

[54] **DEAD-LOCKING LATCH BOLT MECHANISM**

[75] Inventors: **Walter E. Best; R. Gene McCullum,**
both of Indianapolis, Ind.

[73] Assignee: **Best Lock Corporation,**
Indianapolis, Ind.

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[51] Int. Cl. **E05c 1/16**

[58] Field of Search **70/151 R, 151 A, 463;**
292/169.13

[56] **References Cited**
UNITED STATES PATENTS

2,576,648	11/1951	Smith	292/169.13
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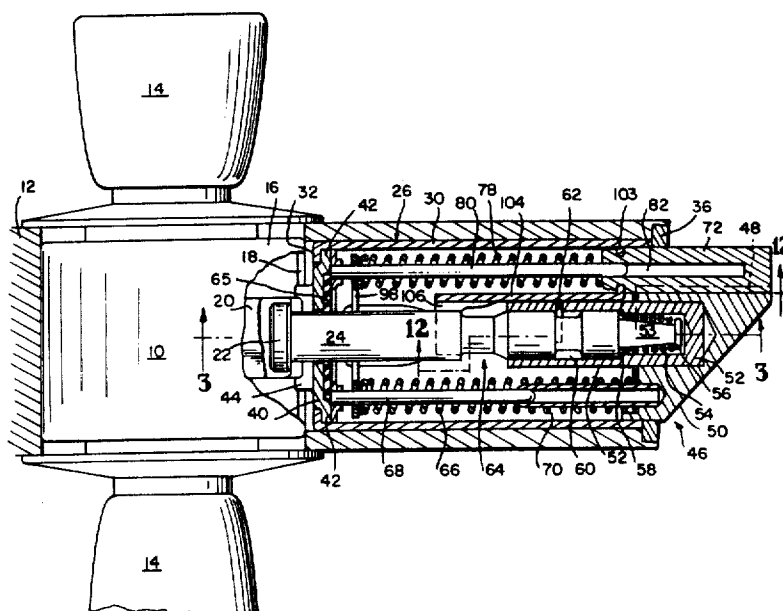
Primary Examiner—Albert G. Craig, Jr.

[57] **ABSTRACT**

A latch bolt mechanism for use with a cylindrical lock set has a main latch bolt and an auxiliary bolt to control deadlocking of the main bolt, all mounted in a tubular housing. The main bolt has a tubular stem telescopically received over a tailpiece in the form of a

round rod with a retraction head at the rear. The tailpiece is slidable in the stem through lost motion which is limited by engagement between a stop ring on the stem and a timing groove in the tailpiece, and the tailpiece is biased to forward position by a spring acting between a cap at the front end of the tailpiece and a reaction washer pressed into the bolt stem. A deadlocking dog is pivoted on a rear support with its forward end positioned to block rearward movement of the bolt stem. The tailpiece also has a cam groove to receive the dogging end of the dog, and the cam of such groove releases the deadlocking dog when the tailpiece is first retracted through its limited lost motion in the stem and thereafter retracts the latch bolt. The bolts are urged forward by springs which seat on a foot lever fulcrumed against the end closure of the tubular housing and engaged at its end with a lug on the deadlocking dog to bias that dog toward its deadlocking position. The auxiliary bolt carries a dog release finger which normally holds the deadlocking dog in release position, but which, when the auxiliary bolt is retracted relative to the bolt, lets the locking dog move to bolt-blocking position. The tailpiece spring is weaker than the bolt spring so that when the bolt is deadlocked retraction of the tailpiece first moves it through its lost motion to where its cam will release the locking dog, and then moves it to retract the latch bolt.

