus provided being especially suitable for the doors of utility trucks and other automotive vehicles where it is desirable to avoid having any projecting part likely to cause personal injury.

A further object is to provide novel lock mechanism of the above-mentioned multiple-bolt type in which the bolts comprise such a slidable first bolt and other slidably movable bolts located on opposite sides of the lock body and in which motion transmitting means for transmitting actuating movement to the other movable bolts from the slidable plungers includes links connected with the latter.

Yet another object is to provide novel lock mechanism of the character above referred to in which spring means is effective to constantly maintain the wedge elements of the bolt plungers in operative engagement.

Additionally, this invention provides novel lock mechanism of the above indicated kind in which the spring means acts to normally hold the bolts in their extended position and to normally hold the handle in its retracted position, and in which the links connected with the plungers extend in transverse crossing relation to the lock body.

The invention can be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the claims hereof.

In the accompanying sheets of drawings:

Fig. 1 is a rear elevational view showing lock mechanism embodying the invention and mounted on a door;

Fig. 2 is a view of the lock mechanism showing the same mainly in vertical section, the view being taken substantially as indicated by section line 2—2 of Fig. 1;

Fig. 3 is a front elevation of the main unit of the lock mechanism and showing the flush position of such main unit on a door;

Fig. 4 is a rear elevation of the main lock unit showing the same with portions thereof broken away;

Fig. 5 is a sectional view taken through the main lock unit as indicated by section line 5—5 of Fig. 4;

Fig. 6 is an edge view of the main lock unit as seen from the lower edge thereof; and

Fig. 7 is a perspective view showing one of the plungers in detached relation.

As representing one practical embodiment of the invention, the drawings show the lock mechanism **10** mounted on a swingable door **11** and consisting, in general, of a main lock unit **12** located at an intermediate point of the door, and a pair of auxiliary lock units **13** located on the door at spaced points on opposite sides of the main unit and operably connected with the latter by the links **14** and **15**. The main unit **12** is in a substantially flush relation with the front surface **16** of the door **11** by being disposed in an opening or recess **17** which extends into or through the door from the front thereof.

The main unit **12** of the lock mechanism **10** is provided with a substantially pan-like sheet metal body **18** of a generally rectangular shape and having walls, including a pair of spaced side walls **19** and **20** and a bottom wall **21**, and which walls define a shallow recess or pocket **22**. The pan-like body **18** is also provided with an outturned lateral flange **23** extending therearound and is mounted in the opening **17** by the engagement of the flange **23** with the front surface **16** of the door **11**.

The main lock unit **12** also includes intersecting guideways **25** and **26** located on or in the body **18** and of which the guideway **25** is defined by a channel-shaped sheet metal member **27** suitably secured to the bottom wall **21** on the rear side thereof. The guideway **26** is defined by a channel-shaped sheet metal member **28** which is also suitably secured to the bottom wall **21** on the rear side thereof. The channel-shaped members **27** and **28** are so constructed and arranged that the guideway **25**, which can be referred to as the longitudinal or main guideway, intersects the transverse or auxiliary guideway **26** at substantially right angles and at an intermediate point thereof.

As shown in the drawings, the main lock unit **12** also comprises a first bolt **29** slidably movable in the longitudinal guideway **25**, and a pair of plungers **30** and **31** slidably movable in the transverse guideway **26** and having their inner ends presented toward the inner end of the first bolt.

The inner ends of the plungers **30** and **31** are provided with oppositely or divergently inclined bearing surfaces 30^a and 31^a forming wedge elements which define a wedge recess **32** facing toward the guideway **25**. The first bolt **29** is provided on the inner end thereof, with a pair of oppositely or divergently inclined bearing surfaces 29^a and 29^b forming wedge elements which define a wedge-shaped end or projection **33** on the inner end of such first bolt and which projection engages in the wedge recess **32**. The bearing surfaces 30^a and 31^a of the plungers are in slidable engagement with the bearing surfaces 29^a and 29^b of the first bolt **29**, such that the movement of the latter inwardly of the guideway **25** wedges the plungers apart and causes slidable outward movement thereof in the transverse guideway **26**.

Outward movement of the plungers **30** and **31** in the transverse guideway **26**, causes the outer ends of these plungers to be projected from the opposite ends of this guideway. The plungers are retained in the transverse guideway **26** by being provided with outwardly facing shoulders **34** which are engageable with inturned stop lugs **35** formed on the channel-shaped member **28** and located at the outer ends of the guideway **26**. The extent

of outward movement of the plungers **30** and **31** in the guideway **26** is thus limited by the engagement of the shoulders **34** with the stop lugs **35**.

