

March 10, 1959

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2,876,873

DOOR STRUCTURE AND LATCHING ASSEMBLY

Filed Nov. 15, 1957

3 Sheets-Sheet 2

Fig. VIII

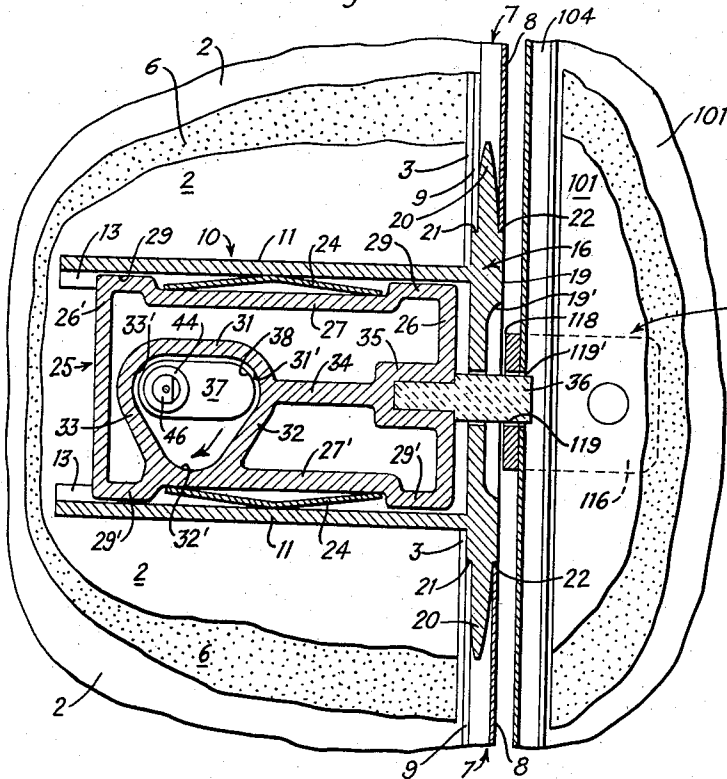


Fig. X

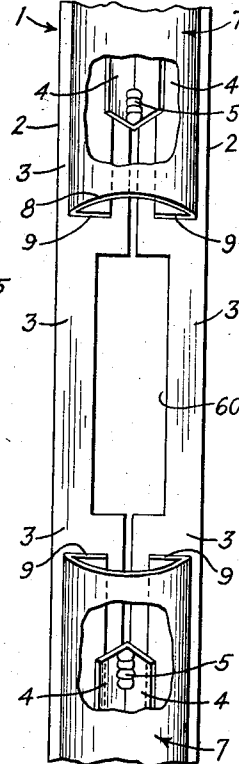


Fig. IX

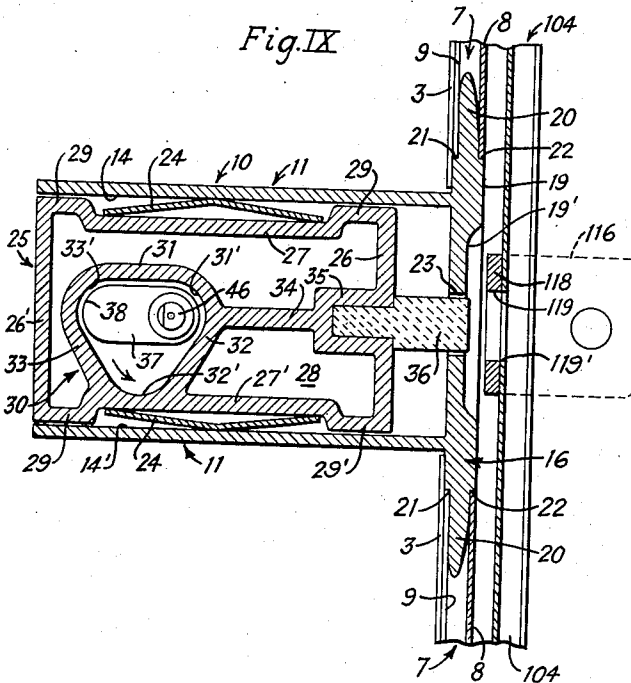
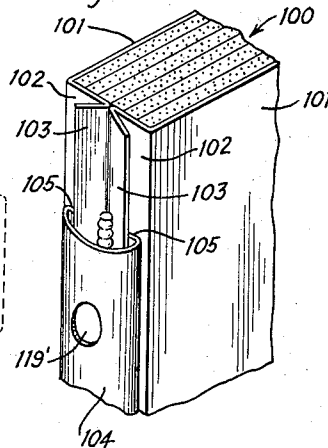


