Dec. 23, 1969 W. J. FLETCHER 3,484,894

REMOVABLE HANDLE

Filed Dec. 15, 1967 2 Sheets-Sheet 1

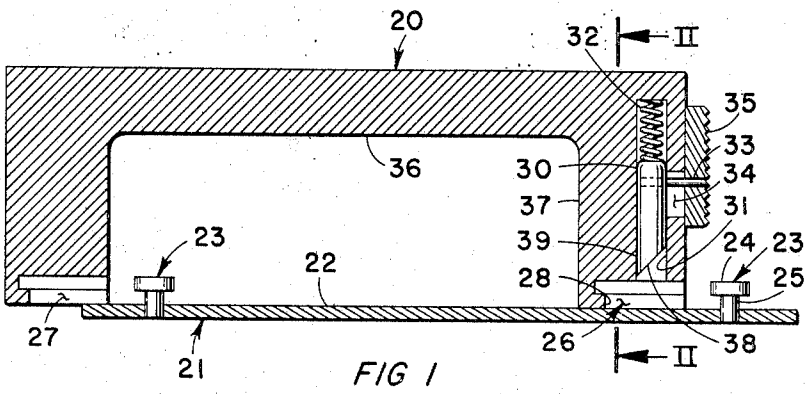


FIG 1

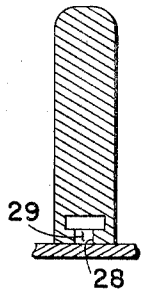


FIG 2

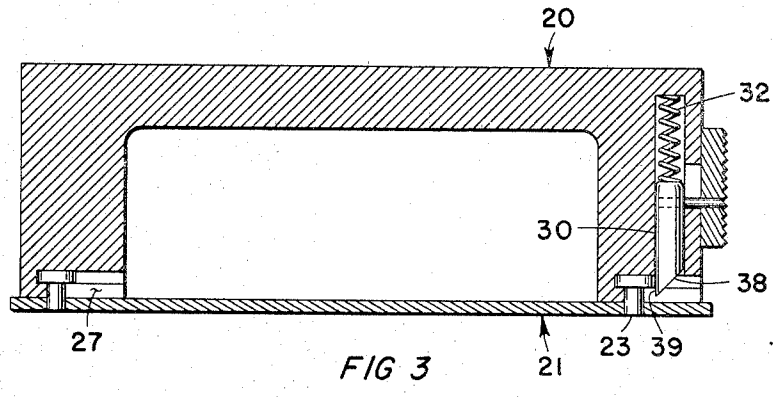


FIG 3

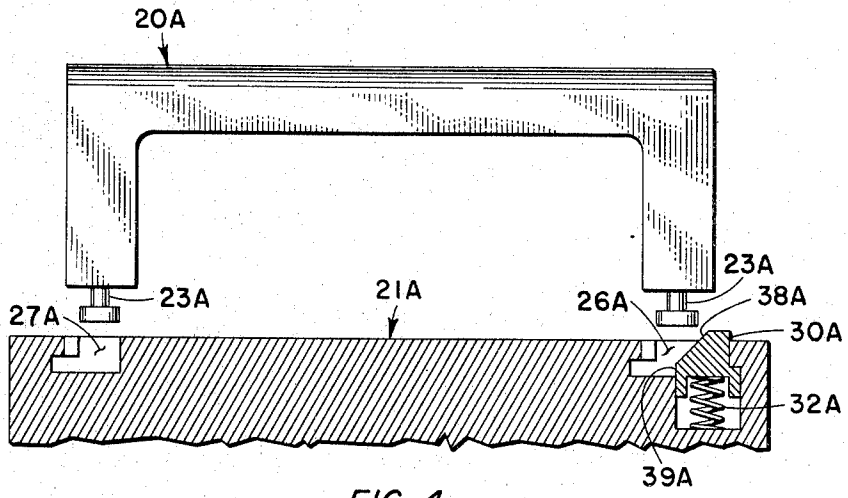


FIG 4

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REMOVABLE HANDLE

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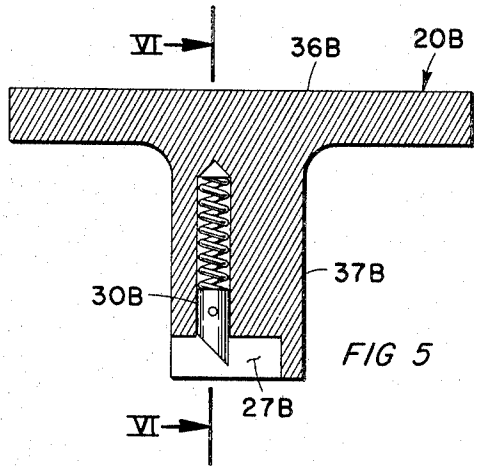


