

BRIEF DESCRIPTION OF THE DRAWINGS

[0037] Other objects, features and advantages of the present invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings, in which:

[0038] **FIG. 1** is a diagram for illustrating a means for adjusting a distribution of amount of light of a received light beam in an optical unit of a conventional information display and input apparatus;

[0039] **FIG. 2** is a diagram showing a structure of an optical unit of an embodiment of a coordinate input and detection device according to the present invention and optical paths of projected and reflected light beams in the optical unit;

[0040] **FIG. 3** is a schematic diagram of an overall structure of the coordinate input and detection device of **FIG. 2**;

[0041] **FIG. 4** is a diagram for illustrating a detection region on a touch panel covered by a pair of optical units shown in **FIG. 3**;

[0042] **FIG. 5** is a block diagram showing a structure of an operation part together with the optical units shown in **FIG. 3**;

[0043] **FIG. 6** is a block diagram showing only a portion of the operation part shown in **FIG. 5**, which portion is used so that a CPU performs a coordinate detection operation;

[0044] **FIG. 7** is a diagram for illustrating a peak point detected by a peak detector shown in **FIG. 6**;

[0045] **FIG. 8** is a diagram for illustrating an operation performed by an x-y computing element shown in **FIG. 6** for computing a coordinate value of a position where light beams are interrupted;

[0046] **FIG. 9** is a diagram showing a structure and a characteristic of a first embodiment of a filter employed as a means for adjusting a distribution of amount of light in the coordinate input and detection device according to the present invention;

[0047] **FIGS. 10A through 10C** are diagrams showing a structure of a second embodiment of the filter according to the present invention;

[0048] **FIG. 11** is a diagram for illustrating a characteristic of the filter shown in **FIGS. 10A through 10C**;

[0049] **FIGS. 12A and 12B** are diagrams for illustrating a state where adhesion portions are provided on first and second filters forming the filter shown in **FIGS. 10A through 10C**;

[0050] **FIG. 13** is a plan view of an attachment frame to which the first and second filters shown in **FIGS. 12A and 12B** are affixed;

[0051] **FIG. 14** is a diagram showing a structure and a characteristic of a third embodiment of the filter according to the present invention; and

[0052] **FIG. 15** is a perspective view of an embodiment of an information display and input apparatus according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0053] A description will now be given, with reference to the accompanying drawings, of embodiments of the present invention.

[0054] **FIG. 2** is a diagram showing a structure of an optical unit of an embodiment of a coordinate input and detection device according to the present invention and optical paths of projected and reflected light beams in the optical unit. **FIG. 3** is a schematic diagram of an overall structure of the coordinate input and detection device. **FIG. 4** is a diagram for illustrating a detection region on a touch panel **10** covered by a pair of the optical units **1L** and **1R**.

[0055] According to **FIG. 3**, the coordinate input and detection device includes the touch panel **10** and a pair of the optical units **1L** and **1R** each provided slantwise on a corresponding corner portion of the bottom side of the touch panel **10**. Each of the optical units **1L** and **1R** includes an optical system including a light source **3**, a CCD **13**, a half mirror **11**, cylindrical lenses **9a** through **9c**, a condenser lens (image formation lens) **12**, and a filter **4**; The light source **3** and the cylindrical lenses **9a** through **9c** form a light emitting part **6**, and the CCD **13** and the condenser lens **12** form a light receiving part **7**.

[0056] A retroreflective sheet **2** that is a reflective member is provided on the three sides other than the bottom side of the touch panel **10**. The retroreflective sheet **2**, which is, for instance, an arrangement of numerous cylindrical corner cubes, has the characteristic of reflecting an incident light to the same optical path.

[0057] The retroreflective sheet **2** is provided on the three sides other than the bottom side of the touch panel **10** and the optical units **1L** and **1R** are provided on the left and right corners of the bottom side of the touch panel **10**, respectively, because the reflection efficiency of the retroreflective sheet **2** may be deteriorated by dust prone to collect thereon if the retroreflective sheet **2** is disposed on the bottom side of the touch panel **10**.

[0058] As shown in **FIG. 4**, light beams projected from the optical units **1L** and **1R** spread out in sector shapes covering regions within angles θA and θB , respectively, in a direction parallel to a panel surface **10a** of the touch panel **10** so that a position can be detected in almost all the region of the panel surface **10a**. As the angles θA and θB become greater, the sector-shaped light beams cover a greater region of the panel surface **10a**, so that an extensive position detection is performable.

[0059] Each of the light beams projected from the optical units **1L** and **1R** is a parallel beam having a uniform thickness in a direction perpendicular to the panel surface **10a**.

[0060] In **FIG. 3**, for convenience of description, the sector-shaped light beam projected from the optical unit **1L** is formed of a bundle of lights **L1** through **Lm**, and similarly, the sector-shaped light beam projected from the optical unit **1R** is formed of a bundle of lights **R1** through **Rm**.

[0061] The light beams projected from the optical units **1L** and **1R** travel parallel to the panel surface **10a** of the touch panel **10** to reach the retroreflective sheet **2** provided on the three sides of the touch panel **10**. Upon reaching the ret-