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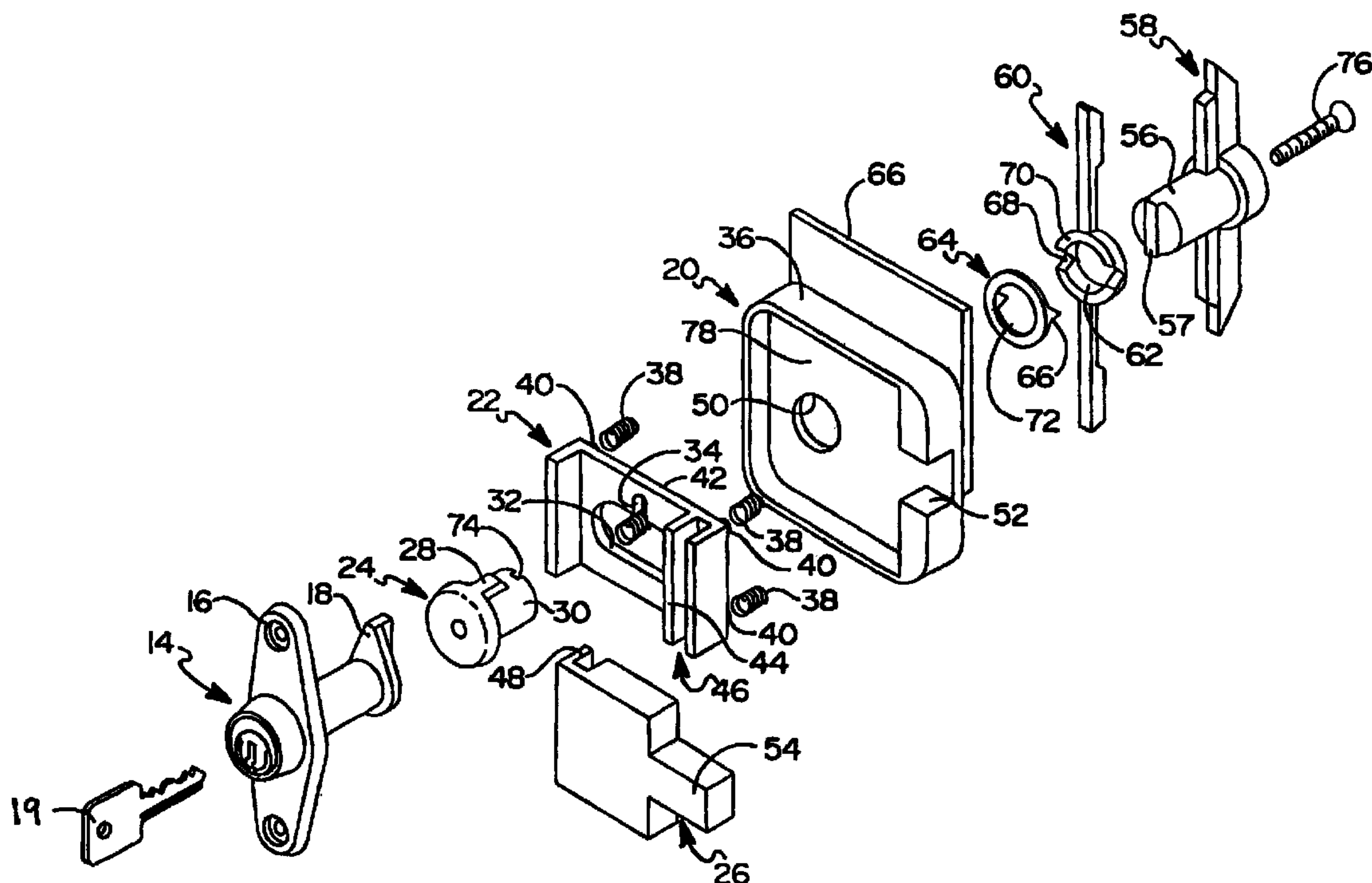
(72) Inventeurs/Inventors:
LACONTE, RICHARD J., US;
KUBE, SCOTT P., US;
KUPFER, SHANNON J., US;
JOHNSON, JAMES J., US;
AUTREY, TONY D., US;
MELBERG, DAVID S., US;
SMITH, LARRY C., US

(73) Propriétaire/Owner:
THE BOEING COMPANY, US

(74) Agent: SMART & BIGGAR

(54) Titre : SERRURE A PENE DORMANT POUR PORTE DE POSTE DE PILOTAGE D'AVION

(54) Title: DEAD BOLT LOCK ASSEMBLY FOR FLIGHT DECK DOOR OF AN AIRCRAFT



(57) Abrégé/Abstract:

A dead bolt lock apparatus specifically adapted for use with a flight deck door of an aircraft. The apparatus includes a dead bolt member which can be moved between locked and unlocked positions via a key. A lockout handle is included on the side of the apparatus which faces the flight deck area of the aircraft. The lockout handle is movable rotationally from a first position, wherein it has no affect on the use of the key to unlock the dead bolt, to a second position wherein it prevents the dead bolt from being moved out of a locked position by use of the key. The apparatus thus provides an additional degree of security to occupants of the flight deck by allowing them to prevent unlocking of the apparatus even with the key.