FIG 5

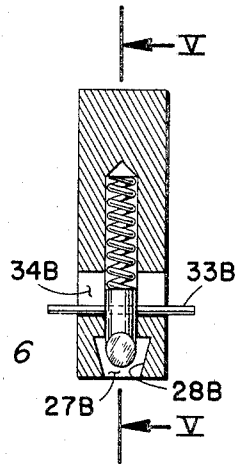


FIG 6

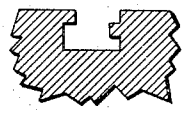


FIG 8

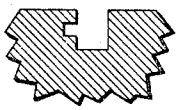


FIG 9

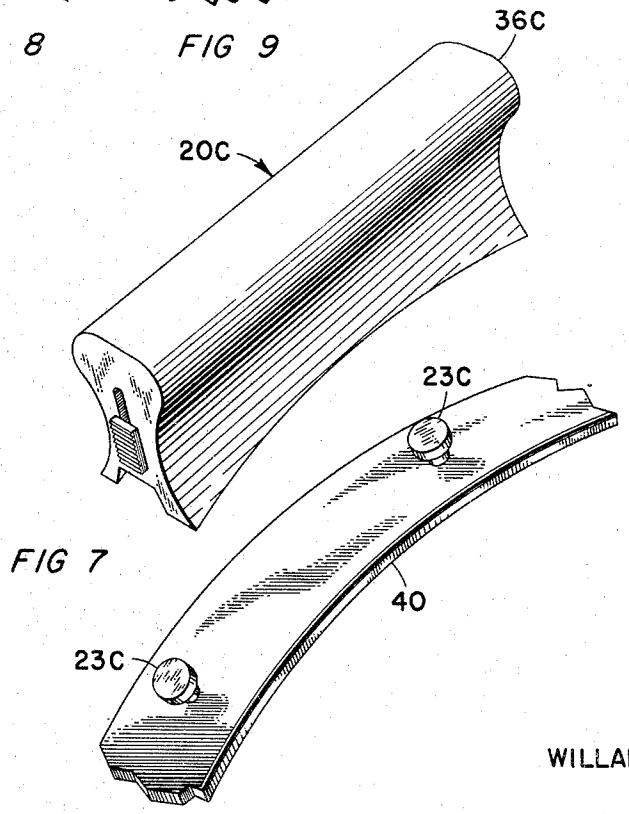


FIG 7

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3,484,894

REMOVABLE HANDLE

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Filed Dec. 15, 1967, Ser. No. 690,929
Int. Cl. A47b 95/02; E05b 1/00
U.S. Cl. 16—114 9 Claims

ABSTRACT OF THE DISCLOSURE

A removable handle for temporary attachment to a body, the handle and body respectively having one or more mutually engaging studs and recesses, and at least one manually movable locking pin to selectively prevent removal of a stud sideward out of an engaged recess.

It is common to place handles, usually called D-handles, on various drawers, modules, equipment packages, etc., that fit into instrument panels, consoles and the like. The reason is simple; it is to facilitate installation and removal of, for example, a given module for repair or replacement, and to assure safe handling of the module when it is not installed. Accordingly, a typical handle must be sturdy, and it should have a gripping portion large enough to be grasped firmly and comfortably with one's hands, and it must usually stand off from the face of the panel for a distance which is adequate to permit a person's fingers to grasp the gripping portion. These physical requirements for handles are well known, but they are often not accorded the emphasis they are entitled to, because a compromise is usually necessary between these requirements and a further requirement, namely, that the face of the module be relatively unobstructed when it is installed. Thus, a handle which has optimum characteristics as an aid in handling a module at the same time has at least some deleterious properties in its static state on the installed item. For example, a comfortably large handle (such as a person would expect to find on a heavy suitcase or trunk) would obviously cast a correspondingly large shadow on the face of equipment to which it is attached, which shadow would interfere with reading dial-indicating instruments, etc. Similarly, a handle as large as might be desirable—based on grasping considerations—could easily obstruct the view of a person sitting to the side of an instrument console, and could interfere with an attempt to reach a switch from a position other than directly in front of said switch. Hence, handles which form a permanent part of instrument panels have historically been kept slim, short and as unobstructive as possible, while gripping convenience has been de-emphasized. It will be recognized, however, that even small handles still cast their shadows, and they still constitute potential obstructions when a person is reaching for control knobs, etc., located near the handles.

