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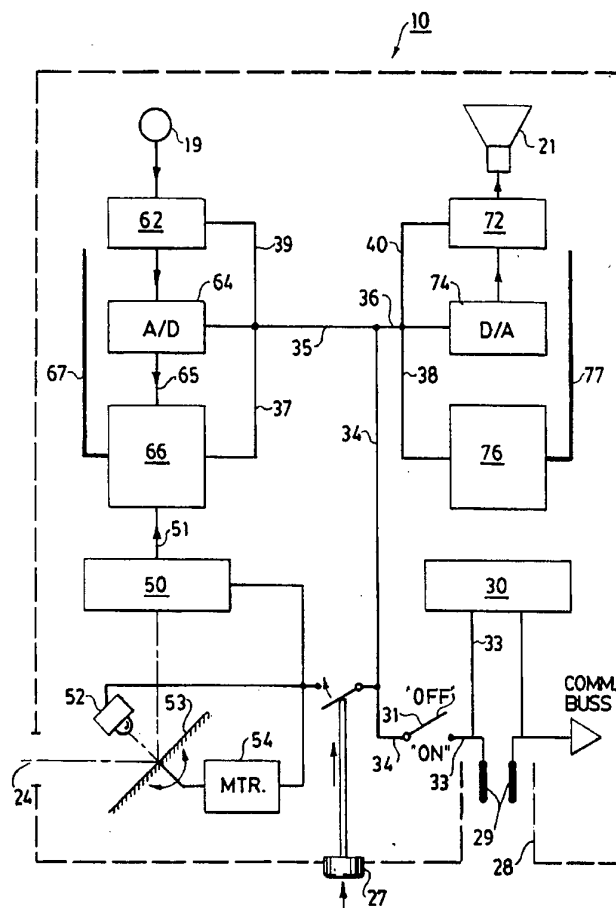
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(54) Title: LAPEL DATA ENTRY TERMINAL

(57) Abstract

A data entry terminal (10) which can be worn on a lapel (1) of one's clothing, and which is used to enter data into a remote data center. The data entry terminal (10) provides for acquisition of data derived from verbal pronouncement of code data into a microphone (19) which is coupled to a transmitter (66) through a speech recognition (62) and an analog-to-digital converter (64). The lapel terminal (10) provides for acquisition of data derived from optical bar code patterns. Optical codes are read by an optical reader (50) whose signal output is also coupled to the transmitter (66). The lapel data entry terminal (10) may be removed from the lapel, activating the optical code reader. The wearer of the lapel terminal (10) can receive instructions from the remote data center through a radio receiver (76) which is coupled to a loudspeaker (21) through a digital-to-analog converter (74) and a voice synthesizer (72). All components, including a rechargeable battery (36), are contained within a housing (11).



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LAPEL DATA ENTRY TERMINAL

DESCRIPTION

5 The present invention relates generally to data
entry and data conveyance systems and particularly to a data
entry terminal of miniature size and light weight, which can
be worn on the lapel of an operator's clothing, so as to
minimize operator effort, reduce operator fatigue, and enhance
10 productivity for data entry and data conveyance.

 The invention is especially suitable for providing,
in one unit, both optical and verbal data entry, and for
conveying entered data to a more powerful transmitter-receiver
unit, which can be worn on an operator's belt, and which is
15 capable, in turn, to be in communication with a central
communications facility, for example, a distribution center or
warehouse responsible for delivery, pricing, stocking, and
inventory management functions of a supermarket or of a chain
of supermarkets. Thus, in the aforementioned supermarket
20 procedures, an operator responsible for inventory control in
the retail division of the supermarket organization would wear
the lapel data entry terminal of the present invention
removably attached to the operator's lapel and a larger-
dimension transmitter-receiver unit attached, for example, to
25 the operator's belt. If, for example, the operator's
responsibility is to check the number of inventory items and
the variety and currently listed retail prices of items placed
on retail shelves, the present invention provides, for
example, the following sequence of communication events
30 between a central communication facility (the center) and the
operator on the retail floor (operator):

 (a) center pages operator (by radio) with an
operator designation code;

 (b) operator's belt-unit receiver responds to page
35 message, for example, a beep-signal, which actuates a low-
power first transmitter in operator's belt unit to transmit
via radio, infra-red, ultrasonic or wire link, said beep-
signal or another readily audible signal to operator's lapel
data entry terminal which contains a receiver responsive to
40 said first transmitter of said belt unit and also contains a
loudspeaker;

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(c) operator hears beep signal from lapel data entry terminal;

(d) operator acknowledges receipt of page signal by entering verbally a location code, for example, by pronouncing the operator's location as "one nine four", indicative of location at "aisle nineteen, section four", into a microphone contained in operator's lapel entry terminal;

