ATTACHMENT METHOD AND APPARATUS USING REMOVABLE PANELS

Inventor: Daniel P. Hurt, Waverly, MN (US)

Correspondence Address:
Altera Law Group, LLC
220 S 6 St Suite 1700
Minneapolis, MN 55402 (US)

Appl. No.: 11/744,470
Filed: May 4, 2007

Related U.S. Application Data
Provisional application No. 60/798,405, filed on May 5, 2006.

Publication Classification
Int. Cl.
A47G 29/02 (2006.01)
U.S. Cl. ........................................... 248/220.41

ABSTRACT
An attachment apparatus may have a fixed engaging surface, and a movable unit that can be attached to any of a series of holes in the fixed engaging surface. The movable unit has a mating surface and a locking mechanism. The user selects a series of holes, inserts a series of properly spaced tabs on the mating surface into the selected holes, rotates and/or translates the movable unit with respect to the fixed engaging surface so that the tabs on the mating surface engage the fixed engaging surface and prevent the movable unit from being pulled away from the fixed engaging surface, and engages a locking mechanism that secures the movable unit in its rotated and/or translated state so that it may not be counter-rotated/translated and detached from the fixed engaging surface. The locking mechanism may be one or more pins that extend through both the mating surface and the fixed engaging surface. The pattern of holes that matches the tabs from the movable unit is repeated on the fixed engaging surface so that the movable unit may be positioned in various locations as desired by the user. In particular, the fixed engaging surface may be disposed on a replaceable panel or insert, which may fit into or onto a frame. In this manner, one frame may accommodate any of a variety of replaceable panels. For instance, the panels may be available in different colors, different printed patterns, different hole patterns, or any suitable variety.
ATTACHMENT METHOD AND APPARATUS USING REMOVABLE PANELS
CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/798,405, filed on May 5, 2006.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention

[0004] The present invention is directed to an attachment apparatus and method using removable panels.

[0005] 2. Description of the Related Art

[0006] In many applications, it is desirable to attach an object to a fixed surface. For instance, in a garage, it may be desirable to attach a bicycle rack to a wall or other vertical surface.

[0007] Attaching the bicycle rack directly to the wall has some disadvantages. For instance, the attachment may require tools, such as a drill or screwdriver, and special hardware, such as drywall screws. The bicycle rack may have to support quite a bit of weight, and if attached directly to a wall, may require that the attachment occur only on a stud, thereby limiting the locations available for the bike rack. If the garage is rearranged at some point, requiring changing the location of the bicycle rack, then the bike rack has to be unattached, leaving holes and possibly anchors in the wall, and then reattached, which has all the disadvantages stated above.

[0008] Existing attachment systems have disadvantages as well. For instance, a common pegboard system has a fixed surface with an array of holes, where each hole can accommodate a hook or peg. Using pegboard may be an improvement over attaching an object directly to a wall, but it still has disadvantages. For example, the fixed surface of a pegboard system is often made from a particulate substance, which is not especially strong. Many pegboard systems cannot accommodate the weight of a bicycle rack with a bike on it. Furthermore, the pegs in common pegboard systems lack a locking mechanism, and may be easily knocked loose. This may be an issue with a bicycle rack, especially when loading or unloading the bicycle. It would be quite unpleasant if a bump or jar were to knock loose the whole bicycle rack from the pegboard.

[0009] Accordingly, there exists a need for an attachment apparatus and method, in which a sturdy fixed surface can support one or more repositionable objects, where the objects may be locked to the surface to prevent accidental detachment from the surface.

BRIEF SUMMARY OF THE INVENTION

[0010] An embodiment is an attachment system, comprising: a frame; a first panel removably attached to the frame; a fixed engaging surface disposed on the first panel; and a movable unit for attaching to the fixed engaging surface. The fixed engaging surface and the movable unit each contain a plurality of mutually engageable features. A greater number of the features are distributed across the fixed engaging surface than across the movable unit. The features distributed across the fixed engaging surface are distributed in a repeating pattern for receiving the movable unit at any one of a plurality of different positions. The features are engageable in an action that is generally parallel to the fixed engaging surface for preventing separation of the fixed engaging surface and the movable unit.