Fig. XI



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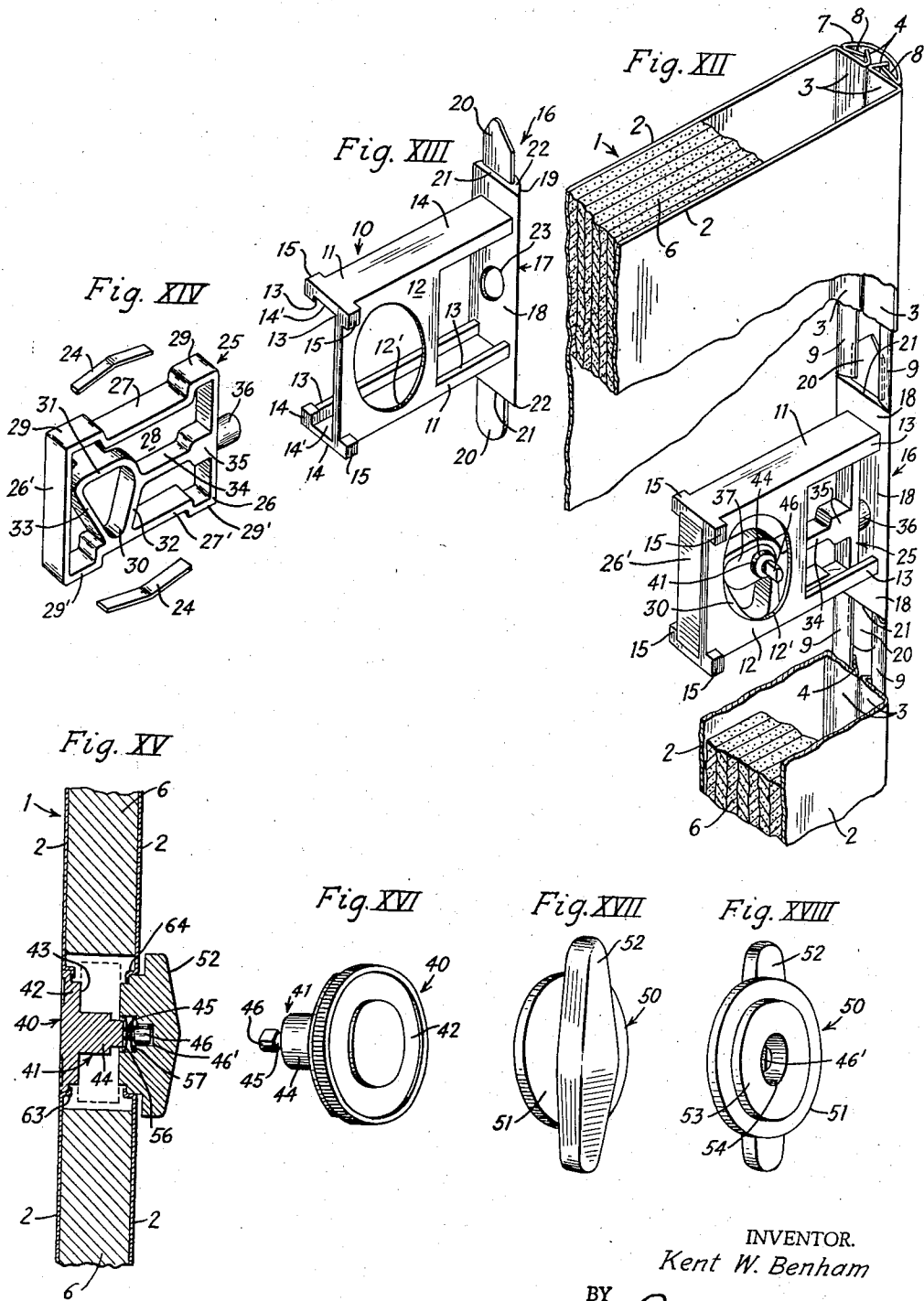
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3 Sheets-Sheet 3



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DOOR STRUCTURE AND LATCHING ASSEMBLY

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15 Claims. (Cl. 189-46)

This invention relates to an improved door structure and latching assembly, and more particularly to a latch structure designed to be substantially concealed within the door body, and which incorporates draw bolt manipulating means presenting circular escutcheon members of attractive design which are rotatably journaled in depressed circular pockets formed in the side faces of the door, the latch structure also incorporating a jamb plate constructed to attractively fit into the jamb edge of the door and interlock therewith to rigidly support the lock structure in cantilever suspension from the jamb edge of the door without the use of visible securing means.

The latch structure of this invention generally comprises a latch case contained within the door body and presenting parallel guide members which slidably support a latch slide having a draw bolt which reciprocates through the edge of the door. The latch slide may comprise a generally rectangular outer frame presenting shoe portions designed to smoothly slide within the guide members of the latch case, suitable tension springs set between the latch slide and guide members of the latch case being employed to insure smooth and non-vibratory sliding action of the latch slide.

The exterior frame of the latch slide contains therein a generally triangular shaped cam frame presenting interior camming faces. A cam lug positioned within the triangular cam frame is fixed at one end thereof to a rotatably mounted shaft or handle spindle so that rotation of the shaft, either clockwise or counter clockwise through an angle of approximately 180°, will cause the end face of the camming lug to cam against the interior camming faces of the cam frame and thereby effectuate reciprocatory movement of the latch slide and its associated draw bolt to and from latching position.

The outer ends of the cam lug supporting shaft are fixed to circular medallion discs which are rotatably journaled in depressed circular pockets formed in the wall faces of the door structure. The outer faces of both medallion discs may be made substantially flush with the outer wall surfaces of the door, and either one or both medallion discs may be equipped with an attractive hand knob fixed thereto to effectuate 180° rotation of the medallion discs, connecting shaft and cam lug fixed thereto.

The latch case and latch slide assembly is designed for insertion into a pocket or cavity defined between the outer side faces of the door through a generally rectangular opening cut in the locking edge of the door. The outer end of the latch case is provided with a vertically extending jamb plate whose body section has a conforming hole through which the draw bolt of the latch slide reciprocates, the body section of the jamb plate also serving to cover the latch assembly insertion hole cut in the door edge.

The outer face of the body section of the jamb plate may be contoured to attractively harmonize with the outer facing contour of the door jamb edge. The jamb plate and other parts of the latch structure are rigidly

supported from the jamb edge of the door by the provision of tongue sections which extend from both ends of the body section of the jamb plate and are designed to be clamped in position by door edging strips which overlap the tongue sections and abut against the adjacent ends of the body section of the jamb plate to provide a flush joint therebetween.

The latch structure of this invention is particularly adapted for application to a so-called hollow metal door formed by spaced metal facing sheets having sound deadening insulation packed therebetween, and which present intumed flanges extending around the vertical and horizontal edges of the door and secured together as by spot welding, the paired intumed flanges presenting flared outturned lips to which semi-tubular edging strips may be telescopically applied. In this form of door structure, a rectangular hole is cut in the adjacent intumed flanges of the door facing sheets through which the latch case and latch slide assembly is inserted, the body section of the jamb plate serving to cover the rectangular hole. The tongue sections of the jamb plate are designed to overlap the outer faces of the adjacent portions of the intumed door flanges, the outturned lip portions of the door flanges being suitably cut away from the flange portions which are overlapped by the tongue sections of the jamb plate. The tongue sections are slightly tapered and so formed that the cross sectional area of the base ends thereof conform to the internal cross sectional area of the semi-tubular edging strips. As thus formed, the adjacent end portions of the semi-tubular edging strips may be telescoped over the tongue sections to thereby securely wedge the tongue sections within the end portions of the semi-tubular edging strips. The latch structure is thereby securely fixed and rigidly mounted in cantilever suspension and interlocking relation to the jamb edge of the door without the use of screws, bolts or other securing means which would deface the appearance of the assembly and require labor to apply.

This door latching assembly, as thus mounted on the jamb edging of the door, provides a door and latch combination which is unique and highly attractive in appearance. The exteriorly exposed faces of the jamb plate may be contoured in conformity with the jamb edge of the door, and may be given a surface finish which harmonizes or blends with the exterior finish of the door structure; and if both are given the same finish, the exposed face of the jamb plate is scarcely discernible.

The medallion discs, as recessed and journaled within the depressed and circular conforming pockets of the door side faces, serve the purpose of escutcheon plates, and the outer faces of the medallion discs may be made substantially flush with the side faces of the door structure. One or both medallion discs may be provided with an attractive hand knob, such as an attractively shaped bar, which may be formed integral therewith. Since the circular conforming cavities or pockets formed in the side faces of the door provide journaling support for the medallion discs and associated cam lug, lug supporting shaft and hand knob, the cost of providing special journals for the knob shaft or spindle is obviated.