Accordingly, it is a major object of this invention to provide a novel handle for instrument panels and the like.

Another object is to provide a handle which is readily removable from a structure when it is not needed for carrying purposes.

A further object is to make possible instrument panels, electronic cabinets, etc., which are unobstructed by protruding handles.

Yet another object is to promote safety in the handling of electronic apparatus by providing optimally proportioned handles without limitations based on their weight or bulk.

Other objects and advantages will be apparent from the specification and claims and from the accompanying drawing illustrative of the invention.

In the drawing,

FIGURE 1 is a cross-sectioned side view of a handle located adjacent a body to which it is to be attached;

FIGURE 2 is a cross-sectional view taken along the plane II—II of FIG. 1;

FIGURE 3 is a cross-sectional side view of a handle which is secured to the adjacent body;

FIGURE 4 is an alternate embodiment of a handle in which the relative positions of the locking recess and studs are reversed as compared with FIG. 1;

FIGURE 5 is a cross-sectional view of a handle made in accordance with the invention;

FIGURE 6 is a cross-sectional view taken along the plane VI—VI of FIG. 5;

FIGURE 7 is a perspective view of an alternate embodiment of the handle shown adjacent the body to which it is to be attached; and

FIGURES 8 and 9 are cross-sectional views of exemplary recesses which are characterized by permitting engagement in only one direction.

With initial reference to FIGS. 1 and 2, a handle **20** which constitutes a first body is shown adjacent a second body **21** which may be any structure on which a handle is, at certain times, desirable for handling purposes. For example, the body **21** may be a drawer which is insertable into an instrument panel, console, etc., and which is removable therefrom at certain times based on necessity or convenience. Extending from a face **22** of the second body **21** in the same general direction are two, spaced studs **23**, each of which has a head **24** and a shank **25**. For economy, the stud **23** may be a common round-headed bolt which is modified as necessary but which still has a shank having a reduced diameter or breadth relative to the head **24**.

In the other of the two bodies, i.e., the handle **20** in this instance, a pair of recesses **26, 27** are provided in a face intended to be juxtaposed with the first face **22**. The recesses **26, 27** are spaced apart by the same distance that the studs **23** are spaced apart so as to permit simultaneous engagement of the two studs with respective recesses. The recesses **26, 27** further have suitable sizes and configurations to match respective studs **23**, with more description of the various possible configurations being provided at a subsequent point herein. In each of the recesses **26, 27**, a holding region is provided which is surrounded by side walls all around except for an opening for a stud, i.e., by three closed sides and one open side. Extending from the closed sides of typical recess **26** is a continuous lip **28** which partially covers the recess, leaving an opening **29** slightly larger than the shank **25** but smaller than a head **24**, whereby an engaged stud secures the handle **20** to the body **21** by preventing movement of the handle perpendicular to the face **22**. As will later be made clear, the lip **28** could extend from only one or two of the side walls, rather than all three of such walls, and still provide a satisfactory locking action. Because of strength considerations, however, it is preferable to have the lip **28** extend as far as possible around the holding region. The recess side opening is sufficient in size to permit sideward movement of a stud into and out of the holding region.

A manually movable pin **30** is mounted in a bore **31** adjacent the recess **26**, the pin being appropriately sized and being positioned so as to block—when desired—the movement of a stud **23** through the recess open side. The pin **30** in FIG. 1 is shown in a raised position such that an associated spring **32** is compressed. In this raised position, it will be apparent that the handle **20** could be easily moved (to the rgiht) with respect to the studs **23** so as to engage the studs in respective recesses **26, 27**. Such engagement is represented in FIG. 3, wherein the pin **30** has been allowed to move downward in response to the

biasing action of the spring **32**. By selectively moving the pin **30**, removal of a stud **23** sideward out of a respective recess holding region is either permitted or prevented. To this end, a manually positionable means is provided to facilitate movement of the pin **30**, such a means in FIG. 1 being shown as a pin **33** which is rigidly connected to the locking pin **30** and which extends through a slot **34** to the exterior of the handle **20**. A motion transferring member such as the thumb plate **35** is attached to the pin **33**, and is positioned on the handle **20** so as to be operable by a thumb on one hand while the fingers of the same hand are conveniently holding the gripping portion **36**. The thumb plate **35** is easily guided, such that it does not rotate to a position where it might be bent or broken, through provision of a groove or rail (not shown) on the handle stand-off portion **37**.