[0011] Another embodiment is a method of attachment, comprising: providing a movable unit having a mating surface with a plurality of tabs; providing a fixed engaging surface on a removable panel, the fixed engaging surface having a plurality of holes; selecting a series of holes in the fixed engaging surface; inserting the tabs on the mating surface into the selected holes; translating the movable unit with respect to the fixed engaging surface so that the tabs on the mating surface engage the fixed engaging surface and prevent the movable unit from being pulled away from the fixed engaging surface; and engaging a locking mechanism that secures the movable unit in its translated state so that it may not be counter-translated and detached from the fixed engaging surface.

[0012] Another embodiment is an attachment system, comprising: a frame; a panel removably attached to the frame; a fixed engaging surface disposed on the panel and containing a plurality of slots; a movable unit containing a plurality of tabs for attaching to the fixed engaging surface, the tabs being engageable with the slots in a translational action that is generally parallel to the fixed engaging surface for preventing separation of the fixed engaging surface and the movable unit; and a locking mechanism for inhibiting the translational action. There are more slots than tabs. The slots are distributed in a repeating pattern for receiving the movable unit at any one of a plurality of different positions.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0013] FIG. 1 is a front-view plan drawing of an exemplary cabinet system.

[0014] FIG. 2 is an isometric drawing of the cabinet system of FIG. 1.

[0015] FIG. 3 is an isometric drawing of the stand-alone assembly of FIGS. 1 and 2.

[0016] FIG. 4 is a close-up drawing of the stand-alone assembly of FIG. 3.

[0017] FIG. 5 is a front-view plan drawing of a door from the workbench of FIGS. 1 and 2.

[0018] FIG. 6 is a front-view plan drawing of just the frame from the door of FIG. 5.

[0019] FIG. 7 is a front-view plan drawing of just the insert from the door of FIG. 5.

[0020] FIG. 8 is an isometric drawing of the door of FIG. 5.

[0021] FIG. 9 is an isometric drawing of just the frame from the door of FIG. 8.

[0022] FIG. 10 is an isometric drawing of just the insert from the door of FIG. 8.
FIG. 11 is an isometric drawing of the insert of FIG. 10 inserted into the frame of FIG. 9.

FIG. 12 is an isometric drawing of the door of FIG. 8 with the frame removed.

FIG. 13 is a front-view isometric drawing of an attachment apparatus, including a fixed engaging surface and a movable unit.

FIG. 14 is a rear-view isometric drawing of the attachment apparatus of FIG. 13.

FIG. 15 is a close-up rear-view isometric drawing of the attachment apparatus of FIGS. 13 and 14.

DETAILED DESCRIPTION OF THE INVENTION

This application claims the benefit of U.S. Provisional Application No. 60/798,405, filed on May 5, 2006, which is incorporated by reference in its entirety herein.

An attachment apparatus may have a fixed engaging surface, and a movable unit that can be attached to any of a series of holes in the fixed engaging surface. The movable unit has a mating surface and a locking mechanism. The user selects a series of holes, inserts a series of properly spaced tabs on the mating surface into the selected holes, rotates and/or translates the movable unit with respect to the fixed engaging surface so that the tabs on the mating surface engage the fixed engaging surface and prevent the movable unit from being pulled away from the fixed engaging surface, and engages a locking mechanism that secures the movable unit in its rotated and/or translated state so that it may not be counter-rotated/translated and detached from the fixed engaging surface. The locking mechanism may be one or more pins that extend through both the mating surface and the fixed engaging surface. Alternatively, the locking mechanism may be a detent, a pin and slot, or any other suitable locking mechanism.

The pattern of holes that matches the tabs from the movable unit is repeated on the fixed engaging surface so that the movable unit may be positioned in various locations as desired by the user. The various occurrences of the pattern may be separated, or they may overlap to permit greater flexibility in positioning the movable unit.

In particular, the fixed engaging surface may be disposed on a replaceable panel or insert, which may fit into or onto a frame. In this manner, one frame may accommodate any of a variety of replaceable panels. For instance, the panels may be available in different colors, different printed patterns, different hole patterns, or any other suitable variety.

FIGS. 13-15 show an exemplary attachment apparatus, in which a bicycle rack (connected non-removably to the so-called "movable unit") is attached and locked to a track (which includes the so-called "fixed engaging surface"). Following the description of this exemplary attachment apparatus, a more detailed description is provided in which the fixed engaging surface is disposed on a removable and/or replaceable panel or insert.

An exemplary attachment apparatus 320 that uses translation is shown in the front-view drawing of FIG. 13, the rear-view drawing of FIG. 14, and the close-up rear-view drawing of FIG. 15.