The combination door and latch structure of this invention presents an assembly which is substantially free of projections or crevices in which dirt would collect, and thus satisfies sanitary requirements to the highest degree. The latch structure of this invention is formed from relatively few and easily made parts, and can be assembled in minimum time to the prepared door structure.

Other objects and advantages of this invention will become apparent as the disclosure proceeds.

Although the characteristic features of this invention are particularly pointed out in the claims; the invention itself, and the manner in which it is made and employed,

may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part hereof, in which:

Fig. I is an elevational view of one form of door and associated door posts or pilasters with which the concealed latch structure of this invention may be used;

Fig. II is a fragmentary elevational view of the latching edge of the door as the same would appear when viewed along line II—II of Fig. I, this view showing the jamb plate of the latch structure fitted to the swinging edge of the door;

Fig. III is a fragmentary elevational view of the adjacent edge of the door post as the same would appear when viewed along line III—III of Fig. I, this view showing the door stop fitted to the edge of the post in cooperating relation to the door latch structure;

Fig. IV is a horizontal cross-sectional view of the door and adjacent door posts as the same would appear when viewed along line IV—IV of Fig. I;

Fig. V is a fragmentary horizontal cross-sectional view of the door and adjacent door post as the same would appear when viewed along line V—V of Fig. I, this view showing the latch case mounted in the door; the latch slide, handle spindle and medallion discs being removed;

Fig. VI is an enlarged fragmentary elevational view of that portion of the door which is in the vicinity of the latch structure, this view showing a handle bar associated with one of the escutcheon medallions;

Fig. VII is a fragmentary elevational view of the opposite side of the door in the vicinity of the latch structure, this view showing the exposed face of the other escutcheon medallion whose handle shaft supports the camming lug and is fixed to the escutcheon medallion shown in Fig. VI;

Fig. VIII is an enlarged fragmentary vertical cross-section of the door and latch structure as the same would appear when viewed along line VIII—VIII of Fig. II and when the latch bolt and slide are in latching position;

Fig. IX is another enlarged fragmentary vertical cross-section of the door and latch structure similar to that viewed along lines VIII—VIII of Fig. II but taken through Fig. III and when the latch bolt and slide are fully retracted;

Fig. X is a fragmentary vertical elevation of the latching edge of the door as the same would appear before the latch structure has been applied thereto, certain parts being broken away to reveal structural details;

Fig. XI is a fragmentary perspective view of the jamb edge of the door post as the same would appear prior to application of the door stop thereto;

Fig. XII is a fragmentary perspective view of a section of the door and the door latch contained therein, certain parts being broken away to illustrate further details of the latch structure and means employed to mount the latch structure on the swinging edge of the door;

Fig. XIII is a perspective view of the latch case and associated jamb plate which may be formed as a one-piece casting;

Fig. XIV is a perspective view of the latch slide which reciprocates within the latch case and which also may be made as a one-piece casting, this view also showing the upper and lower tension springs which may be employed to insure smooth reciprocation of the latch slide in the latch case;

Fig. XV is a fragmentary vertical sectional view of the latch and adjacent door structure as the same would appear when viewed along line XV—XV of Figs. VI and VII, this view supplying further structural details of the manner in which the escutcheon medallions are connected together;

Fig. XVI is a perspective view of the outside face of one of the escutcheon medallions;

Fig. XVII is a perspective view of the outside face of the other escutcheon medallion; and

Fig. XVIII is a perspective view of the inside face of the escutcheon medallion shown in Fig. XVII.

Similar reference characters refer to similar parts throughout the several views of the drawings and specification.

While the improved door concealed latch structure of this invention may be associated with any type of door, whether made of wood, metal or other materials, this improved latch is particularly useful for installation in hollow metal doors made from sheet metal, such as doors designed to close the doorway between the posts or pilasters of interior cubicles such as hospital and toilet cubicles. For purposes of explanation and illustration, the door concealed latch structure of this invention is illustrated in Fig. I of the accompanying drawings as associated with a door mounted between a pair of posts or pilasters 100 whose supporting ends are secured to a horizontal wall such as a floor or ceiling. Each pilaster 100 is formed by a pair of metal facing sheets 101 presenting inturned flanges 102 which terminate in outturned lips 103 along the exposed horizontal edge and vertical edges thereof, as shown in Figs. IV, V and XI. The paired inturned flanges 102 are covered by decorative edging strips 104 presenting paired inturned flange portions 105 interlocking with the outturned lips 103 of the pilaster facing sheets. The supported end of each pilaster 100 may be secured to the horizontal wall as indicated in Fig. I by means of an attaching bar 106 which may be secured to a U-shaped bracket inserted between and welded to the inside faces of the pilaster facing sheets 101. The projecting ends of the bar 106 are secured to the horizontal wall by securing bolts or lag screws 107, the attaching end of the pilaster being concealed within a generally rectangular shaped conforming shoe which telescopes over the pilaster. Other means than that above described may be used to secure the wall attached end of the pilaster to the floor or ceiling wall of the building within the purview of this invention.

The door structure 1 with which the improved concealed latch of this invention can be advantageously associated may be formed by a pair of metal facing sheets 2 presenting inturned flanges 3 along all of the four vertical and horizontal edges thereof as shown in Figs. I, IV and X. Each pair of inturned flanges 3 terminates in paired outturned lips 4, the outturned lips being secured together at the crotch thereof by spot welds 5 as shown in Fig. X. The space between the facing sheets 2 is preferably filled with insulation 6, which insulation may comprise slabs of fibreglass, or a cellular paperboard core, or other sound deadening and facing sheet stiffening material. The insulation filling 6 is placed in position between the facing sheets 2 before the spot welds 5 are applied. The exposed vertical and horizontal edges of the door are given a finished appearance by the application of edging strips 7, each having a curvilinear face portion 8 and inturned flange portions 9 designed to be interlocked between the paired outturned lips 4 and adjacent inturned flanges 3 of the facing sheets 2 as shown in Figs. IV and X.