DEAD BOLT LOCK ASSEMBLY FOR FLIGHT DECK DOOR OF AN AIRCRAFT

ABSTRACT OF THE DISCLOSURE

A dead bolt lock apparatus specifically adapted for use with a flight deck door of an aircraft. The apparatus includes a dead bolt member which can be moved between locked and unlocked positions via a key. A lock out
5 handle is included on the side of the apparatus which faces the flight deck area of the aircraft. The lockout handle is movable rotationally from a first position, wherein it has no affect on the use of the key to unlock the dead bolt, to a second position wherein it prevents the dead bolt from being moved out of a locked position by use of the key. The apparatus thus provides an
10 additional degree of security to occupants of the flight deck by allowing them to prevent unlocking of the apparatus even with the key.

DEAD BOLT LOCK ASSEMBLY FOR FLIGHT DECK DOOR OF AN AIRCRAFT

FIELD OF THE INVENTION

5 This invention relates to lock assemblies, and more particularly to a dead bolt lock assembly particularly adapted for use with a flight deck door in an aircraft.

BACKGROUND OF THE INVENTION

10 Recent events have made increased security in the cockpit of a commercial airliner an important consideration. More specifically, these recent events have led to new government requirements for lock assemblies used on flight deck doors in commercial aircraft which provide an even greater degree of security to occupants in the flight deck area of the aircraft.

15 Traditionally, locking systems used on flight deck doors have involved the use of a lock assembly which may be unlocked with a key by a flight attendant or other member of the flight crew. However, if the key is obtained by an individual who is not authorized to enter the flight deck area, then such an individual would be able to unlock the door lock assembly and gain
20 unauthorized entry onto the flight deck of the aircraft.

 Accordingly, the need has arisen for a door lock assembly particularly well adapted for use with a flight deck door in an aircraft which enables the door lock assembly to be locked and unlocked with a key, but which also provides members on the flight deck the means to override or "lock out" the
25 assembly such that the assembly cannot be unlocked even with a key. In this manner, if members of the flight deck learn that an unauthorized individual on the aircraft may have obtained the key to the lock assembly, the lock assembly can be locked out from the flight deck side of the flight deck door, thereby preventing unlocking of the door lock assembly and unauthorized
30 entry by an individual in the passenger cabin area. Such a door lock assembly would ensure that the occupants of the flight deck have the capability to prevent unlocking of the door lock assembly in the event of an in flight

disturbance where it is deemed necessary to prevent any access whatsoever to the flight deck area by individuals in the passenger cabin area.

SUMMARY OF THE INVENTION

5 In accordance with one aspect of the invention, there is provided a deadbolt lock apparatus particularly adapted for use with a flight deck door. The apparatus includes a housing adapted to be secured to the door, a lock cylinder disposed within the housing for accepting a key to allow the apparatus to be unlocked from a passenger side of the door, the lock cylinder
10 including a driver movable rotatably when the key is inserted into the lock cylinder and rotated, a deadbolt member disposed within the housing and adapted to project into a door jamb positioned adjacent the door when the apparatus is in a locked position, a slider member operatively coupled to the deadbolt for urging the deadbolt member between an unlocked position and a
15 locked position, the slider member further being operatively coupled to the driver such that rotational movement of the driver causes the slider to move the deadbolt member between the locked and unlocked positions, a lockout member disposed on a flight deck side of the door and operatively coupled to the slider such that movement of the lockout member from a first position to a
20 second position causes the slider to be moved out of engagement with the driver, thereby preventing the driver from unlocking the deadbolt member when the key is inserted into the lock cylinder and turned to an unlock position and wherein the lockout member comprises a camming surface, the camming surface operable to move the lockout member away from the door when the
25 lockout member is moved into the second position.

A lock handle may be operatively coupled to the slider and may project adjacent the flight deck side of the door for allowing the apparatus to be unlocked from the flight deck side of the door.

30 The lockout member may comprise a handle graspable by an individual. The handle may be operable with the camming surface to move the lockout member away from the door when the handle is moved into the second position.

The housing may include an escutcheon having a protrusion adapted to engage with the camming surface, to thereby cause the lockout member to be urged away from the door when the handle is moved into the second position.

5 The protrusion may be formed such that movement of the handle from the second position to the first position allows the lockout member to be displaced toward the door, thereby displacing the slider back into operative engagement with the driver.

