mitting and receiving devices **331***a* are mounted at intervals narrower than the width of a head having a standard size.

[**0060**] Although the ultrasonic transmitting and receiving devices **331***a* may simultaneously transmit ultrasonic waves, they may successively do so at a high speed or at least every other ultrasonic transmitting and receiving device **331***a* may alternately do so for detection in order to prevent mutual interference of neighboring ultrasonic transmitting and receiving devices **331***a*. Since an ultrasonic beam having a narrow directivity provides a shortest distance data when it is received by the ultrasonic transmitting and receiving device **331***a* which sent it, there is no particular problem in specifying the ultrasonic transmitting and receiving device **331***a* having the shortest distance data even if the waves are interfered upon being received by the neighboring ultrasonic transmitting and receiving devices **331***a*.

[**0061**] As shown in **FIGS. 14A and 14B**, the return waves reflected by the game player's head are received by the same ultrasonic transmitting and receiving devices **331***a*, and the position detector **332** calculates distances based on periods which elapse from points of time of transmission to points of time of reception using a sound velocity information. In this way, a relationship (as shown in a graph **332***a*) in data between the interval of the ultrasonic transmitting and receiving devices **331***a* and the distance can be obtained. The peak point detector **333** detects a height position Pe and a transverse position Xp of a peak point as shown in **FIG. 14B** from the data on the interval and the distance. Since a graph is convex in height direction as shown in **FIG. 14**B, the peak point detector **333** can detect the peak point even if the peak point is located between the two ultrasonic transmitting and receiving devices **331***a* by providing the position detector **332** with a function of generating a continuous data using a model function prepared in advance. The position determining device **334** can determine the height position of the game player's eyes by subtracting a specified value from the detected height position Pe of the top of the game player's head and the transverse direction based on the arrangement interval of the ultrasonic transmitting and receiving devices **331***a*. An information on the height position and the transverse position of the game player's eyes thus obtained is sent to the game control unit **100**.

[**0062**] (4) **FIG. 15** is a diagram showing further another embodiment of the head detector. A head detector **430** is provided with a pressure-sensitive sheet member **431** laid on the play area and is adapted to detect the positions of both feet of the game player and determine the position of the head using this information and other pieces of information to be described later.

[**0063**] The pressure-sensitive sheet member **431** is constructed such that sensors elongated in forward and backward directions are transversely arranged side by side at intervals at least narrower, preferably sufficiently narrower than the width of the game player's feet (in **FIG. 15**, large intervals are drawn in an exaggerated manner in order to facilitate description and drawing). A known sheet member can be adopted as the pressure-sensitive sheet member **431**. For instance, the sheet member **431** is fabricated by printing elongated pressure-sensitive conductive ink portions **431***b* formed of, for example, a thermoplastic resin in which a pressure-sensitive conductive ink obtained by diffusely mixing conductive particles and nonconductive particles at corresponding positions of facing surfaces of two flexible film bases **431***a* and then adhering the two film bases **431***a* together. Lead wires (thermoplastic resin in which conductive particles such as silver particles are diffusely mixed) provided with insulation coatings are drawn from the respective pressure-sensitive ink portions **431***b* to the outside the film. A specified voltage is applied to the lead wires of one film base **431***a*, and a circuit for detecting the voltage is so connected with the lead wires of the other film base **431** that it can recognize the respective lead wires. Fine irregularities (resulting from the presence of fine particles during printing) are formed on contact surfaces of the pressure-sensitive ink portions **431***b* of the both film bases **431***a* put together. The voltage appearing in the lead wires of the other film **431***a* can be detected in an analog manner by a substantial change in the contact areas of the ink surfaces by application of a pressure on the film bases **431***a*, i.e. a change in resistance on the contact surfaces.

[**0064**] In a pressure data memory **432**, voltage values detected by the voltage detecting circuits for the individual pressure-sensitive ink portions **431***b*, i.e. pressure data are stored in correspondence. In **FIG. 15**, stored contents are represented as a distribution curve. A left/right foot position detector **433***a* calculates an information on the positions of the respective feet of the game player in transverse direction on the pressure-sensitive sheet member **431** by obtaining a center of an area where loads from the left and right feet can be judged based on the stored contents of the pressure data memory **432**. The calculated position information is stored in a foot position information memory **433***b*. The left/right foot position detector **433***a* also adds the pressure data within the foot area for each foot and stores added values in a weight leaning information memory as a weight leaning information.

[**0065**] A center of gravity calculator **433***d* calculates a center of gravity position of the loads on the pressure-sensitive sheet member **431** with respect to transverse direction, i.e. a waist position of the game player based on the contents stored in the pressure data memory **432**, and a calculation result is stored in a center of gravity position information memory **433***e*. In a statistical learning pattern memory **433***f* are stored pattern data used to assume the position of the game player's head based on the positions of both feet, exertion of the weight, the position of the waist, etc. from a human-factors engineering or empirical standpoint. A position determining device **433***g* determines the position of the game player's head based on the contents stored in the foot position information memory **433***b*, the weight leaning information memory **433***c*, the center of gravity position information memory **433***e* and the statistical learning pattern memory **433***f*. The determined head position information is sent to the game control unit **100**.

[**0066**] By laying the pressure-sensitive sheet member **431** on the play area in this way, the transverse position of the head above the pressure-sensitive sheet member **431** can be determined based on the position information on the game player's feet. Therefore, it is not necessary to specially prepare an arrangement space and a construction for the head detector.

[**0067**] (5) **FIG. 16** is a diagram showing another embodiment of the pressure-sensitive sheet member of the head detector. A head detector **530** is provided with a pressure-sensitive sheet member **531** laid on the play area and is