

Portable Electronic Apparatus

Field of the Invention

The present invention relates to a portable electronic apparatus.

Background to the Invention

5 A known portable electronic apparatus comprising an optical sensor is disclosed in JP-A-10164414. A digital camera unit is disposed adjacent to a panel display of a notebook personal computer. The digital camera unit comprises an elongate,
10 opaque barrel that is free to rotate about its long axis and has an slit window cut-away from the cylindrical surface, giving the barrel a post-box appearance. A circular mirror is disposed inside the barrel, behind the window, and may be tilted in such a way that light passing through the window is reflected down the axis of the barrel and is focused by an axially mounted lens onto the face of a charge-
15 coupled device disposed at the base of the barrel.

The camera unit may rotated so that a document, supported on an upright stand, may be viewed and an image captured. This arrangement has several disadvantages. Firstly, the camera and document are mounted on separate surfaces so that if either
20 the notebook or the stand is knocked or vibrates then the captured image will be blurred. Secondly, the user must carefully align the document and camera before the image is captured: this is a time consuming process and involves positioning the document stand by trial and error. Thirdly, the stand must be carried separately, so increasing the number of items the user must carry.

25 A notebook computer comprising an image sensor is disclosed in US-A-5610730. A digital camera is used to capture the image of a document lying on a table or on some other surface on which the computer also rests. However, as with the arrangement described in JP-A-10164414, this configuration can cause degradation
30 of image quality due to vibration or misalignment of the document relative to the camera.

The present invention seeks to ameliorate these problems.

Summary of the Invention

According to the present invention there is provided a portable electronic apparatus comprising first and second wings hingedly coupled to each other and an optical sensor mounted to the first wing, wherein the optical sensor is configured for
5 sensing a document lying against the second wing.

Accordingly, the optical sensor may be configured so as to be directed perpendicular to the second wing and focused substantially thereon.

10 A keyboard may be carried by the second wing and a display screen may be carried by the first wing.

Alternatively, a keyboard may be carried by the first wing and a display screen may be carried by the second wing.

15 Preferably, the portable electronic apparatus may include a photographic flash device. This has the advantage that the document is uniformly illuminated.

The direction in which the optical sensor is directed may be changed relative to the
20 first wing.

The document may be secured to the second wing by a securing means.

Preferably, the securing means comprises a clip means operable to hold the
25 document between the second wing and the clip means.

Accordingly, the clip means may comprise a ribbon and may be paid out from a reel.

Brief Description of the Drawings

30 Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a first embodiment of the present invention;

- Figure 2a is a plan view of a large document held against a panel display of a portable personal computer;
- Figure 2b is a plan view of a small document held against the panel display of a portable personal computer;
- 5 Figure 3 is a magnified view of a camera unit used in the first embodiment;
- Figure 4 is a magnified view of a flash unit used in the first embodiment;
- Figure 5 is a perspective view of a second embodiment of the present invention;
- Figure 6 is a perspective view of a third embodiment of the present invention;
- Figure 7 is a perspective view of a fourth embodiment of the present invention;
- 10 Figure 8 is a magnified view of the mechanism for storing and paying out a transparent plastic ribbon;
- Figure 9 is a perspective view of a fifth embodiment of the present invention;
- Figure 10 is magnified view of a mechanism for sliding a securing ribbon from side to side across the face of a wing of a personal computer;
- 15 Figure 11 is a perspective view of a sixth embodiment of the present invention;
- Figure 12a is a sectional view of an seventh embodiment of the present invention;
- Figure 12b is a plan view of the seventh embodiment of the present invention;
- Figure 13 is a perspective view of an eighth embodiment of the present invention;
- Figure 14 is a sectional view of a camera unit used in the eighth embodiment;
- 20 Figure 15a is a sectional view of alternative camera unit used in the eighth embodiment and
- Figure 15b is a plan view of the alternative camera unit.

Detailed Description of Preferred Embodiments

25 *First Embodiment*

Referring to Figures 1 and 2, in a first embodiment of the present invention, a portable personal computer 1 comprises a first wing 2 and a second wing 3, coupled by hinge members 4a, 4b along a first long edge 4. This arrangement allows the wings 2, 3 to be folded together when the personal computer is not in use. The

30 inwardly directed face of the first wing 2 has a keyboard 5, a track pad control 6, a camera unit 7 and flash units 8a, 8b. The first wing 2 also has power supply socket 9, input/output ports 10, a three-and-a-half inch disc drive 11, a hard drive 12 and a motherboard 13. The inwardly directed face of the second wing 3 has a display

panel 14 and securing means 15 for securing a document 16, for instance a business card, to the inwardly directed face of the second wing 3.

