



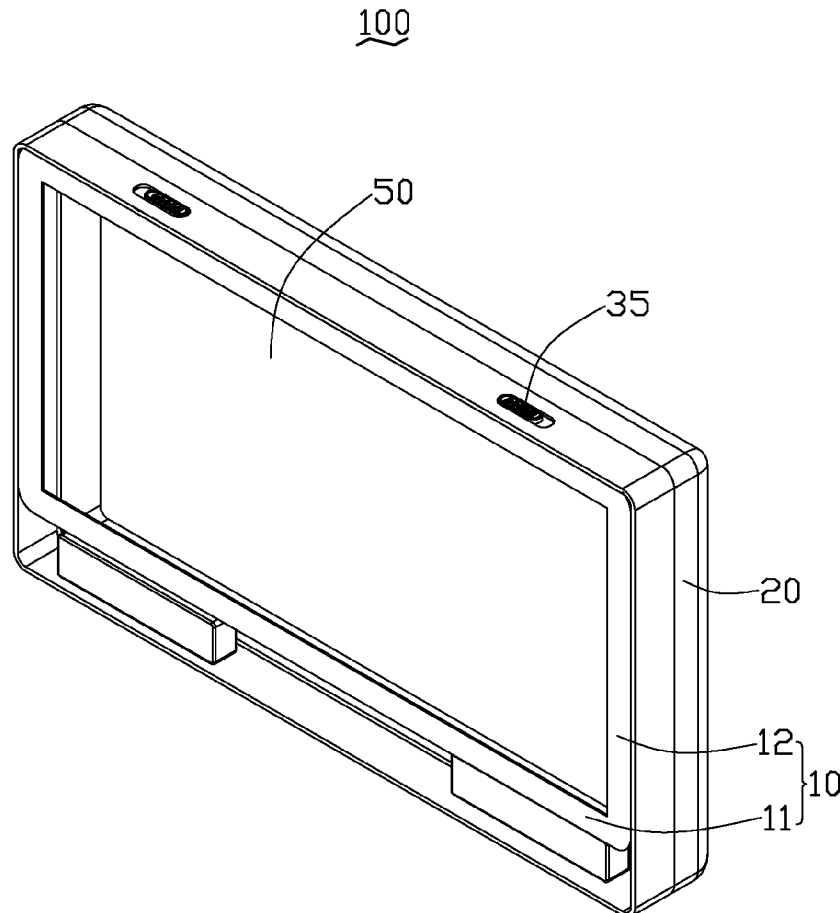
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(19) **United States**(12) **Patent Application Publication**
GU et al.(10) **Pub. No.: US 2012/0132661 A1**(43) **Pub. Date: May 31, 2012**(54) **DISPLAY DEVICE WITH DETACHABLE
DISPLAY MODULE**(30) **Foreign Application Priority Data**

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B65D 25/54 (2006.01)(52) **U.S. Cl.** **220/662**(57) **ABSTRACT**

An exemplary display device includes a rear housing, a front frame, a display module, a connecting assembly pivotally connecting the front frame to the rear housing, a latching member, a slidable key, and a clamping member. The clamping member forms a latching block latched to the latching member for securing the front frame to the rear housing. The display module can be detached from the front frame and the rear housing by operating the slidable key. Correspondingly, the latching of the latching block and the latching member can be released.

