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(54) **WALL MOUNT SYSTEM AND METHOD**

Publication Classification

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(57) **ABSTRACT**

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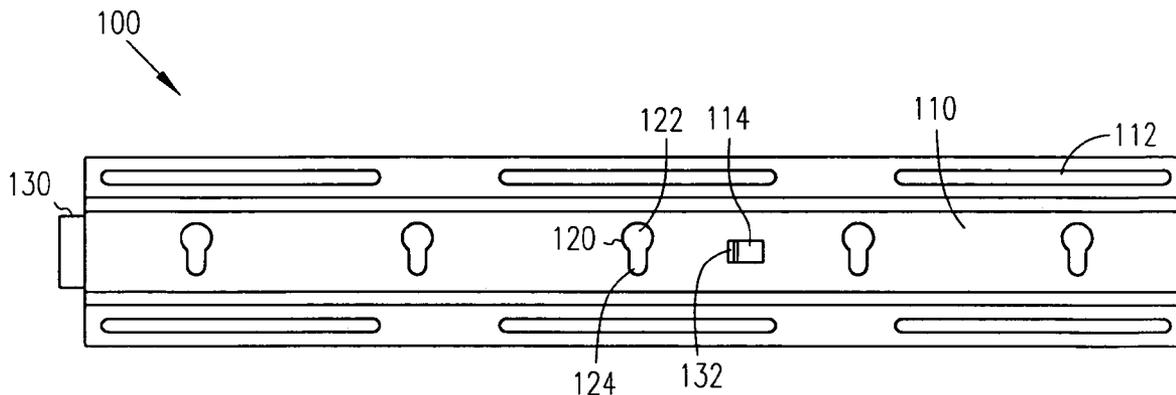
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A mounting system is provided. The mounting system is adapted for mounting a device such as a video display on a surface such as a wall for example. Mounting system configurations include a tray to help align a mating feature with a keyhole opening. Other configurations include a retaining device to hold a mating feature within the mounting system for added security. Other configurations include a locking device to prohibit unwanted motion of the retaining device and theft protection.

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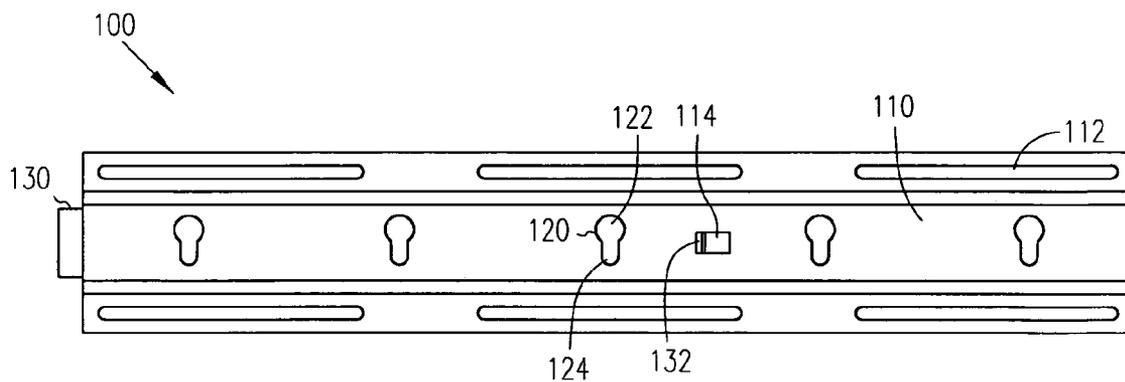