10 The lockout member may include a handle that is secured to the housing for rotational movement.

15 In accordance with another aspect of the invention, there is provided a deadbolt lock apparatus particularly adapted for use with a flight deck door. The apparatus includes a housing adapted to be secured to the door, a lock cylinder disposed within the housing for accepting a key to allow the apparatus to be unlocked from a passenger side of the door, the lock cylinder including a driver movable rotatably when the key is inserted into the lock cylinder and rotated, a deadbolt member disposed within the housing and adapted to project into a door jamb positioned adjacent the door when the apparatus is in a locked position, a slider member operatively coupled to the deadbolt for urging the deadbolt member between an unlocked position and a locked position, the slider member further being operatively coupled to the driver such that rotational movement of the driver causes the slider member to move the deadbolt member between the locked and unlocked positions, a lock handle operatively coupled to the slider member and projecting from a flight deck side of the door for enabling the apparatus to be unlocked from the flight deck side of the door, a lockout member disposed on a flight deck side of the door and operatively coupled to the slider member such that movement of the lockout member from a first position to a second position causes the slider member to be moved out of engagement with the driver, thereby preventing the driver from unlocking the deadbolt member when the key is inserted into the lock cylinder and turned to an unlock position, wherein movement of the lockout member from the second position to the first position

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places the slider member into operative engagement with the driver, to thereby permit the key to be used to unlock the apparatus and wherein the housing comprises a first camming surface and the lockout member comprises a second camming surface, the camming surfaces cooperating to urge the lockout member linearly away from the door when the lockout member is moved into the second position.

The housing may include an escutcheon mounted on the flight deck side of the door, wherein the escutcheon comprises the first camming surface.

The lock handle and the lockout member may be both mounted on the housing for rotational movement.

The lock handle and the lockout member may be mounted adjacent one another such that both can be grasped with a single hand.

The slider member may include a U-shaped distal portion for engaging a slot formed in the deadbolt member when the lockout member is in the first position.

In accordance with another aspect of the invention, there is provided a deadbolt lock apparatus particularly adapted for use with a flight deck door. The apparatus includes a housing adapted to be secured to the door, a lock cylinder disposed within the housing for accepting a key to allow the apparatus to be unlocked from a passenger side of the door, the lock cylinder including a driver movable rotatably when the key is inserted into the lock cylinder and rotated, a deadbolt member disposed within the housing and adapted to project into a door jamb positioned adjacent the door when the apparatus is in a locked position, a slider member mounted within the housing for contact with the driver and the deadbolt member, to enable the driver to urge the slider member, and thereby the deadbolt member, between an unlocked position and a locked position when the key is inserted into the lock cylinder and rotated, a lock handle operatively coupled to the slider member and projecting from a flight deck side of the door for enabling the apparatus to be unlocked from the flight deck side of the door, an escutcheon mounted on the flight deck side of the door and including a first camming surface, a lockout handle pivotally mounted to the housing and disposed adjacent the

escutcheon, the lockout handle including a second camming surface in contact with the first camming surface, the lockout handle being operatively coupled to the slider such that rotational movement of the lockout handle from a first position to a second position causes the slider member to be displaced within the housing out of engagement with the driver, thereby preventing the driver from unlocking the deadbolt member when the key is inserted into the lock cylinder and turned to an unlock position and wherein movement of the lockout handle from the second position to the first position places the slider member into operative engagement with the driver, to thereby permit the key to be used to unlock the apparatus.

The lock handle may be pivotally coupled to the lockout handle.

The lock handle may be arranged relative to the lockout handle such that both of the handles can be grasped simultaneously and rotated when the lockout handle is rotated from the second position back into the first position.

Generally, in one form of the invention, there is provided a door lock assembly generally comprising a housing, a lock cylinder, a slide member, a dead bolt member and a lockout member. The lock cylinder is secured to the housing and includes a driver which is rotated when the proper key is inserted into the lock cylinder and rotated. The slide member is disposed such that it is able to engage a portion of the dead bolt and be moved laterally within the housing by the lock driver when the lock driver is rotated via the key. Thus, the key can be used to move the dead bolt member between a locked position, wherein it is engaged in a door jamb adjacent an edge of the flight deck door, or retracted into an unlocked position. The lockout handle is operatively secured to the slider member and is accessible from the flight deck side of the flight deck door by a crew member present in the flight deck area. In a first position, the lockout handle has no affect on operation of the dead bolt member via the key. Thus, when the lockout handle is in the first position, the dead bolt can be moved between its locked and unlocked positions simply by inserting the key into the lock cylinder and rotating the key between locked and unlocked positions. However, when the lockout handle is moved into a second position, the slider member is placed from the driver

such that use of the key will not be able to unlock the dead bolt from its locked position. With the lockout handle in its lock out position (i.e., second position), the lock cylinder rotates but the driver does not make contact with the dead bolt member. Moving the lockout handle back into its first position displaces the slide member back into operative engagement with the lock driver, thus allowing the key to unlock the dead bolt member.

In one preferred form, the lock assembly of the present invention includes an escutcheon having a first camming surface. The lockout handle includes a second camming surface disposed in engagement with the first camming surface when the lock assembly is fully assembled. Movement of the lockout handle from the first position to the second position affects a camming action between the two camming surfaces which urges the lockout handle away from the door, thus displacing the slider out of operative engagement with the lock driver. In a preferred embodiment, a lock handle is also included and is operatively coupled to a handle driver member. When the dead bolt member is moved into its locked position by use of the key, the handle driver member is rotated, thus moving the lock handle simultaneously rotationally from a first position into a second position and thus indicating to individuals occupying the flight deck that the apparatus is in a locked position. In this pretend embodiment, the lock handle is disposed between the escutcheon and the lockout handle. Both of the handle members can be rotated when the lockout handle is also in its second position by a user grasping both handles with a single hand and rotating same.

