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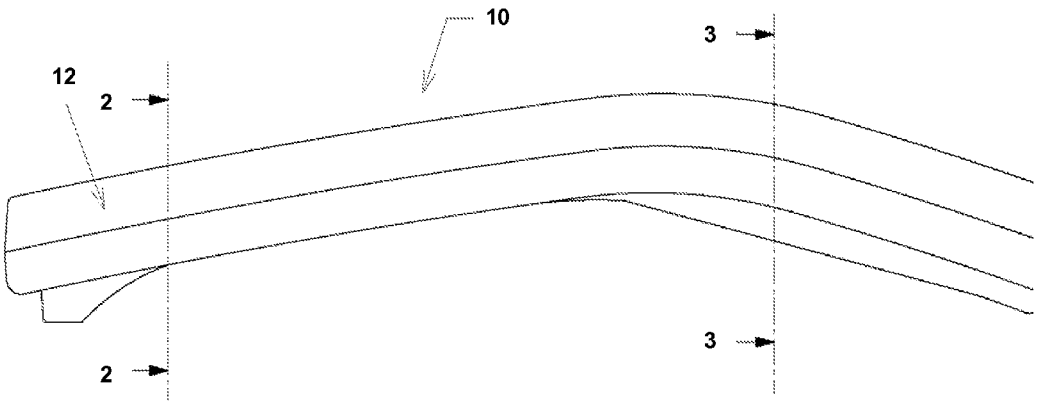
(54) **Title:** ULTRA THIN HANDHELD OPTICAL SCANNER



(57) **Abstract:** A handheld optical scanner is constructed by mounting the tallest internal components inwardly, towards the cross-wise center of the scanner and mounting progressively shorter components towards the sides of the scanner. As a result, a handheld scanner can be provided with an outer body with a central bulge, but having an ultra thin appearance, and it becomes possible to provide a more ergonomic shape, making it possible for an operator to hold such scanners for longer periods of time, without undue discomfort. Further improvement in size reduction can be accomplished by causing the body of the scanner to taper in height towards the rear. As a result the tallest components can be mounted forward in the center of the body, allowing the rear of the body to be reduced even further in height.

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ULTRA THIN HANDHELD OPTICAL SCANNER

BACKGROUND OF THE INVENTION

The present invention relates generally to optical scanners and, more particularly, concerns handheld optical scanners of the type commonly used to scan barcodes on products.

Optical scanners of all types are widely used in industry today, and handheld scanners of the type used to scan barcodes enjoy extremely wide application from scanning products at checkout counters, to inventory systems, such as the type used to track and store physical files in a medical or law office. Despite the use of integrated circuits and modern miniaturization techniques, handheld scanners have, until now, been relatively large and bulky. As a result, operators of such devices tend to suffer discomfort after using them a short time, and they sometimes experience physical maladies. This problem is particularly serious for operators with relatively small hands.

A handheld scanner with an ultra thin contour would go a long way toward alleviating such problems. In addition, it would result in a handheld scanner with a particularly appealing, modern appearance, resulting in improved sales of such scanners.

SUMMARY OF THE INVENTION

In accordance with the present invention, a handheld optical scanner is constructed by mounting the tallest internal components inwardly, towards the crosswise center of the scanner and mounting progressively shorter components towards the periphery of the scanner. As a result, a handheld scanner can be provided with an outer body having an ultra thin appearance, and it becomes possible to provide a more ergonomic shape, making it possible for an operator to hold such scanners for longer periods of time, without undue discomfort. Further improvement in size reduction can be accomplished by causing the body of the scanner to taper in height towards the rear. As a result the tallest components can be mounted forward in the center of the body, allowing the rear of the body to be reduced even further in height.

In accordance with one aspect of the invention, the housing for an optical scanner has a crosswise cross-section, at least towards the rear, which bulges in height inwardly of the lateral extremes of the housing.