The spring-biased pin **30** has an inclined surface **38** which faces toward the recess open side, i.e., away from the recess, and further has a relatively flat surface **39** facing toward the recess interior. As will be more fully explained later, the spring **32** has a low spring constant such that pressing a stud **23** against the pin inclined surface **38** with moderate engaging force causes the pin **30** to be pushed upward in a camming actiin until it passes over a stud head **24**.

While the handle **20** shown in FIGS. 1, 2 and 3 provides the recesses and the second body **21** has the studs **23**, there is no reason why this arrangement could not be reversed, if, for example, manufacturing considerations so dictated. As shown in FIG. 4, a handle **20A** having studs **23A** extending therefrom is located in the approximate position it would have just prior to engagement with a body **21A** having recesses **26A**, **27A**. A locking pin **30A** having an inclined surface **38A** and a relatively flat surface **39A** is biased by a spring **32A** to a position which would lock a stud **23A** in the recess **26A**.

Furthermore, there are other handle configurations that are possible with this technique for connecting one body to another. For example, the T-shaped handle **20B** shown in FIG. 5 has a single stand-off member **37B** which extends from the center of the gripping portion **36B**. In such an embodiment, if only a single round stud engages the handle, it would likely rotate about the stud when mounted thereon, unless some restraining means is provided. Accordingly, if it is desired to preclude rotation, a suitable stud would be provided having, for example, at least one flat side. The recess **27B** would have a similar number of flat sides, two of which are shown in FIG. 6. The stud to match such a recess would then likely have a cross-section in the shape of a trapezoid. As before, a lip **28B** is provided to permit movement of the handle **20B** parallel to but not away from the engaged structure. A pin **33B** extends through a slot **34B** where it can be engaged by two fingers of one hand without letting go of the handle gripping portion **36B**.

Thus far, the face of the body to which the handle is to be attached has only been illustrated as a planar face. This method of attaching removable handles, however, should not be restricted to only flat objects; for cylinders, spheres, etc., could be similarly provided with handles, as suggested by FIG. 7. Furthermore, the studs **23C** need not be permanently attached to the body to be moved. That is, an exemplary strap **40** could be provided with the studs **23C**, and then the strap could be placed (in either a permanent or a temporary fashion) about whatever object is to be moved. If the object were a pressure vessel or the like, the studs **23C** would not need to extend into or through a wall so as to weaken the vessel. Too, such a handle could be advantageously removed after placement of a vessel in, for example, an aircraft, where saving weight is often more important than saving space. As further indicated by FIG. 7, the gripping portion **36C** of the handle **20C** does not necessarily have an adjacent finger opening such as is shown in FIG. 1.

To utilize any of the handles described herein, it is not necessary that the object which is to be lifted or carried be greatly modified. In fact, it is an advantage of this invention that equipment which is already installed and in use and which has fixed handles can be relatively easily converted to a removable-handle configuration. To use a handle **20** like that shown in FIG. 1, modification is effected by removing the fixed handles by sawing them off, etc., and drilling and tapping two holes which are spaced apart by the same distance as the handle recesses **26, 27**. Two studs **23** are then threadably installed in the two holes, and the object is ready to receive a handle.

Next, a handle **20** is grasped in a conventional manner, with the fingers wrapped around the gripping portion **36**. The handle is then moved to a position in line with the two studs **23**, with the recess openings **29** being adjacent the studs. If the locking pin **30** has an inclined surface **38**, the handle **20** may be merely pushed in a straight line until it passes over and envelops the two studs **23**. During engagement in this manner, after the pin inclined surface **38** makes initial contact with a respective stud **23** and the handle is moved further sidewardly, the pin **30** will be forced to rise in what may be described as a camming action over the stud head **24**. This action compresses the spring **32** and introduces a force tending to urge the pin **30** downwardly; when the handle **20** has been moved a sufficient distance, the pin will clear the stud head **24** and will be free to return to its original position in response to the urging of the spring.

