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SLIDE LATCHING SYSTEM FOR A DOOR SYSTEM

Abstract

A slide lactching system for latching a sliding door panel to a door frame includes a jamb strike, a latch assembly, and a handle set The jamb strike is connected to the door frame. The latch assembly is connected to the sliding door panel, and has a latch member having a latch hook portion configured to engage the jamb strike. The latch hook portion is movable between a latched position and an unlatched position. The handle set is mounted to the sliding door panel. The handle set is drivably coupled to the latch assembly. The handle set is configured to facilitate both of a moving of the latch hook portion of the latch assembly to the unlatched position, and a sliding of the sliding door panel in a first direction in a continuous motion applied to the handle set by a user.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application claims priority to U.S. provisional patent application Ser. No. 62/432,371 that was filed on Dec. 9, 2016, which is incorporated herein by reference.

TECHNICAL FIELD
[0002] The present invention relates to a door system having at least one slidable door panel, such as a sliding health care or intensive care unit/critical care unit (ICU/CCU) door.
BACKGROUND ART
[0003] Entry doors for hospital ICU/CCU rooms are typically equipped with doors which have the ability to both slide closed, and under emergency circumstances or for convenience, swing open to provide greater access to the ICU/CCU room. Previously, the ICU/CCU rooms were equipped with manual sliding doors that provided for full access into or out of the room through the breakaway provision of the sliding door.
[0004] What is needed in the art is a door system having a handle set that provides for intuitive unlatching and sliding of the sliding door panel in a continuous motion.
SUMMARY OF INVENTION
[0005] The present invention provides a door system having a handle set that provides for intuitive unlatching and sliding of the sliding door panel in a continuous motion.
[0006] The invention in one form is directed to a slide latching system for latching a sliding door panel to a door frame. The slide latching system includes a jamb strike, a latch assembly, and a handle set. The jamb strike is connected to the door frame. The latch assembly is connected to the sliding door panel, and has a latch member having a latch hook portion configured to engage the jamb strike. The latch hook portion is movable between a latched position and an unlatched position. The handle set is mounted to the sliding door panel. The handle set is drivably coupled to the latch assembly. The handle set is configured to facilitate both of a moving of the latch hook portion of the latch assembly to the unlatched position and a sliding of the sliding door panel in a continuous motion applied to the handle set by a user.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0007] The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become more apparent and the invention will be better understood by reference to the following description of an embodiment of the invention taken in conjunction with the accompanying drawings, wherein:
[0008] FIG. **1** is an exterior side view of a door system having a slidable door panel, with the sliding door panel in the closed position;
[0009] FIG. **2** is an exterior perspective view of a portion of the door system of FIG. **1**, with the sliding door panel in an open position;
[0010] FIG. **3** is a perspective view of the jamb strike of the door system of FIG. **1**;
[0011] FIG. **4** is a section view of the jamb strike of FIG. **3**, taken along line **4-4** of FIG. **3**;
[0012] FIG. **5** is a perspective view of the latch assembly of the door system of FIG. **1**, with a