In accordance with another aspect of the invention, the housing for an optical scanner has a lengthwise cross-section that bulges I height towards the front of the scanner.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing, and other objects, features and advantages of the invention will be understood more completely from the following detailed description of a presently preferred, but nonetheless illustrative, embodiment in accordance with the present invention, with reference being had to the accompanying drawings, in which:

FIG. 1 is a side view of a handheld scanner embodying the present invention;

FIG. 2 is a sectional view taken along line 2-2 in FIG. 1, near the rear of the scanner, and looking in the direction of the arrows; and

FIG. 3 is a sectional view taken along line 3-3 in FIG. 1, towards the front of the scanner, and looking in the direction of the arrows.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawings, FIG. 1 is a schematic side view of an optical scanner 10 embodying the present invention. As may be seen, the housing of the apparatus achieves an ultra thin, sleek shape, particularly, in its rear portion 12, where an operator would typically hold the device.

FIG. 2 is a sectional view taken along line 2-2 in FIG. 1 and looking in the direction of the arrows. As may be seen, the handheld scanner 10 includes a circuit board 14 with electrical components mounted thereon. As illustrated, the taller components, such as a switch 16 and a capacitor 18 are mounted inwardly, towards the crosswise center of the handheld scanner 10. This permits the rear portion of the scanner to have a particularly sleek, slim shape. Most preferably, the cross-section of FIG. 2 is approximately 12 mm high between its peaks and approximately 9 mm high at the sides. However, the central height may be between approximately11 and approximately 14 mm and the height of a side between approximately 8 and approximately 11 mm.

FIG. 3 is a sectional view of the handheld scanner 10 taken along line 3-3 in FIG. 1 and looking in the direction of the arrows. As may be seen, the handheld scanner 10 is

somewhat taller towards the front end. Preferably, it is approximately 17 mm from its highest to its lowest point, but a range of approximately 15 mm to approximately 18 mm may be acceptable. As in FIG. 2, the larger components are mounted towards the crosswise center of the scanner 10. However, in this particular area of the scanner 10, the largest components, such as a laser module 22 may be accommodated, allowing further reduction in the height of the rear. Thus, an ultra slim design is achieved by locating larger components towards the crosswise center of the scanner 10, with the components becoming smaller towards the two sides. In addition, the largest components may be mounted towards the taller front of the scanner, in addition to being towards the crosswise center.

Although preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that many additions, modifications and substitutions are possible without departing from the scope and spirit of the invention as defined by the accompanying claims.

CLAIMS:

1. In an elongate handheld optical scanner having a substantially hollow body including therein a circuit board with a mounting surface having components of various size mounted thereon, the improvement comprising the components being positioned based on how far they protrude from the mounting surface when mounted thereon, the taller components being closer to the crosswise center of the circuit board, the body being taller towards its crosswise center, whereby it may have an overall slim shape.

2. The scanner of claim 1 wherein the body has a height which increases towards a front thereof.

3. The scanner of claim 2 wherein the body has a rear portion with a crosswise varying height, the height being in between approximately 11 and approximately 14 mm at its highest point and between approximately 8 and approximately 11 mm at its point of minimum height.

4. The scanner of claim 3 wherein the body height is approximately 12mm at its tallest point and approximately 10mm at its shortest point.

5. The scanner of claim 2 wherein the body has a front portion with a crosswise varying height, the height being in between approximately 15 mm and approximately 18 mm at its highest point and between approximately 8mm and approximately 11 mm at its point of minimum height.

6. The scanner of claim 3 wherein the body height is approximately 12 mm at its tallest point and approximately 9 mm at its shortest point.

7. The scanner of claim 2, wherein the components are mounted in rear-to-front position in accordance with their height, the components being taller toward the front.

8. The scanner of claim 1 wherein the body has a rear portion with a crosswise varying height, the height being in between approximately 11 mm and approximately 14 mm

at its highest point and between approximately 8 mm and approximately 11 mm at its point of minimum height.

9. The scanner of claim 1 wherein the body height is approximately 12mm at its tallest point and approximately 9 mm at its shortest point.

