March 17, 1970 A. E. HAND ET AL 3,500,884

LATCH INSTALLATION TOOL

Filed Nov. 20, 1967 3 Sheets-Sheet 1

Fig. 1

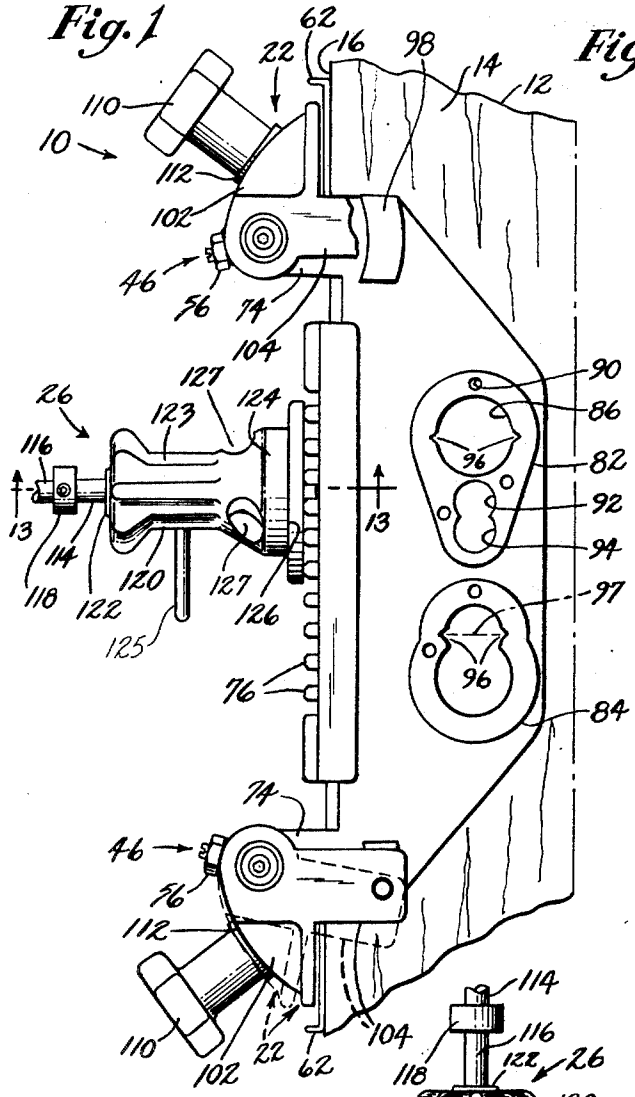


Fig. 2

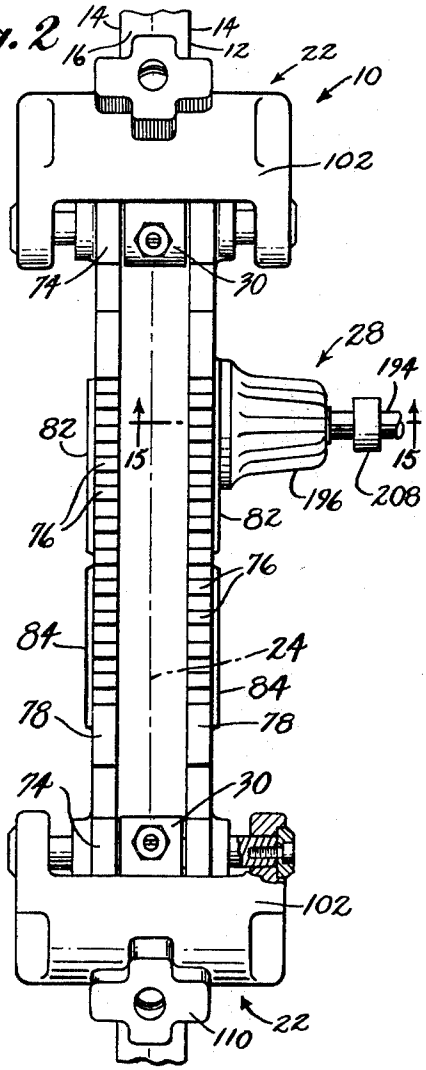
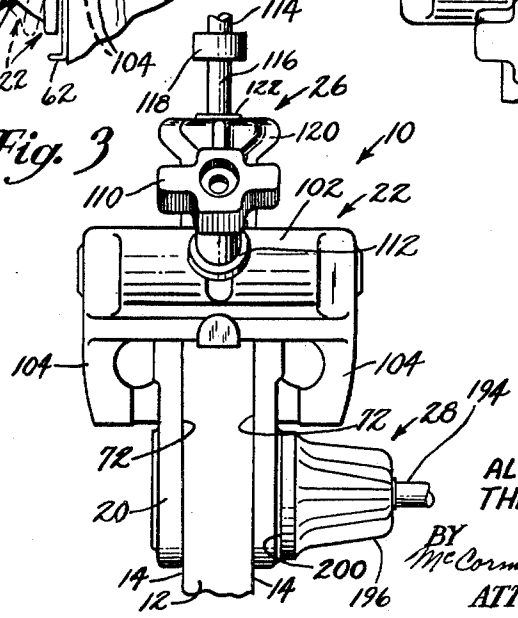


Fig. 3



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March 17, 1970 A. E. HAND ET AL 3,500,884

