located between the shaft and the linear cam to convert a rotary motion of the shaft into a linear motion of the linear cam. A reset means is located near a moving area of the linear cam to set an original position of the stepper motor when the linear cam reaches a reference position.

In the above-mentioned binary information display device, the reset means may be a stopper to be put into contact with the linear cam, which has reached the reference position from one direction, to stop further movement of the linear cam in the same direction, or a sensor for sensing the linear cam, which has reached the reference position, and for transmitting an original position reset signal to the stepper motor.

According to the binary information display device of the present invention, when the stepper motor as a component of the linear movement mechanism is actuated by actuation of the drive mechanism, a rotary motion of the stepper motor on the axis of the shaft is converted into a linear motion of the linear cam by actuation of the conversion means. The linear cam is thereby moved linearly in the direction orthogonal to the axis of the pins.

Since the linear cam is provided with recesses and projections formed in a specific pattern, the recesses and the projections press one end of each of the pins in correlation to the movement of the linear cam, so that the pins are shifted in the axial direction. The other ends of a plurality of pins supported by the support member are thereby extruded from and retracted in the display surface, and binary information is displayed on the display surface.

Furthermore, in the above binary information display device, if the reset means consists of a stopper to be put into contact with the linear cam, which has reached the reference position from one direction, to stop further movement of the linear cam in the same direction, the linear cam is fixed at the reference position by contacting the stopper.

At this time, the shaft of the stepper motor connected to the linear cam through the conversion means is also fixed, and the stepper motor, to which a pulse voltage is applied continuously, is stepped out and forcibly placed in the original position. This makes it possible to reset the stepper motor at the original position without using any detection device, and to provide a compact and inexpensive binary information display device having a simple structure.

In the above binary information display device, if the reset means consists of a sensor for sensing the linear cam, which has reached the reference position, and for transmitting an original position reset signal to the stepper motor, it is possible to easily and reliably set the original position of the stepper motor relative to the linear cam placed at the reference position without using any expensive rotational position detector.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a longitudinal cross sectional view showing an embodiment of a binary information display device according to the present invention.

FIG. **2** is a longitudinal cross sectional view showing a state of the binary information display device shown in FIG. **1** in which different binary information from that shown in FIG. **1** is displayed.

FIG. **3** is a longitudinal cross sectional view showing a second embodiment of a binary information display device according to the present invention.

FIG. **4** is a perspective view of a braille display device in which binary information display devices shown in FIG. **3** are arranged side by side.

FIG. **5** is a front view showing another embodiment of a binary information display device according to the present invention.

FIG. **6** is a front view showing a conventional binary information display device.

An embodiment of a binary information display device according to the present invention will be described below with reference to FIGS. **1** and **2**.

A binary information display device **10** of this embodiment for displaying, for example, four bits of binary information, comprises, as shown in FIG. **1**, four pins **11** arranged in parallel at equal intervals, a support member **12** for supporting the pins **11** slidably in the vertical direction, and a drive mechanism **13** for moving the pins **11** separately in the upward and downward directions by pushing up each of the pins **11** at a bottom end **11***a* thereof.

The support member **12** is a planar member fixed to a casing **14** on which the drive mechanism **13** is mounted, and fits the pins **11** in a plurality of through holes **15** formed vertically and spaced in parallel through the support member **12**, respectively. These through holes **15** are formed as to have a little larger diameter than the pins **11**, thereby supporting the pins **11**, which are to be shifted by the drive mechanism **13**, slidably only in the axial direction.

The drive mechanism **13** is constituted by, for example, a linear cam **16** housed in the casing **14**, and a linear movement mechanism **17** for linearly moving the linear cam **16**. The linear cam **16** is shaped like an almost rectangular plate, and is provided at the top thereof with an uneven surface **18** composed of projections **18***a* and recesses **18***b* between which there is a fixed difference of height as shown in FIG. **1**.

The minimum space between each projection **18***a* and each recess **18***b* is set such as to be one-half the space between the pins **11** supported by the support member **12**, and the projection **18***a* and the recess **18***b* are connected through a gently inclined face **18***c*. The pins **11** each have an almost spherical shape at least at the bottom end **11***a* thereof such as to be moved smoothly in the upward and downward directions by a force applied from the uneven surface **18**.

The vertical distance from the top of the projection **18***a* to the bottom of the linear cam **16** is set a little shorter than that from a ceiling surface **14***a* to a bottom surface **14***b* inside the casing **14**. Thereby, the linear cam **16** driven by the linear movement mechanism **17** is guided so as to linearly move only in the horizontal direction without swinging vertically in the casing **14** while being prevented from rotation.

The bottom end **11***a* of the pins **11** supported in the respective through holes **15** of the support member **12** are protruded from the ceiling face **14***a* of the casing **14** into the casing **14**. The uneven surface **18** of the linear cam **16** is thereby placed in contact with the bottom ends **11***a* of the pins **11**. When being moved upward by the projection **18***a*, the pin **11** is protruded upward from a display surface **12***a* located at the top of the support member **12**, thereby displaying a value "1". When being placed in the recess **18***b*, the pin **11** is moved downward and the top end **11***b* thereof is positioned below the display surface **12***a*, by which a value "0" is displayed on the display surface **12***a*.

The linear movement mechanism **17** comprises, for example, a stepper motor **20** for rotating a horizontally elongating shaft **19** on the axis, and a feed screw mechanism **21** (conversion mechanism) for converting a rotary motion of the stepper motor **20** into a linear motion of the linear cam **16**. The linear movement mechanism **17** further comprises a reset means **22** for setting an original position of the stepper motor **20** when the linear cam **16** is placed in a reference position.