The movable unit 322 includes a bicycle rack 323. The movable unit 322 may include a cover 324 and handle. As seen from the rear-view drawing of FIG. 34, the movable unit may include several tabs 328 that may extend through the fixed engaging surface 321. The tabs 328 may be arranged in any suitable pattern, such as a square, a rectangle, a cross pattern, or any other suitable pattern. There may be any number of tabs 328, including 2, 3, 4, 5, 6, 7, 8 or more than 8.

In FIGS. 13-15, the fixed engaging surface 321 is a track, which may be fastened to a surface or object by the user. Although the track is shown in FIGS. 13-15 as being horizontal, the track may alternatively be vertically oriented. Typically, the fixed engaging surface 321 may be substantially vertical, although other orientations, such as horizontal, may be used.

The track has two parallel rows of engagement holes 325, which repeat periodically with a regular spacing. The track also has a column of locking holes 326, which are interspersed with the engagement holes 325. Alternatively, the locking holes may be a subset of the engagement holes, or vice versa.

The engagement holes 325 may include a central portion 331 and four slots 330a-330d that may extend outwardly from the central portion 331. The central portion may be any suitable shape, such as square or rectangular, and may be large enough to accommodate the engagement portions of the tabs 328 as they are inserted or removed through the engagement holes 325.

The locking holes 326 may also include a central portion that engages a locking pin 329 when the movable unit 322 is in the locked position. Optionally, the locking holes may include a peripheral design that may be ornamental in nature; in FIGS. 13-15, the "Z"-shaped portion of the locking holes may be present for ornamentation, or for brand recognition.

The central portion of the locking holes 326 may or may not be the same size and/or shape as the central portion 331 of the engagement holes 325. Optionally, the attachment apparatus may use a particular hole set of holes for either engaging or locking, depending on the placement of the holes and the placement of the tabs and locking pin on the movable unit.

The fixed engaging surface 321 may also include one or more standoffs 327, which may space the fixed engaging surface apart from the wall or surface on which it is mounted.

The attachment apparatus 320 may be used as follows. A user attaches the fixed engaging surface 321 to a wall or other mounting surface. Alternatively, the fixed engaging surface 321 may be incorporated into another structure, such as a side of a cabinet or a door. Next, the user selects a desired location for the movable unit 322. With the locking mechanism disengaged, the user brings the movable unit 322 into contact with the fixed engaging surface 321, so that the tabs 328 insert through various engagement holes 325. Next, the user translates the movable unit 322 so that the tabs 328 engage fully and prevent the movable unit 322 from being pulled apart from the fixed engaging surface 321.

As drawn in FIGS. 13-15, this translation is downward, although any suitable orientation may be used. Finally, the
user engages the locking mechanism, which prevents the translation of the previous step from being reversed. In the embodiment of FIGS. 13-15, the locking mechanism is a locking pin that extends through one of the locking holes 326. When the locking mechanism is locked, the user is prevented from translating the movable unit 322 with respect to the fixed engaging surface 321, so that the tabs 328 are prevented from disengaging their respective slots 330a-d.

[0042] The preceding discussion of FIGS. 13-15 describes an exemplary attachment apparatus, in which the fixed engaging surface is disposed on a truck. The following discussion describes an exemplary attachment apparatus, in which the fixed engaging surface is disposed on a replaceable and/or removable panel or insert, which may fit into or onto a frame.

[0043] FIG. 1 is a front-view plan drawing of an exemplary cabinet system 10, which includes an exemplary stand-alone assembly 11 and an exemplary workbench 12. Many of the vertically oriented surfaces in the cabinet system 10 include engagement and locking holes that may be used for the attachment apparatus described herein.

[0044] FIG. 2 is an isometric drawing of the cabinet system 10 of FIG. 1. Many of the engagement and locking holes are located on doors or pairs of doors 13a-c, while others are located on stationary surfaces 14a-e. The cabinet system 10 may also include one or more stations of horizontal surfaces, such as a benchtop 15, a shelf 16, or a top panel 17. Various subsets of the full cabinet system 10 are shown and described further in the figures and text that follow.

[0045] FIG. 3 is an isometric drawing of the stand-alone assembly 11 of FIGS. 1 and 2. The stand-alone assembly 11 includes two doors that are hinged at the leftmost and rightmost edges of the doors and swing outward. Alternatively, any other hinge arrangement may be used, such as a single door that hinges along a side edge, a single door that hinges along the top edge, or a single door than hinges along the bottom edge. Alternatively, one or more of the doors may be replaced by a removable drawer.