FIG. 1A

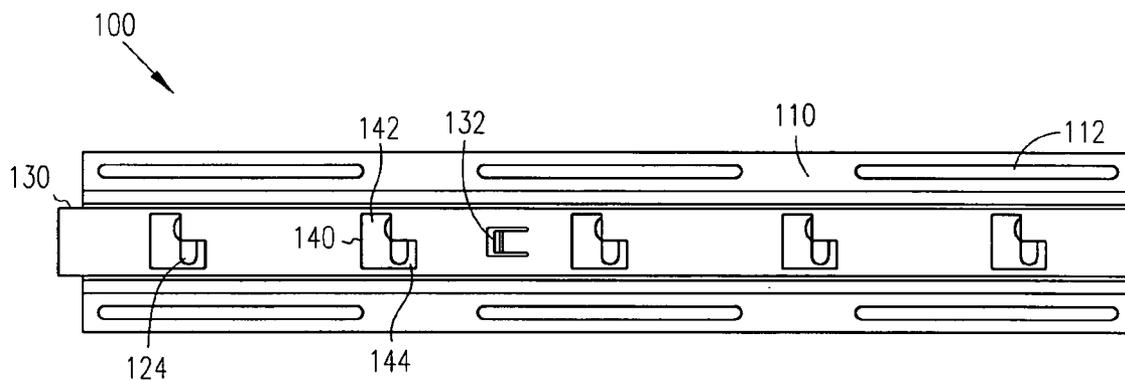


FIG. 1B

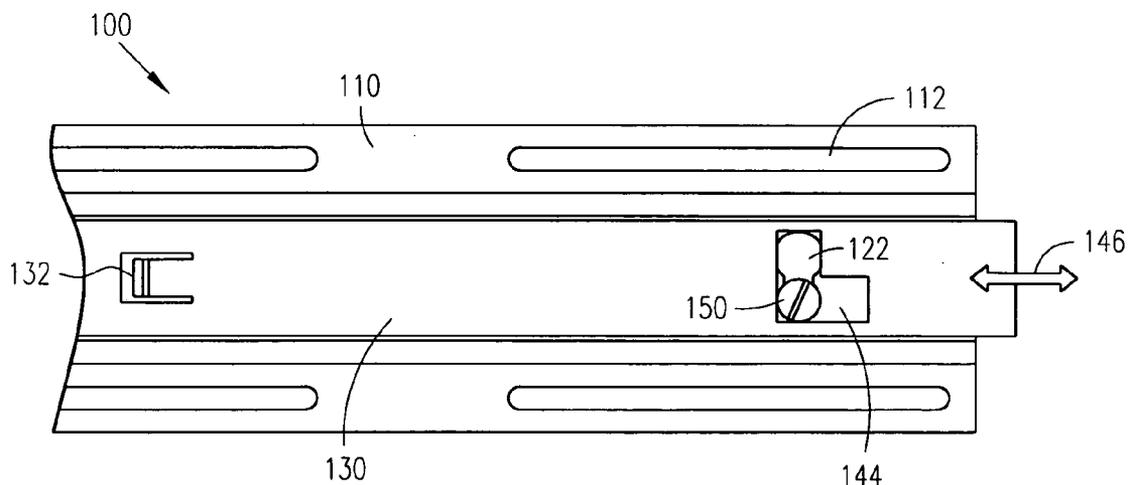


FIG. 1C

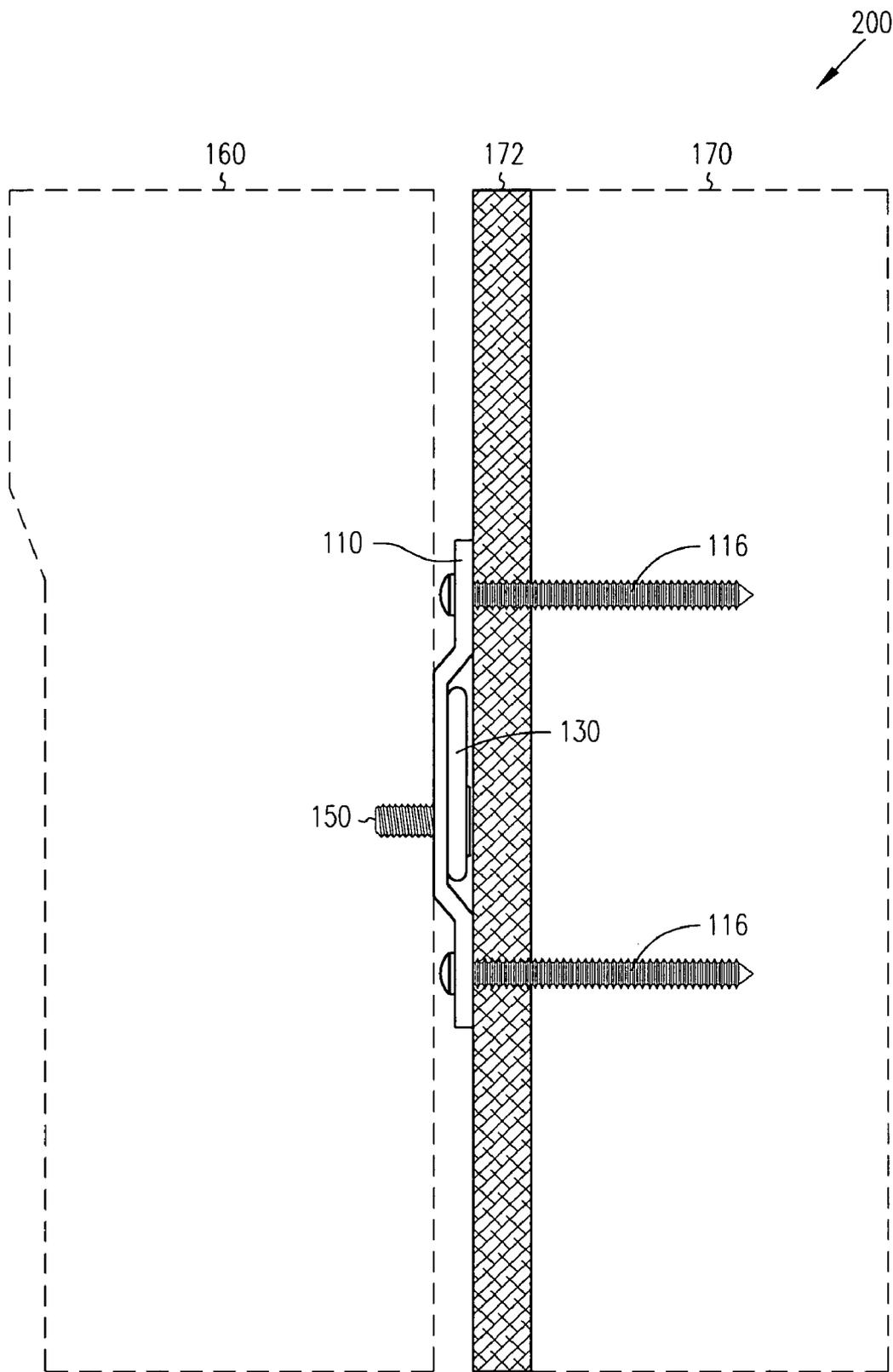


FIG. 2

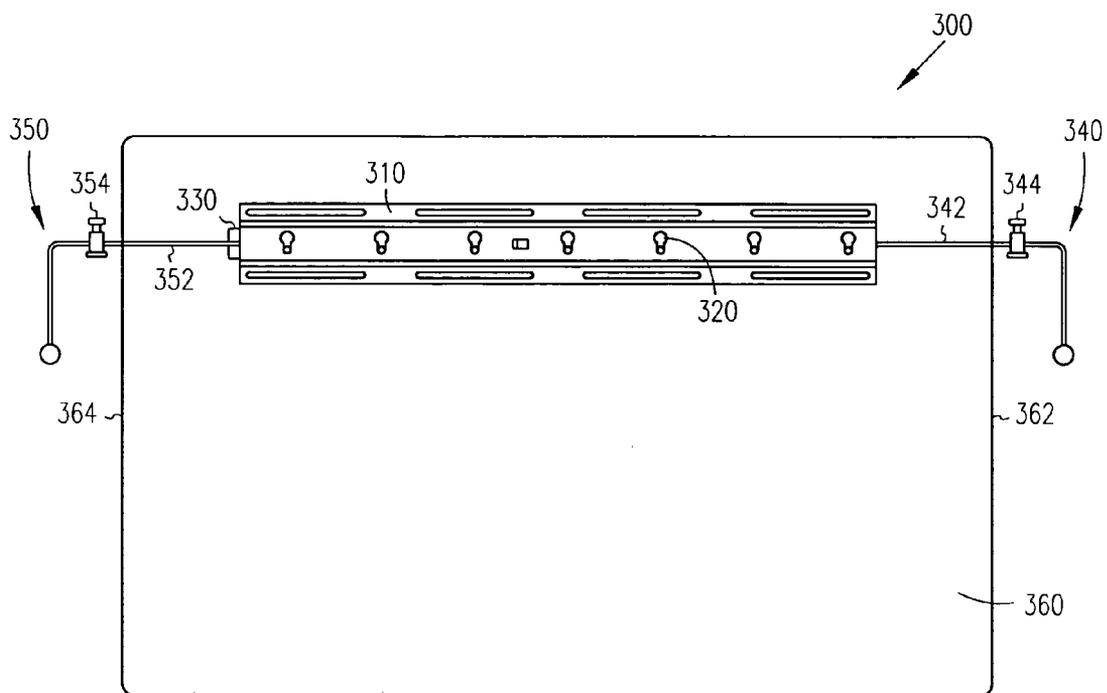


FIG. 3

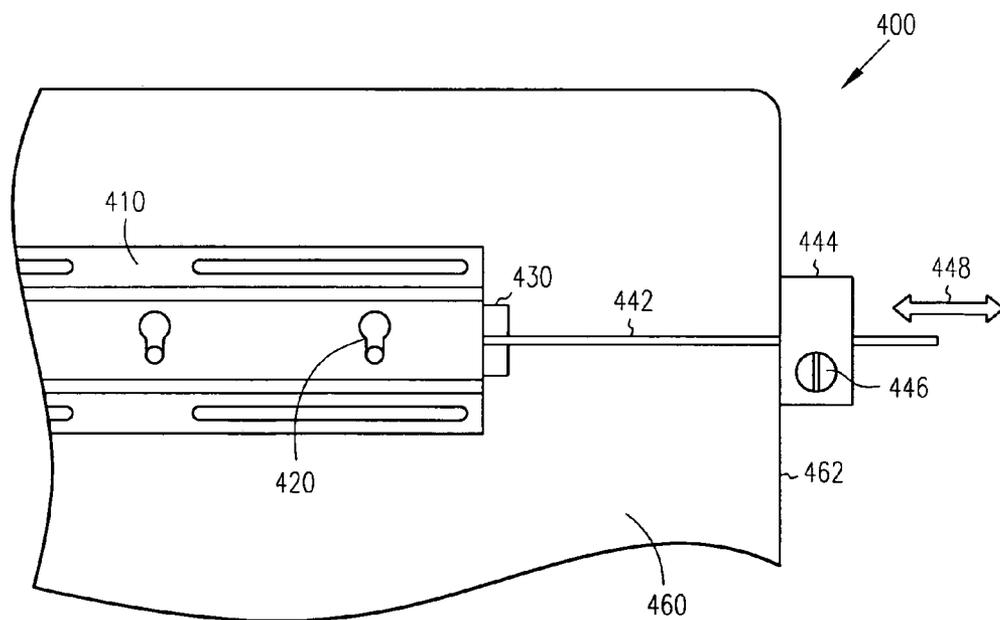


FIG. 4

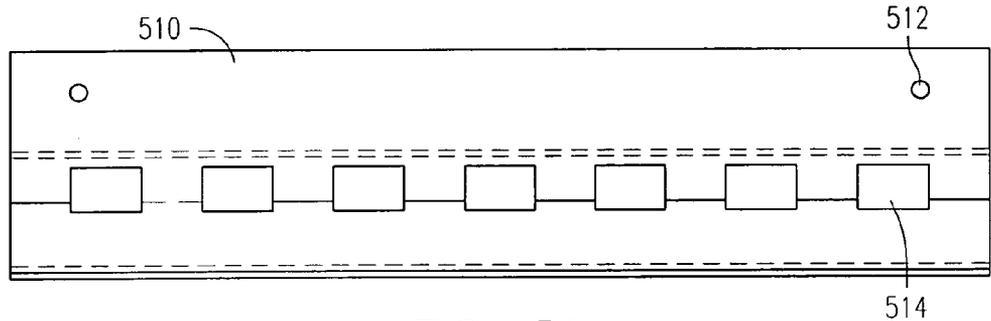


FIG. 5A

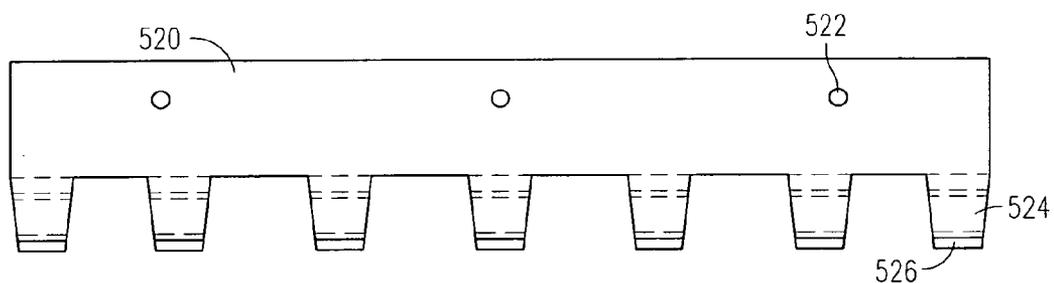


FIG. 5B

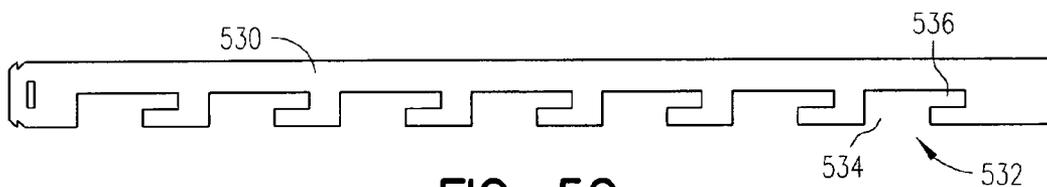


FIG. 5C

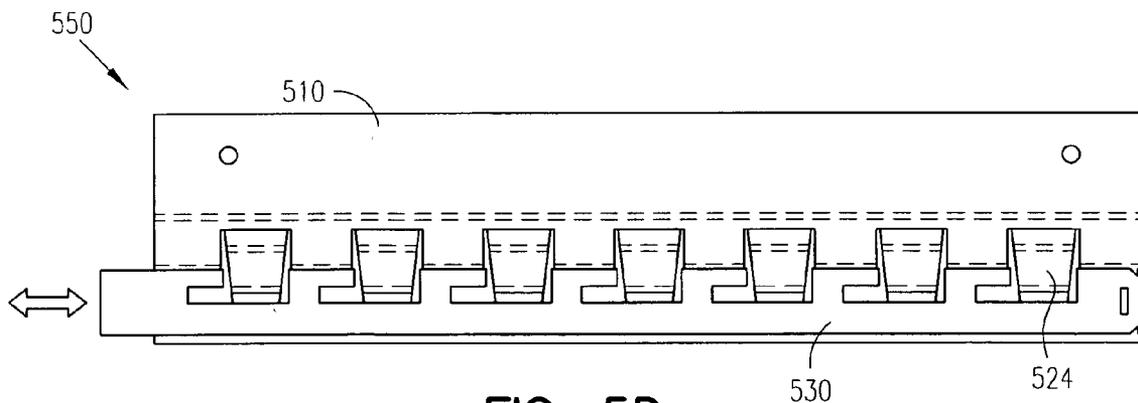


FIG. 5D

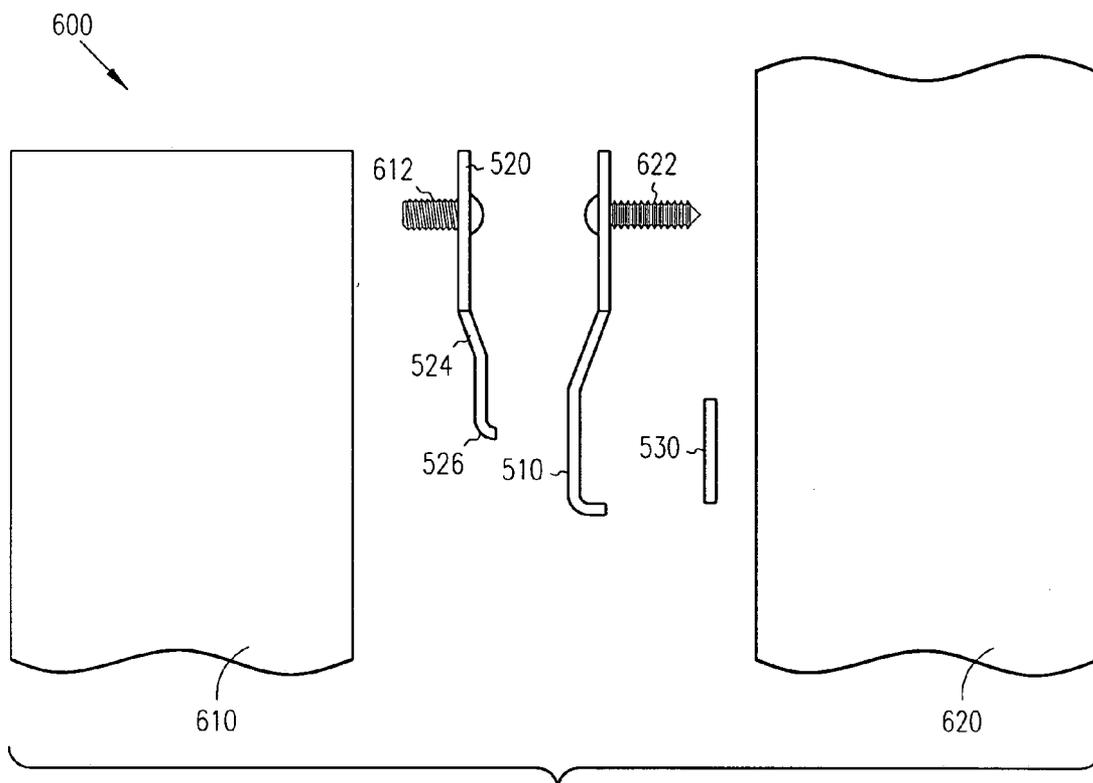


FIG. 6A

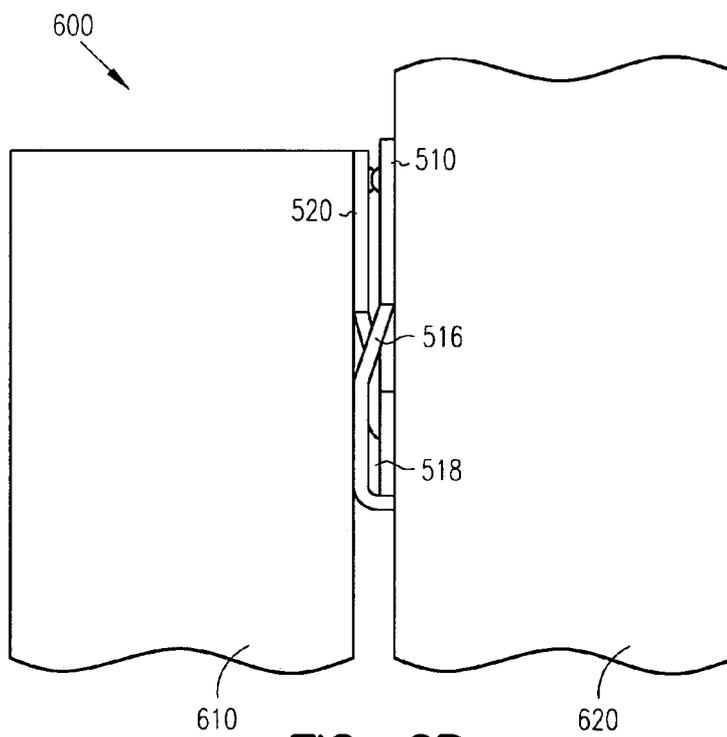


FIG. 6B

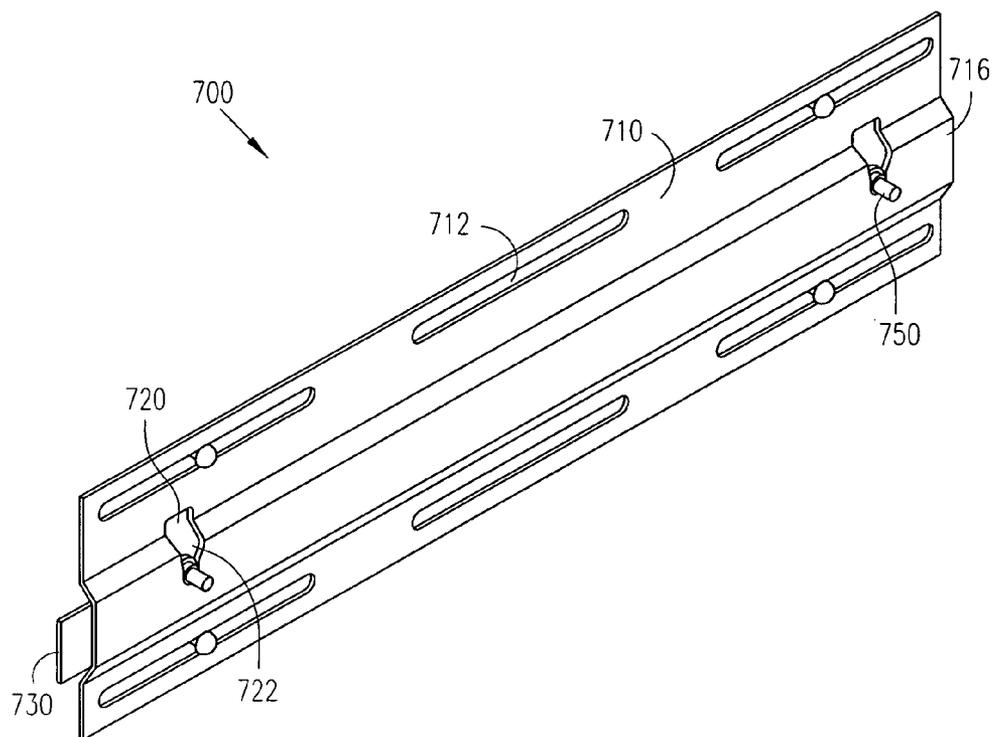


FIG. 7A

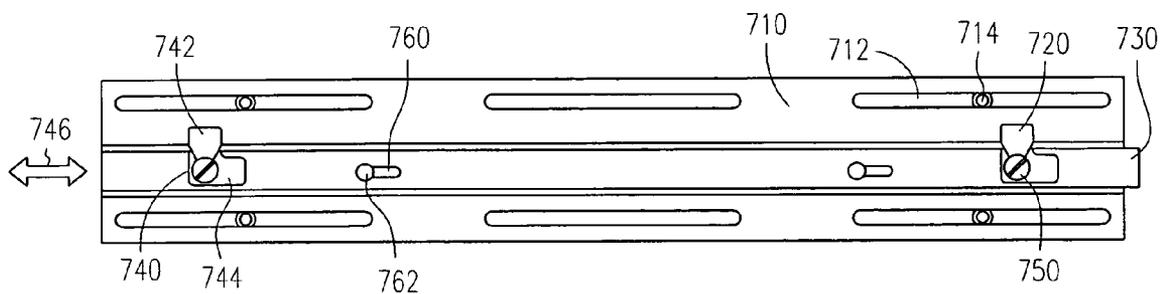


FIG. 7B

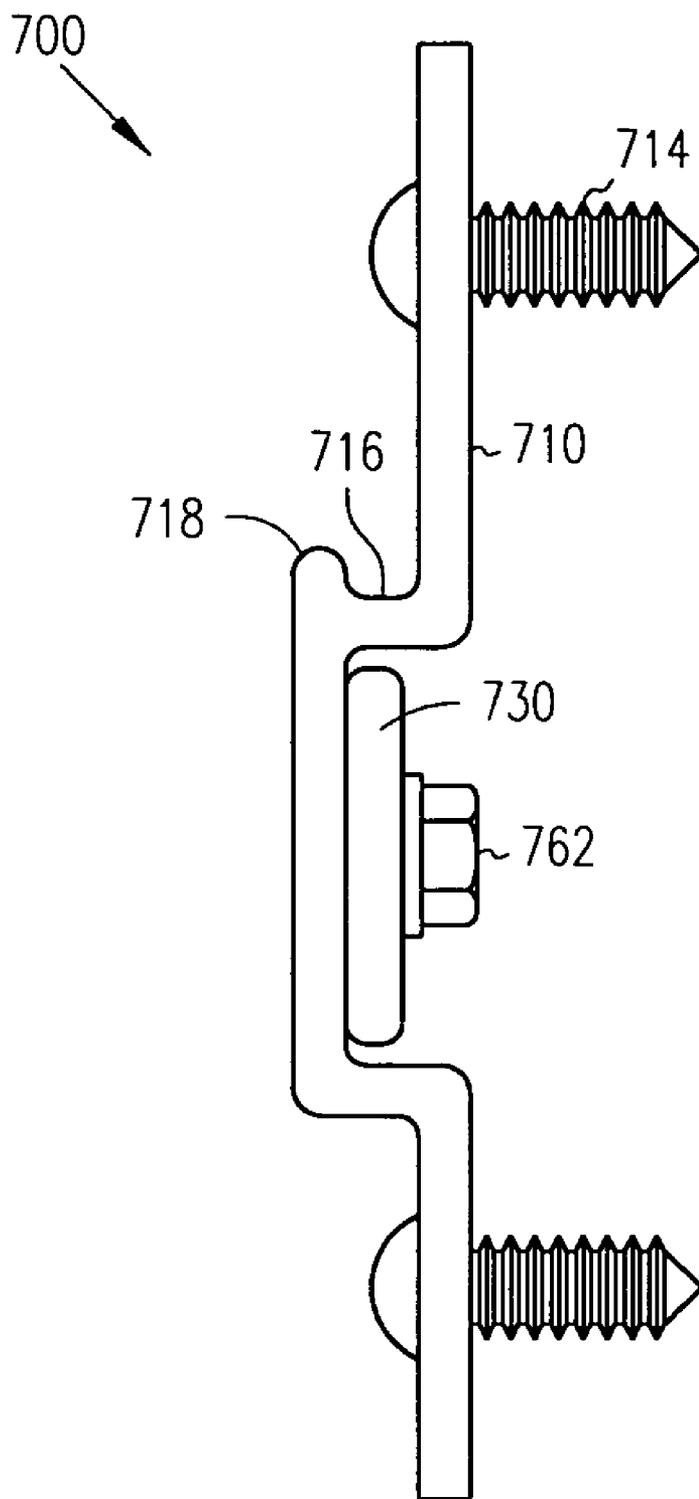


FIG. 7C