Movement of the first bolt **29** along the guideway **25** in a direction to expand or project the plungers **30** and **31**, is produced by handle means **37** which is supported by the body **18** for pivotal movement. The handle means **37** comprises a plate member **38** disposed in and forming a partial cover for the recess **22**, and an arm **39** carried by the plate member **38** as by being secured to the underside thereof and projecting into the guideway **25** through the slot **40** of the bottom wall **21**.

The plate member **38** has inturned side flanges **41** and **42** thereon and is pivotally mounted on the body **18** by suitable pivot elements, such as rivets or the like **43** and **44**, which extend through these flanges and through the side walls **19** and **20** of the body. At the point where these rivets extend through the side walls **19** and **20**, the body **18** is suitably reinforced by clips **45** and **46** which are welded, or otherwise secured, to such side walls. The plate member **38** has its free end **38a** curved slightly outwardly and spaced from the end wall **47** of the body **18** so as to provide therebetween a clear space or opening **48** for the free insertion of an operator's fingers into the recess **22** and beneath the plate member of the handle means **37**.

The actuating arm **39** of the handle means **37** is provided on the inner end thereof with a rounded head or cam portion **49** which extends into a longitudinal slot **50** of the first bolt **29** and is engageable with a thrust surface **51** formed on the first bolt by the inner end wall of the slot **50**. The normal retracted position of the handle means **37** is that shown in the drawings in which the plate member **38** occupies a position substantially flush with the front door surface **16**. Outward swinging of the plate member **38** on the pivot elements **43** and **44** causes the actuating arm **39** to impart inward or retracting movement to the first bolt **29** which, through the action of the cooperating wedge means, also produces an outward separating movement of the plungers **30** and **31**, as explained above.

If desired, the outer ends of the plungers **30** and **31** can be used as auxiliary bolts, but as shown in the drawings, the lock mechanism **10** is preferably provided with a pair of auxiliary bolts **52** which are slidably movable in housing members **53** of the auxiliary lock units **13**. The auxiliary bolts **52** are normally in a projected position to which they are urged by compression springs **54** located in the housing members **53**. The auxiliary bolts **52** are adapted to be retracted against the force of the compression springs **54** by motion transmitting means which includes the above-mentioned links **14** and **15** and bell crank levers **55** pivotally mounted in the housing members **53**.

The bell crank levers **55** of these auxiliary lock units **13** have an arm **55a** thereof engaged in a relatively wide transverse opening **56** of the auxiliary bolt **52** and have the other arm **55b** thereof projecting from the housing member **53** and provided with an eye portion **57** at the outer end thereof. The links **14** and **15** have the outer or remote ends thereof connected with the eyes **57** of the bell crank levers **55** by means of pivot pins **58** which are carried by the eye portions and extend through longitudinal slots **59** provided in such remote ends of the links.

The adjacent or inner ends of the links **14** and **15** extend in transverse crossing relation to the rear side of the body **18** of the main lock unit **12** and carry forwardly extending angular lug portions **60** and **61**. These lug portions are secured to the outer ends of the plungers **31** and **30**, respectively, as by means of the clamping screws **62**.

In the operation of the lock mechanism **10**, the compression springs **54** normally hold the auxiliary bolts **52** in an extended or locking position and the force of these springs is also transmitted through the bell crank levers **35** and the links **14** and **15** to the plungers **30** and **31**. The expansive action of the springs **54** is effective on the plungers **30** and **31** as a pulling force acting to normally hold these plungers in their inward or retracted position in which they exert a wedging force against the inner end of the first bolt **29** for normally holding the latter in its projected or locking position.

The slots **59** of the links **14** and **15** and the relatively wide openings **56** of the auxiliary bolts **52** provide a lost motion characteristic for the operating connections between the plungers **30** and **31** and the auxiliary bolts **52**, such that the first bolt **29** and the auxiliary bolts can move inwardly in their guideways without causing or requiring any actuation of the handle means **37**. This free inward movement of the bolts permits the same to move over or past striker members (not shown) with which they cooperate and thus permits the door **11** to be slammed to its closed position without requiring or resulting in any outward swinging movement of the handle means **37**. The action of the springs **54** in holding the bolts in their normally projected position, is also effective on the arm **39** of the handle means **37** for retaining the plate member **38** in its substantially flush retracted position.

The plungers **30** and **31** are capable of free outward movement away from the wedge projection **33** of the first bolt **29** and, this being the case, the slots **59** can be omitted if desired. When the slots **59** are omitted, the links **14** and **15** are merely provided with holes at this point in which the pivot pins **58** engage.