18 Claims, 12 Drawing Figures



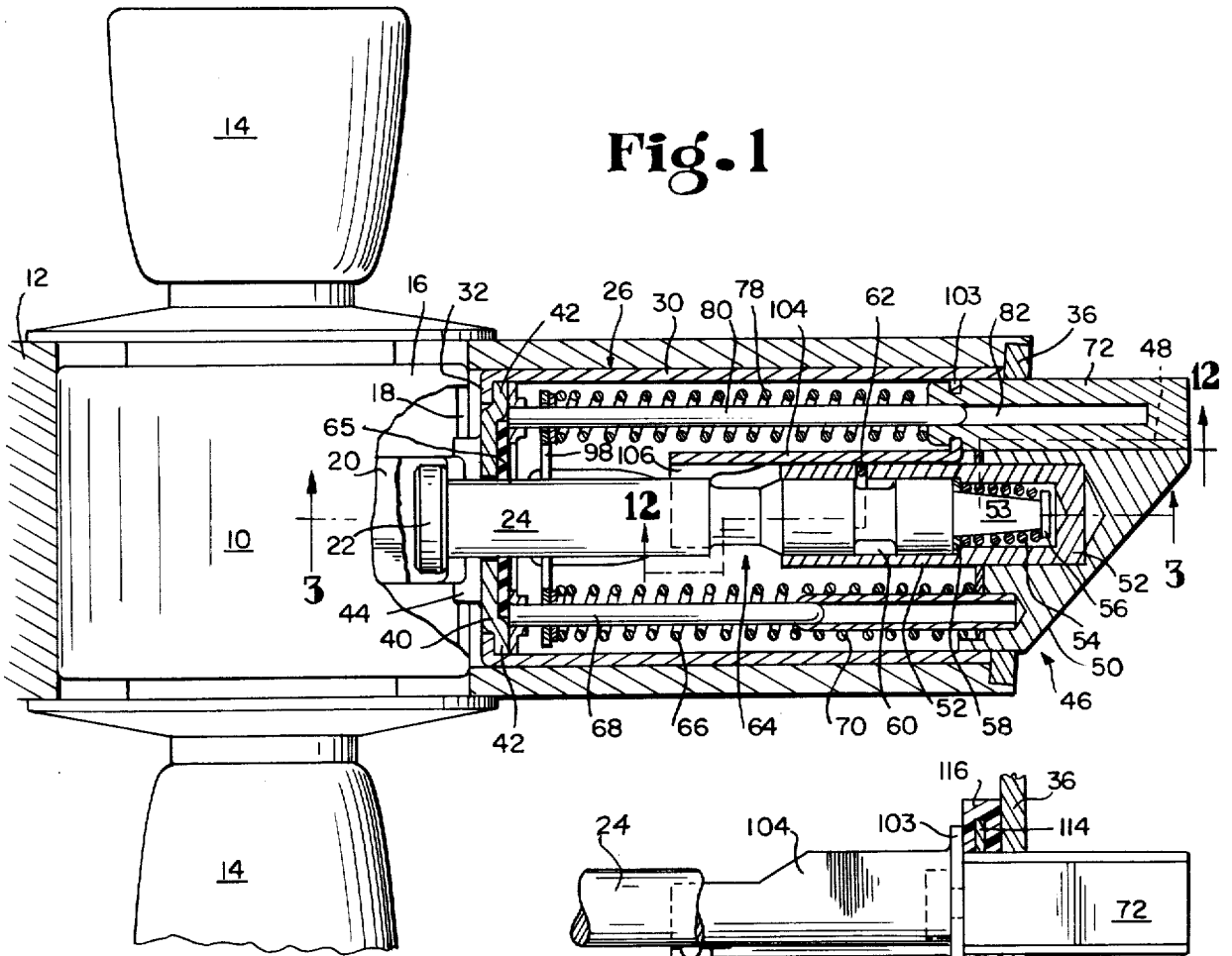


Fig. 12

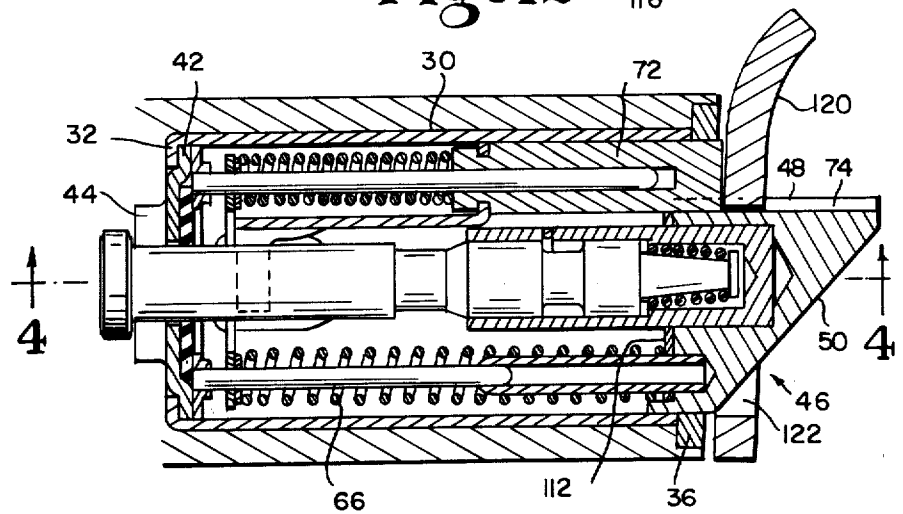


Fig. 2

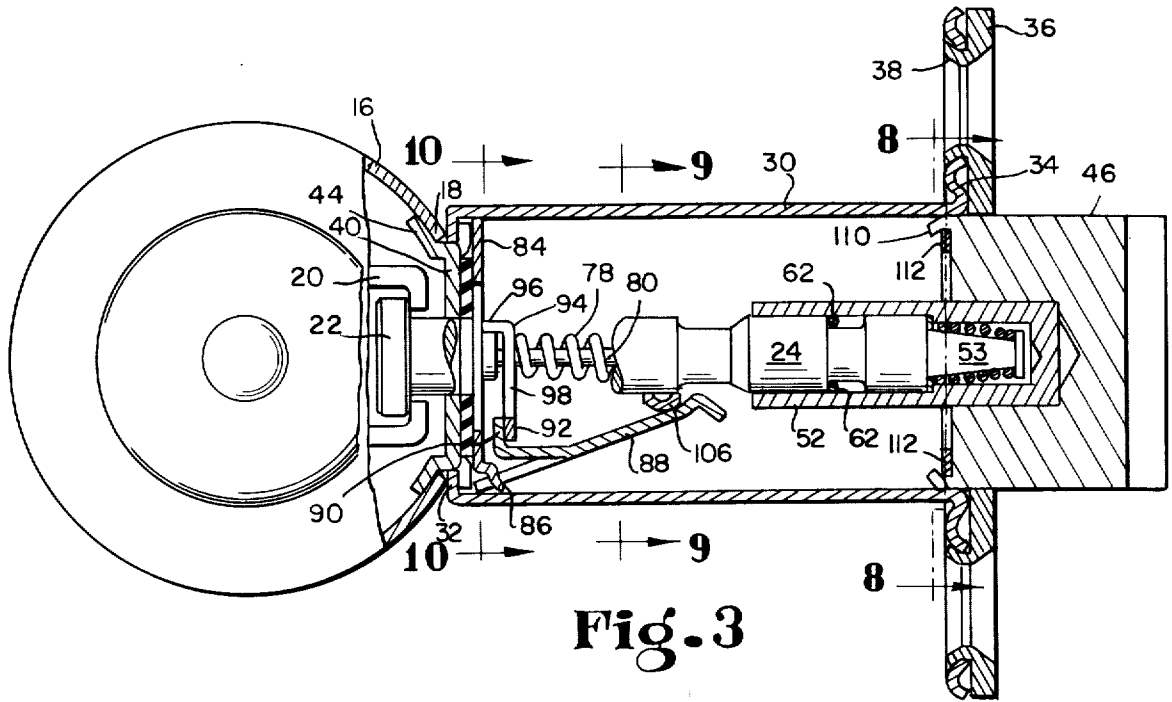


Fig. 3

Fig. 5

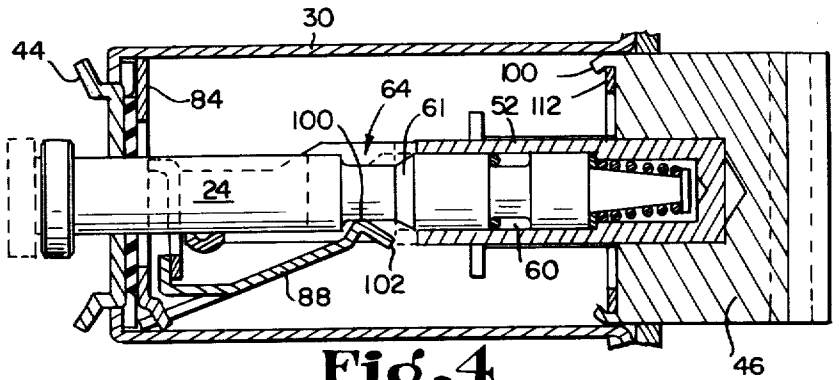
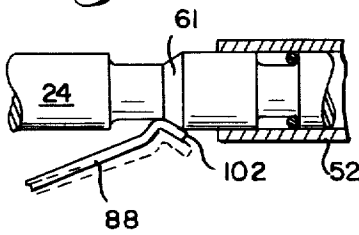