The door as above constructed may be swingingly supported along one vertical edge thereof by suitable hinges 109 of any desired type. The door supporting hinges shown in Fig. I for purposes of illustration may comprise a pair of pilaster attached brackets 110 each presenting a pair of side wings which telescope over and are secured to the edge of the pilaster by suitable bolts or screws 111. Each of the pilaster attached brackets 110 is provided with a laterally projecting lug 112 to which the door 1 is pivoted as by means of a hinge pintle 113. The upper and lower rear corners of the door may be fitted with an attractive bracket 114 shaped to harmonize with the adjacent edging strips 7 and suitably secured to the adjacent inturned flanges 3 of the door facing sheets 2. Each hinge pintle 113 is suitably journaled in the adjacent corner bracket 114. The door may also be pro-

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vided with suitable devices which automatically operate to swing the door to a predetermined closed or open position.

The post or pilaster 100 which is adjacent the opening edge of the door may be provided with a suitable door stop 115 as shown in Figs. I, III and V, and which presents a pair of wing sections 116 which telescope over the facing sheets 101 of the pilaster and secured in position by a connecting screw or bolt 117. The web section 118 which joins the wing sections 116 of the door stop extends over the edging strip 104 of the pilaster in adjacent relation to the latch structure, and the web section 118 thereof has a draw bolt receiving hole 119 therein positioned to align with the draw bolt of the latch structure, the pilaster edging strip 104 also having a draw bolt receiving hole 119' therein as shown in Figs. V and XI in alignment with the draw bolt hole 119. The door stop 115 is also provided with a stop lug 120 which may be formed as an integral part of the door stop and which is of sufficient length to overlap the adjacent vertical edge of the door when closed. The stop lug 120 may be provided with a suitable resilient cushioning button 121 on the inside face thereof against which the vertical edge of the door may resiliently abut when the door is forcibly swung to closed position. The door stop 115 may be formed from cast metal and may be mounted to present the stop lug 120 thereof either on the inside face or the outside face of the post or pilaster to accommodate either an in-swinging or an out-swinging door. In the case of toilet cubicles which are only latched from the inside, the door stop 115 may be arranged to present the stop lug 120 thereof at the outside face of its supporting pilaster.

The improved door concealed latch structure of this invention comprises a door concealed latch case 10 which may be cast in one piece from steel, aluminum, brass, plastic compounds or the like, and which receives and supports a reciprocating latch slide 25 which also may be cast in one piece from steel, aluminum, brass, plastics or other suitable material. The latch case 10 presents a pair of guide channels 11 as shown more particularly in Figs. XII and XIII, which are connected and braced by a connecting side wall 12. The outer end of the paired guide channels 11 are joined to a jamb plate 16 by means of which the latch case 10 and latch slide 25 contained therein may be rigidly supported in operating position. When the latch case 10 is mounted in concealed position within the door, the paired guide channels 11 thereof would normally extend in substantially horizontal position when the door is swingably mounted in vertical position.

Each of the guide channels 11 of the latch case 10 present a pair of spaced guide ribs 13 which serve to guide the latch slide 25 in its reciprocating movement within the latch case. Each of the guide channels 11 provide a web section 14 between the guide ribs 13 thereof. The web sections 14 present a pair of smooth internal web faces 14' along which the latch slide 25 reciprocates. The forward end of the latch case is rigidly fixed to the vertical edge of the door by the jamb plate 16 in the manner hereafter described. The rear end of the latch case is held in fixed position between the facing sheets 2 of the door by two pairs of laterally projecting bosses 15 which are designed to snugly brace against the adjacent inside surfaces of the facing sheets 2 of the door. The connecting web 12 of the latch case is provided with a circular hole 12' designed to snugly receive the circular medallion of the handle member 50 in a manner hereafter described.

The jamb plate 16 is uniquely constructed to be locked to the adjacent portion of the door edge during assembly to the door. The jamb plate 16 has a body section 17 as shown in Fig. XIII, which presents a flat inner face 18 and a curvilinear outer face 19 whose contour may conform to the curvilinear face portions 8 of the adjacent

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door edging strips 7. At the door edge area where the latch case is to be applied, the inturred flanges 3 of the door facing sheets 2 are partly cut away as shown in Fig. X to provide a rectangular shaped opening 60 through which the body of the latch case 10 is inserted to project into the door as shown in Fig. XII, with the inner face 18 of the body section 17 of the jamb plate covering the opening 60 and seating against the flange margins which define the opening 60.

As shown in Figs. VII, XII and XIII, a tapered tongue section 20 projects from the upper and lower ends of the body section 17 of the jamb plate 16, and the base end of each tongue section 20 is surrounded by an adjacent inner shoulder 21 and an outer shoulder 22 which define the end of the body section 17 of the jamb plate. The base end of each tongue section 20 has a cross sectional area which is contoured in close conformity with the interior area of the edging strip 7 as defined by the inner surfaces of the curvilinear face portion 8 and inturred flange portions 9 thereof. The adjacent square cut ends of the upper and lower edging strips 7 can accordingly be driven to snugly telescope over the outwardly tapered tongue sections 20 until the square cut end of each edging strip 7 snugly abuts against the adjacent inner shoulder 21 and outer shoulder 22 of the body section 17 of the jamb plate 16. As thus assembled, the tongue sections 20 are snugly contained and locked within the adjacent ends of the upper and lower edging strips 7, and the edging strips are in turn firmly locked in tightly fitted position against the inturred flanges 3 of the door facing sheets 2 by the outwardly flared lips 4 thereof. The entire lock structure is thus rigidly secured in cantilever suspension within the door solely by the jamb plate 16 thereof. As thus secured, the curvilinear outer face 19 of the body section 17 of the jamb plate 16 forms a substantially flush and smooth joint with the curvilinear outer face 8 of the adjacent edging strips 7 as is evident by referring to Fig. II. The body section 17 of the jamb plate 16 has a draw bolt hole 23 extending through, and the body section may have a flattened outer face 19' adjacent the hole 23 as shown in Figs. II and VIII to accommodate the web section 118 of the door stop 115.

The latch slide 25, as shown more particularly in Figs. XIII and XIV, presents a generally rectangular outer frame defined by front and rear frame sections 26—26' and top and bottom frame sections 27—27'. The front and rear frame sections 26—26' and top and bottom frame sections 27—27' are integrally joined together at the corners thereof and are additionally reinforced by a side wall forming section 28. The top and bottom horizontal frame sections 27—27' are each provided with a pair of raised shoe portions 29—29' adjacent the front and rear ends thereof. The raised shoe portions 29—29' present smooth outer faces designed to have smooth sliding contact with the inner web faces 14' of the latch case 10. The web faces 14' of the latch case, and the slide faces of the shoe portions 29—29', may be smoothly machined to insure smooth sliding action, and if desired, either the outer faces of the shoe portions 29—29', or the inner web faces 14' of the latch case, may be surfaced with an anti-friction material such as moulded nylon. To further insure smooth and noiseless sliding action of the latch slide 25 within the latch case 10, a pair of curvilinear shaped steel tension springs 24 as shown in Figs. VIII, IX and XIV may be set between the paired shoe portions 29—29' of the latch slide 25 to resiliently bear against the inner web faces 14' of the latch case 10.