hidden portion of the latch member shown by dashed lines;
[0013] FIG. **6** is an end view of the sliding door panel and paddle handle assembly of the door system of FIG. **1**, and showing an exterior handle set and an interior handle set of the paddle handle assembly;
[0014] FIG. **7** is a top view of the paddle handle assembly of the door system of FIG. **6**;
[0015] FIG. **8** is a side view of the exterior handle set of FIG. **6**, with the cover removed;
[0016] FIG. **9** is a top view of the exterior handle set of FIG. **8**;
[0017] FIG. **10** is a section view of the exterior handle set of FIG. **8**, taken along line **10**-**10** of FIG. **8**;
[0018] FIG. **11**A is a side view of the cam of the exterior handle set of FIG. **8**; and
[0019] FIG. **11**B is an end view of the cam of FIG. **11**A.
[0020] Corresponding reference characters indicate corresponding parts throughout the several views. The exemplifications set out herein illustrate at least one embodiment of the invention, and such exemplifications are not to be construed as limiting the scope of the invention in any manner.
DESCRIPTION OF EMBODIMENTS
[0021] Referring now to the drawings, and more particularly to FIG. **1**, there is shown a door system **10** having a door frame **12**, a door panel **14**, a door panel **16**, a panel hanger member **18**, a panel hanger member **20**, and a slide latching system **22**. Door system **10** incorporating door panel **14** and door panel **16** provides visibility access into and out of a room.
[0022] In the present embodiment, one door panel, i.e., door panel **14**, is telescopic, i.e., slidable, to allow a greater clear door opening for a given rough opening, thereby providing flexible access to overall and individual patient areas. Door panel **16** may be coupled to door frame **12** in a manner to prohibit sliding motion. Door system **10** includes trackless threshold features, thereby minimizing access obstacles. Door system **10** may be further configured such that door panel **14** and door panel **16** may be allowed to breakout (i.e., to be swung open) under certain circumstances. Door system **10** may also include seals to provide smoke and draft controls.
[0023] Door frame **12** includes a header member **24**, a jamb member **26**, and a jamb member **28**. Jamb member **28** is spaced from jamb member **26**, with header member **24** extending between jamb member **26** and jamb member **28**. Jamb member **26**, jamb member **28**, and header member **24** are interconnected, e.g., by mechanical fasteners, such as screws or bolts, to form an upside down U-shaped structure.
[0024] Panel hanger member **20** is fixedly attached to door frame **12**, e.g., mechanical fasteners. Door panel **16** is located to be adjacent jamb member **28**, and is connected to door frame **12** via panel hanger member **20** in a manner such that door panel **16** is prevented from sliding movement relative to door frame **12** in all circumstances.
[0025] Header member **24** includes an elongate support rail **30**.
[0026] Panel hanger member **18** is slidably coupled to header member **24** via at least two roller assemblies **32**, **34**, each having one or more rollers, e.g., rollers **32**-**1**, **34**-**1** that ride on support rail **30** of header member **24**, as is known in the art. Door panel **14** and door panel **16** are positioned within door frame **12** and staggered in a telescoping manner.
[0027] Door panel **14** has an exterior side **14**-**1**, an interior side **14**-**2**, and a handle end portion **14**-**3**. Door panel **14** is connected to panel hanger member **18**, e, g., by fasteners, such as bolts and/or screws, such that door panel **14** and panel hanger member **18** slide in unison between a closed position **36** (see FIG. **1**) and an open position **38** (see FIG. **2**). Thus, door panel **14** is slidably coupled to door frame **12**. In the closed position **36**, door panel **14** is positioned adjacent jamb member **26**.
[0028] Referring to FIGS. **1** and **2**, slide latching system **22** includes paddle handle assembly **40**, a latch assembly **42**, and a jamb strike **44**. Paddle handle assembly **40** may include an exterior handle set **40**-**1** mounted to exterior side **14**-**1** of sliding door panel **14** and an interior handle set **40**-**2** mounted to interior side **14**-**2** of sliding door panel **14**. Jamb strike **44** is connected to, and extends

