

Candidate's Answer Paper

Note to the Examiners

With regard to the currently known prior art, I can discern the following patentable inventions from the Client's letter :

1. a transducer arrangement which provides pulses in response to a rotation of the ball rather than a variation in (potentio-meter) DC-voltage. This invention solves the limited reach problem.
2. a resilient biasing of the ball. This invention ensures a good transfer of a rotation of the ball to the transducers.

To provide the client with a sufficiently broad protection, each invention should be claimed in a separate independent claim.

In my view, the inventions are not so linked so as to form a general inventive concept. Consequently, if I claimed all 2 inventions independently in the one application for which I have drafted Claims, this application would not satisfy the unity of invention requirement. For this reason, only invention 1 is the subject of an independent Claim in my set of Claims.

However, in practice, I would have advised my client to file an additional application relating to invention 2.

Claims

1. A control device comprising :
 - a freely rotatable ball which is externally contactable;
 - a transducer arrangement for providing an electric signal which is indicative of a rotation of the ball;characterised in that:
 - the transducer arrangement provides electric pulses in response to the rotation of the ball.
2. A control device as claimed in Claim 1, characterised in that the transducer arrangement comprises an encoder disc having one or more irregularities, which disc is rotatably coupled to the ball, and detection means for detecting the or an irregularity so as to provide an electric pulse.
3. A control device as claimed in Claim 2, characterised in that the detection means comprise two mutually displaced detectors for providing two de-phased electric pulses.
4. A control device as claimed in Claim 2 or 3, characterised in that the detection means comprise an optical source arrangement for an optical detection of the or an irregularity.

5. A control device as claimed in Claim 2 or 3, characterised in that the detection means comprise an inductive source arrangement for an inductive detection of the or an irregularity.
6. A control device as claimed in any of the preceding Claims, characterised in that the transducer arrangement comprises two transducers for providing electric pulses in response to the rotation of the ball in an x-plane and an y-plane, respectively, in a Cartesian coordinate system.
7. A control device as claimed in any of the preceding Claims, characterised in that the control device comprises resilient means for imposing a biasing force on the ball for coupling the rotation of the ball to the transducer arrangement.
8. A control device as claimed in Claim 7 and including the features of Claim 6, characterized in that the biasing force is directed to the origin of the Cartesian coordinate system.
9. A control device as claimed in Claim 7, characterised in that the resilient means include a helical spring contacted to the ball via a biasing roller.
10. A control device as claimed in Claim 7, characterised in that the resilient means include a flexible shaft, which is part of a housing of the control device, which flexible shaft exerts the biasing force on the ball via a biasing roller.
- 10a. A mouse for use with software operated systems comprising a control device as claimed in any of the preceding Claims.
11. A trackball for use with software operated systems comprising a control device as claimed in any of the Claims 1-10.
12. A software operated system with display means, comprising a control device as claimed in any of the Claims 1-9 for controlling a display item on said display means.

The invention relates to a control device which is particularly suitable for use in a software operated system with display means.

In such a system, the control device controls the movement of a display item, for example a so-called cursor. A particular software option can be selected by moving the cursor to a graphic representation of the software option and a further execution command. The control device may be embodied as a so-called mouse or track-ball, which are commonly used names for devices to control cursor movement.

Document I describes a typical computer mouse for controlling a cursor. The prior art computer mouse comprises a freely rotatable ball which rotates as the mouse is moved over a support surface, e.g. a desktop surface or table. The ball is associated with first and second potentiometers which produce electrical signals which control the position of the cursor on the screen. The ball and the potentiometers are contained in a housing which has an opening through which the ball partly projects.

By moving the mouse in a desired direction, the ball is caused to roll on the support surface, which changes the electrical signals from the potentiometers. These electrical signals are converted into a corresponding position of the cursor on the screen. Accordingly, the cursor can be displaced on the screen by a corresponding displacement of the mouse over the support surface. By actuating a button mounted on the housing of the mouse, the user can command the computer to execute a software option which corresponds to the icon indicated by the cursor.

Trackball devices have a somewhat similar construction to a mouse. However, instead of the housing being moved by the user, the ball is rotated directly by the user while the housing remains stationary, for example, fixedly attached to the computer housing.

The invention seeks to provide a control device which, with reference to the prior art mouse, is more practical in use.

The invention takes the following aspect into consideration. The prior art mouse has a limited reach, i.e. when the mouse is moved such that the wiper of a potentiometer reaches an end position, the cursor cannot be moved further in that particular direction.

The invention provides a device as set out in Claim 1. In this device, a transducer arrangement is used which provides pulses in response to the rotation of the ball rather than a varying DC voltage as in the prior art mouse. The number of pulses is a measure of the amount of rotation of the ball. It will thus be appreciated that, in contrast to the prior art mouse, the device of the present invention does not require the use of potentiometers.

Consequently, the device need no longer to be limited in its reach, such that a user can always move the ball in the device, either directly (track-ball application) or by moving the device (mouse application).

In addition, a device of the present invention has further advantages. A further advantage is that of reliability and accuracy. Potentiometers, as used in the prior art mouse, are relative inaccurate. The inaccuracy tends to become worse over due time.

Additional features, which may optionally be used to implement the invention to advantage, are set out in the dependent Claims.

The additional features set out in Claim 7 provide the advantage that the rotation of the ball is reliably transferred to the transducer arrangement by resilient means. However, it should be noted that the advantage may also be obtained without the limiting features of the previous Claims.