Fig. 4

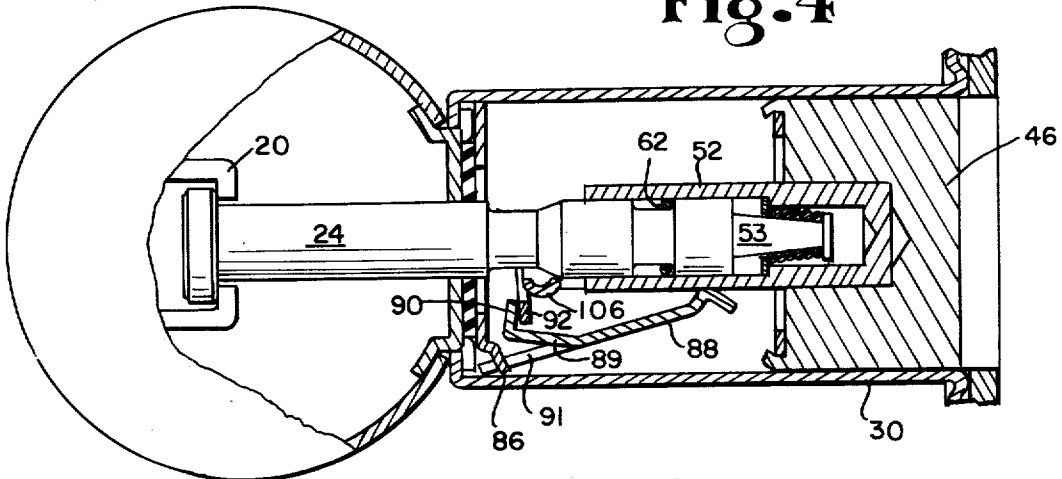


Fig. 6

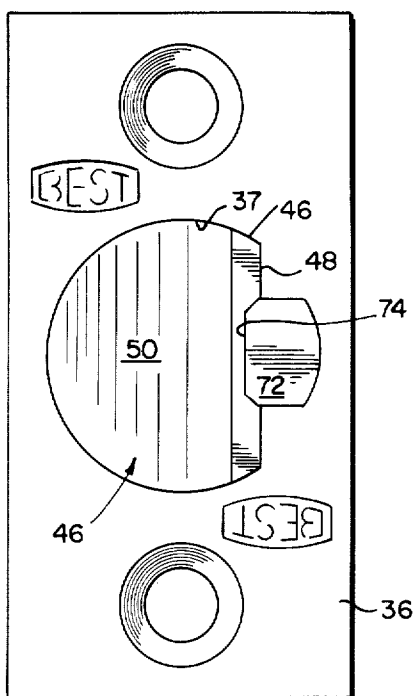


Fig. 7

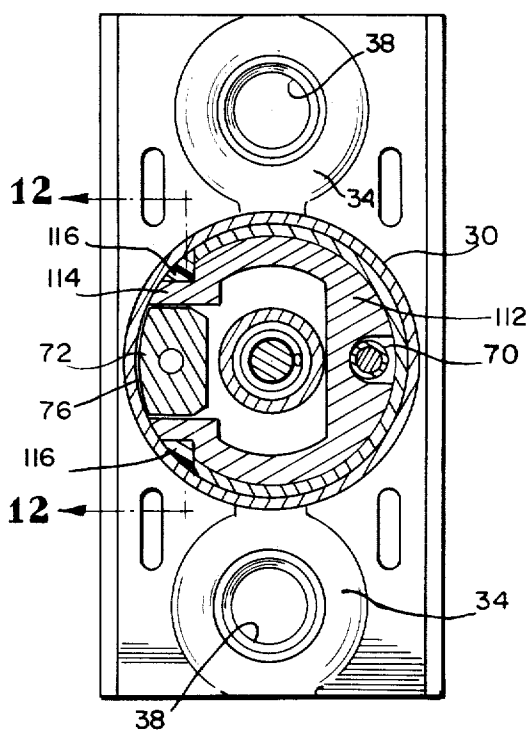


Fig. 8

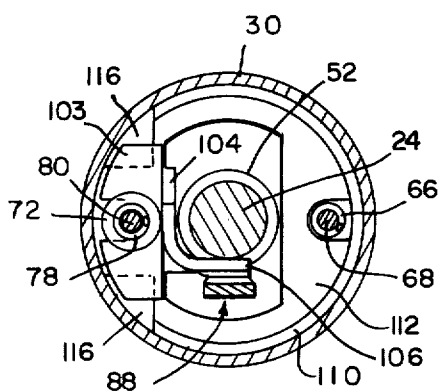


Fig. 9

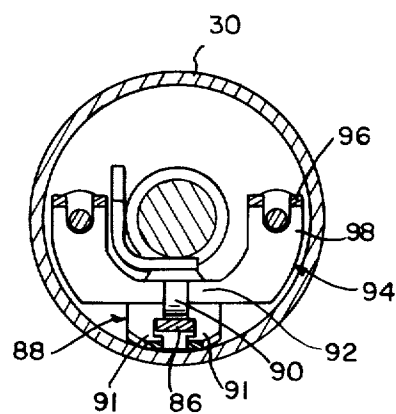


Fig. 10

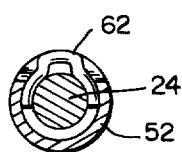


Fig. 11

DEAD-LOCKING LATCH BOLT MECHANISM**BACKGROUND OF THE INVENTION**

This invention relates to a bolt mechanism for use with a cylindrical lock set and includes a main bolt which is deadlocked against retraction when an auxiliary bolt is held in retracted position by the strike plate with which the bolt is engaged.