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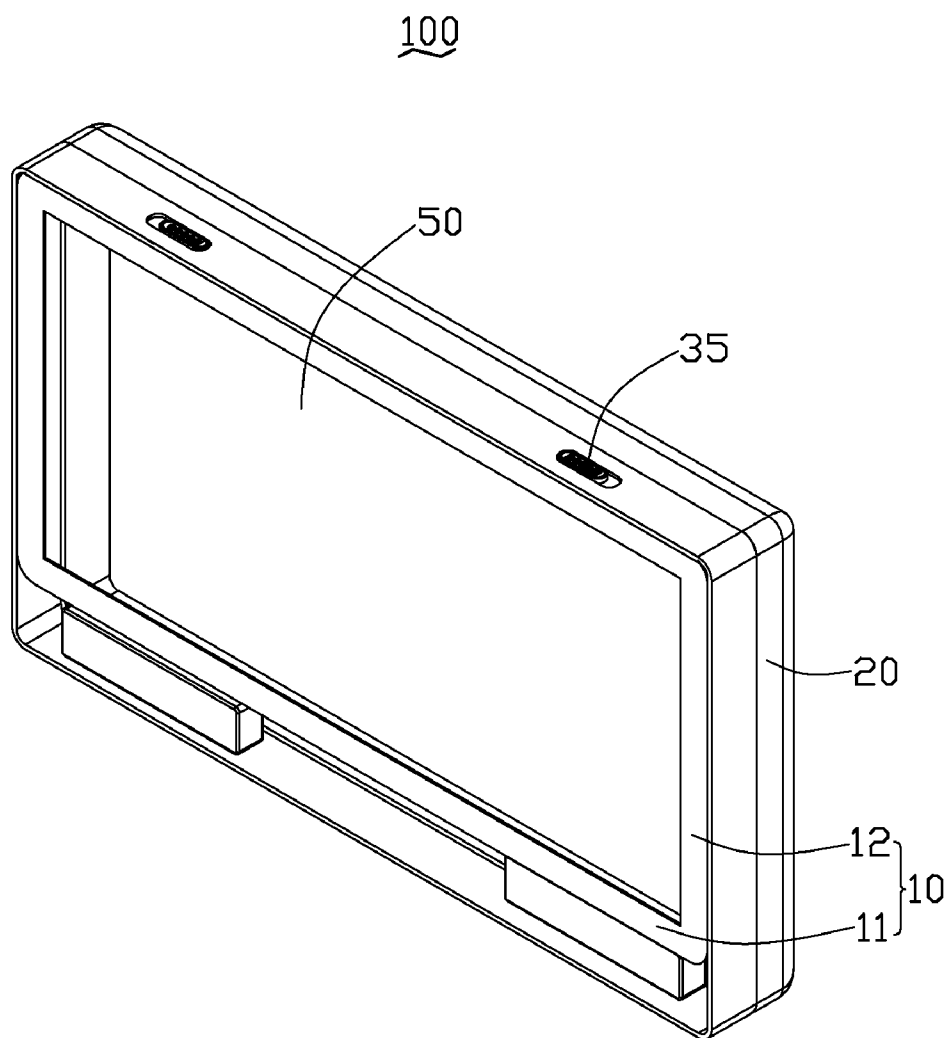