When the handle means **37** is manually actuated by imparting an outward swinging movement to the plate member **38** causing the above-explained retraction of the first bolt **29** and the outward expansion of the plungers **30** and **31**, the outward movement of these plungers transmits pulling motion through the links **14** and **15** to the bell crank levers **55** of the auxiliary lock units **13**. This pulling movement applied to the bell crank levers by the links **14** and **15** retracts the auxiliary bolts **52** against the force of the springs **54**.

With respect to the oppositely inclined bearing surfaces **30a** and **31a** of the plungers **30** and **31** and the oppositely inclined bearing surfaces **29a** and **29b** of the first bolt **29**, it should be explained that these bearing surfaces are all constructed so as to have a smooth and polished surface characteristic. This polished surface characteristic of these bearing surfaces minimizes the friction between the wedge elements of the plungers and the first bolt **29**, such that movement will be freely transmitted back and forth between the plungers and first bolt.

If desired, the lock mechanism **10** can be provided with a key-actuated locking means **64** which is here shown as being carried by a flange extension **65** of the body **18**. This key-actuated means is here shown as comprising a swingable latch **66** adapted to be actuated by manual rotation of a key **67** inserted into a conventional pivoted lock barrel **68**. The latch **66** is engageable in a pair of slots **69** and **70** which are in registering relation when the plate member **38** of the handle means **37** is in its retracted or flush position. The slot **69** is located in the inturned flange **41** of the plate member **38** and the slot **70** is located in the adjacent side wall **19** of the body **18**. Although the key-actuated locking means **64** is illustrated in the drawings as forming a part of the lock mechanism **10**, it will be understood, of course, that this key-actuated locking means can be omitted.

From the foregoing detailed description and the accompanying drawings, it will now be readily understood that this invention provides a novel lock mechanism of the multiple-bolt type in which cooperating wedge elements are utilized in the transmission of actuating movement between a first bolt and one or more auxiliary bolts. It will, likewise, be seen that this lock mechanism embodies the feature of a flush position for the main lock

unit, such that neither the handle means nor any other part of the mechanism will normally occupy a projecting position in which it might cause personal injury. Additionally, it will be seen that this lock mechanism is of a very simple construction comprising a relatively small number of parts adapted to be economically manufactured and assembled.

Although the lock mechanism of this invention has been illustrated and described herein to a somewhat detailed extent, it will be understood, of course, that the invention is not to be regarded as being limited correspondingly in scope, but includes all changes and modifications coming within the terms and scope of the claims hereof.

Having thus described my invention, I claim:

1. In lock mechanism of the character described, a sheet metal body including a bottom wall having first and second guideways thereon of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, handle means supported by said body for pivotal movement and engageable with said first bolt for causing movement of the latter along said first guideway, other movable bolt means including a pair of members slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, oppositely inclined bearing surfaces on the inner ends of said members and defining a wedge recess and oppositely inclined bearing surfaces on said first bolt and defining a wedge portion on the latter having cooperating wedging engagement in said wedge recess such that movement of said first bolt along said first guideway wedgingly imparts movement to said members in an outward direction along said second guideway.

2. In lock mechanism of the character described, a substantially pan-shaped sheet metal body defining a top recess and including a bottom wall having first and second guideways thereon of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, a single handle member located in said top recess and supported by said body for pivotal movement and having a portion engageable with said first bolt for causing movement of the latter along said first guideway, other movable bolt means including a pair of members slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, oppositely inclined bearing surfaces on said members and defining a wedge recess between their inner ends, said first bolt having oppositely inclined bearing surfaces on its inner end defining a wedge projection engaging in said wedge recess such that the inward movement of said first bolt along said first guideway wedgingly imparts movement to said members in an outward direction along said second guideway, and spring means effective to constantly maintain the bearing surfaces of said members in engagement with the bearing surfaces of said first bolt, said handle having a plate portion forming a partial cover for said top recess.

3. In lock mechanism of the character described, a body having first and second guideways of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, handle means supported by said body for pivotal movement and engageable with said first bolt for causing movement of the latter along said first guideway, a pair of plungers slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, housing members on opposite sides of said body, other bolts movable in said housing members, movement transmitting means for transmitting motion between said plungers and said other bolts including a pair of links having their adjacent ends connected with said plungers, and bearing surfaces on said plungers and first bolt and having cooperating wedging engagement such that movement of said first bolt along said first guideway wedgingly imparts movements to said plungers in an outward direction along said second guideway for transmission to said other bolts through said transmitting means.