LATCH INSTALLATION TOOL

Filed Nov. 20, 1967 3 Sheets-Sheet 2

Fig. 4

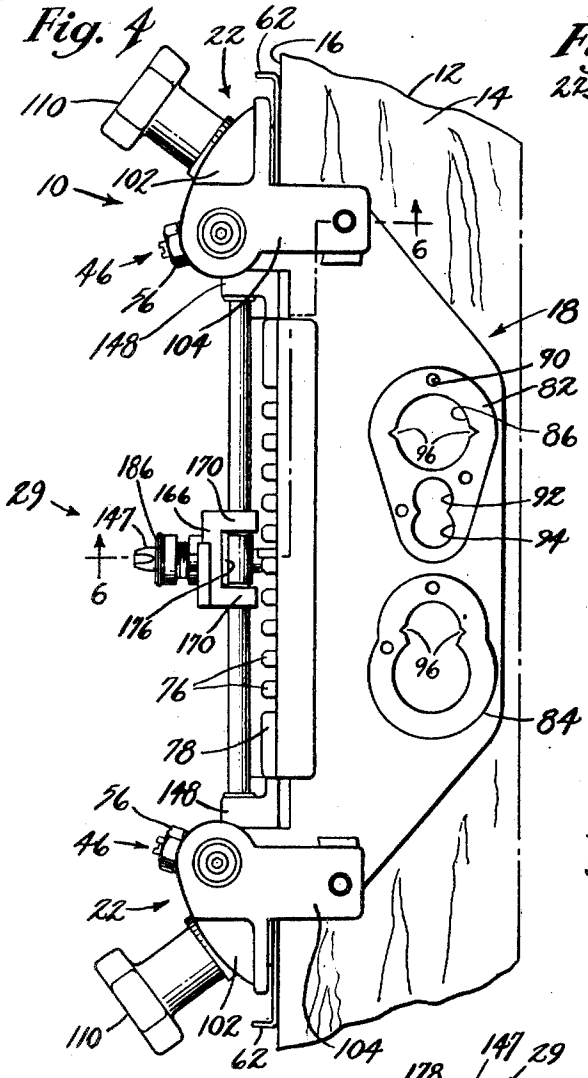


Fig 5

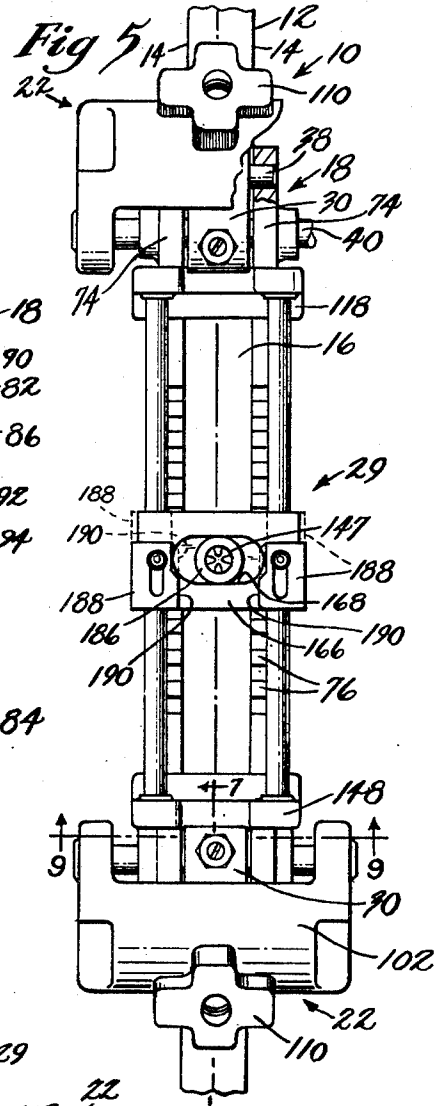
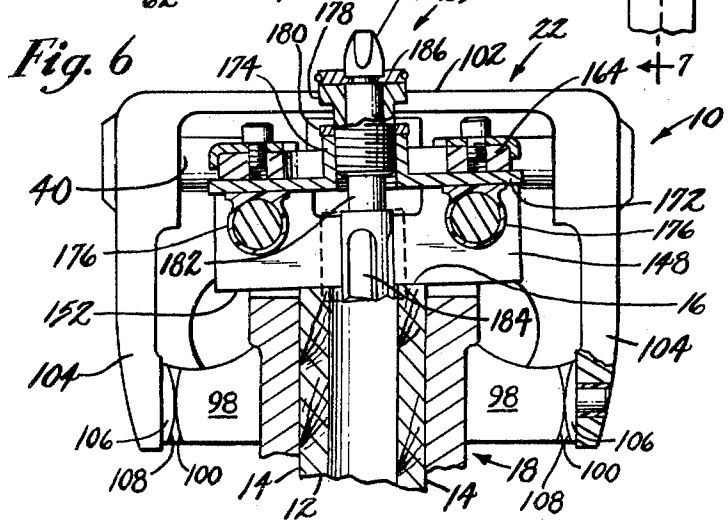