WALL MOUNT SYSTEM AND METHOD

FIELD OF THE INVENTION

[0001] This application relates to devices and methods for mounting devices on surfaces such as a wall, ceiling, inclined surface, etc. Specifically, but not by way of limitation, this application relates to devices and methods for supporting display screens such as flat panel display screens on a wall.

BACKGROUND

[0002] One common device that is mounted on a surface such as a wall includes a video display screen. Examples of video display screens include television monitors, computer monitors, information kiosks, etc. Display screens are commonly mounted on surfaces such as walls, ceilings, inclined surfaces, etc. Display screens are also mounted on other support structures such as poles or carts. One type of display screen that is becoming more common is a flat panel display screen. Such flat panel displays include, LCD monitors, plasma discharge monitors, new configurations of CRT monitors, etc. Mounting systems are needed to secure these flat panel display screens to surfaces where they are to be used.

[0003] What is needed is a mounting system that more easily connects between the device and the surface that the device is to be secured to. What is also needed is a mounting system that provides increased security in device retention at the mounted location.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1A shows a front view of a mounting system according to an embodiment of the invention.

[0005] FIG. 1B shows a back view of a mounting system according to an embodiment of the invention.

[0006] FIG. 1C shows a close up view of a portion of a mounting system according to an embodiment of the invention.

[0007] FIG. 2 shows a cross section view of a mounting system according to an embodiment of the invention.

[0008] FIG. 3 shows a back view of another mounting system according to an embodiment of the invention.

[0009] FIG. 4 shows a back view of another mounting system according to an embodiment of the invention.

[0010] FIG. 5A shows a component of a mounting system according to an embodiment of the invention.

[0011] FIG. 5B shows another component of a mounting system according to an embodiment of the invention.