(e) operator's location code pronouncement is transmitted by the lapel terminal's voice-actuated low-power transmitter to the receiver in operator's belt unit, whereupon a second, more powerful transmitter in the belt unit is actuated to transmit operator's location code to the center;

(f) center instructs operator to check inventory in the frozen vegetable section; operator proceeds to frozen vegetable section and starts inventory of frozen beans:

(g) operator removes the lapel terminal from lapel and actuates a switch means in the (now hand-held) lapel terminal to actuate an optical bar code reader contained within the lapel data entry terminal, scans the bar code-reading light beam, emanating from an aperture of the lapel terminal, across the bar code symbols printed on a package of frozen beans, thereby actuating the lapel terminal's transmitter to transmit data representative of the optical bar code data to the receiver in operator's belt unit and, via the thereby actuated more powerful transmitter in the belt unit, to the center, where the data are entered into a suitable inventory control system. The optically read (scanned) and electronically conveyed data are uniquely indicative of all identical packages of frozen beans as to manufacturer, type of beans, weight of contents and price per package, etc.

(h) having entered and transmitted or conveyed the uniquely indicative bar code data read by the optical bar code reader of the lapel data entry terminal, the operator deactuates the optical bar code reader by deactuating said switch means, reattaches the lapel terminal to the lapel (thereby freeing operator's hands), and the operator now proceeds to count all packages of frozen beans identical to the package which had been optically bar code scanned.

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(i) operator pronounces, in a general direction toward the lapel data entry terminal, the counted number of identical frozen bean packages, for example, "Zero Five Seven", indicative of fifty seven packages of frozen beans identical to the package whose optical bar code data had been entered initially by using the lapel data entry terminal. The verbal pronouncement of this count (of packages) voice-actuates the lapel terminal's transmitter, which enters (by transmission) the count into the belt-unit's receiver, and is thus conveyed by the belt unit's more powerful transmitter for data entry at the center. Thus, the initial optical bar code data entry, initiated by the bar code reader within the lapel data entry terminal, entered data uniquely indicative of the produce; and the subsequent verbal (or voice-responsive) data entry, initiated by the voice-actuated microphone/transmitter data entry function of the lapel data entry terminal entered data uniquely indicative of the number of packages of that product;

(j) operator next starts the inventory of frozen peas packages by entering optical bar code data of particular frozen peas packages via the lapel data entry terminal (repeat of step (g) above);

(k) operator deactuates lapel terminal's optical bar code reader (repeat of step (h) above), and

(l) operator counts particular frozen peas packages, and by verbal pronouncement enters the count via the microphone in the lapel data entry terminal (repeat of step (i) above).

Upon completing the inventory assignment in the frozen vegetable section, operator keeps the lapel data entry terminal attached to lapel of operator's clothing and anticipates subsequent directives. If the lapel data entry terminal has been used for a period of time sufficient to warrant recharging of the re-chargeable battery power supply contained within the lapel terminal, the terminal may notify the operator verbally "low battery" and the operator will insert the lapel terminal into a battery charger unit, such that battery charging terminals mechanically recessed in the lapel terminal provide electrical connection to mating

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terminals in the battery charger unit. To remain equipped with a lapel data entry terminal, operator attaches a previously battery-charged lapel terminal on the lapel of his or her clothing. The lapel terminal may also be batch oriented, i.e. all data stored in battery backed RAM and downloaded when place in the charger.

The foregoing illustrative example highlights the principal objects, aspects, features, and advantages of the lapel data entry terminal (also referred to in shortened terms as "the lapel terminal") in accordance with the present invention:

It is a principal object of the present invention to provide a lapel data entry terminal having sufficiently miniaturized dimensions and sufficiently light weight, so as to be readily and removably attachable to a lapel of an operator's or user's clothing, or other convenient location and to be comfortably wearable when attached to the lapel; or other convenient location.

It is a further object of this invention to provide a lapel data entry terminal having an actuatable and deactuatable optical data acquisition capability which, in the actuated state, enters optically derived data automatically into either ram storage or a data/center through an intermediate communication link, for example, a cable or a transmitter-receiver unit worn on an operator's belt.

It is a further object of the present invention to provide a lapel data entry terminal having a voice-actuated data entry capability for automatically entering verbally pronounced data into either data (RAM) storage or a data center receiver through an intermediate communication link, for example, a cable or a transmitter-receiver unit worn on an operator's belt.

It is another object of the present invention to provide a lapel data entry terminal wherein the lapel terminal's optical and verbally pronounced data entry functions are achieved by optical and electronic sub-assemblies contained within the lapel terminal housing, and wherein these optical and electronic sub-assemblies receive

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electrical power from rechargeable battery means also contained within the lapel terminal's housing.