4. Lock mechanism as defined in claim 3 in which said links extend in transverse crossing relation to said body.

5. In lock mechanism of the character described, a body having first and second guideways of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, handle means supported by said body for pivotal movement and engageable with said first bolt for causing movement of the latter along said first guideway, a pair of plungers slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, housing members on opposite sides of said body, other bolts movable in said housing members, movement transmitting means for transmitting motion between said plungers and said other bolts including a pair of links having their adjacent ends connected with said plungers, bearing surfaces on said plungers and first bolt and having cooperating wedging engagement such that movement of said first bolt along said first guideway wedgingly imparts movement to said plungers in an outward direction along said second guideway for transmission to said other bolts through said movement transmitting means, and spring means acting to project said other bolts and also effective on said first bolt through said movement transmitting means such that the bearing surfaces of said plungers are constantly maintained in engagement with the bearing surfaces of said first bolt.

6. In a lock mechanism, a sheet metal body of substantially pan-like shape having walls including a substantially flat bottom wall and defining a recess of substantially uniform depth extending into said body from the front side thereof, said body being adapted for substantially flush installation in a front surface opening of a door, handle means mounted on said body for pivotal movement and including a plate portion disposed in and forming a partial cover for said recess, means carried by said bottom wall and defining first and second guideways of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first giudeway, said bottom wall having a slot therein connecting said first guideway with said recess and said handle means having an arm extending through said slot and engaging said first bolt, other movable bolt means including a pair of members slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, and bearing surfaces on said members and first bolt and having cooperating wedging engagement such that movement of said first bolt along said first guideway wedgingly imparts movement to said members in an outward direction along said second guideway.

7. In a lock mechanism, a sheet metal body of substantially pan-like shape having walls including a substantially flat bottom wall and defining a recess of substantially uniform depth extending into said body from the front side thereof, said body being adapted for substantially flush installation in a front surface opening of a door, handle means mounted on said body for pivotal movement and including a plate portion disposed in and forming a partial cover for said recess, means carried by said bottom wall and defining first and second guideways of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, said bottom wall having a slot therein connecting said first guideway with said recess and said handle means having an arm extending through said slot and engaging said first bolt, other movable bolt means including a pair of members slidable in said second guideway with their inner

ends presented toward the inner end of said first bolt, bearing surfaces on said members and first bolt and having cooperating wedging engagement such that movement of said first bolt along said first guideway wedgingly imparts movement to said members in an outward direction along said second guideway, and spring means effective to constantly maintain the bearing surfaces of said members in engagement with the bearing surfaces of said first bolt.

8. In a lock mechanism, a sheet metal body of substantially pan-like shape having walls including a substantially flat bottom wall and defining a recess of substantially uniform depth extending into said body from the front side thereof, said body being adapted for substantially flush installation in a front surface opening of a door, handle means mounted on said body for pivotal movement and including a plate portion disposed in and forming a partial cover for said recess, means carried by said bottom wall and defining first and second guideways of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, said bottom wall having a slot therein connecting said first guideway with said recess and said handle means having an arm extending through said slot and engaging said first bolt, a pair of plungers slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, housing members on opposite sides of said body, other bolts movable in said housing members, movement transmitting means for transmitting motion between said plungers and said other bolts including a pair of links having their adjacent ends connected with said plungers, and bearing surfaces on said plungers and first bolt and having cooperating wedging engagement such that movement of said first bolt along said first guideway wedgingly imparts movement to said plungers in an outward direction along said second guideway for transmission to said other bolts through said movement transmitting means.

9. In a lock mechanism, a sheet metal body of substantially pan-like shape having walls including a substantially flat bottom wall and defining a recess of substantially uniform depth extending into said body from the front side thereof, said body being adapted for substantially flush installation in a front surface opening of a door, handle means mounted on said body for pivotal movement and including a plate portion disposed in and forming a partial cover for said recess, means carried by said bottom wall and defining first and second guideways of which the first guideway intersects the second guideway at substantially right angles at an intermediate point of the latter, a first bolt slidable in said first guideway, said bottom wall having a slot therein connecting said first guideway with said recess and said handle means having an arm extending through said slot and engaging said first bolt, a pair of plungers slidable in said second guideway with their inner ends presented toward the inner end of said first bolt, housing members on opposite sides of said body, other bolts movable in said housing members, movement transmitting means for transmitting motion between said plungers and said other bolts including a pair of links having their adjacent ends connected with said plungers, bearing surfaces on said plungers and first bolt and having cooperating wedging engagement such that movement of said first bolt along said first guideway wedgingly imparts movement to said plungers in an outward direction along said second guideway for transmission to said other bolts through said transmitting means, and spring means acting to project said other bolts and also effective on said first bolt through said movement transmitting means such that the bearing surfaces of said plungers are constantly maintained in engagement with the bearing surfaces of said first bolt.

10. Lock mechanism as defined in claim 9 in which said links extend in transversely crossing relation to said body on the rear side thereof.

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