[0046] FIG. 4 is a close-up drawing of the stand-alone assembly of FIG. 3. Note that one or more vertical surfaces, such as the door 13c and the side wall 14a contain patterns of engagement and locking holes, which are used for the attachment apparatus described herein. The holes may be arranged in any suitable pattern, such as in columns or rows. For instance, the exemplary stand-alone assembly 11 includes holes arranged as a set of three columnar patterns, where each columnar pattern has a column of locking holes disposed between two columns of engagement holes. Alternatively, some or all of the holes in a columnar pattern may overlap with those in an adjacent columnar pattern.

[0047] For the cabinet system 10, the engagement and/or locking holes may be included in replaceable panels, which may be swapped out and/or replaced by a user. For instance, one or more replaceable panel may be made of a plastic material, which may be snapped into and out of a metallic frame. The replaceable panels may be available with different colors, different decorative patterns, different materials, and/or different hole patterns. The different hole patterns may include different layouts, so that a single movable unit may be placed in a variety of possible locations, as well as different style of holes, to ensure compatibility with various different styles of movable units. A replaceable panel may also include no holes at all, and may be used for decoration, brand identification with a trademark design or logo, or identification for the contents held within the doors. Each door, wall or vertical surface may contain no replaceable panels, one replaceable panel, or more than one replaceable panel. Two or more replaceable panels on the same vertical surface may or may not be identical, and may optionally include different sizes, different hole patterns, or different identifying indicia.

[0048] In one embodiment, the stand-alone unit 11 includes a metal frame, which is relatively lightweight and strong, and snap-in panels, which may be made of plastic. The plastic panels may be significantly lighter and less expensive than if they were made from metal, and may be available in a variety of patterns, colors, and/or hole patterns. This frame/panel arrangement is shown more fully in FIGS. 5 through 12.

[0049] FIG. 5 is a front-view plan drawing of a door 13e from the workbench 12 of FIGS. 1 and 2. In one embodiment, the door 13e includes a frame 51 for structural support, a panel or insert 52 that can be snapped into and out of the frame 52, a handle 53 for opening and/or closing the door 13e, two hinges 54a-b for attaching the door to the workbench 12, and three locking end caps 55a-c that can secure the door 13e in the closed position yet allow the door 13e to be pulled open by a sufficient force on the handle 53. The handle 53 may optionally include a brand name and/or logo. The panel or insert 52 may include a pattern of engagement and locking holes 56 for the attachment apparatus described herein, and may optionally include ornamental or decorative colors or patterns.

[0050] FIG. 6 is a front-view plan drawing of just the frame 51 from the door 13e of FIG. 5. Note that the frame 51 may be largely rectangular in shape, and may be free from much of the ornamentation found on the inserts. In one embodiment, the frame 51 is of a standard size, so that various panels or inserts may fit inside the frame 51. In one embodiment, the frame 51 is metallic, although any suitable material may be used, such as plastic or wood.

[0051] FIG. 7 is a front-view plan drawing of just the insert 52 from the door 13e of FIG. 5. The insert 52 may include one or more clips around its periphery, so that it may be snapped into and/or out of the frame 51. These clips, as well as the rest of the door structure, are shown in the oblique views of FIGS. 8-12.

[0052] FIG. 8 is an isometric drawing of the door 13e of FIG. 5. In this view, the door 13e is fully assembled.

[0053] FIG. 9 is an isometric drawing of just the frame 51 from the door 13e of FIG. 8. In one embodiment, the frame 51 is rectangular and hollow, so that locking end caps 55a-c may be inserted inside the frame 51 during assembly of the door 13e.

[0054] FIG. 10 is an isometric drawing of just the insert 52 from the door 13e of FIG. 8. The pattern of holes 56 is clearly seen in FIG. 10. Furthermore, FIG. 10 shows several of the tabs that removably attach the insert 52 to the frame 51. During insertion of the insert 52, the tabs 58a-e are compressed radially (toward the center of the door), and the insert 52 is inserted until another set of tabs 59a-d rests against the front surface of the frame 51. The separation between one set of tabs 58a-e and the other set of tabs 59a-d
may be roughly equal to the thickness of the frame 51, so that when the insert is fully inserted, the tabs 58a-e may return to their uncompressed state. In one embodiment, the tabs 59a-d do not deform. The tabs may extend around all four edges of the insert 52. Any suitable number of tabs may be used along each edge, including two, three, four, five, or any other suitable value.