[0012] FIG. 5C shows another component of a mounting system according to an embodiment of the invention.

[0013] FIG. 5D shows an assembly of a mounting system according to an embodiment of the invention.

[0014] FIG. 6A shows an exploded cross section view of a mounting system according to an embodiment of the invention.

[0015] FIG. 6B shows another cross section view of a mounting system according to an embodiment of the invention.

[0016] FIG. 7A shows an isometric view of a mounting system according to an embodiment of the invention.

[0017] FIG. 7B shows a back view of a mounting system according to an embodiment of the invention.

[0018] FIG. 7C shows a cross section view of a mounting system according to an embodiment of the invention.

DETAILED DESCRIPTION

[0019] In the following detailed description, reference is made to the accompanying drawings which form a part hereof, and in which is shown, by way of illustration, specific embodiments in which the invention may be practiced. In the drawings, like numerals describe substantially similar components throughout the several views. In the following detailed description, the term selectively actuated is used in contrast to automatically actuated. A selective operation, or a device capable of selective operation is controlled by a user, and is not triggered automatically. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized and structural, logical changes, etc. may be made without departing from the scope of the present invention.

[0020] FIG. 1A shows a mounting system 100 according to an embodiment of the invention. The mounting system 100 includes a mounting frame 110 having a number of securing features 112. In one embodiment, the mounting frame 110 includes a mounting strip of a length that can be chosen based on dimensions of the device to be mounted. One possible range of strip lengths is from 250 mm to 1850 mm, although the invention is not so limited. In one embodiment, the securing features 112 include slots that have an advantage of providing several possible locations for mounting the mounting frame with a screw or other fastener. In one embodiment, multiple holes are used as the securing features 112. A number of keyhole openings 120 are shown on the mounting frame 110 in FIG. 1A. In one embodiment, the keyhole openings 120 are spaced apart on multiples of 100 mm.

[0021] Generally speaking, in one embodiment, a keyhole opening 120 includes an entry portion 122, and a capture portion 124. In FIG. 1A, the entry portion 122 includes a substantially round portion that is shaped to allow a mating feature on a device to pass through the entry portion 122. In one embodiment, the entry portion 122 is shaped to allow a head of a shoulder bolt to pass through the entry portion 122. In one embodiment, the capture portion 124 is shaped to hold a mating feature when the mating feature is moved to the capture portion 124 of the keyhole opening 120. In one embodiment, the capture portion, 124 includes a slot that is sized to closely fit a shoulder on a shoulder bolt, while being thinner than a head on the shoulder bolt. One of ordinary skill in the art, having the benefit of the present disclosure will recognize that several possible fasteners other than shoulder bolts are possible, including hex head bolts, screw, nails, specially fabricated fasteners, etc. Likewise, one of ordinary skill in the art, having the benefit of the present disclosure will recognize that several possible geometries of

keyhole openings (in addition to the conventional shape illustrated in FIG. 1) are possible for accepting a wide range of possible fasteners.

[0022] In operation, a mating feature, or fastener, is coupled to a device, such as a video display device. Part of the mating feature is then inserted into the entry portion 122 of the keyhole opening 120. The mating feature is moved from the entry portion 122 into the capture portion 124, where it is held to provide a level of mounting stability.

[0023] An opening 114 is included in the mounting frame 110 of FIG. 1A to permit access to a tab 132. In one embodiment, the tab 132 is coupled to a retaining device 130 that is discussed in more detail below.

[0024] FIG. 1B shows a back side of the mounting system 100. The retaining device 130 is shown, including a number of retaining features 140. In one embodiment, the retaining features 140 include an entry portion 142 and a capture portion 144. In one embodiment, the retaining features include an "L" shaped slot. As shown in FIG. 1B, the tab 132 is available to actuate the retaining device in a range of motion. In one embodiment, the retaining device 130 includes a retaining bar. In selected retaining bar embodiments, at least one distal end of the retaining device 130 protrudes from one or more sides of the mounting frame 110. In such embodiments, the distal ends of the retaining device are available, in addition or instead of the tab 132, to actuate the retaining device in its range of motion.

[0025] Although a retaining bar embodiment is shown in FIG. 1B with a sliding linear range of motion, other retaining devices are within the scope of the invention. Other geometries of retaining devices are possible, as well as other ranges of motion such as rotational, or motion through a linkage, etc. Using a bar configuration of a retaining device and a linear range of motion as shown in FIG. 1B, the mounting system 100 is reduced in complexity, and manufacturing costs are low.

[0026] FIG. 1C shows a close up view of one embodiment of a mounting system 100. A mating feature 150 such as a shoulder bolt or other fastener is shown located within the capture portion 124 of the keyhole opening 120. In the device state illustrated in FIG. 1C, the mating feature 150 is allowed to enter the entry portion 122 of the keyhole opening 120 as well as the entry portion 142 of the retaining feature 140. In operation, the retaining device 130 is then selectively actuated by moving the retaining device 130 in the range of motion 146. When the mating feature 150 is located within the capture portion 144, the mating feature is securely retained within the mounting system 100, and cannot be removed without actuating the retaining device 130 to an open position in the range of motion.

[0027] FIG. 2 illustrates a cross section view of a mounting system 200 according to selected embodiments as described above. A device 160 such as a flat panel display is shown with the mating feature 150 coupled to the device 160. The mounting frame 110 is shown coupled to a solid structure 170 in a wall such as a framing stud. A pair of fasteners 116 are shown coupling to the solid structure 170 through a surface cladding 172 such as drywall. As can be seen from FIG. 2 in cross section, a recess is formed in the mounting frame 110 to guide the retaining device 130.

[0028] FIG. 3 illustrates one embodiment of a mounting system 300 similar to embodiments detailed above. A

mounting frame 310 is shown with a number of keyhole openings 320. A retaining bar 330 is shown with a distal end protruding from an end of the mounting frame 310. The system 300 in FIG. 3 further shows a device 360 having a first side 362 and an opposing second side 364. In one embodiment, a first locking device 340 is coupled to the retaining bar 330 to selectively lock the retaining bar in a position within a range of motion. The first locking device in FIG. 3 includes a first length of flexible material 342 and a first grasping mechanism 344 such as a cord lock device. In one embodiment, the first length of flexible material includes a cord material such as nylon. Other flexible materials are also within the scope of the invention.

[0029] Although one embodiment of the first locking device 340 is shown, other configurations are within the scope of the invention that do not necessarily include elements shown in FIG. 3. For example, a rigid member such as a length of metal is attached to the retaining bar 330 in one embodiment that extends past the first side 362 of the device 360. In another embodiment, the retaining bar 330 itself extends past the first side 362 of the device 360. The portion of a selected element that extends past the first side 362 of the device is available for grasping as described below. One advantage of embodiments using the first length of flexible material 342 includes the ability to accommodate several sizes and shapes of devices 360 using inexpensive material such as nylon cord.