Deadlocking latch bolt mechanisms are known as from U.S. Pat. Nos. 1,876,081 and 2,930,646. Prior mechanisms, however, present a number of installation and operating difficulties. For example, in U.S. Pat. No. 1,876,081 the bolt mechanism is not self contained but depends on an exact relationship with the cylinder lock, and the tailpiece has a cross slot which must be accurately located to receive the claw edges of the retractor. With another similar device, installation faults occur which permanently deadlock the latch bolt and make it and its door inoperative. In U.S. Pat. No. 2,930,646, the deadlocking action depends on spring-pressed movement of a cross slide as the bolt is forced back, which is unreliable.

It is the purpose of the present invention to provide an improved deadlocking bolt mechanism which will avoid installation difficulties and problems heretofore encountered, will provide a lock mechanism in a tubular housing which is substantially enclosed to exclude dirt and sawdust, will have smooth and reliable operation even under adverse conditions, and will be subject to low wear and have a long operating life.

In a preferred embodiment of the invention, a main latch bolt having a tubular stem is mounted in a cylindrical housing having a rear closure plate. The bolt has a rearward-extending tubular stem in which a rod-shaped tailpiece is telescopically received. The tailpiece has a head at the rear for one-way retraction engagement by a retractor of the cylindrical lock mechanism and is guided at the rear by a bearing in the rear closure plate. The tailpiece has limited lost motion with respect to the bolt stem, and is spring-pressed into the stem by a spring trapped between a forward cap on the tailpiece and a shoulder fixed in the stem. Lost motion is limited by a timing groove in the tailpiece engaged by a stop clip inserted through the wall of the bolt stem.

A deadlocking dog is pivoted at the rear of the housing and has a dogging position in which its forward end lies in the retraction path of the bolt stem to block retraction of the latch bolt. The tailpiece has a cam groove at the rear of the stem, which moves to a dog-releasing position when the tailpiece is retracted through its lost motion.

The main and auxiliary bolts are urged forward by springs positioned at diametrically opposite points in the housing. The springs seat against a foot lever fulcrumed at the rear of the housing and engaged against a lug on the locking dog to pivot it toward its dogging position. The auxiliary bolt carries a release finger which, when the plunger is flush with the main bolt, holds the locking dog in release position, and which, when retracted relative to the main bolt, lets the locking dog move to dogging position.

The latch bolt spring is stronger than the tailpiece spring, so that when the tailpiece is pulled rearward by the retractor of the cylindrical lock mechanism, the tailpiece first moves through its lost motion with respect to the latch bolt and thereby carries its cam

groove into dog-releasing position so that continued rearward pull on the tailpiece can retract the bolt.

The auxiliary bolt is seated in a longitudinal groove in the latch bolt, to support it in accurate alignment and provide firm support for the back face of the latch bolt, especially when it is cammed to retracted position by engagement with a strike plate. To enhance this action, the outer face of the auxiliary bolt desirably has a limited area of bearing contact with the bolt housing. The main bolt carries a stop plate at its rear face, which straddles the auxiliary bolt and carries wear-resistant bearing blocks in the corner areas at the sides of the deadlocking plunger. The tubular housing is closed at the front by a face plate by which it may be mounted in a door, and the guide blocks move against such front plate as a stop. The auxiliary bolt carries a guide segment at the rear which moves against the rear of the guide blocks as a stop.

The housing is closed at the rear by a rear closure plate which has rearward extending flanges which are bent outward to define segments of arcuate grooves between themselves and the rear face of the tubular housing. The arcuate grooves are easily engaged with the edges of the cylindrical lock housing, and position the tailpiece for easy installation engagement with the retractor of the cylindrical lock. The one piece round tailpiece and head facilitate proper engagement of the tailpiece with the retractor and avoid difficulties encountered with prior mechanisms.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the invention. In such drawings:

FIG. 1 is a horizontal sectional view of a latch bolt mechanism embodying the invention, with the bolts extended;

FIG. 2 is a similar view, omitting the cylindrical lock mechanism and showing the bolts in locking relation with a strike plate;

FIG. 3 is a vertical section taken on the line 3—3 of FIG. 1, omitting some background parts and showing the latch bolt in fully-extended position as in FIG. 1 and showing the dog in release position;

FIG. 4 is a vertical section taken on the line 4—4 of FIG. 2, showing the dog in deadlocking position;

FIG. 5 is a fragmental view showing the dog-releasing position of the tailpiece cam groove;

FIG. 6 is a view similar to FIG. 3 but showing the bolts retracted by the retractor of the cylindrical lock mechanism;

FIG. 7 is a front elevation of the lock mechanism shown in FIG. 3;

FIG. 8 is a section taken on line 8—8 of FIG. 3;

FIG. 9 is a section taken on the line 9—9 of FIG. 3;

FIG. 10 is a section taken on the line 10—10 of FIG. 3;

FIG. 11 is a fragmental section showing a stop ring in the bolt stem and about the tailpiece, taken on the line 11—11 of FIG. 1; and

FIG. 12 is a partial section taken on the line 12—12 of FIGS. 1 and 8, showing the auxiliary plunger and its control finger.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The lock mechanism shown in the drawings comprises a cylindrical lock 10 having an operating mecha-

nism mounted in a transverse hole through a door 12 operated by knobs 14, at least one of which will contain a key-controlled locking device. The retractor mechanism may be any of a number of conventional mechanisms, and comprises a cylindrical shell 16 having an axially extending slot defined by edges 18 of the shell, and a retractor 20 having a transversely slotted end adapted to slide axially into one-way, retracting engagement with a head 22 on the tailpiece 24 of the bolt assembly 26 described below. Rotation of either knob 10 moves the retractor 20 to the left as shown to retract the tailpiece and the bolt to which it is connected.

