[0035] Light emitted from the light emitter **16** and passing through the opening **32** is received by a photosensor **41**. The photosensor **41** detects the amount of movement of the operating member **12** based on a direction from which the light is detected. Therefore, the opening **32** should be sized so as not to inhibit light from traveling within the range of movement of the operating member **12**. The photosensor **41** may detect the movement of the operating member **12** based on a position irradiated with light and the intensity of light in addition to the direction in which the light is detected. The range of movement of the operating member **12** is the same as the range in which the light can be detected by the photosensor **41**. In practice, the range of movement is determined by the size of the opening area in the surface **33** of the housing. The surface **33** of the housing forms a part of the surface of the steering wheel **8** and therefore is rounded in conformity to the shape of the steering wheel **8**. Alternatively, the top plate of the case **21** forming the surface **33** is removed so that the driving section **20** is covered with a member forming the steering wheel **8**.

[0036] The haptic interface device **2** of the present embodiment is attached to the steering wheel **8** in an upright position as shown in **FIG. 4**. Therefore, the control section **40** should control the driving section **20** in consideration of the weight of the frame **30** and the operating section **10**. In order to support the moving part in a rest condition and to account for the vibration normally generated during driving the vehicle, the four sides of the frame **30** are fixed to the case **21** with an elastic member **34** such as a rubber member or spring in the present embodiment.

[0037] The control section **40** includes a control substrate **42** that has a control circuit acting as indication control means therein, and the above-described photosensor **41** provided on the control substrate **42**. The photosensor **41** senses light emitted from the light emitter **16** to detect the position of the operating member **12** within its moving range, as described above. Detection means according to the present embodiment includes the photosensor **41** and a detection circuit (not shown) provided on the control substrate **42** for detecting an operation performed by the operator on the operating member **12**. The control circuit determines whether or not a state of the vehicle detected by the state sensor unit **4** should be indicated to the operator. When the control circuit determines that the state should be indicated, it generates haptic information representing the state of the vehicle and controls the driving section **20** based on the haptic information. This provides haptic information to the driver who touching the operating member **12** and informs them of the state of the vehicle.

[0038] According to the present embodiment, the control section **40** is provided below the driving section **20** as shown in **FIG. 3**, allowing the haptic interface device **2** to be treated as a single component. However, when the configuration of the steering wheel or column is such that the component having the unit shape as shown in **FIG. 3** cannot be fit inside the steering wheel **8**, the control section **40** may be attached to a side of the driving section **20** or may be separated from the driving section **20**, contained in a separate housing, and arranged side by side with the driving section **20** so that it can be contained in the steering wheel **8**. In any case, the photosensor **41** should be located in a position where it can receive light emitted by the light emitter **16**.

[0039] **FIG. 5** shows a functional block diagram of the haptic interface device according to the present embodiment. The state sensor unit **4** is means for sensing a state of the vehicle, such as the fuel level. The indication control unit **50** is implemented by the control section **40**, determines whether the state of the vehicle sensed by the state sensor unit **4** is information to be indicated to the driver and, if so, generates the information as haptic information. The haptic information is information for indicating to the driver information about the vehicle, such as a possible failure to turn off lights or low fuel level. This information is communicated by motion, such as vibration, of the operating member **12**. More specifically, in the present embodiment, drive control information for the driving section **20** causes the operating member **12** to generate motion such as vibration. A haptic presentation unit **52** is implemented by the driving section **20** and operating section **10** and operates based on haptic information sent from the indication control unit **50**.

[0040] An example operation according to the present embodiment will be described below.

[0041] The state sensor unit **4** continuously monitors the status of the vehicle based on signals from the sensors. If the illumination meter senses that the light intensity of lights is higher than a predetermined reference light intensity and that the lights have been in the on-state for a period of time longer than a predetermined period, for example, it determines the state as a possible "failure to turn off lights" and sends a signal indicating such.

[0042] When the state of the vehicle is indicated by the state sensor unit **4** via the connection line **6**, the control section **40** determines whether it should generate haptic information. For example, when an operation disable mode of the haptic interface device **2** is selected by the operator using a mode selection mechanism, which is not shown, or when the operator is making a sharp turn by turning the steering wheel **8** far in one direction, the control section **40** does not generate haptic information and the operating member **12** does not move. Furthermore, after the control section **40** has been controlling the operating member **12** to provide a stimulus to the driver for a certain period of time, it suspends the generation of haptic information predetermined time in order to prevent the driver from becoming immune to the stimulus.

[0043] Otherwise, during haptic stimulus generation mode, the control section **40** generates haptic information according to the state of the vehicle that it received and controls the driving section **20** based on the haptic information to cause the operating member **12** to operate to provide a predetermined haptic stimulus to the driver touching the operating member **12**. For example, the operating member **12** may generate an X-axis vibration stimulus for "failure to turn off lights", a Y-axis vibration stimulus for "fuel level low", and a 45-degree-from-X-axis vibration stimulus for "tire pressure low". This allows the driver, using their knowledge of the meanings of the various stimuli, to understand the state of the vehicle from the stimulus through his or her sense of touch without visually checking a light switch or instrument panel. The haptic stimulus provided to the driver through the operating member **12** is not limited to vibration. For example, it may be any other motion represented by two-dimensional figures such as a circle, square, or triangle.