[0030] In one method of operation, the first length of flexible material 342 is extended past the first side 362 of the device 360, and the grasping mechanism 344 is butted against the first side 362 of the device 360 while holding the first length of flexible material 342 taught. In this way, tension is placed on the retaining bar 330, preventing unwanted movement of the retaining bar from a closed position in the range of motion. The retaining bar 330 is selectively locked in position using the grasping mechanism 344, and actuation of the grasping mechanism 344 allows the user to hold or release the locking device 340.

[0031] In one embodiment, a second locking device 350 is included. In an embodiment illustrated in FIG. 3, the second locking device 350 includes a second length of flexible material 352 and a second grasping mechanism 354 similar to the first locking device 340. Both the first and second locking devices 340 and 350 can be actuated to alternatively lock or unlock the retaining bar 330 or to further prevent unwanted motion of the retaining bar 330 in the range of motion. The use of multiple locking devices has a further advantage of reducing vibration noise of movable elements such as the retaining bar 330.

[0032] FIG. 4 shows an embodiment of a mounting system 400 similar to embodiments detailed above. A mounting frame 410 is shown with a number of keyhole openings 420. A retaining bar 430 is shown with a distal end protruding from an end of the mounting frame 410. The system 400 in FIG. 4 further shows a device 460 having a side 462. A locking device 440 is shown including a connecting length 442 and a grasping mechanism 444. In one embodiment, the grasping mechanism 444 includes a keyed lock cylinder 446 with internal workings (not shown) to selectively engage the connecting length 442.

[0033] In operation, the grasping mechanism 444 is butted against the side 462 of the device 460 and the keyed lock

cylinder is actuated. Thus by locking a range of motion 448 of the grasping device 444, the retaining bar 430 is locked in its range of motion, prohibiting removal of the device 460 from its mounted location. One advantage of the configuration shown in FIG. 4, includes theft deterrent of the device 460.

[0034] Although configurations described above illustrate vertical mounting, such as on a wall, it is noted that mounting on inclined surfaces with a device tilting upward or downward are also possible. Further, configurations described above are also useful in mounting to a ceiling surface, or steep incline. In one embodiment using a ceiling mount, multiple mounting strips as described above are used.

[0035] FIGS. 5A-5D show components of an embodiment of another mounting system. One embodiment of a first mounting frame 510 is shown in FIG. 5A. The first mounting frame 510 includes a number of securing features 512 and a number of receptacles 514. In one embodiment the first mounting frame 510 is adapted to secure to a vertical surface such as a wall. FIG. 5B shows a second mounting frame 520. The second mounting frame 520 includes a number of securing features 522. The second mounting frame 520 further includes a number of mating features 524 adapted to engage the number of receptacles 514. In one embodiment, the second mounting frame 520 further includes a number of retaining features 526. In one embodiment the second mounting frame 520 is adapted to secure to a device such as a display screen. Although the first mounting frame 510 is described as mounting to a surface, and the second mounting frame 520 is described as mounting to a device, this configuration can be reversed in other embodiments.

[0036] FIG. 5C shows one embodiment of a retaining bar 530. In one embodiment, the retaining bar includes a number of retaining features 532. The retaining features include an entry portion 534 and a capture portion 536. In one embodiment, the retaining features include slots arranged in substantially an "L" shape as shown in FIG. 5C. One of ordinary skill in the art, having the benefit of the present disclosure, will recognize that retaining features other than slots such as alternate geometry portions, levers, linkages, cams, etc. are also within the scope of the invention.

[0037] FIG. 5D shows one embodiment of a mounting system 550 utilizing components from FIGS. 5A-5C. FIG. 6A shows a further embodiment of a video display mounting system 600 according to an embodiment of the invention. In one embodiment, the video display mounting system 600 includes components as described in FIGS. 5A-5D. A video display 610 is shown adapted for coupling to the second mounting frame 520 using fastener 612. The first mounting frame 510 is shown adapted for coupling to a wall or other surface 620 using fastener 622. FIG. 6B shows the video display 610 in a mounted state as shown from a side view. An entry portion 516 of the receptacle 514 is shown, as well as a capture portion 518. In one embodiment, a locking device similar to embodiments described above is further used in conjunction with configurations described in FIGS. 6A and 6B.

[0038] In one method of operation, the number of mating features 524 are placed in the number of receptacles 514 through the entry portion 516, and into the capture portion

518. The retaining bar 530 is then selectively actuated to move the capture portion 536 of the retaining feature 532 into engagement with the retaining feature 526. When the video device 610 is to be removed, the retaining bar 530 is selectively actuated in the opposite direction.

[0039] FIG. 7A shows a mounting system 700 according to another embodiment of the invention. The mounting system 700 includes a mounting frame 710 having a number of securing features 712. In one embodiment, a tray 716 is further included. In one embodiment, the tray 716 is located over a number of keyhole openings 722 similar to embodiments described above. In one embodiment, a number of cutouts 720 are formed in the tray 716, located over the keyhole openings. In one embodiment, the tray 716 is integrally formed with the mounting frame 710, although the invention is not so limited. Methods of integral forming include, but are not limited to, extruding, drawing, casting, forging, etc.

[0040] A retaining device 730 is further shown in FIG. 7A. In one embodiment the retaining device 730 includes a retaining bar. FIG. 7B shows the retaining device 730 from FIG. 7A along with related components. A number of retaining features 740 are shown in the retaining device 730. In one embodiment, the retaining features 740 include an entry portion 742 and a capture portion 744. In one embodiment, the entry portion 742 and the capture portion 744 includes slots arranged substantially in an "L" shape. In one embodiment, a guide slot 760 is further included along with a guide fastener 762. In one method of operation, the guide slot 760 directs, and limits a range of motion 746 of the retaining device 730 with respect to the mounting frame 710. In one embodiment, the guide fastener 762 includes a bolt with a portion that rides within the guide slot 760.

[0041] In operation, a mating feature 750 such as a shoulder bolt is inserted into a keyhole opening 722 in a manner similar to embodiments described above. The mating feature will typically be secured to a back surface of a device such as a video display device. In one embodiment, the mating feature 750 passes through an entry portion and into a capture portion of the keyhole opening 722. Concurrently, the mating feature 750 passes through the entry portion 742 of the retaining feature 740 on the retaining device 730. If retaining of the mating feature 750 is desired, the retaining device is actuated in the range of motion 746 to bring the capture portion 744 of the retaining feature 740 over the mating feature 750. In one embodiment a locking device similar to those shown in embodiments above is further included in the mounting system 700. The locking device prevents unwanted movement of the retaining device for reasons such as vibration, bumping, etc.