The apparatus of the present invention thus provides a means for allowing members occupying the flight deck area of an aircraft to positively lockout the apparatus, thus preventing the apparatus from being unlocked in the event an unauthorized individual should gain access to the key. Advantageously, the apparatus allows an individual in the flight deck area to quickly and easily place the apparatus back into a condition wherein the key can be used to unlock the dead bolt. The apparatus provides an additional degree of security to the occupants of the flight deck by allowing them to

place the apparatus in a condition wherein the apparatus cannot be unlocked even with the key.

Further areas of applicability of the present Invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limited the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description and the accompanying drawings, wherein:

Figure 1 is a view of the apparatus of the present invention from the passenger cabin side of a flight deck door;

Figure 2 is a view of the apparatus from the flight deck side of the door;

Figure 3 is an exploded perspective view of the major components of the apparatus; and

Figure 4 is a top view of the apparatus showing how the lockout handle moves away from the flight deck side of the door when it is moved into a lockout position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

Referring to Figures 1 and 2, there is shown a dead bolt lock assembly 10 in accordance with a preferred embodiment of the present invention. The dead bolt lock assembly 10 is particularly well adapted for use on the flight deck door 12 of an aircraft.

With additional reference to Figure 3, the apparatus 10 generally includes a lock cylinder 14 which is adapted to be secured to a passenger cabin side of the flight deck door 12. The lock cylinder 14 includes an

escutcheon **16** and a driver **18** which is rotatable when a key **19** is inserted into the lock cylinder **14** and turned. The apparatus **10** further includes a housing **20** within which is disposed a slider member **22**, a handle driver **24** and a bolt member **26**. The handle driver **24** includes a key portion **28** projecting from a barrel portion **30** and projects through an opening **32** in the slide member **22**. The key portion **28** fits within a notch **34** in the slide member **22** such that rotation of the handle driver **24** causes lateral movement of the slide member **22**.

The housing **20** includes a peripheral wall **36** which houses the slide member **22**. The slide member **22** is biased by a plurality of biasing elements **38**, which in this embodiment comprise coil springs toward the bolt member **26** when the apparatus **10** is fully assembled. The biasing members **38** fit over corresponding posts **40** formed on a rear surface **42** of the slide member **22**.

With further reference to Figure 3, the slide member **22** further includes a pair of upstanding U-shaped wall portions **44** on a distal end which form a channel **46**. The channel receives an end wall **48** of the bolt member **26** when the apparatus **10** is assembled. Thus, lateral movement of the slide member **22** causes corresponding lateral movement of the bolt member **26**.

The housing **20** includes a central aperture **50** and a notched cutout **52**. The notched cutout **52** receives a projecting dead bolt portion **54** of the bolt member **26**. The central aperture **50** receives a neck **56** of a lock handle **58** therethrough when the apparatus **10** is assembled. A lockout handle **60** having an opening **62** is sandwiched between the lock handle **58** and a cam member **64**. The cam member **64** sits flush and fixedly against an escutcheon **66** positioned on the flight deck side of the flight deck door **12**. The cam member **64** has a cam surface **66** which fits within a notch **68** formed in a central portion **70** of the lockout handle **60**. The notch **68** essentially forms a cooperating camming surface which causes the lockout handle **60** to be displaced linearly away from the escutcheon **66**, and therefore away from the flight deck side of the door **12**, when the lockout handle **60** is moved from the position shown in Figure 3 to a substantially horizontal position. The neck portion **56** projects through opening **62** in the lockout handle **60**, through an

opening **72** in the cam member **64**, and through the central aperture **50**. The neck portion **56** has a rib **57** at an outermost end thereof which engages a notch **74** in the handle driver **24**. Thus, rotational movement of the handle driver **24** causes a corresponding rotational movement of the lock handle **58**.
5 The lock handle **58** is secured via a threaded screw **76** to the handle driver **24**.

With further reference to Figures **2**, **3** and **4**, the operation of the apparatus **10** will be described. Initially, when the key **19** is used to lock the apparatus **10**, it is turned rotationally after being inserted into the lock cylinder
10 **14**. This causes the driver **18** to rotate, which in turn rotates the handle driver **24**. This rotational movement of the handle driver **24** moves the slide member **22** laterally, which in turn moves the dead bolt member **26** laterally into a locked position relative to an adjacent door jamb of a wall of the aircraft. Once the key **19** is removed, the dead bolt member **26** prevents the door **12** from
15 being opened. When the dead bolt **26** is moved into its locked position, the handle driver **24** also rotates the lock handle **58** rotationally into a horizontal position, thus providing an indication to individuals on the flight deck that the apparatus **10** is in the locked position. It will be appreciated that during the just-described locking action, the lockout handle **60** does not rotate but
20 remains generally vertically positioned as shown in Figure **2**.