Briefly described, a lapel data entry terminal embodying the invention, does not require a manual keyboard or keypad to affect data entry. It is embodied in a lapel terminal comfortably worn on a lapel or other suitable location on an operator's clothing. The lapel terminal contains an optical code reader for scanning an optical code affixed to a product when actuated. Optical code scanning actuates the data entry function of the lapel terminal. The terminal also contains voice-responsive means for entering data by verbal pronouncement of alphanumeric characters, said pronouncement also actuating the data entry function of the lapel terminal. Additionally, the lapel data entry terminal also contains a small loudspeaker, associated with a radio receiver within the lapel terminal, to provide for reception of audible instructions by the operator of the lapel terminal from a radio transmitter at a remote location. The lapel terminal derives electrical power for its functions from a built-in rechargeable battery.

The foregoing and other objects, features, and advantages of the invention, as well as a presently preferred embodiment thereof, will become more apparent from the following detailed description in conjunction with the accompanying drawings, wherein:

FIG. 1 is a schematic view of a human operator wearing the lapel terminal on the lapel of operator's jacket and wearing a larger transmitter-receiver unit on the belt;

FIG. 2 is a schematic perspective front view of the lapel terminal in accordance with the present invention, showing the optical code reading window optical code reading actuator means and locations of microphone and loudspeaker;

FIG. 3 is an enlarged partial break-away front view of the lapel data entry terminal of FIG. 2, showing schematically some of the major sub-assemblies contained within the lapel terminal;

FIG. 4 is a schematic perspective rear view of the lapel data entry terminal, showing lapel attachment means, for

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recharging of the rechargeable battery; and terminal deactuating means; and

FIG. 5 is a block diagram of the major electronic sub-assemblies contained within the lapel data entry terminal.

Referring to the drawings, there is shown a lapel data entry terminal 10 attached to an operator's lapel 1 and a transmitter-receiver (also referred to as a transceiver) unit 3 attached to operator's belt 2. Lapel data entry terminal 10 is a unit contained within a housing 11 having approximately square-shaped front and rear surfaces 12 and 13, respectively, approximately rectangle-shaped top and bottom surfaces 14 and 15, respectively, and approximately rectangle-shaped left and right side surfaces 16 and 17, respectively. Front surface 12 has perforations throughout a first domain 18 to allow verbally pronounced (voice) codes to be recorded by a microphone 19 located behind said first-domain perforations. Front surface 12 also has perforations throughout a second domain 20 to transmit audible (sound) signals from a loudspeaker 21 located behind said second-domain perforations. Front surface 12 is removable from housing 11 by removing attachment screws 22 or other fastening means, thereby facilitating access to sub-assemblies inside housing 11.

Top surface 14 of the housing 11 has an elongated opening or aperture 24 through which a suitably shaped optical code-reading light beam 45 is directed at an optical code symbol (bar code) affixed to an object (not shown), and through which light 46 from the symbol returns to housing 11. The receptor 50 is shown on a block to schematically indicate that it includes a photodetector and analog and digital circuits for providing signals representing the symbol. It may include a microprocessor for decoding the signals into digital data. Light 46 returns to the receptor 50 either directly or retro-reflectively via an oscillating scan mirror 53.

Rear surface 13 has disposed on it a clamping or fastening means 26, for example, a spring-urged clip or "velcro" by which lapel data entry terminal 10 is removably attached to operator's lapel 1. Right side surface 17 provides a slightly protruding actuating and deactuating means

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27, for example, a pressure-sensitive switch by which the optical code reader light source 52, for example, a laser diode assembly receptor 50, as well as mirror 53 connected to a motor 54 for oscillating the mirror to scan the beam across the symbol on the object, are actuated or deactuated. The scanning operation may also be actuated or deactuated by voice commands. Left side surface 16 has a recessed compartment 28 with recessed electrical contact pins 29 connected (not shown) in the lapel terminal to rechargeable battery 30, and connectable to a battery charging unit outside the terminal (not shown). Additional pins may be used to upload and download data when the lapel terminal is used in batch mode.

Referring particularly to FIG. 3 and FIG. 5, there is shown a printed circuit board 60 extending from the lapel terminal bottom surface to the top surface and from the left to the right side surfaces. The board 60 has mounted there on the receptor 50 a microphone 19, a speech or voice recognition circuit 62, an analog-to-digital (A/D) converter 64, a low-power radio transmitter 66, a transmitter antenna 67, a small loudspeaker 21, a speech or voice synthesizer circuit 72, a digital-to-analog (D/A) converter 74, a radio receiver 76, and a receiver antenna 77. Also shown located on circuit board 60 is the receptor 50 and a laser diode assembly 52. The laser diode 52 (including its power delivering circuits is operated upon actuation of switch 27 by power from B+ line 34 via switch 31. The other circuits are operated when switch 31 which maybe normally closed and opened for recharging, via lines 33-40. The common bus is connected to all components which are powered. The oscillating mirror 53 is suitably mounted (not shown) near the bottom surface 15 of lapel terminal 10, while rechargeable battery 30 is held by a retaining clip 32 in proximity to the left side wall 16 of lapel terminal 10. For clarity of presentation, all components and sub-assemblies are depicted as located on printed circuit board 60 only on the face of the board viewed in FIG. 3. In practice, at least one double-sided printed circuit board 60 facilitates the mounting or deposing of components or sub-assemblies to be suitably distributed on both sides or faces of said printed circuit board.