The bolt assembly 26 in accordance with the present invention comprises an outer tubular housing 30 having an inward flange 32 at its rear and, as shown in FIG. 3, an outward flange 34 at its forward end. The forward flange 34 extends upward and downward considerable distances and is provided with punched openings. A mounting face plate 36 is mounted across the front of the housing 30 and has screw-receiving openings defined by rearward collars 38 which extend through the flange openings and are flared outward to secure the two parts together. The face plate is formed with a bolt opening 37 as shown in FIG. 7. The rear end of the housing 30 is closed by a closure plate 40 having a forwardly offset edge portion 42 which seats against the inward flange 32 of the housing. At opposite sides of the housing, the closure plate 40 has rearward-bent tongues 44 which extend rearward from the rear end of the housing. After assembly of the closure plate 44 in the housing, these flanges 44 are flared outward as shown in FIG. 3, to define arcuate grooves adapted to receive the slot-defining edges 18 of the lock cylinder shell 16, and thus to interconnect that shell 16 with the bolt housing 30.

A main latch bolt 46 is slidably mounted through the face plate 36 of the bolt housing, and has a latching face 48 and a sloping cam face 50. The bolt 46 is fixed to the forward end of a tubular stem 52 which is telescopically received over the forward end of the tailpiece 24. The tailpiece 24 has a tapered forward end 53 of reduced diameter surrounded by a light spring 54. A cap 56 is riveted to the end of the tapered portion 53 and is engaged from the rear by the spring 54. The rear end of the spring bears against a dished washer 58 which is fixed by a press fit against a shoulder in the tubular stem 52. The spring acts between such washer 58 and the cap 56 on the tailpiece to urge the tailpiece forward into fully telescoped position in the bolt 46.

A timing groove 60 is cut in the tailpiece at a point intermediate the length of the tubular stem 52 and a spring clip or stop ring 62 is inserted through a slot in the wall of the stem 52 into the timing groove 60 to limit the lost motion of the tailpiece with respect to the stem 52 and bolt 46. At the rear end of the stem 64, the tailpiece is provided with a cam groove 52 for purposes to be described. Except for the two grooves 60 and 64, the tailpiece is a straight cylindrical rod which is freely rotatable and slidable in the stem 52 within the limits of its lost motion.

The rear end of the tailpiece 24 extends through a central opening in the rear closure member 42 and is supported therein by the edges of the opening. If desired, a bearing washer 65 may be mounted against the inner face of the closure plate 40. The bolt 46 is urged forward by a spring 66, guided by a pin 68 which is

fixed at the rear and slidably extends into a tubular guide 70 fixed in the latch bolt 46.

An auxiliary bolt 72 is mounted against the locking face 48 of the main bolt 46. As shown in FIG. 7, the deadlocking plunger 72 has beveled edges at its inner face and is slidably received in a shallow groove 74 formed in the locking face 48 of the latch bolt 46. As shown in FIG. 8, the opposite or outer face 76 of the deadlocking plunger 72 has an arcuate configuration on a somewhat shorter radius than the inside radius of the tubular housing 30 so as to slidably engage that housing over a limited line-contact area. The deadlocking plunger 72 is urged forward by a spring 78 guided by a pin 80 which slidably extends into bore 82 in the plunger 72.

A deadlocking dog 88 is mounted as follows. The two spring-guided pins 68 and 80 are mounted at the rear in a mounting ring 84 which seats against the peripheral edge of the rear closure plate 40 and traps the bearing washer 65 against that plate. At one position on the periphery of the mounting ring 84, at the bottom as shown in FIGS. 3-5, a pivot tongue 86 is bent forward to form a pivot bearing for the rear end of the locking dog 88. A central tongue 89 at the rear of the locking dog 88 is bent out of the plane of the dog and the end of such tongue is bent at right angles to form a pressure lug 90. The side portions 91 left by that central tongue are formed with opposed notches and bent to engage the pivot tongue 86, as shown in FIG. 10.

As shown in FIG. 3, the pressure lug 90 of the deadlocking dog 88 lies behind the toe 92 of a C-shaped foot lever 94, the heels 96 of which are fulcrumed against the mounting ring 84, and the arched portions 98 of which underlie the rear ends of the springs 66 and 78 to take the spring reaction. The spring reaction tends to tilt the foot member 94 about its heel portions 96 and press the toe 92 against the pressure lug 90 of the deadlocking dog 88, and thus to bias that deadlocking dog for tilting movement about its supporting pivot 86.

As shown in FIGS. 3-6, the forward or dogging end of the dog 88 is formed with an inward extending cam nose 100 adapted to enter the cam slot 64, and with an angular end 102 adapted to lie in abutting relation with the rear end of the bolt stem 52 as shown in FIG. 4. The cam groove 64 is so shaped that when the tailpiece is pulled rearward relative to the sleeve 52, its cam surface 61 will engage the angular end 102, as shown in FIG. 5; so that further rearward movement of the tailpiece will cam that end outward out of abutting relation with the stem 52 and permit that stem to engage the angular face of the dog and slide past the dog, as shown in dotted lines in FIG. 5. The stem 52 can then retract freely, as to the fully retracted position shown in FIG. 6.

The deadlocking dog 102 is also controlled by the auxiliary bolt 72. The rear of such bolt carries a rearward extending arm 104 as shown in FIGS. 1, 9 and 12. This is mounted by means of a radial segment 103 engaged in a groove at the rear of the bolt 72, and at its rear end carries a transverse finger 106 which extends tangentially across the side of the tailpiece 104 and beneath the dog 88. When the plunger 72 in normal advanced position as shown in FIGS. 1 and 3, the finger 106 engages the locking dog 88 to cam it outward away from dogging position, and to a release position as shown in FIG. 3. The bolts 46 and 72 will then retract freely under end pressure on the latch bolt 46. How-

ever, when the auxiliary bolt 72 is retracted relative to the latch bolt 46, as shown in FIG. 2, the finger 106 moves rearward to an idle position as shown in FIGS. 2 and 4, where it is completely out of engagement with the locking dog 88, and this permits that locking dog to pivot inward to its dogging position as shown in FIG. 4. With the dog in that position, attempt to push the latch bolt 46 inward carries the end of the bolt stem 52 into abutment with the end of the dog 88. This deadlocks the bolt against forced retraction.

The mounting of the auxiliary bolt 72 in the groove 74 of the main bolt 46 provides mutual support between them, and allows the auxiliary bolt to form a supporting filler between the flat latching face 48 of the main bolt and the opposite bearing surface of the face plate 36 and tubular housing 30.