FIG. 11 is an isometric drawing of the insert 52 of FIG. 10 inserted into the frame 51 of FIG. 9.

FIG. 12 is an isometric drawing of the door 13e of FIG. 8 with the frame 51 removed. Note that the handle 53 may attach to the insert 52, while the hinges 54a-b and the locking end caps 55a-c may attach to the frame (not shown).

The description of the invention and its applications as set forth herein is illustrative and is not intended to limit the scope of the invention. Variations and modifications of the embodiments disclosed herein are possible, and practical alternatives to and equivalents of the various elements of the present invention are understood to those of ordinary skill in the art upon study of this patent document. These and other variations and modifications of the embodiments disclosed herein may be made without departing from the scope and spirit of the invention.

We claim:

1. An attachment system, comprising:
   a. a frame;
   b. a first panel removably attached to the frame;
   c. a fixed engaging surface disposed on the first panel; and
   d. a movable unit for attaching to the fixed engaging surface;
   wherein the fixed engaging surface and the movable unit each contain a plurality of mutually engageable features;
   wherein a greater number of the features are distributed across the fixed engaging surface than across the movable unit;
   wherein the features distributed across the fixed engaging surface are distributed in a repeating pattern for receiving the movable unit at any one of a plurality of different positions; and
   wherein the features are engageable in an action that is generally parallel to the fixed engaging surface for preventing separation of the fixed engaging surface and the movable unit.

2. The attachment system of claim 1, wherein the generally parallel action is a translational motion.

3. The attachment system of claim 1, wherein the mutually engageable features are slots and tabs.

4. The attachment system of claim 3, wherein the fixed engaging surface contains at least one of the slots, and the movable unit contains at least one of the tabs.

5. The attachment system of claim 4, wherein the slots comprise a plurality of engagement holes and a plurality of locking holes; and
   wherein a tab inserted into a locking hole inhibits the generally parallel action.

6. The attachment system of claim 5, wherein the engagement holes are distinct from the locking holes.

7. The attachment system of claim 1, wherein the first panel snaps into and out of the frame.

8. The attachment system of claim 7, wherein the first panel snaps into and out of an interior of the frame.

9. The attachment system of claim 7, wherein the first panel includes a plurality of tabs for snapping into and out of the frame.

10. The attachment system of claim 1, further comprising a second panel for removably attaching to the frame.

11. The attachment system of claim 10, wherein the second panel includes a different color from the first panel.

12. The attachment system of claim 10, wherein the second panel includes a different decorative pattern from the first panel.

13. The attachment system of claim 10, wherein the second panel includes a different feature repeating pattern from the first panel.

14. The attachment system of claim 1, wherein the frame is metal.

15. The attachment system of claim 1, wherein the first panel is plastic.

16. The attachment system of claim 1, wherein the fixed engaging surface is substantially vertical.

17. The attachment system of claim 1, wherein the frame is disposed on a wall of a cabinet.

18. The attachment system of claim 1, wherein the frame is disposed on a door of a cabinet.

19. A method of attachment, comprising:
   a. providing a movable unit having a mating surface with a plurality of tabs;
   b. providing a fixed engaging surface on a removable panel, the fixed engaging surface having a plurality of holes;
   c. selecting a series of holes in the fixed engaging surface;
   d. inserting the tabs on the mating surface into the selected holes;
   e. translating the movable unit with respect to the fixed engaging surface so that the tabs on the mating surface engage the fixed engaging surface and prevent the movable unit from being pulled away from the fixed engaging surface; and
   f. engaging a locking mechanism that secures the movable unit in its translated state so that it may not be counter-translated and detached from the fixed engaging surface.

20. An attachment system, comprising:
   a. a frame;
   b. a panel removably attached to the frame;
   c. a fixed engaging surface disposed on the panel and containing a plurality of slots;
   d. a movable unit containing a plurality of tabs for attaching to the fixed engaging surface, the tabs being engageable with the slots in a translational action that is generally parallel to the fixed engaging surface for preventing separation of the fixed engaging surface and the movable unit; and
   e. a locking mechanism for inhibiting the translational action;
   f. wherein there are more slots than tabs; and
   g. wherein the slots are distributed in a repeating pattern for receiving the movable unit at any one of a plurality of different positions.

* * * * *