If the locking pin **30** does not have an inclined surface, such as surface **38**, or if a camming surface is present but it seems desirable not to use it for some reason, the pin **30** is moved to an unlocked position by raising thumb plate **35**. This can readily be accomplished using only one digit of a person's hand while other digits of the same hand are holding the gripping portion **36**. Movement of thumb plate **35** results in movement of pin **33** and consequently movement of locking pin **30**. Sufficient movement will obviously cause the pin **30** to be withdrawn into the stand-off portion until the recess opening **29** is unobstructed, and the handle **20** can then be moved sidewardly over the studs **23** until the recesses **26, 27** completely envelop them.

When the locking pin **30** has returned to its original position, the stud **23** engaged by recess **26** is restrained within the recess holding region by the closed walls of the recess **26** and the straight surface **39** of the pin **30**. Since the exit path for the stud **23** in recess **26** is obstructed by the pin **30**, the rigid handle **20** cannot move and there is no need to similarly block the exit path of the stud in recess **27**. If redundancy is desired, however, a similar locking pin **30** can be associated with the recess **27** so that each stud **23** is independently locked in its respective recess.

It will be noted that when the handle **20** is moved into engagement with the studs **23** in an upward direction with respect to, for example, a drawer to be lifted, the bearing load is carried entirely by the lip **28** adjacent the holding region; that is, no load is imposed on or carried by the locking pin **30** during lifting. In this mode, the locking pin **30** serves only to maintain the handle **20** on the drawer when it is at rest. Since lifting loads are carried by the lip **28**, and the lip is a permanent and integral part of the handle, the shear loads that the handle can accommodate are relatively high, while the manufacturing costs are relatively low.

While most persons will probably utilize the handle in the manner in which it is intended to be used, there may be an occasional person who would place the handle on, for example, a drawer with the handle upside down. In this mode the lifting load would not be carried by the lips **28** as described above, but rather by the pin **30**. Although a pin **30** can be made of material which is strong enough to take high stresses, such a high-strength pin would naturally cost more than a pin of only moderate

strength. Hence, it may be desirable to make the studs **23** and the mating recesses **26, 27** unsymmetrical so that the handle can be installed in only one direction, whereby the lifting loads are always carried by lips **28**. Exemplary non-symmetrical recesses are shown in FIGS. 8 and 9; such recesses could of course be either on the handle or the second body. If the locking pins **30** have to only block movement and not carry loads, they can be made weaker and hence smaller or of cheaper material without compromising their efficiency.

While commenting on strength requirements of the pin **30**, it should be noted that an advantageous feature of this invention is that almost all of its operativeness in lifting is not dependent on the locking pin **30**. Thus, if a pin **30** were somehow to fail while a drawer was being placed into position in a console, etc., the drawer would not drop, nor would the person carrying it lose control; for, the load-carrying lip **28** is not dependent on the locking pin for its utility. In fact, a handle **20** having a broken or otherwise inoperative locking pin **30** can be used indefinitely to move drawers, etc., as long as the applied loads have a vertical component. The only liability with a broken pin **30** is that a handle having a vertical orientation will likely fall away from a drawer when a person's grip on the handle is released. A medium or snug fit between a stud and the corresponding recess can, of course, retard relative motion between the two even with a broken pin.

The manner of attaching and removing the handles shown in FIGS. 5 and 7 is of course similar to that described with reference to FIG. 1. One exception may be that it is more convenient to use two fingers to raise the locking pin **30B** in FIG. 5; but as before, a person's grip on the handle need not be completely released in order to unlock the handle, and unlocking can be accomplished with only one hand.

In all embodiments of these novel handles, the gripping portions may be made as heavy and as bulky as seems desirable from a gripping point of view, without concern for any shadows that might be cast or any line of sight that might be blocked, etc. Since the handles can be removed when they have served their purpose, they do not compromise safety or any aesthetic qualities the mounting structure may have in its static position. Furthermore, a single handle may be employed to sequentially move a large quantity of objects such as drawers, etc., such that fewer handles need be purchased in order to serve a given number of drawers.

While several embodiments of the invention have been described in detail herein and shown in the accompanying drawing, it will be evident that various further modifications are possible in the arrangement and construction of its components without departing from the scope of the invention.