5 The securing means 15 comprises first, second, third and fourth elongate, flat securing clips 15a, 15b, 15c, 15d made from plastics resin material. A securing clip 15 is attached to each corner of the inward facing surface of the second wing 3, so that they lie flat against the inwardly directed face. The unattached ends of the clips 15a, 15b, 15c, 15d may be lifted from the surface but, on release, snap back so as to lie flat against the surface once more. The securing clips 15a, 15b, 15c, 15d are
10 rotatable around about their point of attachment. When not in use the securing clips are rotated so that they point parallel to an edge of the second wing 3 and do not cover the display panel 14.

Documents of different sizes may be secured to the surface of the second wing 3,
15 by holding down edges or corners of the document using the securing clips 15a, 15b, 15c, 15d. Figure 2a shows a large document, for instance an A5-sized piece of paper 16a, being held down by its edges using the securing clips 15a, 15b, 15c, 15d. Figure 2b shows the same securing clips 15a, 15b, 15c, 15d holding down a smaller document, for instance a business card 16b, to the surface of the second wing 3.

20 The hinges 4a, 4b are of the friction stay type and allow the second wing 3 to sweep through an angle of 0 to 120° relative to the first wing 2. The hinges 4a, 4b are fitted with a stop at an angle of approximately 50° to indicate to the user that the second wing 3 is in the correct position for the document 16 to be photographed.

25 Referring to Figure 3, the camera unit 7 comprises a charge coupled device image sensor 17 and lens 18. The charge coupled device 17 and lens 18 are disposed at opposite ends of an elongate, box-shaped fold-down unit 19. The lens 18 focuses light passing through it onto the charge coupled device 17.

30 When the camera unit 7 is not in use, the fold-down unit 19 sits within a recess 20 disposed in the first wing 2. This is the "down" position. The fold-down unit 19 is coupled to the first wing 2 within the recess 20 by means of a friction stay hinge 21.

To use the camera unit 7, the uppermost surface 22 of fold-down unit 19 is depressed and an extending/retracting mechanism (not shown) raises the unit 19 into an "up" position. In this position, the fold-down unit 19 is angled with respect to the first wing 2 by approximately 40° and the lens 18 points at the centre of the second wing 3 when it is in the photographing position.

Referring to Figure 4, the first flash unit 8a has a first electronic flash bulb 24a disposed in an elongate, box-shaped fold-down unit 25a. When flash unit 8a is not in use, the fold-down unit 25a sits within a recess 26a disposed in the first wing 2. This is the "down" position. The fold-down unit 25a is coupled to the first wing 2 within the recess 26a by means of a friction stay hinge 27a. To use the flash unit 8a, the uppermost surface 28a of fold-down unit 25a is depressed and an extending/retracting mechanism (not shown) raises the unit 25a into an "up" position. In this position, the electronic flash bulb 24a may illuminate the second wing 3.

Positioning of a document and capturing of its image will now be described.

Assuming that the portable personal computer is open and operating, the user raises the camera and flash fold-down units 19, 25a, 25b into the "up" position. The user selects and runs software for controlling a camera unit 7, capturing an image and saving the captured image to file. The software may also allow editing of the captured image. The user selects, from a pull down menu, the size of the image to be captured. The software prompts the user to fasten the document 16 to the second wing 3 using the securing clips 15, to position the second wing in the photographing position and then to strike a key to capture the image. When a key is struck, the software blanks the panel display 14 behind the document 16 and triggers the flash units 8a, 8b while the image is captured by the camera unit 7. The image is saved to file and is shown on the panel display 14 for viewing by the user. The user repositions the panel display 14 to a viewing position, removes the document 16 and views the captured image on the panel display 14.

Second Embodiment

Referring to Figure 5, in a second embodiment of the present invention, a portable personal computer 31 comprises a first wing 32 and a second wing 33, coupled by hinge members 34a, 34b along a long edge 34. This arrangement allows the wings 32, 33 to be folded together when the personal computer is not in use. The inwardly directed face of the first wing 32 has a membrane keyboard 35, a track pad control 36, securing means 37 for securing a document 38, for instance a business card, to the inwardly directed face of the first wing 32. The first wing 32 also has power supply socket 39, input/output ports 40, a three-and-a-half inch disc drive 41, a hard drive 42, a motherboard 43. The inwardly directed face of the second wing 33 comprises a display panel 44, a camera unit 45, flash units 46a, 46b and a membrane control button 47.