FIG. 1



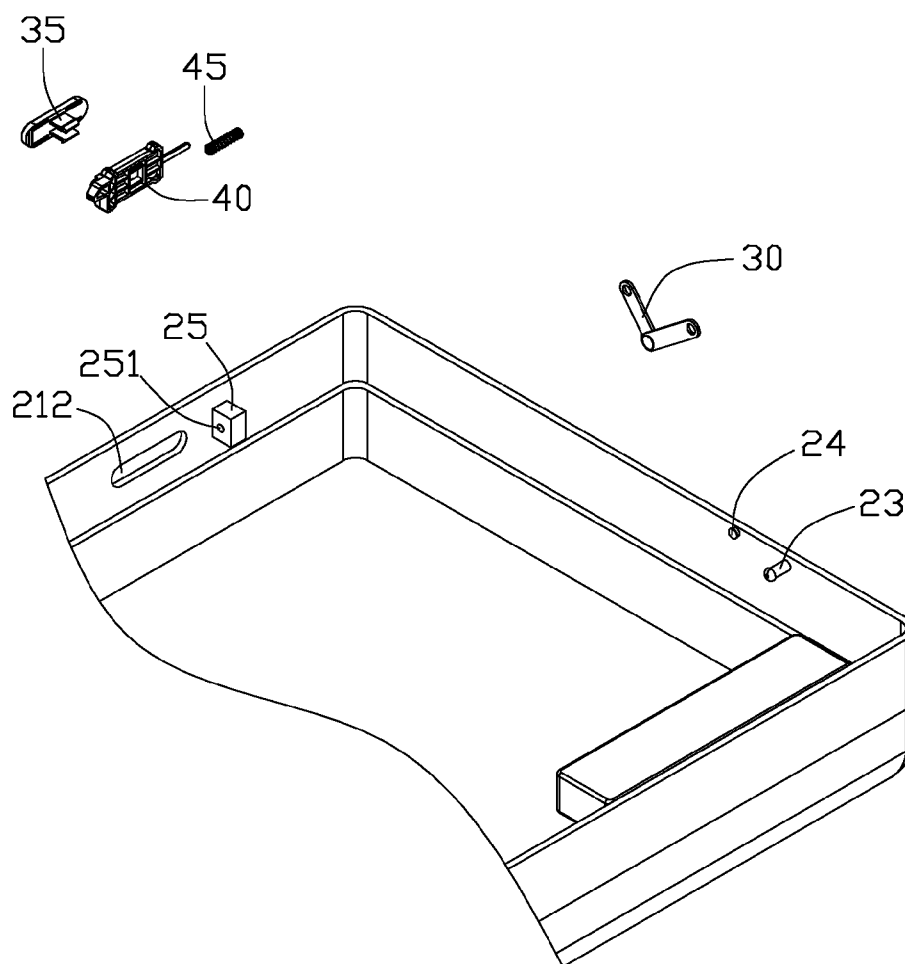


FIG. 3

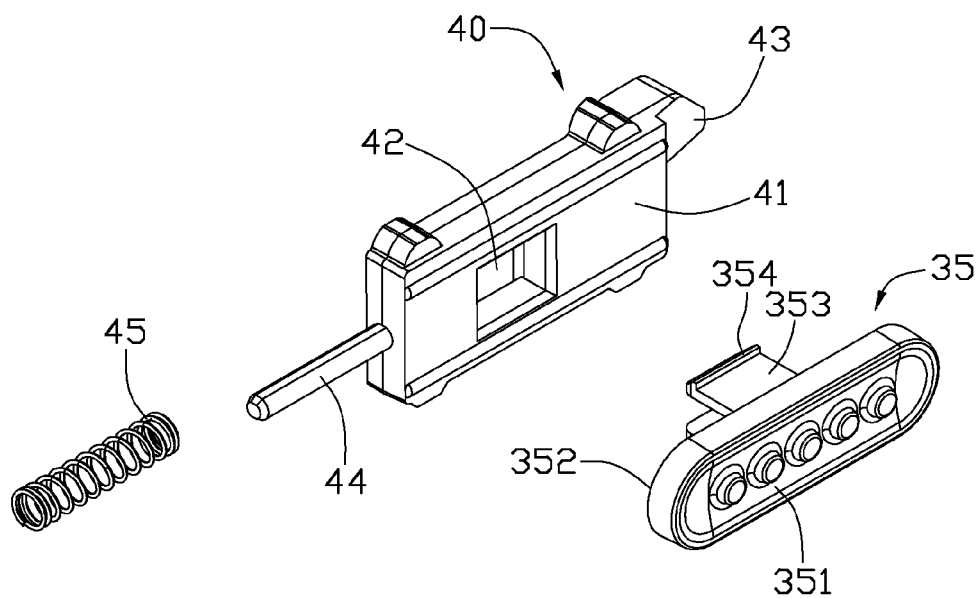


FIG. 4

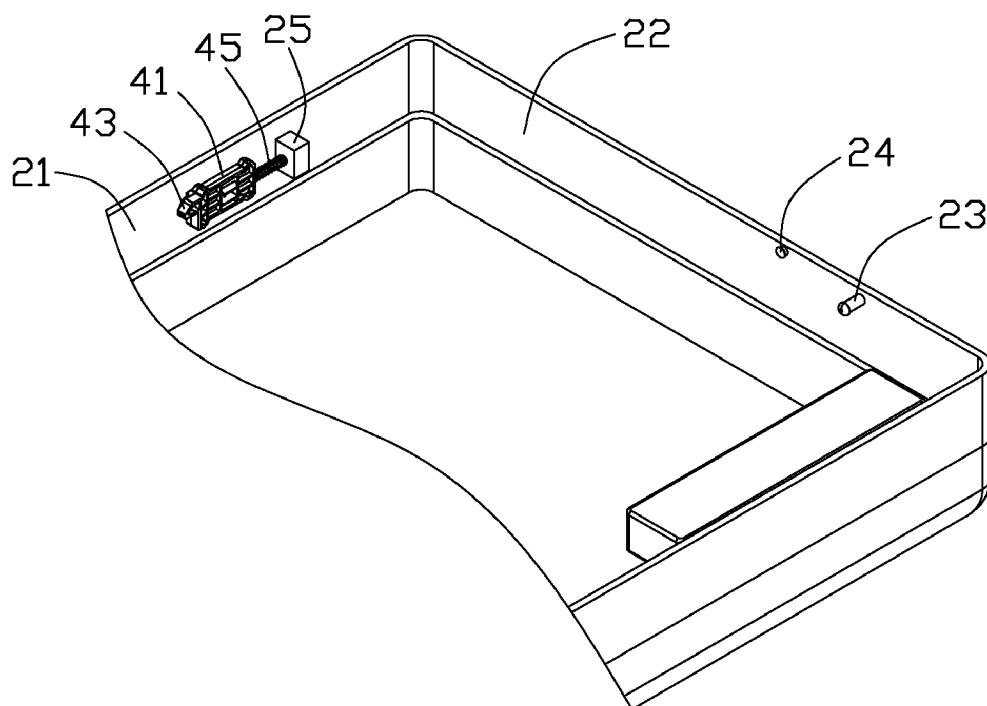


FIG. 5

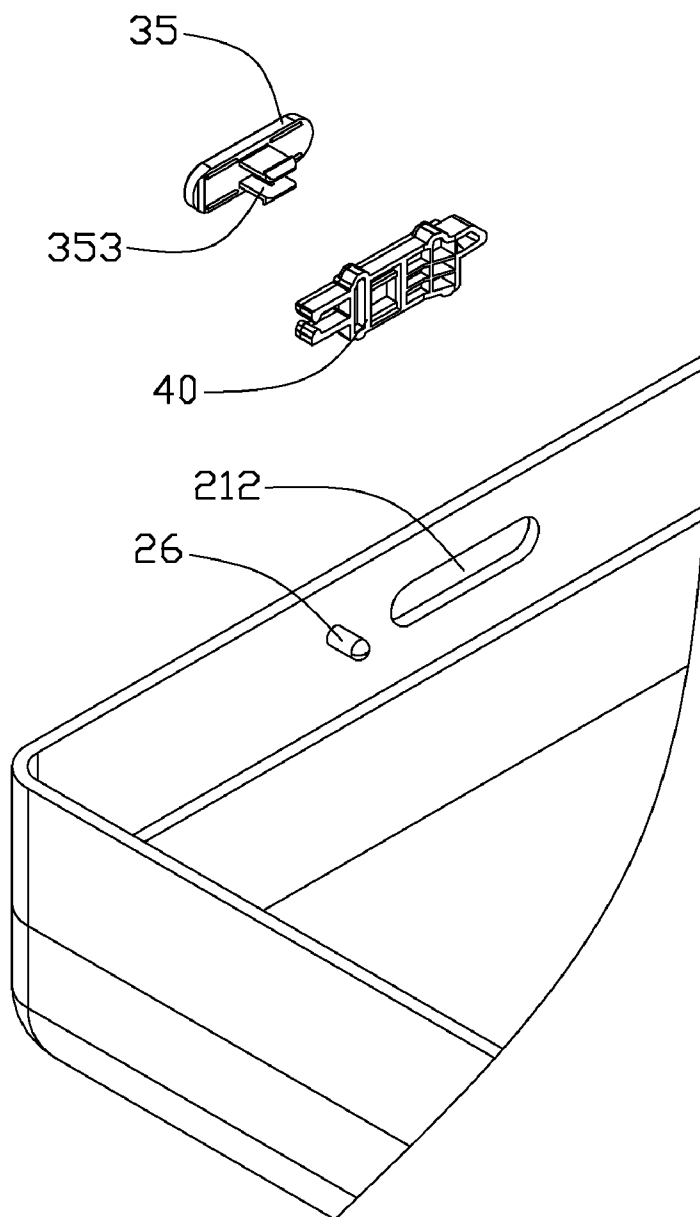


FIG. 6

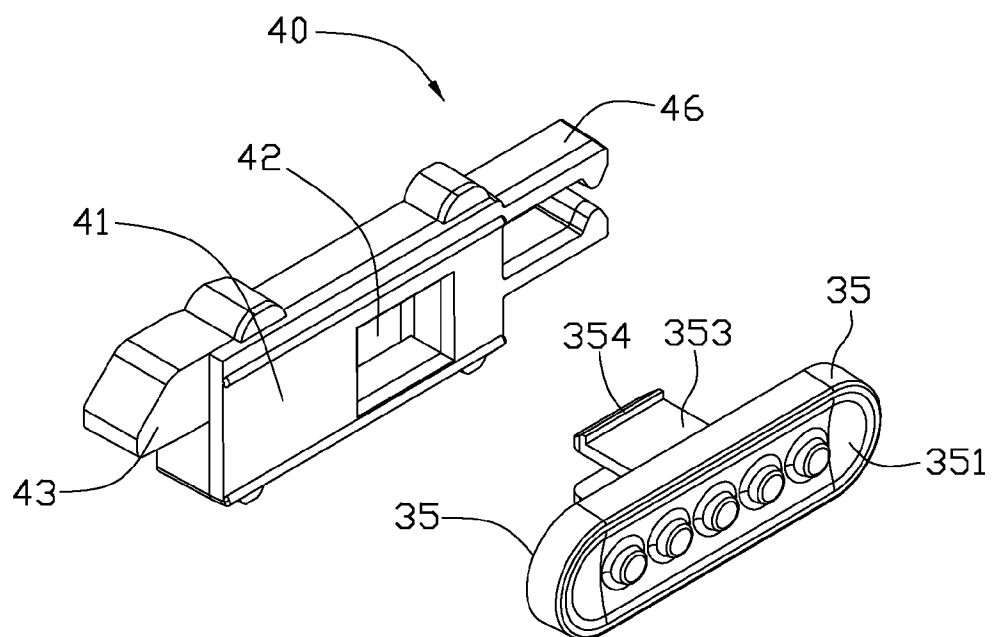


FIG. 7

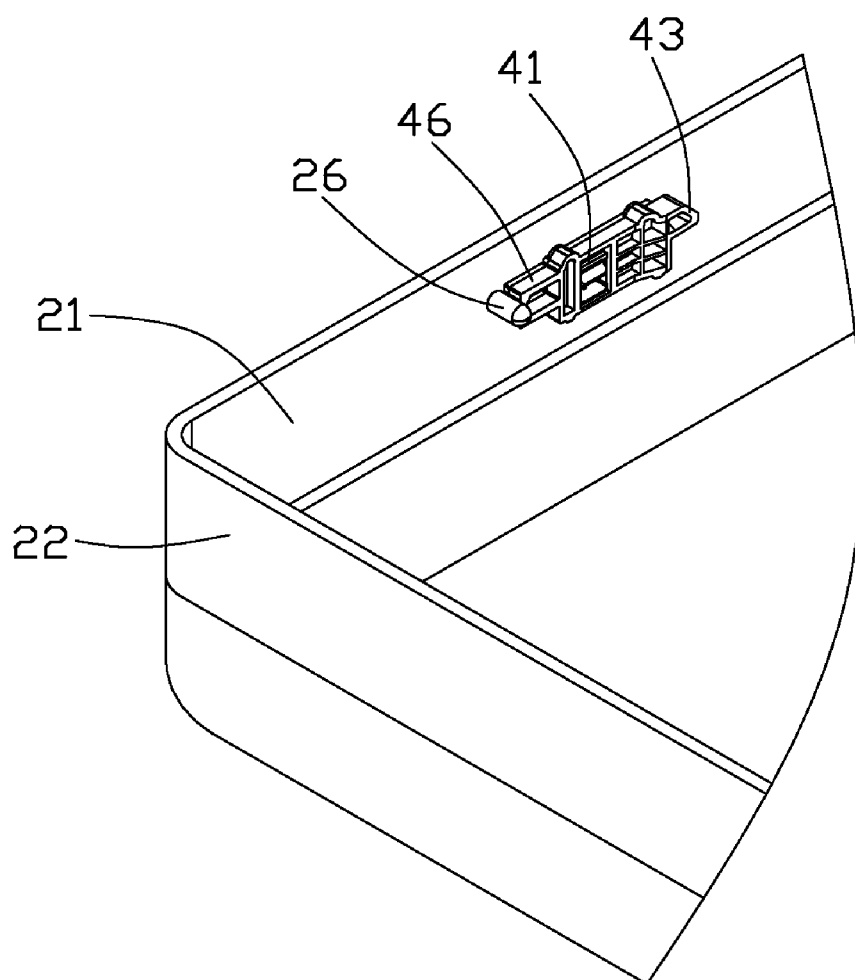


FIG. 8

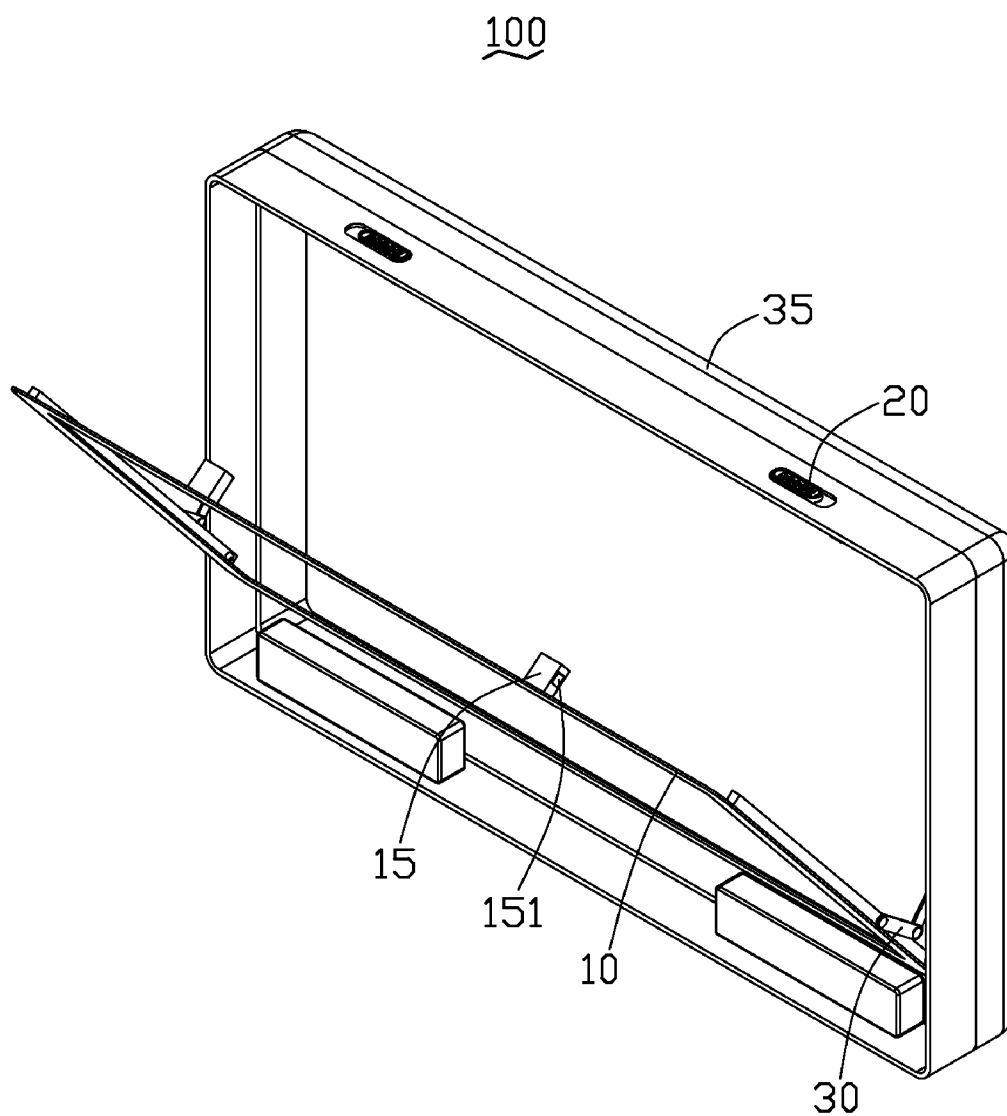


FIG. 9

DISPLAY DEVICE WITH DETACHABLE DISPLAY MODULE

BACKGROUND

[0001] 1. Technical Field

[0002] The present disclosure relates to a display device with a detachable display module.

[0003] 2. Description of the Related Art

[0004] Display device for a portable electronic device assembles a display module inside a device housing. The device housing usually includes a front frame and a rear housing. The front frame can be adhered or screwed to the rear housing. However, when the display module needs to be repaired or replaced, it can be difficult to detach the display module from the device housing.

[0005] Therefore, there is room for improvement within the art.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Many aspects of the present display device can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the present display device. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0007] FIG. 1 is an isometric view of a display device with a detachable display module at a closed position according to an exemplary embodiment.

[0008] FIG. 2 is an isometric exploded view of the display device shown in FIG. 1.

[0009] FIG. 3 is an enlarged partial view of the display device shown in FIG. 1 at a different angle from FIG. 2.

[0010] FIG. 4 is an enlarged view of the clamping member and the slidable key shown in FIG. 3.

[0011] FIG. 5 is an assembled view of the display device shown in FIG. 3.

[0012] FIG. 6 is an enlarged partially exploded view of a display device according to another exemplary embodiment.

[0013] FIG. 7 is an enlarged view of the clamping member and the slidable key shown in FIG. 6.

[0014] FIG. 8 is an assembled view of the display device shown in FIG. 6.

[0015] FIG. 9 is an isometric view of the display device shown in FIG. 1 at an opened position.

DETAILED DESCRIPTION

[0016] FIG. 1 through FIG. 3 show a display device 100 according to an exemplary embodiment. The display device 100 includes a front frame 10, two latching members 15, a rear housing 20, a securing portion 25, two connecting assemblies 30, a slidable key 35, a clamping member 40, and a detachable display module 50.

[0017] The front frame 10 is rotatably connected to the rear housing 20. The front frame 10 includes two opposite vertical frame sections 12, two opposite horizontal frame sections 11 and two opposite securing bars 13 (best shown in FIG. 3). The two securing bars 13 are fixed to the two vertical frame sections 12 and oppose the inside of the rear housing 20. The side wall of the securing bar 13 has a shaft hole 131 defined therein and a first securing column 132 protruding therefrom. The shaft hole 131 and the first securing column 132 are located adjacent to the end of the securing bar 13.

[0018] The latching members 15 are fixed to one of the upper vertical frame sections 11 and oppose the inside of the rear housing 20. The latching member 15 defines a latching hole 151 at the side surface.

[0019] The rear housing 20 can be latched to and be covered by the front frame 10. The rear housing 20 includes an upper wall 21, two opposite side walls 22, two pivot shafts 23 and two second securing columns 24. The upper wall 21 defines two sliding grooves 211 corresponding to the latching members 15.

[0020] The securing portion 25 is fixed to the upper wall 21 near the through hole 212 and received in the rear housing 20. The securing portion 25 defines a securing hole 251 facing the through hole 212.

[0021] The pivot shafts 23 are fixed to the side walls 22 and respectively rotatably engage in the shaft holes 131. The second securing columns 24 are fixed to the side walls 22 near the pivot shafts 23.

[0022] The connecting assembly 30 includes a pivot connecting section 301, a first assembly section 302 and a second assembly section 303. The connecting section 301 connects the adjoining ends of the first assembly section 302 and the second assembly section 303. Accordingly, the first assembly section 302 and the second assembly section 303 can pivot with each other about the axis of the connecting section 301. The first assembly section 302 and the second assembly section 303 respectively define two through holes 305. The through holes 305 are for securing the first securing column 132 and the second securing column 24.