Additional guiding support and stop means for the bolts is provided as follows. The rear face of the bolt 46 is counter-bored to leave a peripheral collar 110 and provide a flat rear seat for a stop plate 112. This is held in place by bending the peripheral collar 110 inward as shown in FIG. 3. The stop plate 112 is C-shaped as shown in FIG. 8, with a central opening to clear the stem 52 and with cordially extending tongues 114 extending along the sides of the auxiliary bolt 72. These fingers 114 support triangular bearing blocks 116 which bear at their outer faces against the inside surface of the tubular housing 30, and at their inner side faces against side faces of the auxiliary bolt 72. The bearing blocks move with the main bolt 46. Their front faces engage the rear of the face plate 36 to stop forward movement of the main bolt 46. Their rear faces are engaged by the projecting ends of the segment 103 at the rear of the auxiliary bolt 72 and form a stop for that bolt which holds it flush with the main bolt.

Operation is as follows: The normal position of the bolt mechanism is as shown in FIGS. 1 and 3. The main bolt 46 and the auxiliary bolt 72 are both fully extended. The cam finger 106 at the rear of the control arm 104 carried by the auxiliary bolt 72 lies against the locking dog 88 to cam it to its release position, as shown in FIG. 3. The bolts will freely retract in response to thrust on the main bolt 46, so that if a door containing the bolt mechanism is closed to carry the bolts against a strike plate 120, the bolts will be thrust rearward by the camming action of the strike plate 120 against the cam face 50 of the latch bolt 46. The auxiliary bolt will be carried with the main bolt. When the latch bolt comes into alignment with the keeper opening 122 in the strike plate 110, the main bolt 46 is projected into that opening 122 by its biasing spring 66. The auxiliary bolt 72, however, is caught by the strike plate 120 and is held in retracted position as shown in FIGS. 2 and 4. This holds the dog-release finger 106 in its rearward position and releases the locking dog 88 to its dogging position, as shown in FIG. 4. The cam nose 100 enters the cam groove 60 of the tailpiece 24 and the dogging end 102 of the dog moves into alignment with the rear face of the bolt sleeve 52. The main bolt 46 is then prevented by the locking dog from moving rearward and is deadlocked in projected position.

When the bolts 46 and 72 are thrust rearward by the strike plate 120, the rear end of the tailpiece 24 moves freely through the jaws of the retractor 20 of the cylindrical lock mechanism, since the engagement is a one-way retraction connection which allows the tailpiece to move freely rearward in this way. This relationship, and

the bolt structure which permits it, greatly reduces the need for exact alignment and spacing between the lock and bolt mechanism.

The latch bolt 46 may be retracted by the retractor 20 of the cylindrical lock 10 at any time, and the operation will be similar whether the bolt 46 is in normal position (FIG. 1) or in deadlocked position (FIG. 2). In either case, the retractor 20 pulls rearward on the tailpiece 24, the forward biasing spring 66 of the bolt 46 will tend to maintain the bolt 46 in projected position and the weaker tailpiece-biasing spring 54 will yield, so that the tailpiece 24 will move rearward through its lost motion with respect to the sleeve 52. This will carry the cam surface 61 of the cam groove 60 into position for engagement with the out-turned end 102 of the locking dog 88 as shown in FIG. 5. Further retraction of the tailpiece will then cause that cam surface 61 to move that end 102 outward away from its dogging position, toward the dotted line position in FIG. 5, and this will allow the sleeve 52 to slide past the end of the dog and move freely to the position shown in FIG. 6.

The main bolt 46 is well supported for sliding movement in the housing 30 by the bearing blocks 116 and the plunger 72, and is supported against tilting by the fixed stem 52 and the tailpiece 24 which in turn is supported at the rear in the rear closure wall 40 and by the bearing washer 65, if present. The auxiliary bolt 72 on the other hand is well supported by its wide area of engagement with the groove 74 in the main bolt and by the guide pin 80. The mechanism is substantially wholly enclosed by the cylindrical housing 30 and its end closure plates 36 and 40. Installation of the bolt assembly in proper relation with the cylindrical lock mechanism 10 is facilitated by the arcuate shape of the grooves defined by the tongues 44 for receiving the edges 18 of the shell 16 of the housing 30, and is facilitated by the shape of the tailpiece and the nature of its engagement with the retractor 20. Operation does not depend upon an exact relationship between the retractor 20 and the head 22 of the tailpiece, and the lost-motion connection permits some leeway in this relationship. The construction simplifies manufacture and assembly and provides good operating characteristics over a long life.

We claim:

1. A deadlocking latch bolt mechanism comprising a bolt housing,
 - a latch bolt slidably mounted in said housing and having a tubular stem fixed thereto and extending rearward therefrom a distance not less than the throw of the bolt, said stem having a rearwardly-presented stop face,
 - a rod-shaped tailpiece telescopically mounted in said stem in coaxially supporting relation therewith and having limited axial lost motion therein, said tailpiece having a head at its rear end for retraction engagement with the retractor of a lock mechanism,
 - a locking dog mounted in said housing and having a forwardly-presented dogging end, said dog having a dogging position in which said dogging end lies in the path of said stop face of the stem to block retraction of the bolt and a release position in which said end lies out of said path so as to permit such retraction,
 - said dog also having a cam portion which includes a sloping cam surface rearward of said dogging end and which in dogging position of the dog projects

inward of the inner surface of the stem and into interfering relation with the tailpiece.

said tailpiece having a groove therein which has an inactive forward position aligned with said cam portion so as to receive the same and allow the dog to assume its dogging position, and which groove has an active rearward position to which it is moved by rearward movement of the tailpiece relative to the stem and in which its forward end is operative to engage said sloping cam surface of the dog and move the dog outward sufficiently to position its dogging end out of the path and its sloping cam surface in the path of said stop face of the stem so as to cause the dog to ride past such stop face and allow retraction of the bolt upon further rearward movement of the tailpiece.

and an auxiliary bolt slidable in said housing and means movable therewith for moving the locking dog to release position when the auxiliary bolt is in projected position and permitting the dog to assume its dogging position when the auxiliary bolt is retracted relative to the latch bolt.

2. A deadlocking latch bolt mechanism as in claim 1, further comprising

a timing groove in the tailpiece spaced forwardly from said cam-receiving groove, and a stop member fixed to the stem and engaged in the timing groove, the timing groove being axially longer than the stop member by a predetermined amount so as to limit the lost motion between the tailpiece and stem.