If a situation should develop in the passenger cabin area that causes members on the flight deck to determine that the door **12** should remain locked, then an individual on the flight deck can turn the lockout handle **60** to a generally horizontal position (shown in phantom in Figure **2**). This action
25 causes the lockout handle **60** and the lock handle **58** to be cammingly urged by contact with the cam member **64** away from the flight deck side of the door **12**. This movement is relatively small, and in one preferred form is approximately **0.125** inch or less in overall distance. However, this movement of the lock handle **58** away from the flight deck side of the door **12** causes the
30 handle driver **28** to be drawn toward the escutcheon **66**, which in turn urges the slide member **22** toward an inner wall **78** of the housing **20**. This linear movement of the slide member **22** toward the inner wall **78** is sufficient to

prevent the lock driver **18** from engaging the slide member **22** if the key **19** is used to move the lock driver **18** rotationally into its unlocked position. Thus, the lock driver **18** will not make contact with the slide member **14** when it is rotated. Therefore, even with the key **19** inserted in the lock cylinder **14**, the apparatus **10** will not be able to be unlocked when the lockout handle **60** is rotated to its horizontal position, as indicated in phantom in Figure 2.

The apparatus **10** thus provides a means for occupants of the flight deck to positively prevent unlocking of the apparatus **10** if it should be determined that a disturbance in the cabin area has arisen, or that a person in the passenger cabin area of the aircraft may have obtained the key **19** and may be seeking access to the flight deck area of the aircraft. The apparatus **10** allows an occupant of the flight deck to quickly and easily place the apparatus **10** in an unlocked condition by grasping both of the handles **60** and **58** and simultaneously rotating both handles into a generally vertical position as shown in Figure 2. This causes the lock driver **18** to rotate into its unlocked position, thereby withdrawing the dead bolt portion **54** of the dead bolt member **26** out of the door jamb and allowing the flight deck door **12** to be opened.

Those skilled in the art can now appreciate from the foregoing description that the broad teachings of the present invention can be implemented in a variety of forms. Therefore, while this invention has been described in connection with particular examples thereof, the true scope of the invention should not be so limited since other modifications will become apparent to the skilled practitioner upon a study of the drawings, specification and following claims.

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

1. A deadbolt lock apparatus particularly adapted for use with a flight deck
5 door, said apparatus comprising:

a housing adapted to be secured to said door;

10 a lock cylinder disposed within the housing for accepting a key
to allow said apparatus to be unlocked from a passenger side of
said door, said lock cylinder including a driver movable rotatably
when said key is inserted into said lock cylinder and rotated;

15 a deadbolt member disposed within said housing and adapted to
project into a door jamb positioned adjacent said door when said
apparatus is in a locked position;

20 a slider member operatively coupled to said deadbolt for urging
said deadbolt member between an unlocked position and a
locked position, said slider member further being operatively
coupled to said driver such that rotational movement of said
driver causes said slider to move said deadbolt member
between said locked and unlocked positions;

25 a lockout member disposed on a flight deck side of said door
and operatively coupled to said slider such that movement of
said lockout member from a first position to a second position
causes said slider to be moved out of engagement with said
driver, thereby preventing said driver from unlocking said
30 deadbolt member when said key is inserted into said lock
cylinder and turned to an unlock position; and

wherein said lockout member comprises a camming surface, said camming surface operable to move said lockout member away from said door when said lockout member is moved into said second position.

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2. The apparatus of claim 1, further including a lock handle operatively coupled to said slider and projecting adjacent said flight deck side of said door for allowing said apparatus to be unlocked from said flight deck side of said door.

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3. The apparatus of claim 1, wherein said lockout member comprises a handle graspable by an individual, said handle operable with said camming surface to move said lockout member away from said door when said handle is moved into said second position.

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4. The apparatus of claim 3, wherein said housing comprises an escutcheon having a protrusion adapted to engage with said camming surface, to thereby cause said lockout member to be urged away from said door when said handle is moved into said second position.

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5. The apparatus of claim 4, wherein said protrusion is formed such that movement of said handle from said second position to said first position allows said lockout member to be displaced toward said door, thereby displacing said slider back into operative engagement with said driver.

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6. The apparatus of claim 1, wherein said lockout member comprises a handle that is secured to said housing for rotational movement.