Fig. 6



March 17, 1970 A. E. HAND ET AL 3,500,884

LATCH INSTALLATION TOOL

Filed Nov. 20, 1967 3 Sheets-Sheet 3

Fig. 7

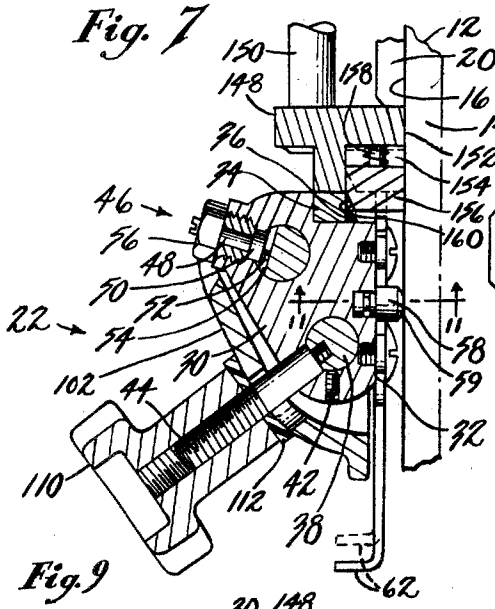


Fig 8

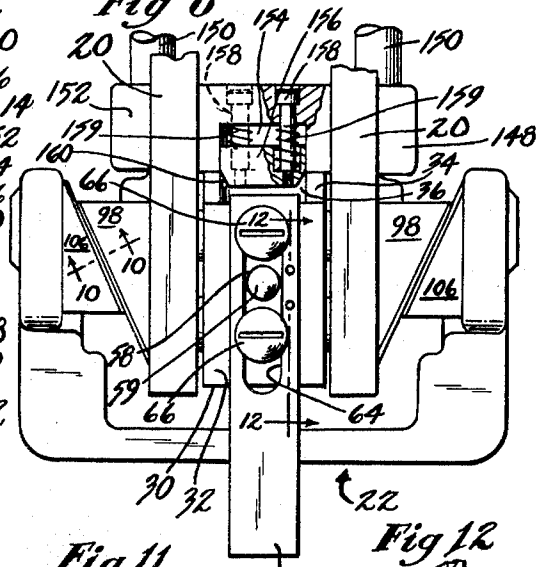


Fig. 9

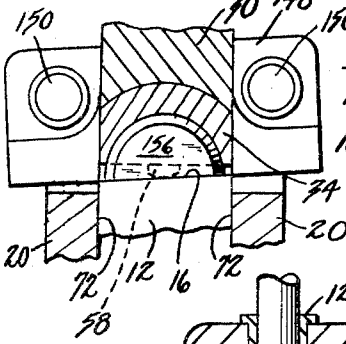


Fig. 10



Fig 11

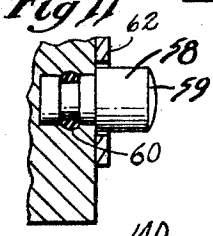


Fig 12

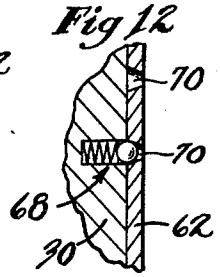


Fig. 13

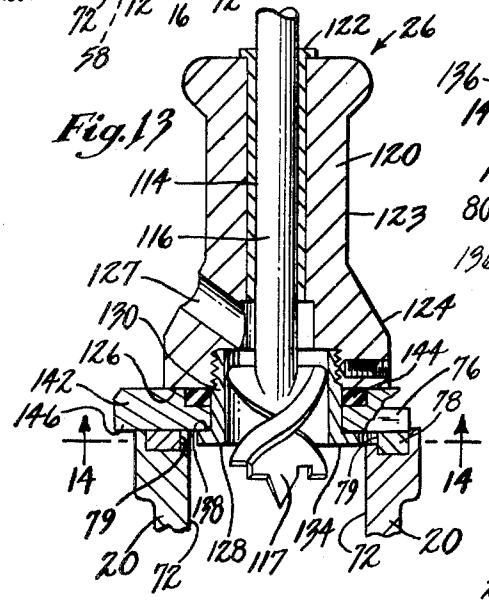


Fig. 14

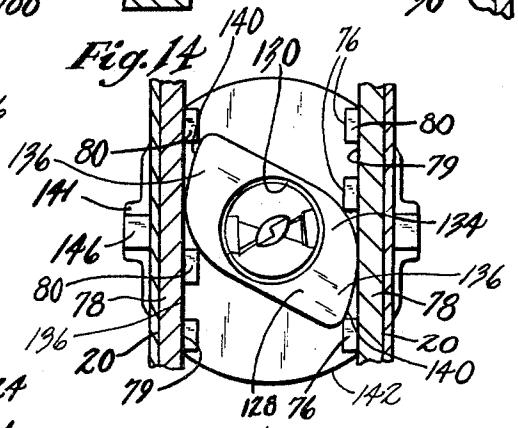
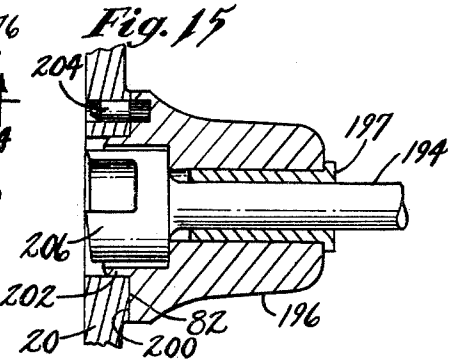


Fig. 15



United States Patent Office 3,500,884 Patented Mar. 17, 1970

3,500,884

LATCH INSTALLATION TOOL

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Filed Nov. 20, 1967, Ser. No. 684,567
Int. Cl. B27c 9/00
U.S. Cl. 144—3 28 Claims

ABSTRACT OF THE DISCLOSURE

A latch installation tool having a frame including a pair of clamp plates is moved into clamping engagement with a door in orientation with a predetermined line of reference on the door by a pair of clamping elements which are pivotally supported on the frame and cammingly engage the plates. Various cutter assemblies supported in predetermined positions on the frame operably engage the door to form intersecting openings therein in orientation with the line of reference to receive various parts of a conventional latch or lock mechanism to be mounted on the door.

BACKGROUND OF INVENTION

This invention relates in general to latch or lock installations tools and deals more particularly with a tool for installing a door latch of the so-called mortice type. To prepare a door to receive a latch of this type, a plurality of intersecting openings are formed therein. The vertical center line of the door outer edge, which is or may be beveled or inclined with respect to the side faces of the door, ordinarily provides a line of reference from which the centers of the various openings may be accurately located. A mortice opening through the door outer edge for receiving the latch case is usually centered on this line of reference. Backset dimensions normally provided by the latch manufacturer to aid in positioning various openings required to receive knob spindles, lock cylinders and like parts of a latch mechanism are also customarily measured from this reference line.

Accordingly, it is the general aim of the present invention to provide an improved latch installation tool for clampingly engaging a door in automatic alignment with a line of reference, such as aforedescribed, to facilitate the rapid and accurate formation of openings in the door required for the installation of a conventional latch or lock mechanism.

Other objects and advantages of the invention will be apparent from the following description and from the drawings forming a part thereof.