[0042] A side view of an embodiment of the mounting system 700 is shown in FIG. 7C. A number of fasteners 714 are further shown in FIG. 7C for attachment to a wall or other mounting surface. One of ordinary skill in the art, having the benefit of the present disclosure will recognize that several fastener options are possible in addition to the screw 714 shown in FIG. 7C. For example, fasteners include, but are not limited to screws, bolts, nails, tape, adhesives, etc.

[0043] The tray 716 is shown in profile in FIG. 7C. In one embodiment, the tray 716 includes a lip portion 718. In one method of operation, the mating feature 750 such as a

shoulder bolt is coupled to a backside of a device such as a video display device. It is frequently difficult to properly align the mating feature 750 with the keyhole opening 722 during mounting because the device is in the way as it approaches the wall or other surface. One advantage of the tray 716 includes the ability to rest the mating feature 750 on the tray 716 in any lateral position, not necessarily over the keyhole opening 722. By sliding the mating feature along the tray 716, the mating feature will eventually drop through the cutout 720 in the tray and thus align with the keyhole opening 722. This permits a user to mount a device to the mounting system 700 without seeing the keyhole opening 722 during mounting.

[0044] In one embodiment, the cutout 720 is shaped with a taper that further guides the mating feature 750 into the keyhole opening 722. In selected embodiments, the lip portion 718 further aids in holding the mating feature 750 within the tray 716 while laterally sliding the mating feature along the tray 716 to locate the keyhole opening 722.

[0045] Although the use of the tray 716 for mounting is described above as a vertical wall mounting configuration, as previously mentioned, the invention is not so limited. The tray 716 also functions to help alignment of the mating feature 750 in configurations such as on an incline, or on a ceiling, etc.

CONCLUSION

[0046] Using embodiments described above, a number of advantages are realized. One advantage includes a mounting system with a tray to help align a mating feature with a keyhole opening. Another advantage includes a mounting system with a retaining device to hold a mating feature within the mounting system for added security. Another advantage includes a mounting system with a locking device to prohibit unwanted motion of the retaining device and theft protection.

[0047] Although selected advantages are detailed above, the list is not intended to be exhaustive. Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the present invention. It is to be understood that the above description is intended to be illustrative, and not restrictive. Combinations of the above embodiments, and other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention includes any other applications in which the above structures and fabrication methods are used.

What is claimed is:

1. A mounting system, comprising:

- a mounting frame for attachment to a mounting surface;
- a keyhole opening in the mounting frame to accept a mating feature on a device, the keyhole opening having an entry portion, and a capture portion; and
- a tray located adjacent to the entry portion of the keyhole opening, with a cutout in the tray providing access to the entry portion of the keyhole opening.

2. The mounting system of claim 1, wherein the keyhole opening includes a round entry portion and a slotted capture portion.

3. The mounting system of claim 1, wherein the tray further includes a lip portion.

4. The mounting system of claim 1, wherein the cutout includes a tapered slot.

5. The mounting system of claim 1, wherein the tray is horizontally oriented on a wall surface.

6. A video display system, comprising:

a video display device;

at least one mating feature attached to a back surface of the video display device;

a mounting strip for attachment to a substantially vertical mounting surface;

a keyhole opening in the mounting strip to accept the mating feature, the keyhole opening having an entry portion, and a capture portion; and

a tray located adjacent to the entry portion of the keyhole opening, with a cutout in the tray providing access to the entry portion of the keyhole opening.

7. The video display system of claim 6, wherein the keyhole opening includes a round entry portion and a slotted capture portion.

8. The video display system of claim 6, wherein the tray further includes a lip portion.

9. The video display system of claim 6, wherein the mating feature includes a shoulder bolt.

10. The video display system of claim 6, wherein the cutout includes a tapered slot.

11. A mounting system, comprising:

a mounting strip for attachment to a substantially vertical mounting surface;

a plurality of keyhole openings in the mounting strip to accept a mating feature on a device, each keyhole opening having an entry portion, and a capture portion;

a tray located adjacent to the entry portions of the keyhole openings, with a cutout in the tray providing access to the entry portions of the keyhole openings; and

a retaining device that is movable in a range of motion, wherein a first position in the range of motion allows mating features access to the capture portion of the keyhole openings, and a second position locks the mating features in the capture portion of the keyhole openings.

12. The mounting system of claim 11, wherein the plurality of keyhole openings are spaced apart on multiples of 100 mm.

13. The mounting system of claim 11, further including a locking device that prohibits movement of the retaining device in the range of motion.

14. The mounting system of claim 13, wherein the locking device includes a length of cord coupled to the retaining device and a cord lock gripper on the length of cord.

15. The mounting system of claim 13, wherein the locking device includes a key lock to lock the retaining device at a location in the range of motion.

16. A video display mounting system, comprising:
 a mounting frame for attachment to a mounting surface;
 a receptacle in the mounting frame to receive a mating feature on the video display mounting system, the receptacle having an entry portion, and a capture portion;
 a retaining bar that is movable in a range of motion, wherein a first position in the range of motion allows the mating feature access to the capture portion of the receptacle, and a second position retains the mating feature in the capture portion of the receptacle; and
 a locking device that when actuated fixes movement of the retaining device in relation to an edge of the video display.

17. The video display mounting system of claim 16, further including a second locking device that fixes movement of the retaining device in relation to a second edge of the video display.

18. The video display mounting system of claim 16, wherein the locking device includes a length of cord coupled to the retaining device and a cord lock gripper on the length of cord.

19. The video display mounting system of claim 16, wherein the locking device includes a solid extending member coupled to the retaining device and a key lock.

20. A video display mounting system, comprising:
 a mounting frame for attachment to a substantially vertical mounting surface;
 a holding means in the mounting frame to accept a mating feature on a device, the holding means having an entry portion, and a capture portion;
 a retaining means that is movable in a range of motion, wherein a first position in the range of motion allows the mating feature access to the capture portion of the holding means, and a second position retains the mating feature in the capture portion of the holding means; and
 a locking means that when actuated fixes movement of the retaining means in relation to an edge of the video display.

21. The video display mounting system of claim 20, wherein the holding means includes a keyhole opening.

22. The video display mounting system of claim 20, wherein the retaining means includes a retaining bar.

23. The video display mounting system of claim 20, wherein the locking means includes a length of cord coupled to the retaining means and a cord lock gripper on the length of cord.

* * * * *