

MECHANISM FOR ADJUSTING A DISPLAY

FIELD

Embodiments of the invention generally relate to the field of electronics. More specifically, embodiments of this invention relate to a mechanism adapted to enable both horizontal and vertical rotation of a display of an electronic device.

GENERAL BACKGROUND

Over the past few years, there has been increased demand for portable computers, especially in light of their enhanced data processing functionality. Operating from either external or portable power sources, conventional portable computers feature a liquid crystal display (LCD) connected to and mounted on a body case with an integrated keyboard.

According to one type of conventional portable computer, the LCD is rotationally attached to the body case along a vertical axis of rotation. For instance, the LCD is rotationally attached to the body case by a cylindrical shaft as described in a published Japanese Application No. JP-A-10-55227. Therein, the shaft operates as a conduit for a display cable that electrically connects the LCD to circuitry within the body case. As a result, the computer can generally operate either as a tablet computer when the LCD is positioned directly above the body case or as a laptop computer when the LCD is rotated and now offset from the body case.

One disadvantage associated with this conventional portable computer is that the LCD only faces upward relative to the body case. Hence, in order to review information displayed on the LCD, the user must either look down at the LCD from above or tilt the entire electronic device so that the LCD is placed at a selected viewing angle.

According to another type of conventional portable computer, the LCD is attached to the body case by mechanical guides. These guides are positioned on opposite sides of the body case and are in contact with the edges of the LCD. When laterally moved along these guides, the LCD remains generally in parallel with the body case. Alternatively, a top side of the LCD may be raised as the bottom side of the LCD is moved within the mechanical guides.

One disadvantage associated with this conventional portable computer is that the LCD cannot be adjusted along a vertical axis. Thus, the orientation of the LCD relative to the body case cannot be angularly altered. Moreover, the LCD cannot be rotated along a horizontal axis and placed in multiple viewing angles.

BRIEF DESCRIPTION OF THE DRAWINGS

Features and advantages of embodiments of the invention will become apparent from the following detailed description in which:

FIG. 1 is a side view of an exemplary embodiment of an electronic device placed in a TABLET position.

FIG. 2 is an overhead view of the electronic device of FIG. 1.

FIG. 3 is a perspective view of the bottom sides of the electronic device of FIG. 1.

FIG. 4 is a perspective view of electronic device of FIG. 1 placed in a SELF-SUPPORTING position.

FIGS. 5A–5B are exploded views of exemplary embodiments of the coupling member adapted to be interposed between the display and body case of the electronic device.

FIG. 6 is an overhead view of an exemplary embodiment of the electronic device placed in the TABLET position.

FIG. 7 is an exemplary embodiment of multiple layers of the interconnect area within the body case of the electronic device.

FIG. 8 is a cross-sectional view of the electronic device of FIG. 6 along a cross-sectional line A—A.

FIG. 9 is a cross-sectional view of a guide positioned within the second body of FIG. 8 along a cross-sectional line B—B.

FIG. 10 is an exemplary embodiment of the electronic device placed in a TABLET position for illustration of the operations for placement into a SELF-SUPPORTING position.

FIG. 11 is an exemplary embodiment of the electronic device being rotated for illustration of the operations for placement into a SELF-SUPPORTING position.

FIG. 12 is an exemplary embodiment of the electronic device being placed in the INTERMEDIARY position for illustration of the operations for placement into a SELF-SUPPORTING position.

FIG. 13 is a cross-sectional view of the electronic device of FIG. 12 along a cross-sectional line A—A.

FIG. 14 is an exemplary embodiment of the electronic device being placed in the SELF-SUPPORTING position for illustration of the operations performed on the electronic device.

FIG. 15 is a cross-sectional view of the electronic device of FIG. 14 along cross-sectional line A—A.

DETAILED DESCRIPTION

Embodiments of the invention set forth in the following detailed description generally relate to an electronic device with a mechanism that permits vertical rotation of the display to be varied at will. The assembly also permits horizontal rotation and translation of the display that is mounted on top of the body case. The mechanism comprises a hinge and a coupling member described below.

In the following description, certain terminology is used to describe various features of one or more embodiments of the invention. For instance, an “electronic device” is defined as an electronic product with a flat panel display that can be rotated and translated. In this detailed description, for clarity sake, the electronic device is illustrated as a hand-held tablet computer that can be converted to a free-standing, portable computer. However, it is evident that the invention may be utilized in other types of electronic devices including, but not limited or restricted to personal digital assistants, cellular telephones, digital cameras, video cameras, navigation systems, and the like.

Herein, the term “rotate” as well as varying tenses thereof is generally defined as the angular movement about an axis of rotation. The axis of rotation may be relatively fixed to the overall orientation of the electronic device. For this detailed description, when used to denote a direction of rotation, the term “vertically rotate” (or any tense thereof) relates to rotation about a generally horizontal axis of rotation. Similarly, the term “horizontally rotate” (or any tense thereof) relates to rotation about a generally vertical axis of rotation. The terms “translate”, “translation” or any tense thereof are defined as linear movement.

The term “interconnect” is any medium that is capable of transferring electrical signals from one point to another. Examples of an interconnect may include one or more electrical wires, any type of cable (e.g., flexible printed cable), optical fiber, or the like. A “display interconnect” is simply an interconnect coupled at one end to a display such as a flat panel display.