

connecting electrodes on front and rear surfaces of an integral proximal end portion of a predetermined number of piezo-electric actuating elements to said lead terminals.

6. The device according to claim 1, wherein control drive circuits for said piezo-electric actuating elements are provided to be housed in said module.

7. A tactile reading device comprising:

a plurality of sensing rods arranged in first and second rows and supported so as to be vertically movable, for serving as braille type display unit;

a plurality of piezo-electric actuating elements arranged in said first and second rows and disposed vertically such that free end portions thereof extend in an upward direction;

a frame body including a module having said sensing rods and said piezo-electric actuating elements mounted thereon; and

a plurality of support rods arranged between said sensing rods and piezo-electric actuating elements in said first and second rows, respectively;

a plurality of pushing-up cams axially and pivotally supported by said support rods and disposed between said sensing rods and said piezo-electric actuating elements to transmit tactile reading information from said piezo-electric actuating elements to said sensing rods;

each of said pushing-up cams has first and second levers;

the first lever of each said pushing-up cam supported by a respective said support rod in the first row extending downward from said support rod to a respective said piezo-electric actuating element arranged in the first row to freely contact with said free end portion thereof, and the second lever thereof extending laterally to a lower portion of a respective said sensing rod arranged in the second row to freely contact with a lower portion of said sensing rod arranged in the second row; and

the first lever of each said pushing-up cam supported by a respective said support rod in the second row extending downward from said support rod to a respective said piezo-electric actuating element arranged in the second row to freely contact with said free end portion thereof, and the second lever thereof extending laterally to a lower portion of a respective said sensing rod arranged in the first row to freely contact with a lower portion of said sensing rod arranged in the first row.

8. A tactile reading device comprising:

a frame body;

a plurality of sensing rods, provided on an upper portion of a frame body and supported so as to be vertically movable, for serving as braille type display units;

a plurality of piezo-electric actuating elements provided on a lower portion of said frame body to respectively correspond to said sensing rods and disposed vertically such that free end portions thereof extend in an upward direction;

said frame body including a module having said sensing rods and said piezo-electric actuating elements mounted thereon;

a plurality of pushing-up cams disposed between said sensing rods and said piezo-electric actuating elements to transmit tactile reading information from said piezo-electric actuating elements to said sensing rods;

support rods for axially and pivotally supporting said pushing-up cams; and

each of said pushing-up cams has first and second levers, said first lever extending downward from a respective said support rod and having a lower end portion which freely contacts with said free end portion of a respective said piezo-electric actuating element, and said second lever extending laterally to a lower portion of a respective said sensing rod and having an upper portion which forms a predetermined angle with respect to a horizontal direction and freely contacts with a lower portion of said respective sensing rod, and said pushing-up cam rotates on said support rod to transmit a force applied to said lower portion of said first lever of said pushing-up cam from said piezo-electric actuating element to said lower portion of said sensing rod.

9. A tactile reading device comprising:

a frame body;

a plurality of sensing rods, provided on an upper portion of a frame body and supported so as to be vertically movable, for serving as braille type display units;

a plurality of piezo-electric actuating elements provided on a lower portion of said frame body to respectively correspond to said sensing rods and disposed vertically such that free end portions thereof extend in an upward direction;

said frame body including a module having said sensing rods and said piezo-electric actuating elements mounted thereon;

a plurality of pushing-up cams disposed between said sensing rods and said piezo-electric actuating elements to transmit tactile reading information from said piezo-electric actuating elements to said sensing rods;

support rods for axially and pivotally supporting said pushing-up cams; and

each of said pushing-up cams has first and second levers, said first lever extending downward from a respective said support rod and having a lower end portion which freely contacts with said free end portion of a respective said piezo-electric actuating element, and said second lever extending laterally to a lower portion of a respective said sensing rod and having an upper portion which forms a predetermined curved surfaces with respect to a horizontal direction and freely contacts with a lower portion of said respective sensing rod, and said pushing-up cam rotates on said support rod to transmit a force applied to said lower portion of said first lever of said pushing-up cam from said piezo-electric actuating element to said lower portion of said sensing rod.

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