within, a recess of jamb member **26** of door frame **12**.
[0029] Referring also to FIGS. **3** and **4**, jamb strike **44** may be configured as an insert to be inserted into the recess in jamb member **26**. To reduce noise and friction, jamb strike **44** is made from a durable polymer material, and in the present embodiment, is made from a nylon material, such as Nylatron®, available from Polymer Corporation of Reading Pennsylvania, but is not limited in this regard and can include any suitable material adapted for friction and noise reduction.
[0030] Jamb strike **44** includes a body **46** having an upper strike catch **46-1**, a lower strike catch **46-2**, and a cavity **46-3** between the upper strike catch **46-1** and the lower strike catch **46-2**. Cavity **46-3** extends into body **46** and behind each of the upper strike catch **46-1** and the lower strike catch **46-2**. While jamb strike **44** has two strike catches **46-1**, **46-2**, only the upper strike catch **46-1** is used during a latching of door panel **14** to jamb member **26** of door frame **12**. As such, when upper strike catch **46-1** experiences an amount wear that is no longer acceptable, then jamb strike **44** is inverted, top-to-bottom, such that lower strike catch **46-2** becomes a new upper strike catch for releasable engagement with latch assembly **42**. Latch assembly **42** is connected to, and extends into an end recess of, door panel **14**.
[0031] Referring to FIG. **5**, latch assembly **42** has a latch housing **48**, a rotary actuator **50**, and a latch member **52**, as is known in the art. Rotary actuator **50** defines a latch pivot axis **54**. Rotary actuator **50** includes opposed slotted ends **50-1**, which may be an axial through slot, for receiving a drive portion of each of exterior handle set **40-1** and interior handle set **40-2**. Latch member **52** has a latch hook portion **52-1** having an upwardly extending hook **52-2**. Latch hook portion **52-1** is configured to engage jamb strike **44**, and in particular, to enter into cavity **46-3** of the latch member **52** and to latchably engage upper strike catch **46-1**. Latch hook portion **52-1** of latch member **52** is drivably coupled to rotary actuator **50** such that latch member **52** and the rotary actuator **50** pivot about latch pivot axis **54** in unison. Latch hook portion **52-1** is movable (pivots) between a latched position **56-1** (upper position) and an unlatched position **56-2** (lower position), wherein latch hook portion **52-1** of the latch member **52** operably engages only the upper strike catch **46-1** of jamb strike **44** (see also FIG. **3**) when in latched position **56-1**.
[0032] Additionally, as shown in FIGS. **2** and **6**, latch assembly **42** may include a covering element **58**, such as a shroud, to surround latch hook portion **52-1** of the latch member **52** that is exposed from the edge of sliding door panel **14**.
[0033] Paddle handle assembly **40** latches door panel **14** to jamb member **26** when sliding door panel **14** is slid to the closed position **36**. In accordance with an aspect of the present invention, each of exterior handle set **40-1** and interior handle set **40-2** is configured such that a continuous motion applied by a user in direction **60** can both unlatch latch assembly **42** and slide sliding door panel **14** to the open position **38**, as will be described in more detail below.
[0034] Referring to FIGS. **1**, **2**, **6** and **7**, exterior handle set **40-1** has an exterior paddle handle **62** and exterior cover **63**, and interior handle set **40-2** has an interior paddle handle **64** and an interior cover **65**. Each of exterior paddle handle **62** and interior paddle handle **64** has a curved design to prevent intravenous (IV) lines, wires, or clothing from getting caught on the respective handle. Notwithstanding, it is contemplated that the paddle handles of paddle handle assembly **40** may include other designs, such as a hook or L-shape.
[0035] Each of exterior handle set **40-1** and interior handle set **40-2** is configured to facilitate both of a moving of latch hook portion **52-1** of latch assembly **42** to the unlatched position **56-2** and a sliding of the sliding door panel in a continuous, e.g., a single substantially linear, motion in direction **60** as a result of a force in direction **60** applied by a user.
[0036] FIG. **7** shows exterior paddle handle **62** in a home position **66** and shows interior paddle handle **64** in a home position **68**. When exterior paddle handle **62** is in home position **66**, exterior paddle handle **62** is oriented at an acute angle **70** (e.g., approximately **85** degrees) relative to a planar extent (in direction **60**) of sliding door panel **14**. When exterior paddle handle **62** is pivoted about a vertical handle pivot axis **72** to an actuated position **74**, exterior paddle handle **62** is

oriented to be substantially parallel to the planar extent (in direction **60**) of the sliding door panel **14**. Likewise, when interior paddle handle **64** is in home position **68**, interior paddle handle **64** is oriented at an acute angle **76** (e.g., approximately **85** degrees) relative to a planar extent (in direction **60**) of sliding door panel **14**, and when interior paddle handle **64** is pivoted about a vertical handle pivot axis **78** to an actuated position **80**, interior paddle handle **64** is oriented to be substantially parallel to the planar extent (in direction **60**) of the sliding door panel **14**.

[0037] In the present embodiment, exterior handle set **40-1** and interior handle set **40-2** are configured as mirror images of one another, and thus, for brevity, only the exterior handle set **40-1** will be described in detail. As such, it is to be understood that any discussion that follows directed to the exterior handle set **40-1** will equally apply to the interior handle set **40-2**, as being mirror images of one another. Also, it is contemplated that in some implementations, paddle handle assembly **40** may include only one of exterior handle set **40-1** or interior handle set **40-2**.

[0038] Referring to FIGS. **8-10**, exterior handle set **40-1** includes exterior paddle handle **62**, a base **90**, and a cam **92**. Exterior handle set **40-1** further includes a biasing member **94** (see FIG. **8**), e.g., one or more torsion springs, that apply a torsional force to exterior paddle handle **62** in a first rotary direction **96-1** (see FIG. **9**) to position exterior paddle handle **62** in home position **66**.

[0039] Referring to FIGS. **1** and **2**, base **90** plate of exterior handle set **40-1** is mounted to the exterior side **14-1** of sliding door panel **14**. Referring again to FIGS. **8-10**, exterior paddle handle **62** is rotatably mounted to the base **90** plate to pivot about handle pivot axis **72**.

[0040] Base **90** plate includes an upper pivot arm **90-1**, a lower pivot arm **90-2**, and a cam mounting hole **90-3**. Upper pivot arm **90-1** and lower pivot arm **90-2** of base **90** plate are axially aligned, e.g., vertically aligned, along handle pivot axis **72**. Exterior paddle handle **62** is positioned between upper pivot arm **90-1** and lower pivot arm **90-2**. Exterior paddle handle **62** is pivotably coupled to each of upper pivot arm **90-1** and lower pivot arm **90-2** by a respective pivot arrangement, such as a pin/hole arrangement, arranged along handle pivot axis **72**. Handle pivot axis **72** is oriented to be substantially vertical.