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7. A deadbolt lock apparatus particularly adapted for use with a flight deck door, said apparatus comprising:

a housing adapted to be secured to said door;

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a lock cylinder disposed within the housing for accepting a key to allow said apparatus to be unlocked from a passenger side of said door, said lock cylinder including a driver movable rotatably when said key is inserted into said lock cylinder and rotated;

10

a deadbolt member disposed within said housing and adapted to project into a door jamb positioned adjacent said door when said apparatus is in a locked position;

15

a slider member operatively coupled to said deadbolt for urging said deadbolt member between an unlocked position and a locked position, said slider member further being operatively coupled to said driver such that rotational movement of said driver causes said slider member to move said deadbolt member between said locked and unlocked positions;

20

a lock handle operatively coupled to said slider member and projecting from a flight deck side of said door for enabling said apparatus to be unlocked from said flight deck side of said door;

25

a lockout member disposed on a flight deck side of said door and operatively coupled to said slider member such that movement of said lockout member from a first position to a second position causes said slider member to be moved out of engagement with said driver, thereby preventing said driver from unlocking said deadbolt member when said key is inserted into said lock cylinder and turned to an unlock position;

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wherein movement of said lockout member from said second position to said first position places said slider member into

operative engagement with said driver, to thereby permit said key to be used to unlock said apparatus; and

wherein said housing comprises a first camming surface and said lockout member comprises a second camming surface, said camming surfaces cooperating to urge said lockout member linearly away from said door when said lockout member is moved into said second position.

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10 8. The apparatus of claim 7, wherein said housing comprises:

an escutcheon mounted on said flight deck side of said door;

wherein said escutcheon comprises the first camming surface.

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9. The apparatus of claim 7, wherein said lock handle and said lockout member are both mounted on said housing for rotational movement.

20 10. The apparatus of claim 9, wherein said lock handle and said lockout member are mounted adjacent one another such that both can be grasped with a single hand.

25 11. The apparatus of claim 7, wherein said slider member includes a U-shaped distal portion for engaging a slot formed in said deadbolt member when said lockout member is in said first position.

12. A deadbolt lock apparatus particularly adapted for use with a flight deck door, said apparatus comprising:

30 a housing adapted to be secured to said door;

a lock cylinder disposed within the housing for accepting a key to allow said apparatus to be unlocked from a passenger side of said door, said lock cylinder including a driver movable rotatably when said key is inserted into said lock cylinder and rotated;

5

a deadbolt member disposed within said housing and adapted to project into a door jamb positioned adjacent said door when said apparatus is in a locked position;

10

a slider member mounted within said housing for contact with said driver and said deadbolt member, to enable said driver to urge said slider member, and thereby said deadbolt member, between an unlocked position and a locked position when said key is inserted into said lock cylinder and rotated;

15

a lock handle operatively coupled to said slider member and projecting from a flight deck side of said door for enabling said apparatus to be unlocked from said flight deck side of said door;

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an escutcheon mounted on said flight deck side of said door and including a first camming surface;

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a lockout handle pivotally mounted to said housing and disposed adjacent said escutcheon, said lockout handle including a second camming surface in contact with said first camming surface;

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said lockout handle being operatively coupled to said slider such that rotational movement of said lockout handle from a first position to a second position causes said slider member to be displaced within said housing out of engagement with said driver, thereby preventing said driver from unlocking said

deadbolt member when said key is inserted into said lock cylinder and turned to an unlock position; and

5 wherein movement of said lockout handle from said second position to said first position places said slider member into operative engagement with said driver, to thereby permit said key to be used to unlock said apparatus.

10 13. The apparatus of claim 12, wherein said lock handle is pivotally coupled to said lockout handle.

15 14. The apparatus of claim 13, wherein said lock handle is arranged relative to said lockout handle such that both of said handles can be grasped simultaneously and rotated when said lockout handle is rotated from said second position back into said first position.