The securing means 37 comprises securing clips 37a, 37b, 37c, 37d identical to those in the first embodiment. A securing clip 37 is attached to each corner of the inward facing surface of the first wing 33, so that they lie flat against the surface.

The camera unit 45 is identical in construction as that shown in Figure 3 except that the unit is housed in the second wing 33.

Positioning of a document and capturing of its image will now be described.

Assuming that the portable computer is open and operating, the user raises the fold-down camera and flash units 45, 46a, 46b into the "up" position. The user selects and runs software for controlling a camera unit 45, capturing an image and saving the captured image to file. The software may also allow editing of the captured image. The user selects, from a pull down menu, the size of the image to be captured. The software prompts the user to fasten the document 38 to the first wing 32 using the securing clips 37, to position the second wing 33 to the photographing position and then to press the membrane control button 47 to capture the image. When the button is struck, the software blanks the panel display 36 behind the document 38 and triggers the flash units 46a, 46b while the image is captured by the camera unit 45. The image is saved to file and is shown on the

panel display 44 for viewing by the user. The user repositions the second wing 33 to a viewing position, removes the document 38 and views the captured image on the panel display 44.

5 *Third Embodiment*

Referring to Figure 6, in a third embodiment of the present invention, an electronic book 61, comprises a first wing 62 and a second wing 63, coupled by hinge members 64a, 64b along a long edge 64. This arrangement allows the wings 62, 63 to be folded together when the electronic book is not in use. The inwardly directed face of the first wing 62 has a first display panel 64, first membrane control pads 65, securing means 66 for securing a document 67, for instance a business card, to the inwardly directed face of the first wing 62. The first wing 62 also has power supply socket 68, input/output ports 69, a memory unit and logic board. The inwardly directed face of the second wing 63 has a second display panel 70 and a camera unit 71, flash units 72a, 72b and second membrane control pads 73.

The securing means 66 comprises flat, rectangular securing clips 66a, 66b, 66c, 66d. A securing clip 66 is attached to the middle of each edge of the inward facing surface of the first wing 62, so that they lie flat against the surface. Alternatively the securing means 66 may be identical to that used in the first embodiment.

The camera unit 71 is identical in construction as that shown in Figure 3 except that the unit is housed in the second wing 63.

25 Positioning of a document and capturing of its image will now be described.

Assuming that the electronic book 61 is open and operating, the user raises the fold-down units of the camera and flash units 71, 72a, 72b into the "up" position. The user selects and runs software for controlling a camera unit 71, capturing an image and saving the captured image to file. The user selects, from a pull down menu, the size of the image to be captured. The software prompts the user to fasten the document 67 to the first wing 62 using the securing clips 66, to adjust the angle of the second wing 63 to the photograph position and then to press the

second membrane control pads 73 to capture the image. When the pad is pressed, the software blanks the first and second panel displays 64, 70 and triggers the flash units 72a, 72b while the image is captured by the camera unit 71. The image is saved to file and is shown on the first panel display 64 for viewing by the user. The user repositions the second wing 63 to a viewing position, removes the document 67 and views the captured image on the first panel display 64.

Fourth Embodiment

Referring to Figures 7 and 8, in a fourth embodiment of the present invention, a portable personal computer 91 comprises a first wing 92 and a second wing 93, coupled by hinge members 94a, 94b along a first long edge 94. The second wing 93 has securing means 95 and a panel display 96.

The personal computer is identical to that in Figure 1, except that the securing means 95 comprises first, second, third and fourth extendable transparent ribbons 95a, 95b, 95c, 95d. The securing ribbons 95a, 95b, 95c, 95d are made from transparent plastics resin material. The ribbons are wound onto first, second, third and fourth reels 97a, 97b, 97c, 97d disposed in an overhanging lip 98 running between a panel display 96 and the edge of the second wing 93.

Viewing the inwardly directed face of the second wing 93, the first and second reels 97a, 97b are mounted in the upper lip 98a which runs along the top edge of the second wing 93. The third and fourth reels 97c, 97d are mounted in the left lip 98b which runs along the left edge of the second wing 93.

Considering the arrangement of the first reel 97a in more detail. The securing ribbon 95a is fixed at one end to the axis of the reel and wound on. The reel 97a is carried on an axle 98a about which the reel is free to rotate. A flat, coiled constant force spring 99a is attached at its outer end to the rim of the reel 97a. The inner end of the spring 99a is fixed to the axle 98a. The axle 98a bearing the reel 97a and the spring 99a is snap-fitted into receiving slots 100a, either side of a cavity 101a in the overhanging lip 98. A clip means 102a is fixed to the free end of the ribbon.

