DEVICE AND SUPPORT SHEET FOR THE PUNCTIFORM REPRESENTATION OF GRAPHICAL INFORMATION WHICH MAY BE READ BY TOUCH

[0001] The invention relates to a device and a support sheet for the punctiform representation of graphical information which can be read by touch, in particular for the representation of Braille script, with a multiplicity of systematically arranged touch points. The device has actuators for activating selected touch points, the touch points being formed integrally with the support sheet. An erasing element is provided, to bring all the touch points into the activated state or into a deactivated state by springing back of the touch region on or below the plane which is formed by the touch surface of the support sheet.

[0002] Braille characters are a punctiform script which can be read by touch for the blind, developed by Louis Braille. The characters to be represented were in this case originally coded with the aid of a system of six dots. By various arrangements of the dots, 63 combinations of the basic form can be achieved. Consequently, all the characters that can also be printed by typescript can be represented. This was followed by the development also of musical notation for the blind. To create a stenographic script for the blind, permitting a faster writing speed, the system of six dots was supplemented by a seventh dot and an eighth dot. In this way, 255 possible combinations can be represented. Consequently, every common word can be represented as a contraction. The increase in the speed compared with stenography is approximately 50%. Information on the Braille script is disclosed on the Internet at www.braille.at.

[0003] For the continuous representation of Braille characters there are known devices in which the Braille characters are created in fixed positions by parallel activation of individual fixed actuators. To permit fluent reading, very many characters (about 40 to 80 characters) must be grouped together in one or two lines. This results in a relatively large, unergonomic design and is also expensive and complex.

[0004] Devices of this type, which are known as Braille writers, represent the Braille characters on a large surface area. Further devices are known, with which the characters are represented on the outside of a large drum, for example the rotating-wheel Braille display from NIST. In the case of this Braille display, the Braille characters are represented on a rotating wheel by exposed actuators, which are provided around the entire wheel.

[0005] Modern devices for representing Braille characters have piezoelectric actuators, it being possible to represent up to 80 characters. Smaller devices with approximately 20 characters are also available. These devices or Braille writers are relatively expensive on account of their complex structural design.

[0006] There are further known devices for representing Braille script, in which a support sheet in band form circulates around two rollers that are spaced apart from one another, the Braille characters being represented on the surface of the support band.

[0007] FR 00 16 390 discloses a device in which pins are pressed into or out of the reading plane of the band by electromagnetic activation. As a result, reading of the script characters by touch is possible.

[0008] In EP 0 123 205 A1 there is a description of a method and a device for representing graphical information in Braille script, small magnetic balls which partly protrude from a support being moved into a reading plane. A suction station removes the balls that are not required. The exposed balls then represent the character to be read and can be sensed from the surface.

[0009] U.S. Pat. No. 4,571,190 likewise discloses a method in which balls are placed in a circulating band in such a way that they form letters which can be read by touch by a blind person.

[0010] The abovementioned devices are relatively large, so that mobile use is not possible, or only with difficulty. The use of steel balls also leads to a great weight and additionally hinders mobile use. Furthermore, the reading speed is not optimally variable.

[0011] DE-C 44 30 942 C1 discloses a device for displaying script for the blind in which an endlessly circulating elastic band has lugs cut into it in a U-shaped manner as character elements which can be lowered. By pressing out and positively engaging the lugs from the band, the touch points are set. Erasing the touch points takes place by stretching the band, so that the positive undercut engagement is reversed. A disadvantage is the high expenditure of force for stretching the band.

[0012] JP 02134674 A discloses a device for representing script for the blind in which a flat band with a memory function is provided. The touch points are formed such that they are raised from the band, in that pressure is exerted on the corresponding positions of the band. By heating the band, the touch points are erased again, since said band assumes a smooth surface on account of the memory function. A disadvantage is that the service life of the band [lacuna] to a restricted number of pressure/heating cycles.

[0013] In Gilliland, J. W.: Braille Character electrothermo display element. In: IBM Technical Disclosure Bulletin, Vol. 17 No. 15 Oct. 1974, pages 1481 to 1482, there is a description of a Braille reading device activatable by electrical heating, which disadvantageously does not allow running script to be created and is relatively energy-intensive and costly.

[0014] DE 34 00 094 A1 discloses a device for creating a tactile character array, in particular for representing Braille script, which has a circulating support band with a multiplicity of systematically arranged touch points. The touch points are activated by actuators. Moreover, an erasing roller is provided for the deactivation of the touch points. The touch points are dimples formed integrally with the support band, the dimples having a parabolic cross section and protruding beyond the surface of the support band in the activated state. In the deactivated state, the dimples are retracted, sprung back in a mirror-inverted manner about the plane of the support band. In an intermediate stage, the dimples are located in an undular manner in a corresponding accommodating space of the support band.

[0015] The parabolic dimples have a uniform thickness and are formed in such a way that a relatively great displacement and relatively considerable work are required to displace a dimple from one position into the other.

[0016] It was therefore an object of the invention to provide an improved device of the generic type which is inexpensive, lightweight and reliable.