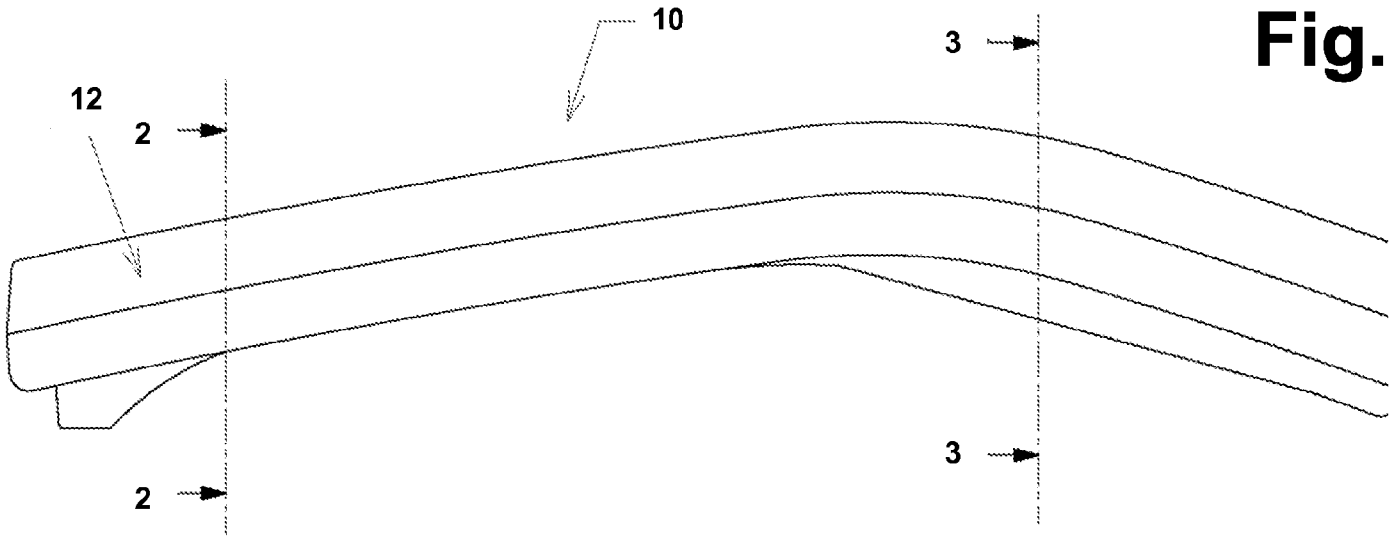

Fig.

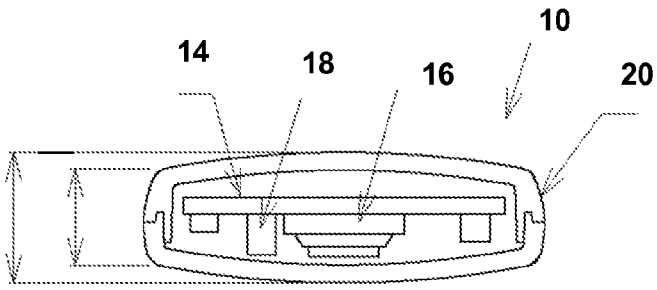

Fig. 2

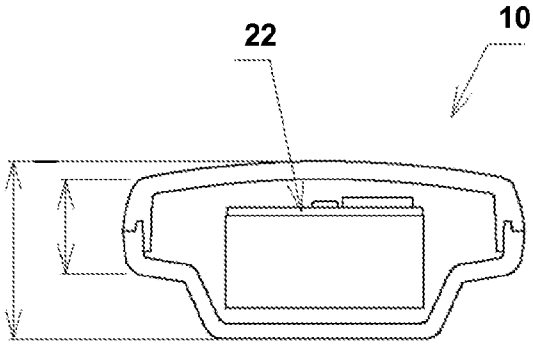

Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/62964

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06K 7/10 (2007.01)
USPC - 235/462.43
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G06K 7/10 (2007.01)
USPC - 235/462.43

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/0206827 A1 (SILVERBOOK et al) 21 October 2004 (21.10.2004) entire document	1-9
A	US 6,543,695 B1 (HAMILTON et al) 08 April 2003 (08.04.2003) entire document	1-9
A	US 6,527,183 B2 (BARD et al) 04 March 2003 (04.03.2003) entire document	1-9

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

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