SUMMARY OF INVENTION

In accordance with the present invention, a latch installation tool is provided having a frame including a pair of movable clamp plates for engaging opposite side faces of a door. Means are provided for positioning the frame in longitudinal alignment with the outer edge of the door and for camming the plates into clamping engagement with the door to further orient the frame relative to the vertical centerline of the door outer edge. Intersecting openings in the door accurately located and angularly positioned to receive associated parts of a conventional latch mechanism are formed by one of more cutter assemblies selectively positioned in predetermined locations on the frame.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a latch installation tool or jig embodying the present invention mounted on a door and including a mortice cutter assembly for boring one or more openings through the outer edge of the door.

FIG. 2 is a front elevational of the tool of FIG. 1 but having the mortice cutter assembly removed therefrom and showing a boring cutter assembly supported thereon.

FIG. 3 is an end view of the tool of FIG. 1 and shows both the mortice and boring cutter assemblies illustrated in FIGS. 1 and 2.

FIG. 4 is a side elevation of the latch installation tool of FIG. 1 but shows a cutter assembly or router mounted thereon for forming an opening in the outer edge of the door.

FIG. 5 is a front elevation of the tool arranged as shown in FIG. 4, a portion of the frame and one clamp member being broken away.

FIG. 6 is a somewhat enlarged fragmentary sectional view taken generally along the line **6—6** of FIG. 4.

FIG. 7 is a somewhat enlarged fragmentary sectional view taken along the line **7—7** of FIG. 5.

FIG. 8 is a somewhat enlarged fragmentary rear elevation of the tool arranged as shown in FIG. 4.

FIG. 9 is a fragmentary sectional view taken along the line **9—9** of FIG. 5.

FIG. 10 is a fragmentary sectional view taken along the line **10—10** of FIG. 8.

FIG. 11 is a somewhat enlarged fragmentary sectional view taken along the line **11—11** of FIG. 7.

FIG. 12 is a somewhat enlarged fragmentary sectional view taken along the line **12—12** of FIG. 8.

FIG. 13 is a somewhat enlarged fragmentary sectional view taken along the line **13—13** of FIG. 1.

FIG. 14 is a fragmentary sectional view taken along the line **14—14** of FIG. 13.

FIG. 15 is a somewhat enlarged sectional view taken along the line **15—15** of FIG. 2.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning to the drawings, and first considering FIGS. 1–5, a latch installation tool or jig embodying the present invention and indicated generally at **10** is shown mounted on a hung door **12** having an upright stile including side faces **14, 14** and a forward or outer edge **16** beveled or inclined with respect to the side faces. The tool **10** comprises a frame indicated generally at **18** adapted for positioning in longitudinal alignment with the outer edge and including a pair of movable clamp plates **20, 20.** A pair of clamp members **22, 22** supported on the frame cammingly engage and move the plate **20, 20** equal distances toward each other and into clamping engagement with the side faces **14, 14** to further align the frame with the vertical centerline of the outer edge indicated at **24.**

One or more cutter assemblies adapted for support in predetermined positions on the frame and movable in cutting engagement with the door form openings required for the installation of a mortice lock or latch mechanism (not shown). A mortice cutter assembly indicated generally at **26** in FIGS. 1 and 3 is adapted for support on the frame **18** in a longitudinal spaced series of positions to bore a single hole or a plurality of adjacent overlapping holes of desired depth through the door outer edge **16** to collectively form a mortice for receiving the case of the latch. Another cutter assembly **28** shown in FIGS. 2 and 3 is provided to bore an opening transversely through the door **12** for receiving a latch knob spindle, lock cylinder or the like. Still another cutter or router assembly **29** is shown in FIGS. 4 and 5 mounted on the frame for forming another opening in the door outer edge **16** surrounding

the mortice to receive the face plate of the latch mechanism.

To facilitate handling, the frame **18** and some of the other parts of the apparatus not subject to wear are preferably made from aluminum or other metal of relatively light weight. The frame **18** is laterally adjustable to accommodate doors of varying thickness and has a central portion including a pair of substantially identical longitudinally spaced end blocks **30, 30** (FIG. 2) of somewhat lesser width than the thickness of the narrowest door to be accommodated. Considering the lower end block **30** as it appears in FIGS. 7 and 8, it will be seen to include a substantially flat rearwardly facing surface **32** and has a recess formed at its inner end containing a bearing block **34**. A parti-cylindrical recess **36** formed in the bearing block **34** opens rearwardly and inwardly, or toward the center of the frame. A pair of shafts **38** and **40** extend laterally through the block **30** and include end portions which project from opposite sides of the block. These shafts support the associated clamping device **22**. The shaft **38** is secured against lateral movement relative to the block by a set screw **42**. A stud **44** threaded at its outer or free end threadably engages the shaft **38** within the block **30**, and projects radially outwardly therefrom.

Each shaft **40** is laterally adjustable relative to its associated supporting block **30** and to effect this adjustment a positioning driver generally indicated at **46** is provided. Referring to FIG. 7, the positioning driver **46** has a cylindrical shank **48** extending into the block **30** in radial relationship with the shaft **40**, and has an enlarged cylindrical base **50** bearing against a flattened surface portion of the latter shaft. An eccentric drive pin **52** projects from the base **50** and is received in a slot **54** which extends transversely of the shaft **40**. At its outer end the driver shank **48** is slotted to receive a tool for rotating the driver **46** to laterally adjust the position of the shaft **40** relative to the block **30**. A lock nut **56** threadably engages the block **30**, surrounds the shank **48** and bears against the base portion **50** to lock the shaft **40** in a desired position of lateral adjustment.