[0041] Exterior paddle handle **62** includes an operator portion **62-1** and a driver portion **62-2**, with the operator portion **62-1** and the driver portion **62-2** being located on opposite sides of handle pivot axis **72**. Driver portion **62-2** includes a cam driver **62-3**, e.g., a beveled surface, which is slidably engaged with cam **92**.

[0042] Cam mounting hole **90-3** of base **90** defines a cam axis **90-4**, and rotatably mounts cam **92**. Cam axis **90-4** is oriented to be substantially horizontal. Cam **92** is rotatably mounted to base **90**, e.g., by a bushing/snap ring arrangement, so as to pivot about cam axis **90-4**.

[0043] Referring also to FIGS. **11**A and **11**B, cam **92** includes a barrel **92-1**, e.g., a cylindrical portion, having a driver end portion **92-2**, and has a cam arm **92-3** having a driven end portion **92-4**. Cam arm **92-3** extends substantially orthogonally from the barrel **92-1** such that driven end portion **92-4** of cam arm **92-3** is offset from cam axis **90-4**.

[0044] Referring again to FIGS. **8** and **10**, driven end portion **92-4** of cam arm **92-3** of cam **92** is drivably engaged by cam driver **62-3** of driver portion **62-2** of exterior paddle handle **62**. Cam mounting hole **90-3** of base **90** plate is configured to receive barrel **92-1** of cam **92**, with barrel **92-1** extending through the cam mounting hole **90-3** such that the driver end portion **92-2** of barrel **92-1** engages rotary actuator **50** of latch assembly **42** (see also FIG. **5**). More particularly, driver end portion **92-2** is in the form of a drive tab that drivably engages the corresponding drive slot, i.e., one of the opposed slotted ends **50-1**, in rotary actuator **50** of latch assembly **42**.

[0045] In operation, a pivoting of exterior paddle handle **62** about handle pivot axis **72** between home position **66** and actuated position **74** causes a corresponding rotation of the cam **92** about cam axis **90-4** to effect a movement of latch hook portion **52-1** of latch assembly **42** from the latched position **56-1** to the unlatched position **56-2**.

[0046] In operation, referring particularly to FIGS. **1**, **2**, and **8-10**, to open the latched sliding door panel **14**, the user pulls exterior paddle handle **62** in direction **60**, i.e., the opening direction of

sliding door panel **14**, which in turn pivots exterior paddle handle **62** in a second rotary direction **96-2** about the handle pivot axis **72** to the actuated position **74** to unlatch latch assembly **42** and to slide sliding door panel **14** to the open position (see FIG. **2**), all in the same continuous motion. It is noted that the second rotary direction **96-2** is opposite to the first rotary direction **96-1** effected by biasing member **94**.

[0047] As exterior paddle handle **62** pivots in the second rotary direction **96-2** about handle pivot axis **72**, cam driver **62-3** of the driver portion **62-2** of exterior paddle handle **62** rotates cam arm **92-3** of cam **92**, and in turn rotates barrel **92-1** of cam **92** about cam axis **90-4**, so as to rotate the rotary actuator **50** of latch assembly **42**, which in turn moves latch hook portion **52-1** of latch member **52** to the unlatched position **56-2** (see FIG. **5**) to thereby disengage latch hook portion **52-1** of the latch member **52** from upper strike catch **46-1** of jamb strike **44** (see FIG. **3**) so as to permit a sliding opening of sliding door panel **14** in the same continuous motion as used to unlatch latch assembly **42**.

[0048] As previously stated, interior handle set **40-2** is configured as a mirror image of exterior handle set **40-1**. Accordingly, each of exterior handle set **40-1** and interior handle set **40-2** is configured to facilitate a moving of the latch hook portion **52-1** of the latch assembly **42** to the unlatched position **56-2** and a sliding of sliding door panel **14** by a continuous motion applied by a user in direction **60** to the respective exterior paddle handle **62** or interior paddle handle **64**.

[0049] As used herein, “substantially,” “generally,” “slightly” and other words of degree are relative modifiers intended to indicate permissible variation from the characteristic so modified. It is not intended to be limited to the absolute value or characteristic which it modifies but rather possessing more of the physical or functional characteristic than its opposite, and approaching or approximating such a physical or functional characteristic.