The clip means 102a comprises a rectangular metal plate with one edge curved back on itself. In cross-section the clip has the shape of a letter "J".

The free end of the ribbon is drawn out by the user, from one edge of the wing,
5 across the surface, to the other parallel edge, where a catch means 103a is disposed for receiving and engaging the clip means 102a. In this way the securing ribbon 95a is run across the surface of the second wing 91 and held in place.

Second, third and fourth reels 97b, 97c, 97d are fitted into the lip 98 in an identical
10 fashion to the first reel 97a. Similarly, second, third and fourth ribbons 95b, 95c, 95d are fitted with clip means 102b, 102c, 102d which are received by and engaged with catch means 103b, 103c, 103d.

The securing of the document 104 will now be described.

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The user places the document 104 flat against the second wing 93 and takes the first
securing ribbon 95a by the clip 102a and unwinds the ribbon 95a from the reel 97a. The clip 102a is attached to the catch 103a. Any slack in the ribbon 95a is pulled in by the spring 99a and so the ribbon is pulled taught across the surface of second
20 wing 96. This holds the document 104 to the surface of the second wing 93. The user does the same for the second, third and fourth securing ribbons 95b, 95c, 95d. In this way the whole document is held against the second wing 93 by a mesh of securing ribbons 95.

25 *Fifth Embodiment*

Referring to Figures 9 and 10, in a fifth embodiment of the present invention, a portable personal computer 121 comprises a first wing 122 and a second wing 123, coupled by hinge members 124a, 124b along a first long edge 124. The second wing 123 has securing means 125 and a panel display 126.

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The personal computer is identical to that in Figure 7, except that the securing means 125 comprises first, second, third and fourth permanently extended transparent ribbons 125a, 125b, 125c, 125d. The securing ribbons 125a, 125b, 125c,

125d are made from transparent plastics resin material. The first and second ribbons 125a, 125b run parallel to each other and are attached to first and third bars 127a, 127c disposed in an overhanging lip 128 running between a panel display 126 and the edge of the second wing 123. The third and fourth ribbons 125c, 125d which run perpendicular to the first and second ribbons 125a, 125b are attached to second and fourth bars 127b, 127d.

The document 130 is held against the second wing 123, by sliding the document 130 beneath at least two parallel securing ribbons 125.

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Viewing the first ribbon 125a in more detail, one end of the first ribbon 125a is wound and glued onto a sheath 129a that is free to slide up and down the first bar 127a. The other end of the first ribbon 125a is similarly attached to the third bar 127c. In this way the first ribbon 125a is movable across the face the of the second wing 123. Similarly the second ribbon 125b is movable across the face the of the second wing 123. Resultantly the separation between the first and second ribbons 125a, 125b is variable, so different sizes of documents may be accommodated. The third and fourth ribbons 125a, 125b are similarly moveable.

20 The securing of the document and capturing of an image of the document is similar to that described in the fourth embodiment.

Sixth Embodiment

Referring to Figure 11, in a sixth embodiment of the present invention, a hand-held personal computer 151, comprises a first wing 152 and a second wing 153, coupled by hinge members 155a, 155b along a first long edge 155. This arrangement allows the wings 152, 153 to be folded shut when the personal computer is not in use. The inwardly directed face of the first wing 152 has a display 156, first and second thumb-operated joysticks 157a, 157b, first and second control buttons 158a, 158b, a camera unit 159 and first and second flash units 160a, 160b. The first wing 151 also has power supply socket 161, input/output ports 162, a memory module (not shown), a motherboard (not shown), first and second microphones 163a, 163b and first and second loudspeakers 164a, 164b. The inwardly directed face of the second

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wing 153 comprises a securing means 165 for securing a document 166, for instance business card, to the inwardly directed face of the second wing 153.

The left-most adjacent edges of the first and second wings 152, 153 are bridged by a first shielding means 167a comprising a collapsible fan. Similarly the right-most adjacent edges of the first and second wings 152, 153 are bridged by a second shielding means 167b comprising a collapsible fan. The first and second shielding means 167a, 167b are made from durable opaque plastics resin material.

10 The securing means 165 may be similar to those used in the first, third, fourth or fifth embodiments.

Seventh Embodiment

Referring to Figures 12a and 12b, in a seventh embodiment of the present invention, a combined video phone 181 comprises a first wing 182 and a second wing 183 coupled by a friction stay hinge 184. The inwardly directed face of the first wing 182 has a touch key pad 185 and a clip 186 for securing a business card 187. The inwardly directed face of the second wing 183 has a panel display 188 and a first camera unit 189. The outwardly directed face of the second wing 183 has a second camera unit 190. The second wing 183 also has an antenna 191.