3. A deadlocking latch bolt mechanism as in claim 1, in which said tailpiece has slidable telescopic engagement with said stem over a long length thereof greater than the inside diameter of the stem so as to form a coaxially self-sustaining assembly, and said bolt has slidable bearing engagement with the forward end of said housing, and bearing means at the rear of the housing and slidably supporting the tailpiece to thereby support said assembly and the bolt in coaxial slidable relation with the housing.

4. A deadlocking latch bolt mechanism as in claim 1, which includes a bolt-advancing spring biasing said latch bolt toward projected position, and biasing means acting between the tailpiece and latch bolt to urge the tailpiece forward in its lost motion relative to the stem, said biasing means being weaker than said advancing spring so that rearward pull on the tailpiece by the retractor will first move the tailpiece relative to the latch bolt to dispose said tailpiece groove in its active position and thereafter retract the latch bolt.

5. A deadlocking latch bolt mechanism as in claim 4, in which said locking dog is pivotally mounted at the rear of the housing and has a forward dogging end, and said tailpiece groove has a cam surface formed at its forward end for engagement with said cam surface on the dog.

6. A deadlocking latch bolt mechanism, comprising a bolt housing,

a latch bolt slidably mounted in said housing and having a rearward-extending tubular stem fixed thereto,

a rod-shaped tailpiece telescopically mounted in said stem and having limited axial lost motion therein, said tailpiece having a head at its rear end for retraction engagement with the retractor of a lock mechanism,

a locking dog mounted in said housing and having a dogging position in which it lies in the path of said stem to block retraction of the bolt and a release position in which it permits such retraction,

cam means on said tailpiece having an inactive forward position and an active rearward position to which it is moved by rearward movement of the tailpiece relative to the stem, said cam means being operative in said active position to move the dog from its dogging position to its release position, an auxiliary bolt slidable in said housing and means movable therewith for moving the locking dog to release position when the auxiliary bolt is in projected position and permitting the dog to assume its dogging position when the auxiliary bolt is retracted relative to the latch bolt,

biasing means acting between the tailpiece and latch bolt to urge the tailpiece forward in its lost motion relative to the stem to a position in which it disposes the cam means in its inactive forward position, and a bolt-advancing spring biasing said latch bolt toward projected position, said biasing means between the tailpiece and latch bolt being weaker than said advancing spring so that rearward pull on the tailpiece by the retractor will first move the tailpiece relative to the latch bolt to dispose said cam means in its active position and thereafter retract the latch bolt,

said locking dog being pivotally mounted at the rear of the housing and having a forward dogging end which in dogging position lies adjacent the side of the tailpiece in the path of said stem,

said cam means comprising a cam element formed on said tailpiece which in its forward inactive position during rearward movement of the bolt allows the dog to engage the stem before it engages said cam element, and in its active rearward position engages the dog to move it out of the path of the stem before the dog engages the stem,

said cam element being the forward portion of a circumferential groove in the rod-shaped tailpiece, and said locking dog having a cooperating cam element which lies in said groove when the dog is in dogging position.

7. A deadlocking latch bolt mechanism, comprising a bolt housing,

a latch bolt slidably mounted in said housing and having a rearward-extending tubular stem fixed thereto,

a rod-shaped tailpiece telescopically mounted in said stem and having limited axial lost motion therein, said tailpiece having a head at its rear end for retraction engagement with the retractor of a lock mechanism,

a deadlocking dog mounted in said housing and having a dogging position in which it lies in the path of said stem to block retraction of the bolt and a release position in which it permits such retraction, cam means on said tailpiece having an inactive forward position and an active rearward position to which it is moved by rearward movement of the tailpiece relative to the stem, said cam means being operative in said active position to move the dog from its dogging position to its release position,

an auxiliary bolt slidable in said housing and means movable therewith for moving the locking dog to release position when the auxiliary bolt is in pro-

jected position and permitting the dog to assume its dogging position when the auxiliary bolt is retracted relative to the latch bolt,
 a spring extending longitudinally of said housing and urging one of said bolts to projected position,
 a support at the rear of the housing,
 said deadlocking dog being pivoted at the rear of said housing, extending forward therefrom, and having a pressure lug extending inward of its pivot axis,
 and a foot lever having a heel portion fulcrumed on said support and having a toe portion engaging said pressure leg,
 said spring being supported by and reacting against said foot lever at a point between its heel and toe portions so as to urge the foot lever about its fulcrum in a direction to press on the pressure lug of the deadlocking dog and thereby bias the deadlocking dog inward toward its deadlocking position.

8. A deadlocking latch bolt mechanism as in claim 7 which includes two springs on opposite sides of said tailpiece, respectively for urging the latch bolt and auxiliary bolt to projected positions, said foot lever being arranged to support and sustain the reaction of both of said springs.

9. A deadlocking latch bolt mechanism as in claim 8, in which said rear support carries guide pins extending axially through said springs and said foot lever is a C-shaped member having bifurcated ends engaged about said pins.

10. A deadlocking latch bolt mechanism, comprising a generally cylindrical bolt housing,

a latch bolt slidable in said housing and including a bolt member and a rearward-extending tailpiece, said bolt member having a latch side face extending chordally of said housing,

an auxiliary bolt slidably mounted against said latch side face, said auxiliary bolt being narrower than the chordal side face of the latch bolt so as to form longitudinal angular grooves at opposite sides of the auxiliary bolt,

and low-friction bearing blocks mounted in said grooves.

11. A deadlocking latch bolt mechanism as in claim 10, with the addition of a stop plate fixed to the rear face of said latch bolt member and having arms extending into said angular grooves, said bearing blocks being engaged over said arms so as to move with the latch bolt, and a plate closing said grooves at the outer end of said housing, against which the bearing blocks engage to stop outward movement of the latch bolt.

12. A deadlocking latch bolt mechanism as in claim 11 with the addition of a stop segment fixed to the inner end of said auxiliary bolt and overlying the rear faces of said bearing blocks so as to engage the same to stop forward movement of the auxiliary bolt relative to the latch bolt.