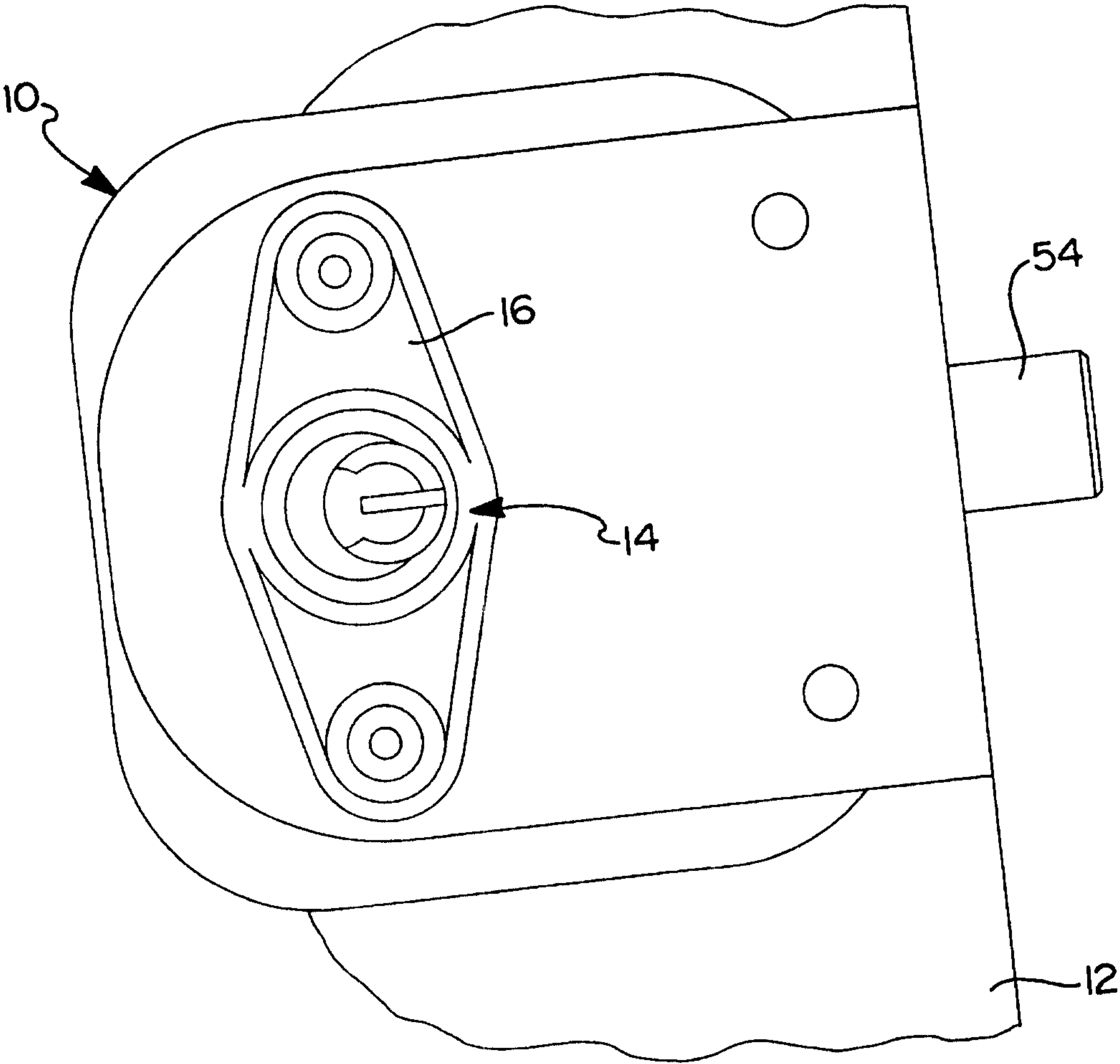


FIG 1

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FIG 2

