drive IC **21** also supplies driving power (200 V) to these piezoelectric element pieces **15** via the printed wiring on the printed circuit board **18**. An external connector **22** is provided at the top of the drive circuit board **20**. Data transmitted by the computer (not shown) and corresponding to graphical information is inputted to the external connector **22**. The external connector **22** outputs data and driving power to the drive IC **21**.

[**0044**] Projections **23***a* and **23***b* are provided centrally at the respective ends of the front surface of the unit substrate **11**. Hole portions **24***a* and **24***b* corresponding to the projections **23***a* and **23***b*, respectively, are formed centrally at the respective ends of the back surface of the unit substrate **11**. When the adjacent unit substrates **11** are connected together, they are positioned by fitting the projections **23***a* and **23***b* on one of the unit substrates **11** into the hole portions **24***a* and **24***b*, respectively, in the other unit substrate **11**.

[**0045**] Through-holes **25***a* to **25***c* are formed in the four corner portions of the unit substrate **11**. When a plurality of unit substrates **11** are connected together, shaft rods (not shown) penetrate the through-holes **25***a* to **25***c*. Then, the unit substrates **11** are tightened and fixed to one another using a tightening member (not shown).

[**0046**] A plurality of thus configured braille graphics cell modules **30** are connected together in the horizontal direction as shown in **FIG. 6** to constitute a braille graphics tactile apparatus which has a display screen of a predetermined size enough to display graphical information.

[**0047**] The unit substrates **11** are connected together while fitting the projections **23***a* and **23***b* on each unit substrate **11** into the hole portions **24***a* and **24***b*, respectively, in the adjacent unit substrate **11** for positioning. In this state, the shared shaft rods (not shown) are allowed to penetrate the through-holes **25***a* to **25***c* in the unit substrates **11**. Further, the tightening member (not shown) is used to integrally tighten and fix the unit substrates **11**.

[**0048**] Further, the drive circuit board **20**, provided for each unit substrate **11**, connects to a shared bus circuit board **26** via its external connector **22**. The bus circuit board **26** is connected to the computer (not shown). The drive IC **21** of each unit substrate **11** is supplied with data transmitted by this computer and corresponding to graphical information as well as driving power for the piezoelectric element pieces **15**.

[**0049**] In this configuration, the lower end of the unit substrate **11**, constituting a unit, is provided with the printed circuit board **18**, having the terminals **18***a*, **18***b*, and **18***c*, to which the piezoelectric element pieces **15***a*, **15***b*, and **15***c*, respectively, of the proximal ends **151** of the piezoelectric element pieces **15** are electrically connected, the printed circuit board **18** also having the electric circuit guiding the terminals **18***a*, **18***b*, and **18***c* to the drive circuit board **20**. However, the upper edge of the printed circuit board **18** is located close to the node portion of each piezoelectric element piece **15** for a bending operation. Further, its lower edge is located close to the proximal end **151** of each piezoelectric element piece **15**. Thus, compared to the conventional configuration in which the arithmetic driving section with the connector or the like is projected from the proximal end of the unit substrate, it is possible to eliminate the members projecting downward from the unit substrate **11**. This sharply reduces the dimension in the height direction to enable a reduction in the size of the braille graphics cell module.

[**0050**] Further, the pushup cam **16** is provided between the free end **152** of each piezoelectric element piece **15** and the corresponding tactile pin **13**. The pushup cam **16** has the first action piece **16***a*, which contacts against the free end **152** of the corresponding piezoelectric element piece **15**, and the second action piece **16***b*, which has the placement surface **16***b***1** on which the lower end of the corresponding tactile pin **13** is placed. Furthermore, the pushup cam **16** is formed to have a large angle (obtuse angle) between the first action piece **16***a* and the placement surface **16***b***1** of the second action piece **16***b*. Thus, when the free end **152** of the bent piezoelectric element piece **15** pushes the first action piece **16***a*, the pushup cam **16** is pivoted to push up the tactile pin **13** placed on the second action piece **16***b* is pushed up. Specifically, the pushup cam **16** is formed to have such a large angle (obtuse angle) between the first action piece **16***a* and the second action piece **16***b* that the pushup cam **16** can be slightly bent. Thus, the tactile pin **13** is pushed up as a result of a small pivot angle associated with a bending operation of the corresponding piezoelectric element piece **15**. This enables a reduction in the space required to pivot each pushup cam **16**. Consequently, the spacing between the piezoelectric element pieces **15** and the tactile pins **13** can be reduced. It is thus possible to set a much smaller distance between the tactile pins **13**. This enables a reduction in the display area required to communicate the same amount of graphical information. Therefore, the size of the braille graphics cell module can be reduced.

[**0051**] Furthermore, the pushup cam **16** helps to push up the corresponding tactile pin **13** when the corresponding piezoelectric element piece **15** is bent, even if the piezoelectric element piece **15** is extended in the vertical direction. Consequently, compared to the conventional configuration in which the piezoelectric element pieces are obliquely arranged, it is possible to eliminate the longitudinally projecting members. Thus, the dimension in the longitudinal direction can also be reduced. This also enables a reduction in the size of the braille graphics cell module.

[**0052**] Then, when a braille graphics tactile apparatus is configured by connecting a plurality of thus configured braille graphics cell modules together in the horizontal direction, it is possible to sharply reduce the height and longitudinal dimension of the whole apparatus. Consequently, the braille graphics tactile apparatus can be miniaturized. Further, a much smaller distance can be set between the tactile pins **13** of each braille graphics cell module. It is thus possible to reduce the area of the display screen required to communicate graphical information sufficient to be properly understood by users. This also enables a reduction in the size of the braille graphics tactile apparatus. Further, since the tactile pins **13** can be densely arranged, precise graphical information can be communicated.

[**0053**] According to the embodiment of the present invention, it is possible to provide a braille graphics cell module and a braille graphics tactile apparatus the sizes of which can be sharply reduced.

[**0054**] The inventions described below can be extracted from the above embodiments. The inventions described below may be individually applied or combined as required.