What is claimed is:

1. Apparatus for connecting one body to another, with one of said bodies constituting a removable handle for the other of said bodies, comprising:

a pair of spaced studs extending in the same general direction from a first one of said bodies, each of said studs having a head and a shank, said shank having a reduced breadth relative to the head;

a pair of recesses in a face of the second one of said bodies, said recesses being spaced apart and each having a suitable size and configuration to allow engagement by a respective stud, each of said recesses having a holding region bounded by a lip which extends from at least one side wall of the recess to provide a top opening slightly larger than the shank but smaller than the head, and said holding region having a side opening sufficient in size to permit sideward movement of a stud into said holding region; and

a manually movable pin associated with at least one recess for selectively preventing removal of a stud sideward out of a respective recess holding region, said pin being spring-biased to a position for restraining a stud head within said recess holding region, and said pin having an inclined surface oriented to cause the pin to rise in a camming action over the stud head upon the pin being pressed against the stud during engagement of the handle with the other of said bodies.

2. A removable handle for attachment to a structure having a face with at least one protruding stud, the stud having a head and having a shank of smaller breadth than the head, comprising:

a gripping portion;

at least one stand-off member extending from the gripping portion, witht each stand-off member having a recess with three closed sides and one open side, and further having a lip extending from at least one of the closed sides to partially cover the recess such that a top opening larger than the stud shank but smaller than the stud head is created, and the recess open side being large enough to permit sideward movement of an associated stud head into the recess upon engaging movement of the handle with respect to the structure face; and

means for selectively locking the handle to the structure face, said means including a spring-biased pin for selectively blocking the movement of a stud through the recess open side.

3. The handle claimed in claim **2** wherein the stud head has a non-symmetrical configuration and the recess has a matching non-symmetrical cross-section such that the handle can be engaged with the structure by moving the handle with respect to the structure in only one direction.

4. The handle as claimed in claim **2** wherein the spring-biased pin has an inclined surface facing away from the recess and a flat surface facing toward the recess, with the spring being compressible to permit the pin to be pushed upward and to ride over a stud upon the stud being pressed against the pin inclined surface.

5. The handle as claimed in claim **2** wherein the spring-biased pin has a normal position effectively closing the recess open side, and a second position wherein the recess open side is unobstructed, and the handle further having a manually positionable means for moving the pin from said normal position to said second position.

6. The handle as claimed in claim **5** wherein the manually positionable means for moving the pin includes a motion transferring member suitably arranged to be operable by at least one digit of a person's hande while other digits of the same hand are holding the handle gripping portion.

7. The handle as claimed in claim **2** wherein the recess open side is oriented such that loads normally imposed on said handle during use thereof in moving said structure are carried by said lip, such that the spring-biased pin experiences no loading due to the weight of the attached structure.

8. The handle as claimed in claim **2** wherein a single stand-off member extends from the center of the gripping portion to form a substantially T-shaped handle, with the stud head having at least one flat side and the recess having a similar flat side adapted to be juxtaposed with the head flat side so as to preclude rotation of the handle with respect to the stud when the handle is engaged with the stud.

9. A removable handle for attachment to a structure, the structure having a face with two spaced studs protruding therefrom, each of the studs having a head and a shank of smaller breadth than the head, comprising:

an elongated gripping portion having first and second ends;

a stand-off member extending from each of the two gripping portion ends, with each stand-off member having a recess with three closed sides and one open side, the recesses being spaced and oriented so as to simultaneously engage the studs upon movement of the handle in a first direction, and each of the recesses

further having a lip extending from the three closed sides to partially cover the recess such that an opening slightly larger than an associated stud shank but smaller than a respective stud head is provided, with each recess open side being large enough to permit sideward movement of an associated stud hand into the recess;

means for selectively locking the handle to the structure face, said means including a spring-biased pin for selectively blocking movement of a stud out of the open side of at least one of said recesses, and said pin having an inclined surface such that moving the handle in the first direction causes an abutting stud head to bear against the inclined surface for pushing the pin upward and over the respective stud; and

a thumb plate connected to the spring-biased pin for manually moving the pin from a first position wherein a recess open side is closed to a second position wherein the recess open side is free of obstruction, with the thumb plate being so arranged as to be movable by a person's thumb without removal of the person's fingers from the handle gripping portion.

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