[0023] Referring further to FIG. 4, the slidable keys 35 are slidably mounted respectively in the sliding grooves 211. The slidable key 35 includes a key panel 351, a mounting surface 352 and two spaced locking portions 353 attached to the mounting surface 352. The locking portions 353 protrude from the middle of the mounting surface 352. Each of the locking portions 353 has a locking end portion 354 formed at the distal end.

[0024] The clamping member 40 includes a base member 41, a locking groove 42, a latching block 43, a positioning bar 44, and a spring 45 coiled around the positioning bar 44. The locking groove 42 is defined through the base member 41. The wedge-shaped latching block 43 and the positioning bar 44 protrude from two opposite ends of the base member 41. The positioning bar 44 can be positioned facing the securing hole 251 of the securing portion 25. The spring 45 can be resisted between the base member 41 and the securing portion 25.

[0025] FIG. 5 shows the assembly of the clamping member 40 and the slidable key 35 with the rear housing 20. The slidable key 35 is assembled in the sliding groove 211. The locking portion 353 passes through the through hole 212 into the rear housing 20. The clamping member 40 is secured to the slidable key 35 with the locking portions 353 being secured in the locking groove 42. The locking end portions 354 lock the surface of the clamping member at the periphery of the locking groove 42. The positioning bar 44 engages in the securing hole 251 and the spring 45 is resisted between the base member 41 and the securing portion 25.

[0026] FIG. 1 further shows the display device 100 is at an assembled state. The front frame 10 is rotatably assembled with the rear housing 20. The pivot shaft 23 rotatably engages in the shaft hole 131. The first securing column 132 and the second securing column 24 respectively rotatably engage in the through holes 305. When the front frame 10 rotates rela-

tive to the rear housing 20, the first assembly section 302 rotates relative to the second assembly section 303 about the axis of the connecting section 301.

[0027] In FIG. 1, the display device 100 is positioned at a closed position and the front frame 10 closes the opening of the rear housing 20. The display module 50 is secured between the securing bars 13. During the closing process, the front frame 10 can be pushed towards the rear housing 20. The latching member 15 resists against the latching block 43, enabling the clamping member 40 to move towards the securing portion 25. The spring 45 is compressed between the base member 41 and the securing portion 25. The slidable key 35 slides along the sliding groove 211. The latching member 15 moves along the wedge-shaped surface of the latching block 43. When the latching block 43 moves to align with the latching hole 151, the spring 45 expands to push the latching block 43 into the latching hole 151. The latching block 43 latches in the latching hole 151, latching the front frame 10 to the rear housing 20. The clamping member 40 and the slidable key 35 return to original positions. The display module 50 is secured between the front frame 10 and rear housing 20.

[0028] FIG. 9 shows the display device 100 in an opened position for taking out the display module 50. The slidable key 35 can slide along the sliding groove 211 to compress the spring 45. The latching block 43 moves out of the latching hole 151 and the front frame 10 can be rotated relative to the rear housing 20 at a predetermined angle. The display module 50 can be detached from the front frame 10.

[0029] FIGS. 6 through 8 show another exemplary embodiment of the display device similar to the display device 100. The differences embody that a protruding column 26 on the upper wall 21 replaces the securing portion 25. Correspondingly, the clamping member 40 includes the base member 41, the locking groove 42, the latching block 43, and two elastic clamping arms 46. The clamping arms 46 are spaced and protrude from the same side of the base member 41 opposite to the latching block 43.

[0030] During the closing of the front frame 10 relative to the rear housing 20, the front frame 10 can be pushed towards the rear housing 20. The latching member 15 resists against the latching block 43, enabling the clamping member 40 to move towards the protruding column 26. The protruding column 26 engages between the clamping arms 46. The slidable key 35 slides along the sliding groove 211 and the latching member 15 can move along the wedge-shaped surface of the latching block 43. The slidable key 35 can be manually pushed to slide back to the original position and the latching member 15 engages into the latching block 43. The latching member 15 latches in the latching block 43, latching the front frame 10 to the rear housing 20. The protruding column 26 is clamped between and by the clamping arms 46. The display module 50 is secured between the front frame 10 and rear housing 20.

[0031] To detach the display module 50 from the display device, the slidable key 35 can slide along the sliding groove 211 and the protruding column 26 slides between the clamping arms 46. The latching of the latching block 43 and the latching member 11 can be released, and the front frame 10 can be rotated relative to the rear housing 20 at a predetermined angle. The display module 50 can be detached from the front frame 10.

[0032] It is to be understood that even though numerous characteristics and advantages of the present embodiments have been set forth in the foregoing description, together with

details of assemblies and functions of various embodiments, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the present disclosure to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

What is claimed is:

1. A display device, comprising:

- a rear housing;
 - a front frame rotatably attached to the front frame;
 - a display module detachably assembled between the rear housing and the front frame;
 - a connecting assembly pivotally connecting the front frame to the rear housing;
 - a latching member mounted on the front frame;
 - a slidable key;
 - a clamping member securing the slidable key and slidably mounted to the rear housing, the clamping member forming a latching block, the latching block latched to the latching member for securing the front frame to the rear housing;
- wherein for detaching the display module from the front frame and the rear housing, the slidable key can drive the clamping member to move along the rear housing, releasing the latching of the latching block and the latching member.