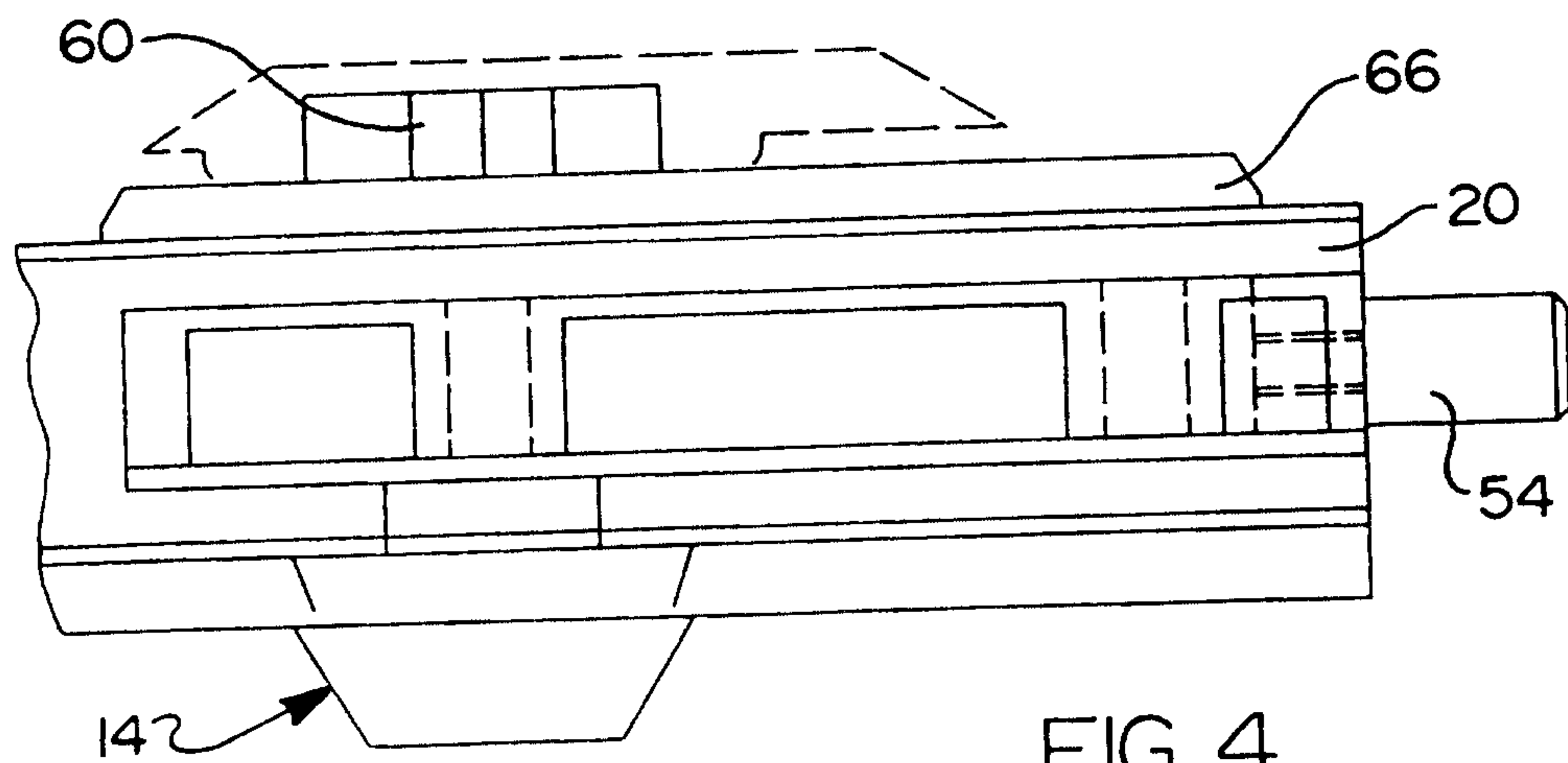
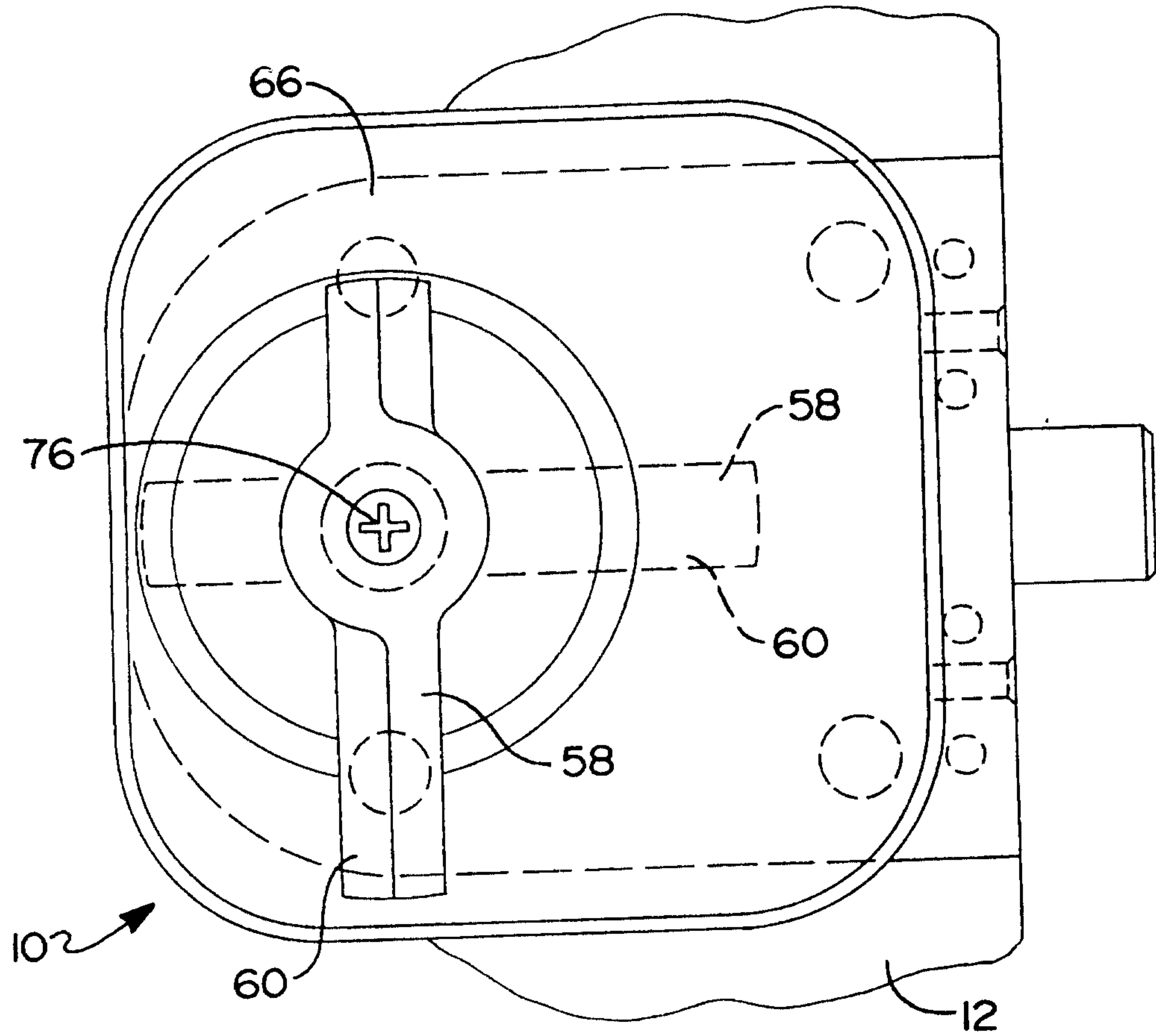


FIG 4

3/3