To effect reciprocation of the latch slide 25, a generally triangular cam frame 30 as shown in Fig. XIV is contained within the outer frame of the latch slide as defined by the top and bottom frame sections 27—27' and the front and rear frame sections 26—26'. The triangular cam frame 30 may be cast integral with the bottom frame

section 27' and the side wall forming section 28. The side wall section 28 also has a triangular shaped opening therein which is in alignment with and in shape conformity to the inner surface contour of the triangular cam frame 30. The triangular cam frame 30 of the latch slide is in inverted position so that its base portion 31 extends approximately parallel and in proximity to the top frame section 27, and with its side leg portions 32 and 33 extending in downwardly inclined relation as shown in Fig. VIII.

A bracing strut 34 extends horizontally between the inclined leg portion 32 of the triangular cam frame and the front frame section 26 of the outer slide frame, and may be cast integral therewith. The junction between the bracing strut 34 and the front vertical frame section 26 may be strengthened and reinforced by an enlarged boss portion 35. A draw bolt 36 extends forwardly from the front vertical frame section 26 and its inner end is pocketed within the boss portion 35 as shown in Fig. VIII. The draw bolt 36 is of sufficient length to extend through the conforming hole 23 in the body section 17 of the jamb plate 16 and into the latch hole 119 of the door stop 115 when the latch bolt 36 is fully extended as shown in Fig. VIII. While the latch bolt 36 may be polygonal in cross section, it is preferably made substantially circular in cross section, with the draw bolt receiving holes 23 and 119 in the jamb plate 16 and web section 118 of the door stop respectively, each having a cross sectional contour in substantial conformity with the cross section of the draw bolt 36.

The latch slide 25 is reciprocated by means of a cam lug 37 which fits within the triangular cam frame 30 as shown in Figs. VIII, IX and XII, and is swingable clockwise and counterclockwise through an arc of approximately 180°. The cam lug 37 has a hole at one end thereof through which the shaft 41 of an escutcheon member 40 extends. The shaft 41 of the escutcheon member 40 is connected or integrally cast to a medallion disc 42 which presents an inner disc section 43 of reduced diameter and which defines a circular recessed shoulder which seats within the depressed circular rim 63 of an escutcheon hole formed in the adjacent door facing sheet 2 as shown in Figs. V and XV. The medallion disc 42 of the escutcheon member 40 is designed to smoothly rotate in the depression defined by the depressed rim 63 formed in the adjacent door facing sheet. The shaft 41 of the escutcheon member 40 is provided with an enlarged body section 44 to which the cam lug 37 is rigidly secured. The body section 44 of the cam supporting shaft 41 has a neck extension 45 of reduced diameter. The neck extension 45 is provided with a head portion 46 presenting a flattened side face designed to extend into a similarly shaped socket 46' formed in the handle member 50.

The handle member 50 as shown in Figs. XV, XVII and XVIII may be formed as a one piece casting to present an outer medallion disc 51 whose outer face carries the handle forming cross bar 52 which may be formed integral therewith. An inner disc section 53 of reduced diameter and formed integral with the outer medallion disc 51 defines an inner recessed shoulder on the inner side of the outer medallion disc 51. This shoulder is designed to snugly seat and rotate within the depressed rim 64 of a circular hole formed in the adjacent door facing sheet 2.

The inside face of the handle member 50 presents an enlarged circular cavity 54 which merges into the conforming pocket 46' into which the head portion 46 of the escutcheon shaft 41 snugly telescopes. A circular retaining ring 56 and a crescent retaining ring 57 is telescoped over the neck extension 45 of the shaft 41 and is pocketed within the enlarged cavity 54 of the handle member 50 and cooperates to lock the handle member 50 to the neck extension 45 of the escutcheon shaft 41.

As thus assembled, it will be noted that manual rota-

tion of the handle member 50 as effected by rotating the handle bar section 52 thereof, will in turn rotate the medallion discs 42 and 51 and the shaft 41 which connects these discs. The escutcheon discs 42 and 51 are rotatably supported and smoothly rotate in the depressed rims 63 and 64 which define the circular openings in the door facing sheets 2 as shown in Figs. V, VI, VII and XV. The outer faces of the medallion discs 42 and 51 may be made substantially flush with the adjacent outer face of the door facing sheets 2, to thereby enhance the finished appearance of the door and latch assembly.

The cam lug 37 may be rigidly fixed to the enlarged body section 44 of the escutcheon shaft by shrinkage, welding or set screw. The cam lug 37 presents a rounded camming end 38 designed to cam against the inside faces of the triangular cam frame 30 of the latch slide 25. The base portion 31 and the side leg portions 32 and 33 of the triangular cam frame 30 are provided with smooth inner faces which smoothly merge into curvilinear corner faces 31', 32' and 33'.

When the draw bolt 36 of the latch slide 25 is in locking position as shown in Fig. VIII, the rounded camming end 38 of the cam lug 37 will be pocketed adjacent the curvilinear corner face 31' of the triangular cam frame 30. When the draw bolt 36 is to be withdrawn, the cam lug 37 is rotated clockwise from the position shown in Fig. VIII and its cam faced end 38 will cam along the inner face of the side leg 32, the curvilinear corner face 32', and then upwardly along the inner face of the side leg 32 until the camming end 38 of the cam lug 37 comes to rest adjacent the curvilinear corner face 33'. When the cam lug 37 is in this position, the draw bolt 36 will be fully retracted as shown in Fig. IX. When the draw bolt 36 is to be projected into locking position, the cam lug 37 is swung counter clockwise from the position shown in Fig. IX to the position shown in Fig. VIII, in which case the camming end 38 of the cam lug 37 will respectively slide along the cam face of the leg 33, the curvilinear corner face 32', and cam face of leg 32 of the triangular camming frame, until the camming end 38 of the cam lug 37 is positioned adjacent the curvilinear corner face 31' thereof. Thus by a counter clockwise or clockwise rotation of the finger grip bar 52 of the handle member 50 through a 180° angle, the draw bolt 36 can be manipulated from retracted position into locking position, or from full locking position to fully retracted position.

The camming end 38 of the cam lug 37 may be made of case hardened steel, or may be provided with a moulded nylon camming surface to reduce friction and wear, or conversely, the inner faces of the legs 31, 32 and 33 and the corner faces 31', 32' and 33' of the triangular cam frame 30 may be surfaced with moulded nylon or other wear resistant and anti-friction material.