[0050] For definitional purposes and as used herein, “connected” or “attached” includes physical or electrical, whether direct or indirect, affixed or adjustably mounted. Thus, unless specified, “connected” or “attached” is intended to embrace any operationally functional connection.

[0051] Also, as used herein, the terms “interior” and “exterior” are terms of convenience used to distinguish between opposite sides of sliding door panel **14**.

[0052] While this invention has been described with respect to at least one embodiment, the present invention can be further modified within the spirit and scope of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the invention using its general principles. Further, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this invention pertains and which fall within the limits of the appended claims.

Claims

1. A slide latching system for latching a sliding door panel to a door frame, comprising: a jamb strike is connected to the door frame; a latch assembly connected to the sliding door panel, the latch assembly having a latch member having a latch hook portion configured to engage the jamb strike, the latch hook portion being movable between a latched position and an unlatched position; and a handle set mounted to the sliding door panel, the handle set being drivably coupled to the latch assembly, the handle set configured to facilitate both of a moving of the latch hook portion of the latch assembly to the unlatched position and a sliding of the sliding door panel in a continuous motion applied to the handle set by a user.

2. The slide latching system of claim 1, the latch assembly having a latch housing, a rotary actuator, and the latch member, the rotary actuator defining a latch pivot axis, the latch member having a latch hook portion configured to engage the jamb strike, the latch member being drivably coupled to the rotary actuator such that the latch member and the rotary actuator pivot in unison, the latch hook portion being movable between a latched position and an unlatched position; and the handle

set being drivably coupled to the rotary actuator of the latch assembly.

3. The slide latching system of claim 2, the handle set comprising a base, a cam, and an exterior handle, the cam being rotatably mounted to the base to pivot about a cam axis, the cam axis being oriented to be substantially horizontal, the cam including a barrel having a driver end portion and a cam arm having a driven end portion, the driver end portion being drivably engaged with the rotary actuator of the latch assembly, the handle being rotatably mounted to the base plate to pivot about a handle axis, the handle axis being oriented to be substantially vertical, the handle having a cam driver that is slidably engaged with the driven end portion of the cam arm of the cam, wherein a pivoting of the handle about the handle axis causes a corresponding rotation of the cam about the cam axis to effect a movement of the latch hook portion of the latch assembly from the latched position to the unlatched position.

4. The slide latching system of claim 3, the handle set including a biasing member that pivots the handle in a first rotary direction to position the handle in a home position, and wherein the user pulls the handle in the first direction to pivot the handle in a second rotary direction to an actuated position about the handle pivot axis, the second rotary direction being opposite to the first rotary direction.

5. The slide latching system of claim 3, wherein when the handle is in the home position, the handle is oriented at an acute angle relative to a planar extent of the sliding door panel, and when the handle is in the actuated position, the handle is oriented to be substantially parallel to the planar extent of the sliding door panel.

6. The slide latching system of claim 5, wherein the acute angle is approximately 85 degrees.

7. The slide latching system of claim 2, wherein the base plate of the handle set includes an upper pivot arm and a lower pivot arm, the handle being positioned between the upper pivot arm and the lower pivot arm, and the handle being pivotably coupled to each of the upper pivot arm and the lower pivot arm.

8. The slide latching system of claim 3, wherein the base plate has a cam mounting hole configured to receive the barrel of the cam, the barrel extending through the cam mounting hole such that the driver end portion engages the rotary actuator of the latch assembly.

9. The slide latching system of claim 8, wherein the cam arm extends substantially orthogonally from the barrel.

10. The slide latching system of claim 1, wherein the jamb strike includes a body having an upper strike catch, a lower strike catch, and a cavity between the upper strike catch and the lower strike catch, the cavity extending into the body and behind each of the upper strike catch and the lower strike catch.

11. The slide latching system of claim 10, wherein the latch hook portion of the latch member of the latch assembly operably engages only the upper strike catch, and when the upper strike catch experiences an amount wear that is no longer acceptable, then the jamb strike is inverted such that the lower strike catch becomes a new upper strike catch.

12. The slide latching system of claim 10, wherein the jamb strike is made from nylon material.

13. The slide latching system of claim 1, wherein the handle set is an exterior handle set mounted to an exterior side of the sliding door panel, and further including: an interior handle set mounted to the interior side of the sliding door panel, the interior handle set being configured as a mirror image of the exterior handle set and configured to facilitate a moving of the latch hook portion of the latch assembly to the unlatched position and a sliding of the sliding door panel in an interior-side continuous motion applied by a user.