The first and second camera units 189, 190 comprise a fixed convex lens positioned in front of a charge couple device optical sensor.

Eighth Embodiment

Referring to Figures 13 and 14, in an eighth embodiment of the present invention, a portable personal computer 211 comprises a first wing 212 and a second wing 213, coupled by hinge members 214a, 214b along a first long edge 214. This arrangement allows the wings 212, 213 to be folded together when the personal computer is not in use. The first wing contains a camera unit 215.

The personal computer is identical to that in Figure 1, except that the camera unit 215 is permanently disposed within the body of the first wing 213. The camera unit

comprises a charge couple device optical sensor 216 disposed at the bottom of an inclined shaft 217. The shaft 217 is inclined at an angle of about 40 degrees with respect to the first wing 212. A lens 218 is disposed in the shaft to focus light on the charge couple device 216. A removable plug 219 covers the shaft opening when
5 the camera unit 215 is not in use.

In order to make the camera unit 215 more compact, the shaft 217 may be "L"-shaped with a mirror 220 located at its elbow.

10 It will be appreciated that many modifications can be made to the embodiments described above.

For example, the securing means may comprise a clear plastic sheet disposed in front of a wing such that the document may be slid between the wing and the clear
15 plastic sheet.

Rather than using fold-down units, the flash units may be fixed within the wing of the computer.

20 Instead of flash units a back light of an LCD display may be used to illuminate the document.

The surface on which a document is placed may be marked with the outlines of documents of different shapes (for instance business card, A4 or A5) to aid
25 alignment of the document.

Motorised zoom lenses may be used instead of fixed focus lenses.

Instead of a mirror in the elbow of the "L" shaped shaft, a prism may be used.
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Claims



1. A portable electronic apparatus (1; 31; 61; 91; 121; 151; 181; 211) comprising first and second wings (2, 3; 32, 33; 62, 63; 92, 93; 122, 123; 152, 153; 182, 183; 212, 213) hingedly coupled to each other and an optical sensor (7; 45; 71; 159; 189; 215) mounted to the first wing, characterised in that the optical sensor is configured for sensing a document (16; 38; 67; 104; 130; 166; 187) lying against the second wing.
2. A portable electronic apparatus according to claim 1, wherein the optical sensor (16; 38; 67; 104; 130; 166; 187) is configured so as to be directed perpendicular to the second wing and focused substantially thereon.
3. A portable electronic apparatus according to claim 1 or 2, wherein a keyboard is carried by the second wing (3; 33; 63; 93; 123; 153; 183; 213).
4. A portable electronic apparatus according to claim 3, wherein a display screen (64; 156) is carried by the first wing (2; 32; 62; 92; 122; 152; 182; 212).
5. A portable electronic apparatus according to claim 1 or 2, wherein a keyboard (5; 35; 185) is carried by the first wing (2; 32; 62; 92; 122; 152; 182; 212).
6. A portable electronic apparatus according to claim 5, wherein a display screen (14; 44; 70; 96; 126; 188) is carried by the second wing (3; 33; 63; 93; 123; 153; 183; 213).
7. A portable electronic apparatus according to any preceding claim, including a photographic flash device (8a, 8b; 46a, 46b; 72a, 72b; 160a, 160b).
8. A portable electronic apparatus according to any preceding claim, wherein the direction in which the optical sensor (7; 45; 71; 159; 189; 215) is directed is changeable relative to the first wing (2; 32; 62; 92; 122; 152; 182; 212).

9. A portable electronic device according to any preceding claim wherein the document (16; 38; 67; 104; 130; 166; 187) is secured to the second wing (3; 33; 63; 93; 123; 153; 183; 213) by a securing means (15a, 15b, 15c, 15d; 37a, 37b, 37c, 37d; 66a, 66b, 66c, 66d; 95a, 95b, 95c, 95d; 125a, 125b, 125c, 125d; 165a, 165b, 165c, 165d; 186).

10. A portable electronic device according to claim 9 wherein the securing means comprises a clip means (95a, 95b, 95c, 95d; 102a, 102b, 102c, 102d) operable to hold the document (16; 38; 67; 104; 130; 166; 187) between the second wing (3; 33; 63; 93; 123; 153; 183; 213) and the clip means.

11. A portable electronic device according to claim 10 wherein the clip means comprises a ribbon (95a, 95b, 95c, 95d).

12. A portable electronic device according to claim 11, including a reel (97a, 97b, 97c, 97d) wherein the ribbon is wound on the reel so that it can be paid out for securing the document.