The concealed latch structure as above described is economical to manufacture and install. The entire latch case 10 as shown in Fig. XIII may be economically formed as a one piece casting from steel, aluminum, brass, or other metal or plastic material. The latch slide 25 as shown in Fig. XIV may also be formed as a one piece casting from suitable metal or plastic material, and with minimum smoothing or polishing of the slide faces of the raised shoe portions 29—29' and the inner faces of the guide ribs 13 and web sections 14 of the guide channels 11. The tension springs 24 are easily set between the raised shoe portions 29—29' of the latch slide 25 and the latch slide 25 can then be telescoped into position within the latch case 10. The latch case 10 and latch slide 25 are then ready for mounting within the partly formed door.

In assembling the latch case 10 and latch slide 25 contained therein onto the partly assembled door, the latch case 10 is telescoped into the conforming hole 60 formed in the vertical front edge of the door in a manner so that the flat inner face 18 of the body section 17 of the jamb

plate 16 thereof snugly seats against the rim of the rectangular conforming hole 60, with the tapered tongue sections 20 of the jamb plate 16 overhanging the outside surfaces of those portions of the facing sheet flanges 3 of the door which are directly above and below the rectangular conforming hole 60. Door edging strips 7 which are to be applied directly above and below the latch structure, are then telescoped over the outturned lips 4 of the door facing sheets 2 and driven toward the latch structure until the square cut ends of the strips 7 snugly abut against the inner and outer shoulders 21 and 22 of the body section 17 of the jamb plate 16. The tapered tongue sections 20 of the jamb plate 16 will then be snugly telescoped within the adjacent ends of the upper and lower door edging strips 7. The latch case 10, as thus rigidly secured to the door, is further braced against movement by the projecting bosses 15 which brace against the inside surfaces of the door facing sheets 2.

The latch slide manipulating means can then readily be assembled to the door and latch structure. The cam lug 37 is first applied and secured to the enlarged body section 44 of the escutcheon shaft 41, and the circular retaining ring 56 and the crescent retaining ring 57 are applied to the neck extension 45 of the shaft 41. The escutcheon shaft 41 with the cam lug 37 attached thereto is then inserted into the triangular cam frame 30 of the latch slide 25 through the circular hole in the door facing sheet 2, the medallion disc 42 of the escutcheon member 40 being simultaneously fitted within the depressed circular rim 63 which defines the escutcheon receiving hole in the adjacent door facing sheet 2. The handle member 50 is then placed in position on the opposite side of the door with the inner disc section 53 thereof seated within the depressed rim 64 which defines the circular hole in the adjacent door facing sheet 2. Inward pressure applied to the escutcheon member 40 and handle member 50 serves to drive the end portion 46 of the escutcheon shaft 41 into the conforming pocket 46' of the handle member and simultaneously serves to deform the circular retaining ring 56 and the crescent retaining ring 57 in a manner to frictional lock the neck extension 45 of the escutcheon shaft 41 to the circular wall which defines the enlarged cavity 54 in the handle member, thereby rigidly locking the handle member 50 to the escutcheon shaft 41 and completing the assembly of the concealed latch to the door structure.

It will be appreciated that a latch manipulating knob may be provided on both sides of the door by providing the medallion disc 42 of the escutcheon member 40 with a finger manipulating bar similar to the bar 52 associated with the handle member 50. The circular medallion disc 42 associated with the escutcheon member 40 may be similar in diameter to the medallion disc 51 associated with the handle member 50. These diameters may be as large as desired, but need be no more than one to two inches. Since the medallion discs 42 and 51 are inset within the conforming rims 63 and 64 of the door facing sheets 2, the outer faces thereof may be made substantially flush with the outer surfaces of the door facing sheets 2. Additionally, the curvilinear outer face 19 of the body section 17 of the jamb plate 16 may be contoured in conformity with the curvilinear outer face 8 of the adjacent edging strips 7 associated with the door edge, with only a fine line joint seam therebetween, thereby further enhancing the appearance of the door structure. The curvilinear outer face 19 of the jamb plate 16 may be given the same surface finish as the adjacent door edging strips 7 so that the lock structure carried by the door is hardly discernible. The exposed faces of the escutcheon member 40 and handle member 50 may be given a surface finish similar to that applied to the outer surfaces of the door facing sheets 2, or if desired, the outer surfaces of escutcheon member 40

and handle member 50 may be metal plated to make them attractively visible.

While certain novel features of this invention have been above disclosed and are pointed out in the claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art, without departing from the spirit of this invention.

What is claimed is:

1. A hollow metal door structure and latch assembly including in combination, spaced side wall facing panels and a jamb wall forming part of a door body, a latch case presenting a pair of spaced guide members contained within the door body, a jamb plate fixed to the outer ends of said guide members and extending along the jamb wall of the door body, a latch slide supported by and slidable between said guide members, said latch slide presenting a cam frame having an internal camming surface, a latch bolt fixed to and projecting forwardly from said latch slide, a latch bolt receiving hole in said jamb plate, and means structurally independent of said latch case and latch slide for reciprocating said latch slide in the latch case, said means including a cam shaft extending through said cam frame, a pair of circular escutcheon discs rigidly fixed to the opposite ends of said cam shaft, openings in said side wall panels in alignment with said shaft, said side wall panels presenting fixed circular rim formations in axial alignment with said shaft and in which said circular escutcheon discs are rotatably journaled, a handle member fixed to at least one of said escutcheon discs, and a camming lug fixed to said shaft and positioned to cam against the internal camming surface of said cam frame upon rotation of said handle member.

2. A hollow metal door structure and latch assembly including in combination, spaced side wall facing panels and a jamb wall forming part of a door body, a latch case presenting a pair of spaced guide members contained within the door body, a jamb plate fixed to the outer ends of said guide members and extending along the jamb wall of the door body, a latch slide supported by and slidable between said guide members, a cam frame fixed within said latch slide, said cam frame having a generally triangular shaped internal surface which presents a pair of converging camming faces joined by an arcuate camming face, a latch bolt fixed to and projecting forwardly from said latch slide, a latch bolt receiving hole in said jamb plate, and means structurally independent of said latch case and latch slide for reciprocating said latch slide in the latch case, said means including a cam shaft extending through same cam frame, a pair of circular escutcheon discs rigidly fixed to the opposite ends of said cam shaft, openings in said side wall panels in alignment with said shaft, said side wall panels presenting circular rim formations in axial alignment with said shaft and in which said circular escutcheon discs are rotatably journaled, a handle member fixed to at least one of said escutcheon discs, and a camming lug fixed at one end thereof to said shaft and presenting an arcuate shaped camming face at the other end thereof, the arcuate shaped end of said camming lug being positioned to travel in camming engagement with the converging camming faces and arcuate camming face of said cam frame upon rotation of said handle member through an angle of approximately 180°.