13. A deadlocking latch bolt mechanism, comprising a tubular bolt housing,

a latch bolt slidably mounted in the forward end of said housing and having a rearward-extending tubular stem fixed thereto,

a rod-shaped tailpiece telescopically mounted in said stem and having limited axial lost motion therein, a tailpiece-biasing spring or the like acting between the bolt and tailpiece and urging the tailpiece forward with respect to the bolt, said tailpiece having

a head at its rear end for retraction engagement with the retractor of a lock mechanism,

a locking dog pivotally mounted at the rear of the housing and extending forward along side the tailpiece and having a forward dogging end which normally lies in a dogging position in the path of said stem to block retraction of the bolt, said dog being pivotally movable outward from said dogging position to a release position in which it lies out of the path of the stem so as to permit retraction of the bolt, spring means biasing the dog to said normal dogging position,

a cam element formed on the tailpiece opposite a portion of said locking dog, said cam element having a normal position in which it clears the locking dog to permit the same to assume its dogging position when the tailpiece is forward with respect to the bolt, said cam element being movable to a position to engage the locking dog upon rearward lost-motion movement of the tailpiece and to move the locking dog to its release position so as to permit rearward movement of the tailpiece to retract the bolt,

a foot lever having a heel portion fulcrumed on a support at the rear of said bolthousing and having a toe portion engaged with said locking dog so as to tilt the same inward to its normal locking position, and a spring acting between one of said bolts and said foot lever to urge the bolt forward and urge the lever in a direction to tilt the locking dog to its dogging position.

14. A deadlocking latch bolt mechanism, comprising a bolt housing,

a latch bolt slidably mounted in said housing and having a rearward-extending stem fixed thereto,

a tailpiece connected with said stem and having limited axial lost motion with respect to the stem, said tailpiece having means at its rear end for retraction by the retractor of a lock mechanism,

a locking dog pivotally mounted at the rear of said housing, extending forward therefrom and having a pressure lug extending inward of its pivot axis, said dog having a dogging position in which it lies in blocking relation with said stem to block retraction of the bolt and a release position in which it permits such retraction,

and a foot lever having a heel portion fulcrumed on a support at the rear of the housing and having a toe portion engaging said pressure lug,

a bolt-advancing spring supported by and reacting against said foot lever at a point between its heel and toe portions so as to urge the foot lever about its fulcrum in a direction to press on the pressure lug of the deadlocking dog and thereby bias the deadlocking dog inward toward its deadlocking position,

dog-controlling means on said tailpiece having an inactive forward position and an active rearward position to which it is moved by rearward movement of the tailpiece relative to the stem, said means being operative in said active position to move the dog from its dogging position to its release position, and an auxiliary bolt slidable in said housing and means movable therewith for moving the locking dog to release position when the auxiliary bolt is in projected position and permitting the dog to as-

sume its dogging position when the auxiliary bolt is retracted relative to the latch bolt.

15. A deadlocking latch bolt mechanism, comprising a bolt housing,

a latch bolt slidably mounted in said housing and having an elongated tubular stem fixed thereto and extending rearward therefrom,

a rod-shaped tailpiece telescopically received in said stem and having slidable engagement therewith over a substantial length thereof greater than the diameter of the rod so as to form a stiff coaxially self-sustaining assembly in which the tailpiece has limited axial lost motion in the stem, said tailpiece having a head at its rear end for retraction engagement with the retractor of a lock mechanism,

said bolt being slidably supported in said housing at the front end of said coaxially self-sustaining assembly and said tailpiece being slidably supported at the rear end of said housing, so as to provide widely spaced slidable bearing supports for said self-sustaining assembly to thereby support the same and the bolt in coaxial slidable relation with the housing,

a locking dog mounted in said housing and having a dogging position in which it lies in blocking relation with said stem to block retraction of the bolt and a release position in which it permits such retraction,

cam means on said tailpiece having an inactive forward position and an active rearward position to which it is moved by rearward movement of the tailpiece relative to the stem, said means being operative in said active position to move the dog from its dogging position to its release position,

and an auxiliary bolt slidable in said housing and means movable therewith for moving the locking dog to release position when the auxiliary bolt is in projected position and permitting the dog to assume its dogging position when the auxiliary bolt is retracted relative to the latch bolt.

16. A deadlocking latch bolt mechanism as in claim 15 in which said bolt member has a latch side face extending chordally of said bolt housing, said auxiliary bolt is slidably mounted against said latch side face and is narrower than said chordal side face so as to form longitudinal angular grooves at opposite sides of the auxiliary bolt, and low-friction bearing blocks mounted in said grooves to slidably support the front end of said

bolt and tailpiece assembly.

17. A deadlocking latch bolt mechanism as in claim 15 in which said housing is cylindrical, said auxiliary bolt is slidably mounted in a guiding groove in the side face of said latch bolt, and has a substantially cylindrical outer face in substantially mating bearing engagement with the front end of the cylindrical housing so as to support the latch bolt for coaxial sliding movement therein.

18. A deadlocking latch bolt mechanism, comprising a bolt housing,

a latch bolt slidably mounted in said housing and having an elongated rearward-extending tubular stem fixed thereto, the internal bore of said stem having a shoulder formed therein adjacent its forward end, a rod-shaped tailpiece telescopically mounted in the bore of said stem and having limited lost motion therein, said tailpiece having a shoulder adjacent its forward end and a reduced diameter end portion extending beyond said tailpiece shoulder and having a cap at its forward end,

a reaction washer mounted about said tailpiece end portion and shaped to engage said tailpiece shoulder in thrust relation,

a spring about said tailpiece end portion and compressed between said cap and washer so as to urge the washer rearward and urge the cap and tailpiece forward relative to the washer,

said washer being fixed in the bore of the stem against the shoulder therein so as to support the adjacent end of the spring in fixed position in the stem against rearward movement and thereby cause the spring to bias the cap and tailpiece forward relative to the stem,

a locking dog mounted in said housing and having a dogging position to which it is biased and in which it lies in blocking relation relative to said stem to block retraction of the bolt, and a release position in which it permits such retraction,

means on said tailpiece responsive to rearward lost motion movement of the tailpiece relative to the stem, against the bias of said spring, for moving said dog from its dogging position to its release position,

and an auxiliary bolt slidable in said housing and means movable therewith for independently moving the locking dog to release position.

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