Leveling buttons **58, 58** are provided at each end of the frame **18** for longitudinally aligning it with the door **12** and for controlling the backset or distance from the longitudinal centerline of the door outer edge to the center of the opening formed by the cutter assembly **28**. Each leveling button extends rearwardly from an associated block **30** and includes a crowned or parti-spherical end portion **59**. The leveling buttons engage the door outer edge at longitudinally spaced points on the centerline **24** to effect the desired condition of alignment. A plurality of leveling button sets of various lengths are preferably provided for selective use to adapt the tool **10** to the setback requirements of a variety of latch mechanisms. For this reason each leveling button **58** is preferably releasably retained in its associated block **30** by an O-ring **60** shown in FIG. 11 engaging in a suitable groove in the button shank.

Each block **30** also carries a release member or slide **62** for disengaging the router assembly **29** from the frame **18** as will be hereinafter further discussed. As best shown in FIGS. 7 and 8, each slide **62** is secured to the rear surface of an associated block **30** and has a longitudinally extending slot **64** through which an associated leveling button **58** passes. Shoulder screws **66, 66** extend through the slot **64** and threadably engage the block **30** on opposite sides of the leveling button to retain the slide for limited movement in a longitudinal direction. A ball detent mechanism in the block **30**, and indicated generally at **68** in FIG. 12 cooperates with ball receiving openings **70, 70** in the slide **62** to selectively retain the slide in its inactive or full line position and in its active or releasing position indicated by broken lines in FIG. 7. It should be noted that when the slide **62** is in the latter position, the inner end thereof extends inwardly through and beyond the recess **36**.

The clamp plates **20, 20** are substantially identical but of opposite hand. Each such plate includes an inwardly facing clamping surface **72** for engaging an associated door side face **14** and a pair of longitudinally spaced and forwardly projecting ears **74, 74** (FIG. 1) apertured to slidably receive the supporting shafts **38, 38** and **40, 40**. Along the forward edge of each plate **20** there is formed a longitudinal spaced series of forwardly projecting teeth **76, 76** which are supported forwardly of the door outer edge **16** when the tool **10** is in clamping engagement with the door **12**. The teeth may be integrally formed on the plates **20, 20**, but preferably and as shown they are formed on a pair of durable metal inserts **78, 78** fastened in associated recesses in the forward edge of the plates and having opposing inwardly facing surfaces **79, 79** (FIG. 13). Each tooth **76** extends laterally inwardly for some distance beyond an associated surface **79** and includes a rearwardly facing surface **80** best shown in FIGS. 13 and 14.

Apertured bosses **82** and **84** on the outer surfaces of the plates **20, 20** are provided for supporting one or more cutter assemblies on the frame. The boss **82** (FIG. 1) has a cylindrical hole **86** therethrough to accommodate the boring cutter assembly **28** and a somewhat smaller cylindrical hole **90** for receiving a locating pin associated with the latter cutter assembly. A pair of overlapping or interconnected cylindrical holes **92** and **94** also extend through the boss **82** to selectively accommodate another cutter assembly (not shown) similar to the assembly **28** but of somewhat smaller size in either of two positions for boring an opening to receive a spindle of a thumb turn on lock condition indicator. Additional holes are provided in the boss **84** to accommodate the tool **28** in still another position and to support a similar but somewhat smaller tool (not shown) in a still further boring position. To aid in vertically positioning the frame **18** on the door **12**, horizontally opposed generally V-shaped notches **96, 96** are formed in the plate **20** in association with one or more of the aforedescribed holes. The notches provide indicia for positioning the frame **18** on the door in alignment with a horizontal reference line, such as **97**, scribed on the door at a desired position above the lower edge thereof. Generally wedge shaped cam bosses **98, 98** (FIG. 1) are integrally formed on each plate **20** and extend laterally outwardly from opposite ends thereof to cooperate with cams carried by the clamp devices **22** for moving the plates into clamping engagement with the door. Each cam **98** includes an arcuately shaped cam surface **100** which is inclined to the lateral direction and has its center of curvature on the axis of the shaft **40**. The cam surfaces **100, 100** are preferably crowned or outwardly convex as best shown in FIG. 10.

Further considering the clamp members **22, 22**, it will be noted that each such member is supported at an opposite end of the frame **18** for pivotal movement about the axis of an associated shaft **40** and is secured to the latter shaft in the manner illustrated in FIG. 2 for lateral adjustment therewith. Referring now particularly to the lower clamp member **22** as it appears in FIGURES 1–3, this member has a hollow body **102** overlying an associated part of the frame **18**. A pair of legs **104, 104** extend from the body **102** in radial relation to the shaft **40** and on opposite sides of the frame. Each leg **104** carries a generally wedge shaped cam **106** (FIG. 8) for complementary engagement with an associated plate cam **98**. Like the previously described cams **98, 98**, each cam **106** includes an arcuately shaped cam surface **108** which has its center of curvature on the axis of the shaft **40**. Each cam surface **108** is also convex or crowned to engage an associated cam surface **100** along an arcuate line of contact which has its center of curvature located at the clamping element pivot axis. Means for pivoting each clamp member **22** inwardly from a releasing position indicated by broken lines in FIG. 1 to a clamping position shown in full lines is provided by a knob **110** threaded onto an associated stud **44**. The knob bears

against a washer **112** (FIG. 7) which is contoured to exert a substantially uniform pressure on the clamp body **102** through the aforedescribed range of positions.

Tightening the knobs **110, 110** causes the clamp members **22, 22** to pivot toward their clamping positions so that the cams on the latter members and the plates **20, 20** cooperate to move the plates equal distances toward each other. The positioning driver **46** is employed to center the leveling buttons **58, 58** between the cams **106, 106** so that the said buttons will be automatically longitudinally aligned with the door centerline **24** when the plates are brought into clamping engagement with the door. Due to the parti-spherical configuration of the button end portions **59, 59** the leveling buttons will rest on the centerline **24** although the door outer edge **16** may be beveled and therefore inclined with respect to the axes of the buttons.