3. A door latching structure designed to be substantially concealed within the body of a door including in combination, a latch case presenting a pair of spaced and substantially parallel channel shaped guide members, said guide members having a jamb plate fixed to and extending transversely across the outer ends thereof, a latch slide having a generally rectangular exterior frame formed by a pair of spaced and generally parallel and longitudinally extending frame members connected by a pair of spaced and transversely extending frame members, each of said longitudinally extending frame members presenting a pair of spaced slide shoes designed to slide along

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the inner channel faces of said guide members, an outwardly arching tension spring positioned between each pair of said slide shoes and slidably engaging the inner guide face of the adjacent guide members of the latch case, said exterior frame of the latch slide containing a cam frame presenting a generally triangular shaped internal camming surface, a bracing strut connecting said cam frame to at least one of the frame members of the exterior frame, a latch bolt fixed to and projecting forwardly from one of the transverse frame members of the exterior frame of said latch slide, and a latch bolt receiving hole in the jamb plate of the latch case.

4. A hollow metal door structure and latch assembly including in combination, spaced side wall facing panels and a jamb wall forming part of a door body, a latch case presenting a pair of spaced guide members contained within the door body, said guide members having a jamb plate fixed to the outer ends thereof and extending along the jamb edge of the door body; a latch slide supported by and slidable between said guide members, said latch slide presenting a cam frame having a generally triangular shaped internal camming surface, a latch bolt fixed to and projecting forwardly from said latch slide, a latch bolt receiving hole in the jamb plate of the latch case, a rotatable slide manipulating shaft extending through said cam frame, a circular escutcheon disc rigidly fixed to one end of said shaft and rotatable therewith, a second circular escutcheon disc separately attachable in rigid position to the other end of said shaft and rotatable therewith, openings in said side wall panels in alignment with said shaft, said side wall panels presenting circular rim formations in axial alignment with said shaft and in which said circular escutcheon discs are rotatably journaled, and a handle member fixed to at least one of said circular escutcheon discs, said shaft having a camming lug fixed thereto positioned to cam against the internal camming surface of said cam frame upon rotation of said handle member to thereby reciprocate the latch slide within the latch case and manipulate said latch bolt to and from door latching position.

5. A door latching structure designed to be substantially concealed within the body of a door including in combination, a latch case presenting a pair of spaced and substantially parallel guide members, a jamb plate presenting a body section fixed to and extending transversely across the outer ends of said guide members, door body attaching tongues projecting from the opposite ends of the jamb plate, a latch slide having an exterior frame containing a cam frame fixed thereto and presenting a generally triangular shaped internal camming surface, a latch bolt fixed to and projecting forwardly from the exterior frame of said latch slide, a latch bolt receiving hole formed in the jamb plate of the latch case, a rotatable slide manipulating shaft extending through said cam frame, a circular escutcheon disc rigidly fixed to one end of said shaft and rotatable therewith, a second circular escutcheon disc separately attachable in fixed position to the other end of said shaft and rotatable therewith, and a camming lug fixed to said shaft and engaging the internal camming surface of said cam frame to thereby reciprocate the latch slide within the latch case and manipulate said latch bolt to and from door locking position.

6. A door latching structure designed to be substantially concealed within the body of a door including in combination, a latch case presenting a pair of spaced generally channel shaped guide members, a jamb plate fixed to and extending transversely across the outer ends of said guide members, a latch slide having a generally rectangular exterior frame presenting raised shoe portions slidable along the inner faces of said guide members, said exterior frame containing a cam frame fixed thereto and presenting a generally triangular shaped internal surface which includes a pair of converging camming faces joined by an arcuate camming face, a latch bolt fixed to and projecting forwardly from said latch slide, a latch bolt receiving

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hole formed in the jamb plate of the latch case, a rotatable slide manipulating shaft extending through said cam frame, a circular escutcheon disc rigidly fixed to one end of said shaft and rotatable therewith, a second circular escutcheon disc separately attachable in fixed position to the other end of said shaft and rotatable therewith, a handle member fixed to one of said circular escutcheon discs, and a camming lug fixed at one end thereof to said shaft and presenting an arcuate shaped camming face at the other end thereof, the arcuate shaped end of said camming lug being positioned to travel in camming engagement with the converging camming faces and arcuate camming face of said cam frame upon rotation of said handle member through an angle of approximately 180° to thereby reciprocate the latch slide within the latch case and manipulate said latch bolt to and from door latching position.

7. A door latch structure designed to be attached to the jamb wall of a hollow metal door and to extend between the side wall facing panels thereof, said latch structure including a jamb plate having a body section, a latch case presenting a pair of spaced and generally parallel guide members of generally channel shaped cross section having the adjacent ends thereof fixed to the rear face of the body section of the jamb plate, a reinforcing web connecting said guide members, the body section of said jamb plate presenting rear seating faces extending laterally with respect to the top, bottom and side faces of the latch case and designed to seat against the jamb wall of the door structure, and a tongue section projecting from each end of the body section of the jamb plate and having a base area which is less than the adjacent end area of the body section of the jamb plate to thereby provide inset end shoulders adjacent the rear face and front face of the body section.

8. A door structure and latching assembly including in combination, a latch structure which includes a jamb plate having a body section, a latch case projecting from the rear side of said body section, said body section presenting a seating face adjacent the base of said latch case, and a tongue section projecting from an end of said body section, said door structure presenting a jamb wall having an opening formed therein into which said latch case projects, said jamb wall presenting exterior face portions adjacent said opening providing a seat for the seating face of the body section of the jamb plate, and a semi-tubular edging strip slidably secured to the jamb wall of said door structure and having an end portion thereof telescoped over the adjacent tongue section of said jamb plate.

9. A door structure and latching assembly including in combination, a latch structure which includes a jamb plate having a body section, a latch case projecting from the rear side of said body section, said body section presenting a seating face adjacent the base of said latch case, and a tongue section projecting from each end of said body section, said door structure presenting a jamb wall having an opening formed therein into which said latch case projects, said jamb wall presenting exterior face portions adjacent said opening providing a seat for the seating face of the body section of the jamb plate, and a pair of semi-tubular edging strips each slidably secured to the jamb wall of said door structure and extending from the opposite ends of the body section of the jamb plate, each of said edging strips having an end portion thereof telescoped over the adjacent tongue section of said jamb plate.