2. The display device as claimed in claim 1, wherein the latching member defines a latching hole, the latching block latched in the latching hole.

3. The display device as claimed in claim 1, wherein the slidable key comprises a locking portion, the clamping member further comprises a base member and a locking groove defined in the base member, the locking portion passing through the locking groove and locked to the base member.

4. The display device as claimed in claim 3, wherein the rear housing further comprises a sliding groove, the slidable key slidably engaging the sliding groove.

5. The display device as claimed in claim 4, wherein the rear housing further comprises a securing portion, the clamping member further comprising a positioning bar and a spring, the spring coiled around the positioning bar and resisted between the clamping member and the securing portion, the latching block and the positioning bar extending from two opposite ends of the base member.

6. The display device as claimed in claim 4, wherein the rear housing further comprises a protruding column, the clamping member further comprises two clamping arms, the two clamping arms extending from the same side of the base member, the protruding column slidably engaging between the clamping arms, the latching block and the clamping arms extending from two opposite ends of the base member.

7. The display device as claimed in claim 1, wherein the front frame further defines a shaft hole, the rear housing defines a pivot shaft engaging in the shaft hole.

8. The display device as claimed in claim 7, wherein the connecting assembly comprises a pivot connecting section, the connecting section rotatably connecting the first assembly section to the second assembly section.

9. The display device as claimed in claim 8, wherein the front frame further comprises a first securing column adjacent to the shaft hole, the rear housing further comprises a second securing column adjacent to the pivot shaft, the first assembly section and the second assembly section define two through

holes, respectively, the first securing column and the second securing column secured in the through holes, respectively.

10. The display device as claimed in claim **9**, wherein the front frame further comprises two vertical frame sections and two horizontal frame sections connecting the vertical frame sections, each of the horizontal frame sections forms a securing bar, the securing bars secure the display module, the shaft hole is defined in the securing bar, and the first securing column are formed on the securing bar.

11. A display device, comprising:

a rear housing;

a front frame rotatably connected to the front frame;

a display module detachably secured to the front frame;

a connecting assembly pivotally connecting the front frame to the rear housing;

a latching member mounted on the front frame;

a slidable key;

a clamping member securing the slidable key and slidably mounted to the rear housing, the clamping member forming a latching block corresponding to the latching member;

wherein, the display device can be transferred between a closed position and an opened position by operating the slidable key;

in a closed position where the latching block is latched to the latching member, enabling the front frame to secure with the rear housing;

in an opened position where the clamping member moves along the rear housing to release the latching of the latching block and the latching member, the front frame rotates to detach from the rear housing.

12. The display device as claimed in claim **11**, wherein the latching member defines a latching hole, the latching block latched in the latching hole.

13. The display device as claimed in claim **11**, wherein the slidable key comprises a locking portion, the clamping member further comprises a base member and a locking groove defined in the base member, the locking portion passing through the locking groove and locked to the base member.

14. The display device as claimed in claim **13**, wherein the rear housing further comprises a sliding groove, the slidable key slidably engaging the sliding groove.

15. The display device as claimed in claim **14**, wherein the rear housing further comprises a securing portion, the clamping member further comprising a positioning bar and a spring, the spring coiled around the positioning bar and resisted between the clamping member and the securing portion, the latching block and the positioning bar extending from two opposite ends of the base member.

16. The display device as claimed in claim **14**, wherein the rear housing further comprises a protruding column, the clamping member further comprises two clamping arms, the two clamping arms extending from the same side of the base member, the protruding column slidably engaging between the clamping arms, the latching block and the clamping arms extending from two opposite ends of the base member.

17. The display device as claimed in claim **11**, wherein the front frame further defines a shaft hole, the rear housing defines a pivot shaft engaging in the shaft hole.

18. The display device as claimed in claim **17**, wherein the connecting assembly comprises a pivot connecting section, the connecting section rotatably connecting the first assembly section to the second assembly section.

19. The display device as claimed in claim **18**, wherein the front frame further comprises a first securing column adjacent to the shaft hole, the rear housing further comprises a second securing column adjacent to the pivot shaft, the first assembly section and the second assembly section define two through holes, respectively, the first securing column and the second securing column secured in the through holes, respectively.

20. The display device as claimed in claim **19**, wherein the front frame further comprises two vertical frame sections and two horizontal frame sections connecting the vertical frame sections, each of the horizontal frame sections forms a securing bar, the securing bars secure the display module, the shaft hole is defined in the securing bar, and the first securing column are formed on the securing bar.

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