Considering now the various cutter assemblies in the preferred order of use, and first referring to the mortise cutter assembly **26** shown in FIGS. 1, 3, 13 and 14, this cutter assembly is adapted for support on the frame forwardly of the door outer edge and includes a cutter or boring bit supported for rotation about a generally rearwardly extending axis and for axial movement into cutting engagement with the door. Means are provided for releasably retaining the cutter assembly **26** in a longitudinally spaced series of positions on the frame to bore a plurality of interconnected or overlapping holes of desired depth through the door outer edge **16** to collectively form a mortise for receiving the latch case.

The bit is indicated at **114** (FIGS. 1 and 13) and includes an elongated shank **116** adapted for connection at its forward end with a suitable power tool (not shown) for imparting rotation thereto. At the rear end of the shank there is formed a conventional spirally fluted cutting blade **117**. An adjustable stop collar **118** surrounds the shank and is secured thereto by a set screw **119**. Support for the bit **114** is provided by a support member **120** carrying a bearing or bushing **122** in which the shank **116** is journalled. The support member **120** is generally cylindrical and includes a fluted body portion **123** and a somewhat enlarged hollow base portion **124** having a rearwardly facing radially disposed bearing surface **126**. A handle or locking lever **125** extends radially outwardly from the body portion. To release chips produced by the cutting operation a plurality of openings **127, 127** are formed in the base portion.

A locking cam **128** is threaded into the hollow base **124** for releasably retaining the cutter assembly **26** on the frame **18**. The said cam includes a cylindrical portion **130** having a coaxially aligned cylindrical bore for receiving the cutter blade **117** in its retracted or inactive position as it appears in FIG. 13. Extending radially outwardly from the cylindrical portion **130** in axially spaced relation to the bearing surface **126** is a cam plate **134** (FIGS. 13 and 14) which includes substantially identical diametrically opposed end portions **136, 136**. Each end portion **136** has a forwardly facing bearing surface **138** and also has a cam surface **140** which curves arcuately outwardly from the cylindrical portion **130** in a clockwise direction as viewed in FIG. 14. An annular bearing plate **142** surrounds the cylindrical portion **130** between the bearing surface **126** and the cam plate **134** and includes a forwardly opening annular recess containing an annular compression member **144**. The compression member is preferably made from an elastomeric material and extends from the latter recess to engage the bearing surface **126**. A rib **146** projects rearwardly from and preferably extends diametrically of the bearing plate **142**.

The center assembly **26** is positioned on the frame **18** with the bearing plate **142** resting on the forwardly facing surfaces of associated teeth **78, 78** and the rib **146** extending transversely of the frame **18** and selectively positioned in the spaces between opposite pairs of adjacent teeth. A rearwardly directed force is applied to the body portion **123** to compress the elastomeric member **144** a sufficient amount to permit the locking lever **125** to be moved in a clockwise direction to bring the bearing surface **138** into engagement with associated teeth surfaces **80, 80**. Further clockwise movement of the locking lever causes each cam surface **140** to engage an associated insert surface **79** as best shown in FIG. 14, thereby moving the cutter bit **114** to a centered position between the plates **20, 20** and into alignment with the reference line **124**. The teeth **78, 78** are so spaced that the cutter assembly may be successfully positioned on the frame **18** to bore a series of overlapping or interconnected holes in the door which collectively form a generally rectangular mortise. Indicia or mortise longitudinal dimension is or may be indicated on the plates **20, 20** to provide a convenient reference for positioning the cutter assembly **26** to form a mortise of desired length. To control the depth of the mortise, the stop collar **118** is selectively positioned on the shank **116**.

The router assembly **29** (FIGS. 4–6) is positioned on the frame after the mortise has been formed so that it is necessary to rout only a small area surrounding the mortise thereby minimizing the time required to perform this operation. Like the previously described cutter assembly, the router assembly **29** is also releasably retained on the frame **18** forward of the door outer edge and includes a support structure which carries a cutter or bit **147**. The bit extends some distance into the mortise and is arranged for rotation about a generally rearwardly extending axis for lateral and longitudinal movement relative to the frame **18**.

Referring now to FIGS. 4–9, the router support structure includes a pair of stop blocks **148, 148** connected by a pair of parallel cylindrical rails or guide rods **150, 150**. Each stop block has a substantially flat rearwardly facing surface **152** and a rearwardly and outwardly opening semi-cylindrical recess **154**, as best shown in FIGS. 7 and 8. A generally semi-cylindrically shaped plunger **156** is received in each recess **154** and retained for longitudinal movement therein by a pair of plunger screws **158, 158**, this for releasably retaining the router support structure on the frame. Each plunger is biased outwardly by a pair of compression springs **159, 159**, each spring surrounding an associated screw **158**. The outer end of each plunger has a conical outwardly converging surface **160** which is normally based to a position out of the recess **154**.

The bit **147** is supported for longitudinal movement relative to the frame by a generally U-shaped guide block **164** (FIGS. 4, 5 and 6) which has a central portion **166** including a laterally extending slot **168** and a pair of rearwardly directed legs **170, 170** apertured to slidably receive the guide rods **150, 150**. The bit **147** is further supported for rotary and lateral movement relative to the guide block **164** by a rectangular slide **172** (FIG. 6) which has a generally cylindrical central portion **174** projecting forwardly through the slot **168**. Each end portion of the slide is received in a space between the guide block **164** and an associated guide rod **150**. To support the slide for lateral movement relative to the guide block a pair of bearing members, **176, 176** slidably received on the guide rods between the guide block legs bear against the rear surface of the slide. A bushing **178** threadably received in the central portion **174** and retained in position therein by a lock nut **180** serves to journal the bit **147** for axial adjustment relative to the frame **18**.

Referring particularly to FIG. 6, the bit **147** includes a shank **182** carrying a conventional router blade **184**. A split collar **186** retains the bit in assembly with the bushing **178** which also serves as a thrust bearing. At its forward end the shank **182** is rounded and has radial grooves for receiving complementary ribs on a female adapter (not shown) for connecting the bit with a power source

which may, for example, be a conventional rotary power tool. The adapter provides a quick release connection of somewhat universal type between the bit and its power source thereby eliminating the need for maintaining the power source in precise alignment with the bit during the cutting operation.

To adjust the lateral movement of the bit **147** and thereby control the lateral dimension of the router cut, a pair of gauge plates **188, 188** are secured to the forward surface of the guide block **164**. Each gauge plate has an inwardly facing abutment surface **190** and is movable between positions of adjustment indicated by solid and broken lines in FIG. 5 for positioning in the path of lateral movement of the bit **147** to limit the latter movement. In the illustrated embodiment the longitudinal movement of the bit is limited by the stop blocks **148, 148**. However, additional stop means may be provided to limit this movement and thereby further control the longitudinal dimension of the router cut.

As the router assembly is moved into position on the frame **18** the plungers **158, 158** engage the rounded forward portions of the end blocks **30, 30** and are thereby urged into their respectively associated recesses **158, 158**. When the stop blocks **148, 148** are aligned with the end blocks **30, 30** the springs **159, 159** urged the plungers into the recesses **36, 36** to retain the router assembly on the frame. Due to the semicylindrical configuration of each plunger and the complementary configuration of the recess **36** in which it is received the router assembly is thereby supported on the frame for limited pivotal movement about a longitudinal axis. Engagement of the conical surfaces **160, 160** with the end blocks **30, 30** urge the stop block surfaces **152, 152** into engagement with the beveled door outer edge **16** thereby causing the router assembly to pivot to a position wherein the bit **147** extends into the mortise and assumes an axially normal position with respect to the door outer edge as shown in FIG. 6. Thereafter, the power source is connected to the bit in the aforedescribed manner and the bit is moved longitudinally and laterally between its limits to accurately rout an opening surrounding the mortise.

As previously noted that tool **10** may be adapted to the setback requirements of a variety of latch mechanisms. To adapt the router assembly **29** to these requirements a plurality of sets of spacer pads (not shown) are provided. Each set of pads is used with a corresponding set of leveling buttons and comprises a pair of substantially identical rectangular blocks. Each pad is adapted to be secured to an associated stop block **148** adjacent its rear surface **152** to serve as a shim to compensate for increased spacing between the surfaces **152, 152** and the door outer edge **16** caused by changing the leveling buttons.

Removal of the router assembly **29** from the frame **18** is facilitated by moving the slides **62, 62** to their respective releasing positions in which positions they are retained by the spring ball detent mechanism **68, 68**. In the releasing position the inner end of each slide **62** bears against an associated plunger **158** to hold the plunger in a retracted position so that the router assembly may be readily removed from the frame without first removing the frame from the door.

As previously noted the cutter assembly **28** is employed to form a transverse opening through the door communicating with the mortise for receiving a latch knob spindle or the like or to counterbore such an opening to receive a lock cylinder associated with the latch. The cutter assembly **28** includes a boring bit **194** journalled for rotation about laterally extending axis and axially movable into cutting engagement with the door. Referring particularly to FIG. 15 the boring cutter assembly is shown to comprise a hollow support member **196** which has a fluted gripping surface and supports a bushing **197** for journalling the bit **194**. At its inner end the support member **196** has a radially disposed bearing surface **200** for engaging the boss **82**. Projecting inwardly beyond the surface **200** is a generally cylindrical portion **202** adapted to be received in the opening **86** to align the cutter with the frame **18**. A locating pin **204** adapted to be received in the hole **90** projects inwardly from the support member **196** beyond the cylindrical portion to further aid in positioning the cutter assembly **28** on the frame and to prevent rotation of the support member **196** as it is held in engagement with the frame during the cutting operation. The bit **194** has an elongated shank carrying a conventional boring cutter blade **206**, shown in a retracted position in FIG. 15, and is adapted for connection with a power tool. A stop collar such as **208** (FIG. 2) may be employed to limit the axial movement of the bit and thereby control the depth of the cut when the cutter assembly **28** is used to perform a counter-boring operation.

The arrangement of the frame and the releasable arrangement of the various cutter assemblies with respect thereto provides a substantial advantage in that any of the cutter assemblies may be removed from the frame at any stage of the operation to permit insertion of the various lock parts into the openings formed without first removing the frame from its clamped position on the door. Thus, as necessary, the cutter assembly may be adjusted and repositioned on the frame and the cutting operation resumed without risk of cutter misalignment.

The drawings show a preferred embodiment of the invention and such an embodiment has been described but it will be understood that various changes may be made from the construction disclosed and that the drawings and description are not to be construed as defining or limiting the scope of the invention the claims forming a part of the specification being relied upon for this purpose.

What is claimed is:

1. A latch installation tool comprising a frame including a pair of clamp plates having opposing laterally spaced clamp faces for engaging opposite side faces of a door positioned between said plates, means supporting said plates for lateral movement toward and away from each other, means for positioning said frame in longitudinal alignment with the outer edge of said door, clamping means for moving said plates, said clamping means and each of said plates having engaging cam surfaces, at least one of said cam surfaces associated with each of said plates being inclined to the lateral direction to cause said plates to move toward each other and into clamping engagement with said door side faces in response to movement of said clamping means in one direction, and a cutter assembly supported on said frame for operably engaging said door to form a latch part receiving opening therein.

2. A latch installation tool as set forth in claim **1** wherein said clamping means is supported on said frame for pivotal movement about a laterally extending axis.

3. A latch installation tool as set forth in claim **2** wherein said cam surfaces associated with each of said plates are engageable along arcuate lines of contact having centers of curvature on said pivot axis.

4. A latch installation tool as set forth in claim **2** including means for moving said clamping means in said one direction.

5. A latch installation tool as set forth in claim **4** wherein said means for moving said clamping means comprises a clamp knob supported by and threadably movable relative to said frame generally toward and away from said clamping means, said knob engaging said clamping means in radially spaced relation to said pivot axis.

6. A latch installation tool as set forth in claim **1** includng means for adjustably locating said clamping means relative to said positioning means to effect lateral alignment of the latter means with the central plane of said door when said clamp plates are brought into clamping engagement with said door.

7. A latch installation tool as set forth in claim 6 wherein said supporting means comprises a shaft extending laterally through said frame, said clamping means being carried by said shaft, and wherein said means for adjustably locating said clamping means comprises an eccentric mechanism associated with said frame and operably engaging said shaft for axially moving said shaft relative to said frame.

8. A latch installation tool as set forth in claim 1 wherein said frame includes a central portion intermediate said plates and forwardly of said door outer edge and wherein said positioning means comprises a pair of longitudinally spaced leveling buttons projecting rearwardly from said central portion for engaging said outer edge.

9. A latch installation tool as set forth in claim 8 including means for releasably retaining said leveling buttons in said central portion.

10. A latch installation tool as set forth in claim 8 wherein each of said leveling buttons has a parti-spherical end portion for engaging said outer edge.

11. A latch installation tool as set forth in claim 1 wherein said clamping means comprises a pair of longitudinally spaced clamp members, each of said members supported on said frame for pivotal movement about a laterally extending axis and including a pair of generally radially extending legs disposed on opposite sides of said frame, one of said engaging cam surfaces being associated with each of said legs.

12. A latch installation tool as set forth in claim 1 wherein said cutter assembly comprises a boring bit journalled for rotation about a laterally extending axis and axially movable relative to said frame.

13. A latch installation tool as set forth in claim 1 wherein said cutter assembly comprises a bit supported on said frame forwardly of said door outer edge for rotation about a generally rearwardly extending axis.

14. A latch installation tool as set forth in claim 13 wherein said bit is a routing cutter longitudinally and laterally movable relative to said frame.

15. A latch installation tool as set forth in claim 14 including means for axially adjusting said bit relative to said frame.

16. A latch installation tool as set forth in claim 13 including means for releasably retaining said bit in a longitudinally spaced series of positions on said frame.

17. A latch installation tool as set forth in claim 16 wherein each of said plates includes a longitudinally spaced series of forwardly projecting teeth, said cutter assembly including a support member for journalling said bit, and wherein said means for releasably retaining said bit comprises a laterally disposed rearwardly projecting rib carried by said support member for selective positioning between said teeth.

18. A latch installation tool as set forth in claim 16 wherein said means for releasably retaining said bit includes means for positioning said bit axis in the central plane of said door.

19. A latch installation tool as set forth in claim 18 wherein said plates include opposed longitudinally disposed surfaces and wherein said means for positioning said bit axis comprises a cam supported for pivotal movement on said bit axis and engageable with said opposed surfaces.

20. A latch installation tool for forming an opening in the outer edge of a door comprising a frame, positioning means for longitudinally aligning said frame with said outer edge, means for clamping said frame in engagement with the opposite side faces of said door, a cutter assembly including a rotary bit, means for supporting said bit on said frame for longitudinal and lateral movement relative to said outer edge in cutting engagement therewith, and means for releasably retaining said supporting means on said frame and for automatically positioning said bit axially normal to the plane of said outer edge when said supporting means is positioned on said frame.

21. A latch installation tool as set forth in claim 20 wherein said supporting means comprises a pair of laterally spaced longitudinally extending rails and a guide block mounted for longitudinal movement on said rails, said bit being supported by said guide block for rotation and lateral movement relative thereto.

22. A latch installation tool as set forth in claim 20 wherein said supporting means includes a pair of longitudinally spaced rearwardly facing bearing surfaces disposed in a plane axially normal to said bit and wherein said means for releasably retaining said supporting means comprises means for retaining said supporting means for pivotal movement about a longitudinal axis and for biasing said bearing surfaces into engagement with said outer edge.

23. A latch installation tool as set forth in claim 20 including means for moving said releasably retaining means to and retaining said means in a releasing position so that said cutter assembly may be removed from said frame while said frame is in clamping engagement with said door.

24. A latch installation tool as set forth in claim 20 including means for adjusting the lateral movement of said bit relative to said frame.

25. A latch installation tool comprising a frame including a pair of clamp plates having opposing laterally spaced clamp faces for engaging opposite side faces of a door positioned between said plates, means supporting said plates for lateral movement toward and away from each other, means for positioning said frame in longitudinal alignment with the outer edge of said door, clamping means for moving said plates, said clamping means and each of said plates having coengaging cam surfaces for moving each of said plates toward the other and into clamping engagement with said door side faces in response to movement of said clamping means in one direction, and means for supporting a cutter assembly on said frame for operably engaging said door to form a latch part receiving opening therein.

26. A latch installation tool as set forth in claim 25 wherein said clamping means is supported on said frame for pivotal movement about a laterally extending axis.

27. A latch installation tool as set forth in claim 25 including means for moving said clamping means in said one direction.

28. A latch installation tool as set forth in claim 27 wherein said means for moving said clamping means comprises a clamp knob supported by and threadably movable relative to said frame generally toward and away from said clamping means, said knob engaging said clamping means in radially spaced relation to said pivot axis.

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U.S. Cl. X.R.

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PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,500,884 Dated March 17, 1970

Inventor(s) Albert E. Hand and Theodore H. Miller

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 28, "installations" should read --installation--

Col. 1, line 66, "of" should read --or--

Col. 2, line 4, "elevational" should read --elevation--

Col. 2, line 42, following "Turning" insert --now--

Col. 4, line 30, preceding "spindle" insert --knob--

Col. 6, line 10, "124" should read --24--

Col. 6, line 11, "successfully" should read --successively--

Col. 8, line 71, "includng" should read --including--

SIGNED AND
SEALED
AUG 25 1970

(SEAL)
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