10. A hollow metal door structure and latch assembly including in combination, spaced side walls and a jamb wall forming part of the door structure, said jamb wall presenting a latch case receiving hole therein, a latch structure which includes a jamb plate having a body section, a latch case projecting from the rear face of said body section through the receiving hole in the jamb wall and extending inwardly between the side walls of

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the door structure, said body section presenting rear seating faces extending laterally with respect to the side faces of the latch case and seating against the exterior faces of the adjacent hole-defining portions of the jamb wall, a tongue section projecting from an end of the body section of the jamb plate and positioned to overlie an adjacent portion of the jamb wall of the door structure, a semi-tubular shaped edging strip presenting an end portion telescoping over the tongue section of the jamb plate, and concealed means for securing said semi-tubular edging strip to the jamb wall of the door structure.

11. A hollow metal door structure and latch assembly including in combination, spaced side walls and a jamb wall forming part of the door structure, a latch structure, a latch case receiving hole formed in the jamb wall of the door structure which includes a jamb plate having a body section, a latch case projecting from the rear face of said body section through the receiving hole in the jamb wall and extending inwardly between the side walls of the door structure, said body section presenting rear seating faces extending laterally with respect to the side faces of the latch case and seating against the exterior faces of the adjacent hole-defining portions of the jamb wall, a tongue section projecting from each end of the body section of the jamb plate and positioned to overlie adjacent portions of the jamb wall of the door structure, semi-tubular shaped edging strips positioned above and below the body section of the jamb plate and each presenting an end portion telescoping over the adjacent tongue section of the jamb plate, and concealed means for securing said semi-tubular edging strips to the jamb wall of the door structure.

12. A door structure and latch assembly including in combination, spaced door facing sheets presenting intumed flanges along the jamb edge of the door structure, said jamb edge presenting a latch case receiving hole therein, a latch structure which includes a jamb plate having a body section, a latch case projecting from the rear face of said body section through the receiving hole in the jamb edge of the door and extending inwardly between the facing sheets of the door structure, said body section presenting rear seating faces extending laterally with respect to the top, bottom and side faces of the latch case and designed to seat against the adjacent hole-defining portions of said intumed flanges, a tongue section projecting from an end of the body section of the jamb plate and positioned to overlie adjacent portions of the intumed flanges of the door structure, outturned lips projecting from the intumed door flanges and terminating adjacent the terminal end of the tongue section of the jamb plate, and a semi-tubular shaped edging strip presenting an end portion which snugly telescopes over the adjacent tongue section of the jamb plate, said semi-tubular edging strip presenting an outer facing section and intumed flange sections interlocking with said outturned lips, said intumed flange sections presenting flange end portions which underlie the adjacent tongue section of the jamb plate.

13. A door structure and latch assembly including in combination, spaced metal side wall panels forming parts of a hollow metal door structure, a latch structure including a latch case containing a latching device positioned between the side wall panels of the door structure, a rotatable shaft having means fixed thereto operative to reciprocate said latching device to and from latching position, a circular escutcheon plate fixed to said shaft, an opening in one of said side wall forming panels in axial alignment with said shaft and rimmed by a circular depression, said circular depression being defined by a depressed lip portion inset with respect to the outer face of

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the side wall panel and a circular rim portion surrounding said depressed lip portion and extending inwardly from the outer face of the side wall panel and providing a tubular sleeve in which the circular escutcheon plate is journaled, and a handle member fixed to said circular escutcheon plate for rotating said shaft.

14. A door structure and latch assembly including in combination, spaced metal side wall panels forming parts of a hollow metal door structure, a latch structure including a latch case containing a latching device positioned between the side wall panels of the door structure, a rotatable shaft having means fixed thereto operative to reciprocate said latching device to and from latching position, a circular escutcheon plate fixed to each end of said shaft, an opening in each of said side wall panels in axial alignment with said shaft and rimmed by a circular depression, each of said circular depressions being defined by a depressed lip portion inset with respect to the outer face of the side wall panel and a circular rim portion surrounding said depressed lip portion and extending inwardly from the outer face of the side wall panel and providing a tubular sleeve in which the adjacent circular escutcheon plate is journaled, and a handle member fixed to at least one of said circular escutcheon plates for rotating said shaft and escutcheon plates.

15. A door structure and latch assembly including in combination, spaced metal side wall panels joined to a sheet metal jamb wall forming parts of a hollow metal door structure, a latch case receiving opening formed in the jamb wall of the door structure, a latch structure which includes a jamb plate having a body section and a latch case projecting from the rear face of said body section and through the receiving opening formed in the jamb wall and extending between the side wall panels of the door structure, the body section of said jamb plate presenting a seating face adjacent the base of said latch case and a tongue section projecting from each end of the body section, said jamb wall presenting exterior face portions adjacent the opening therein providing a seat for the rear seating face of the body section of the jamb plate, a pair of semi-tubular edging strips slidably secured in the jamb wall of the door structure and each having an end portion thereof telescoped over the adjacent tongue section of the jamb plate, a latching device slidable within said latch case, a rotatable shaft having means fixed thereto for reciprocating said latching device to and from latching position, a circular escutcheon plate fixed to each end of said shaft, an opening in each of said side wall panels in axial alignment with said shaft and rimmed by a circular depression, each of said circular depressions being defined by a depressed lip portion inset with respect to the outer face of the side wall panel and a circular rim portion surrounding said depressed lip portion and extending inwardly from the outer face of the side wall panel and providing a tubular sleeve in which the adjacent circular escutcheon plate is journaled, and a handle member fixed to at least one of said circular escutcheon plates for rotating said shaft and escutcheon plates.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 8,158	Yale	Apr. 2, 1878
65 241,998	King	May 24, 1881
1,430,176	Miller	Sept. 26, 1922
2,240,482	Anderson	May 6, 1941
2,664,181	Boughton	Dec. 29, 1953
2,677,443	Kottick	May 4, 1954
70 2,776,029	Hult	Jan. 1, 1957
2,795,445	Beil	June 11, 1957

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,876,873

March 10, 1959

Kent W. Benham

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 10, line 49, for "same" read -- said --; column 13, line 15, beginning with "wall forming" strike out all to and including "having a" in line 17, same column and insert instead --

 wall forming part of the door structure, a latch
 case receiving hole formed in the jamb wall of the
 door structure, a latch structure which includes
 a jamb plate having a

Signed and sealed this 8th day of December 1959.

(SEAL)

Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents