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Varveris

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(54) **FINGER-MOUNTED STYLUS FOR COMPUTER TOUCH SCREEN**

5,940,066 * 8/1999 Weinblatt 345/179

OTHER PUBLICATIONS

(76) Inventor: **Nicholas G. Varveris**, 538 Churchill Ave., Palo Alto, CA (US) 94301

Copy of 2 pages from Internet, entitled "Fingertip Styles", by Concept Kitchen (date unknown)*.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

* cited by examiner

Primary Examiner—Steven Saras
Assistant Examiner—Fritz Alphonse
 (74) *Attorney, Agent, or Firm*—Skjerven Morrill MacPherson LLP; David E. Steuber

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(22) Filed: **Oct. 21, 1998**

(57) ABSTRACT

(51) **Int. Cl.⁷** **G09G 5/00**
 (52) **U.S. Cl.** **345/179; 345/157; 401/8**
 (58) **Field of Search** 345/156, 157, 345/168, 173, 179, 184; 178/19.01, 19.02, 19.03, 19.05, 19.06; 401/7, 8

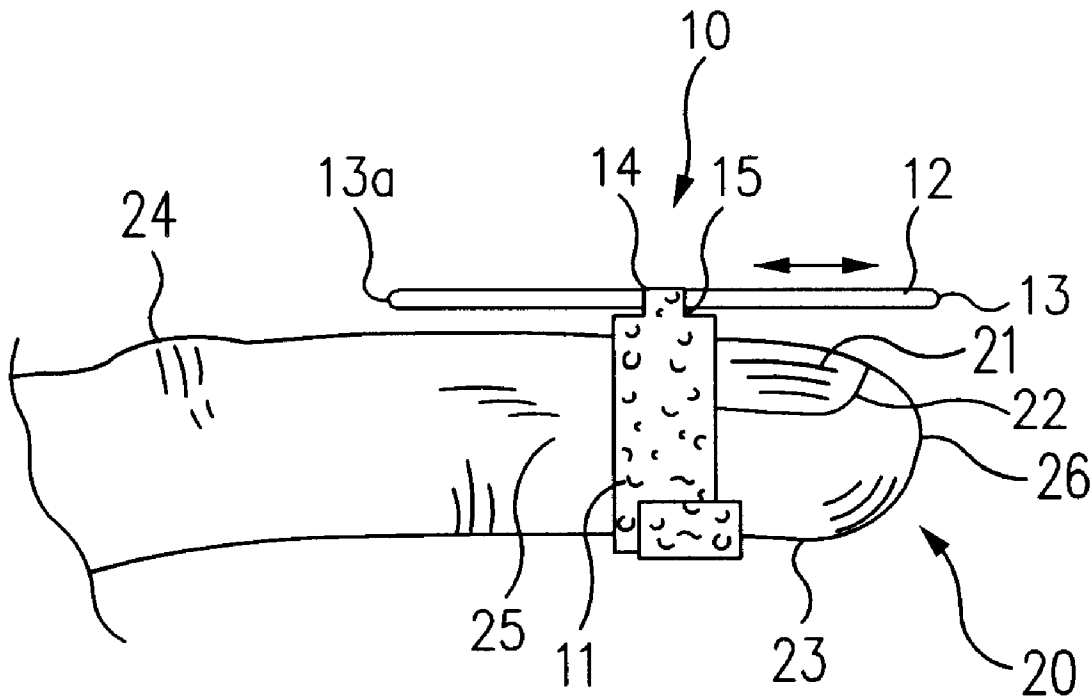
A finger stylus for a touch screen includes a flexible non-metallic elastic ring or a flexible, fabric-like strap having distal ends, each of the distal ends includes parts of an interconnect fastener such as a hooks and loops or a magnetic fastener. The ring or strap forms a wraparound for a human fingertip such that, in use, the bonding of the interconnect fastener parts about the fingertip or the elasticity of the ring firmly hold the strap against the fingertip. The ring or strap includes an intermediate portion including a loop-hole extending from an exterior surface of the intermediate portion which receives a longitudinal stylus rod extending through the loop-hole in a semi-friction-fit connection with the loop-hole. The rod in use is positioned to extend through the loop-hole generally transversely to the strap and above and beyond a user's fingertip for touching a touch screen. The stylus rod is made of a non-marking material with generally rounded shaped ends.

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U.S. PATENT DOCUMENTS

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4,738,556	* 4/1988	Brown	401/7
4,780,707	* 10/1988	Selker	345/703
4,954,817	9/1990	Levine	340/706
5,405,206	4/1995	Bedol	401/7
5,627,648	5/1997	Berkson et al.	178/18
5,635,682	6/1997	Cherdak et al.	178/18
5,706,026	1/1998	Kent et al.	345/156
5,868,509	* 2/1999	Crutcher	401/8

9 Claims, 2 Drawing Sheets



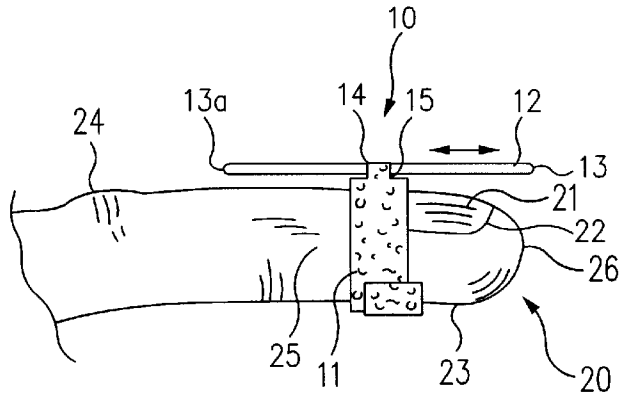


FIG. 1

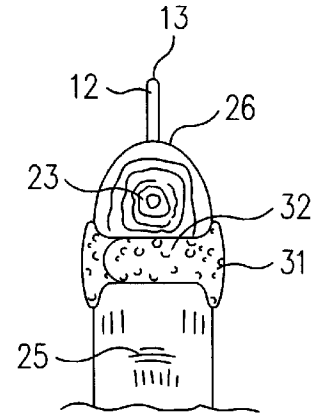


FIG. 2

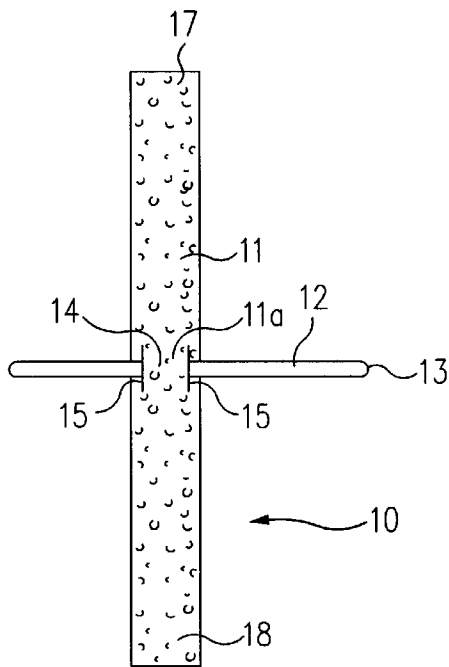


FIG. 4

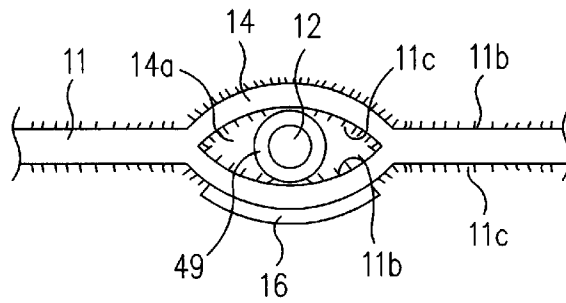


FIG. 3

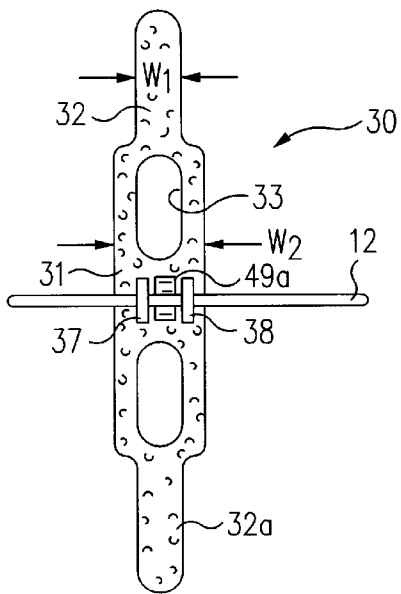


FIG. 5

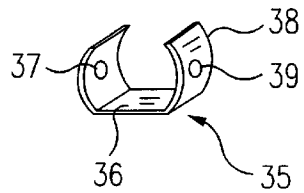


FIG. 6

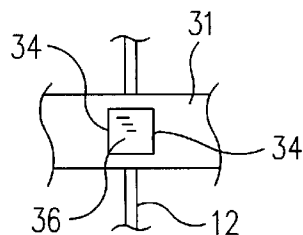


FIG. 7

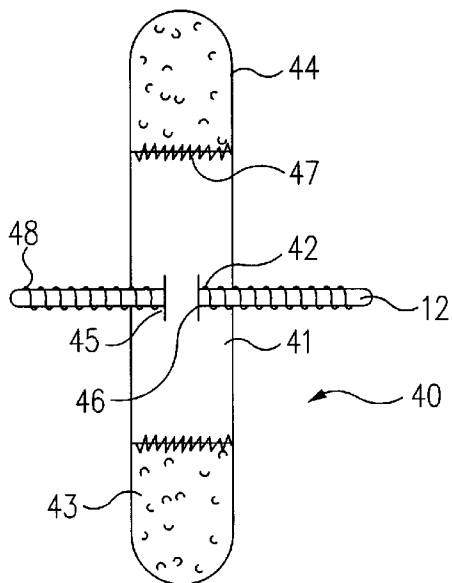


FIG. 8

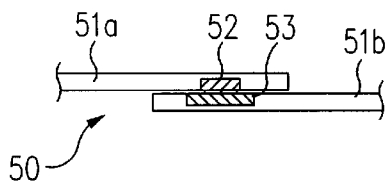


FIG. 9

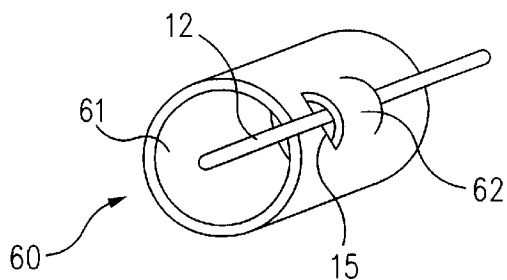


FIG. 10

FINGER-MOUNTED STYLUS FOR COMPUTER TOUCH SCREEN

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to writing stylus for "touch screen" devices. "Touch screen" devices are devices that can sense and record when an object contacts their surface. The invention relates to such devices that sense and record or relay data when contacted by passive-non-electrical objects. Particularly, the invention is directed to a writing stylus for touch screen devices that the user can wear on or attach to their finger.

2. Related Art

Recently personal digital assistants ("PDA's") such as the Palm Pilot from 3COM, Microsoft Windows CE based handheld PC's, the Apple Newton, or personal organizers such as the Sharp Zaurus have been produced with touch sensitive screens. These computing devices typically include a simple wooden or plastic pen-type stylus with a non-marking tip. The stylus is touched to the screen in order to act like a mouse (to move the cursor, highlight text, etc.) or to enter information (characters for handwriting recognition, drawings, etc.). A non-marking implement is used so that the screen of the device will not be scratched or damaged when touched. In addition, these pen-style styli must usually be over four inches (10 cm.) long to be properly supported by a user's hand. This requires a significant amount of space, within the case of a touch screen device, for storage of the stylus.

Moreover, the stylus for such devices is often lost. Copies of the original stylus may or may not be available. Therefore replacement styli are necessary. In addition, existing styli are pen-shaped. This requires the user to stop what they are doing and pick up or put down these specialized styli when they wish to enter information in the touch screen device while doing other work such as typing or writing. In place of the normal stylus a user will occasionally use a fingertip as a stylus; unfortunately a fingertip is blunt and a user often cannot position their finger with sufficient accuracy to locate the cursor or enter other data where needed on the screen.

Recently two patents have been issued regarding digital styli to the A. T. Cross Company. These U.S. Pat. Nos. 5,635,682 and 5,627,348 cover the creation of a replaceable non-marking stylus core in conventional pen-shaped writing instruments, and the composition of the non-marking stylus tip that will produce a "sound and feel" comparable to traditional writing on paper. Neither of these inventions contemplate the use of a non-marking stylus attached to or covering a portion of a user's finger.

Other prior art contemplates the use of a writing implement, i.e., a pencil or pen, attached to a finger. For example, U.S. Pat. No. 198,484 of 1877 uses a perforated finger sleeve to attach a pen, "a pencil or other writing or marking instrument" to one's finger. Other patents, including U.S. Pat. No. 361,535 of 1887, and U.S. Pat. No. 5,405,206, use an assortment of rings, metal clamps or thimble type devices to attach writing instruments (most of which use ink or some other physical marking process) to one's finger. U.S. Pat. No. 4,738,556 uses a Velcro strap to secure a pen in-line with the end of a finger. A recent fingertip stylus device has been shown on the Internet. The device is a rotatable bent wire ring including a tip extension for contacting a touch screen. Still other prior art contemplates the use of finger mounted writing implements for digital tablets, however, these patents contemplate use of

devices which gather or send electrical signals from the device tips and do not contemplate a passive, non-marking tip. These patents include U.S. Pat. No. 4,954,817 and U.S. Pat. No. 5,706,026.

SUMMARY OF INVENTION

Generally, the purpose of the device is to provide a stylus for touch screen devices that the user can wear on or attached to their finger. It will allow a user to enter data on a touch screen without having to hold a separate stylus or pen-type implement, and will allow users to type on a keyboard or hold a normal (marking) pen without having to remove or adjust the finger mounted stylus, hereinafter called the "finger stylus".

The current invention provides a finger stylus that can be attached in a variety of ways to the user's finger. It uses a strap type body with an easily removable fastener (such as a Velcro® hook and loop type material, or a magnetic clasp) or can be an elastic fabric or rubber ring, each with a passive non-marking tip attached or incorporated therein. The device will be attached to or cover a portion of the finger. The device may be manufactured as two or more pieces so that the attachment or "strap" portion of the preferred embodiment of the device and the non-marking tip can be made of different materials. The attachment or "strap" portion of the device can be made entirely of plastic "Velcro" material, or of rubber, leather, or fabric with Velcro material or other separable fastener at the ends. The non-marking tip of the device extends outwardly from a position above or to the side of a user's finger and in a general parallel direction to the user's fingertip so as not to interfere with a user's ability to type or otherwise use the finger. Since the non-marking tip may wear down with use and require replacement, the finger stylus preferably has a replaceable non-marking tip. The non-marking tip may be made of different materials such as wood, plastic or hard rubber or a combination of these and be of different shapes so that it can work on different screen surfaces without marking. The non-marking finger mounted stylus can be used not only with self contained touch screen "PDA's", etc. but also with touch screen tablets or pads attached to other computing devices or computers, and other electrical devices incorporating touch screens such as cellular phones, etc.

The present invention will allow a user to enter data on a touch screen without having to hold a separate stylus or pen type implement, and will allow a user to type on a keyboard or hold a normal (marking) pen without having to remove or adjust the finger mounted stylus. The finger stylus on the user's finger will not interfere with the user's ability to perform other work such as typing, traditional cursory writing with a pen, operating a computer mouse, etc. while the finger stylus remains affixed to the user's finger.

The non-marking finger stylus can be rolled, unrolled, flattened or folded to a very small size so that it can be easily carried, or attached to or contained in touch screen devices, for example, by attaching the stylus fastening part to a complementary portion of Velcro material affixed to an edge of the computer screen or case. The finger stylus is adjustable longitudinally with respect to the user's finger so that the tip may accurately contact target areas of a touch screen device. The finger stylus is simple to use, inexpensive to make and is comfortable to wear or have attached to one's finger. The finger stylus cushions and redirects the impact force, resulting from the repetitive contact of the non-marking tip with the screen, away from the tip of ones finger or finger nail. The non-marking tip can be extended or

retracted various distances beyond the tip of the user's finger to adjust for various finger lengths, finger diameter and fingernail length. Non-marking tips of various materials and shapes are provided for contacting the surface of a particular touch screen device. The non-marking tip can be extended various distances to compensate for the erosion of the non-marking tip as the tip is used. The finger stylus is so light-in-weight, e.g., about 1.4 grams, that after a minute or so the user is no longer aware that it is on his or her fingertip.

The finger stylus for a touch screen includes a flexible non-metallic elastic ring, or fabric-like strap having distal ends, each of the distal ends includes parts of an interconnect fastener such as a hooks and loops or a magnetic fastener. The strap forms a wraparound for a human fingertip such that, in use, the bonding of the interconnect fastener parts about the fingertip firmly hold the strap against the fingertip. The ring or strap includes an intermediate portion or loop including a loophole extending from an exterior surface of the intermediate portion which receives a longitudinal stylus rod extending through the loophole in a semi-friction-fit connection with the loophole. The rod in use is positioned to extend through the loophole generally transversely to the strap and above and beyond a user's fingertip for touching a touch screen.

The distal ends of the strap can be crossed i.e., the ends being at an angle to each other, creating a funnel shape to compensate for the taper of a user's fingertip. This also helps keep the strap and stylus from slipping away from the tip of the finger as the stylus is used.

BRIEF DESCRIPTION OF THE DRAWINGS

The above mentioned purposes and advantages of the present invention will become apparent from the following description taken in connection with the accompanying drawings.

FIG. 1 is a side view of a preferred embodiment of the finger stylus of the invention as temporarily affixed to a human fingertip.

FIG. 2 is a bottom view of the FIG. 5 embodiment.

FIG. 3 is a partial side view of the finger stylus and strap per se showing a friction ring portion of another embodiment.

FIG. 4 is a top plan view of FIG. 1.

FIG. 5 is a top plan view of a third embodiment.

FIG. 6 is a perspective view of a spring clip for holding the stylus rod in the third embodiment.

FIG. 7 is a partial bottom view of the clip, the stylus rod and the strap.

FIG. 8 is a top plan view of a fourth embodiment of the invention.

FIG. 9 is a partial side view of a fifth embodiment of the invention.

FIG. 10 is a perspective view of a ring embodiment of the invention.

DETAILED DESCRIPTION

FIG. 1 depicts a flexible strap-type finger stylus including a strap 11 having a stylus rod 12 with a non-marking generally curved tip 13. The rod passes through a loophole 14a or a substantially half bend formed by two parallel through slits 15 in an intermediate portion 11a (FIG. 4) of the strap. The slits 15 extend from an upper surface 11b of the flexible strap portion 11a to the bottom surface 11c of the strap 11. The distal ends 17, 18 of the strap include a

reusable interconnect fastener such as magnetic pads or a hooks and loops type fastener (such as that sold under the trademark Velcro® material).

A plastic, fairly rigid rubber or wood non-marking stylus rod 12 having a non-marking tip 13 is inserted into and held in the loophole 14a in a semi-friction-fit. "Semi-friction-fit" as used herein means that the stylus rod will not appreciably shift in making stylus contact with a touch screen but it is movable by a user to a desired to and fro position by a user pulling or pushing the rod with respect to the loophole.

As seen in FIG. 1 the finger stylus is preferably affixed to a user's finger 20 at a fingertip portion 25 extending outwardly from a first finger joint 24. The overall strap 11 in use preferably overlaps the base of fingernail 21 leaving the user's fingertip pad 23 exposed so that the strap does not interfere with typing or the tactile feel of the natural fingertip pad. The tip 13 of stylus rod 12 in use preferably extends beyond the tip 22 of fingernail 21 and the distal end 26 of the fingertip. While the stylus preferably extends over the finger top the strap or ring can be rotated to a position in either direction up to 90° so as not to grossly interfere with an adjacent finger.

The strap and stylus rod per se are shown in FIGS. 3 and 4. Loops of the hooks and loops fastener material are shown on one surface 11b of the strap while the hooks are shown on the opposite surface 11c of the strap. A loophole cover or pad 16 made of plastic, rubber, or fabric material may extend under the loophole and be affixed by an adhesive or complementary hook or loop fabric fastener. The purpose of this pad is to smooth the underneath surface of the loopholes that contact the top or side of the finger. The pad can also provide additional friction with the stylus rod. It is relatively non-stretchable and thus restricts stretching of the overlying band material. Also a friction pad or ring 49 (FIG. 3) may be inserted and affixed in the loophole with the stylus rod passing therethrough to keep the rod in place during touching of the touch screen while later permitting movement of the rod to adjust its position relative to the ring and the loophole.

FIG. 2 illustrates the user's finger bottom facing the user's palm, where a modified embodiment of the strap is shown. As seen in FIG. 5 the distal ends 32 and 32a of the strap are narrower in width W_1 than the width W_2 of the intermediate portion 31 of the strap 30. This allows more of the whorls-containing fingertip pad 23 to be exposed when the strap is wrapped around the fingertip as clearly shown in FIG. 2. FIGS. 1 and 2 also show the preferred location of stylus rod tip 13 extending outwardly beyond the end 22 of fingernail 21 so as to easily access a touch screen while not interfering with other uses of the fingertip and the fingertip pad 23. The proximal end 13a of the rod 12 extends above and is spaced from fingertip portion 25 and joint 24 so as to allow complete finger flexing at the joint without contacting end 13a.

FIGS. 5-7 illustrate another embodiment 30 of the invention where the stylus rod is held in a semi-friction-fit in a U-shaped plastic or metal (such as brass) clip 35. Bight 36 of the clip seats on the underside of an intermediate portion 31 of the strap and the legs 37, 38 are inserted into and through slits 34 in the strap. Each leg includes an aperture 39 which apertures are aligned for receipt of the stylus rod 12. The legs 37 and 38 may be slightly bowed to insure that a semi-friction-fit is provided. A friction pad or ring 49a may be fixed to portion 31 between the legs 37 and 38 to augment the friction against the stylus rod. Apertures 33 may be provided in the strap to lighten the finger stylus and to allow

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