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Optical code (for example, bar code) scanning and code reading may be accomplished with an optical bar code scanner and reader system of the type which is shown in U.S. Patent 5,015,831 issued May 14, 1991, or in U.S. Patent Application Serial Number 07-543950 filed June 26, 1990 in the name of J.M. Eastman, et al. Such scanners and readers are presently preferred because of their miniaturized configuration.

Radio receiver 76 and radio transmitter 66 may be conventional, miniaturized UHF radio receiver and transmitter sub-assemblies. Transmitter 66 can be of relatively low power, since its signal transmitted via transmitter antenna 67 need only be sufficient to communicate with the operator's belt unit receiver-transmitter 3. Instead of radio frequency signals, infrared (IR) or ultrasonic transmission may be used. Also, an extendible (coiled) cable may alternatively be used to connect the terminal 10 to the belt unit. Output signal 51 from receptor 50 is a digital signal representative of the optical bar code affixed to the object being scanned by optical code reading light beam 45 and returned to the receptor 50. The return light is shown schematically by the dashed lines 46. Output signal 51 is one input to transmitter 66, whose second input is the digital output signal 65 from A/D converter 64. Thus, transmitter 66 transmits digitally encoded signals, and thereby enters data into a remote data center (via operator's more powerful transmitter in belt unit 3). Likewise, receiver 76 receives digitally encoded signals which are converted to analog signals in D/A converter 74 and further processed in voice or speech synthesizer 72 to generate command-like audible signals in loudspeaker 21.

It will be apparent from the foregoing description that the operator or user of the lapel data entry terminal enters all verbally pronounced data by pronouncing such data in the general direction of the lapel unit on operator's lapel. For scanning and reading optical bar code, the lightweight, miniaturized lapel terminal is temporarily removed from the lapel. Thus, except during bar code scanning, the operator's hands are free for picking, placing and counting products and for performing other inventory

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functions. Variations and modifications in the herein described lapel data entry terminal, within the scope of the invention, will undoubtedly suggest themselves to those skilled in the art. For example, an ear jack and plug may be used in noisy environments in place of or to supplement the loud-speaker. Accordingly, the foregoing description should be taken as illustrative, and not in a limiting sense.

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CLAIMS

1. A data entry terminal comprising a housing with a light-transmissive opening and sound-transmissive openings, said terminal having means for removably attaching the housing to an operator's clothing, means in said housing for acquiring optical code data signals when actuated, means for transmitting said optical code data signals to a remote receiver, means for acquiring verbal pronouncement code data signals, and means for transmitting and receiving said verbal pronouncement code data signals from the remote data center.

2. The terminal according to Claim 1, further comprising actuating means for actuating the acquisition of optical code data.

3. The terminal according to Claim 2 wherein said actuating means is manually actuated.

4. The terminal according to Claim 2 wherein said actuating means is verbally actuated.

5. The terminal according to Claim 1, wherein said means for acquiring optical code data is an optical code scanner/optical code reader assembly.

6. The terminal according to Claim 5, further comprising a light-transmissive opening in the terminal housing through which the optical code scanner/optical code reader assembly transmits a scan beam and acquires optical code data.

7. The terminal according to Claim 5, further comprising means for actuating the optical code scanner/optical code reader assembly only when optical code data acquisition is required.

8. The terminal according to Claim 1, wherein said means for acquiring verbal pronouncement code data signals comprises sound-transmissive openings in said terminal housing, a microphone proximal to said openings, a speech or voice recognition means, and a converting means for converting analog signals to digital signals.

9. The terminal according to Claim 1, wherein said means for transmitting said optical code data signals and said

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means for transmitting said verbal pronouncement code data signals into the remote data center includes a wireless link.

10. The terminal according to Claim 1, wherein said means for receiving verbal message signals comprises a wireless link, and further comprising speech or voice synthesizer means, and a loudspeaker positioned in proximity to sound-transmissive openings in said housing.

11. The terminal according to Claim 1, wherein said attaching means includes a clip or velcro fastener on an exterior surface of said housing for removably attachment of said housing to the clothing of an operator.

12. The terminal according to Claim 11, wherein said terminal has transducer means for converting audio into electrical signals and vice versa and wireless means for receiving and transmitting commands from a data center operatively connected to said transducer means, openings in said housing for audio from said transducer means being on a surface of said housing other than said exterior surface having said clip or fastener thereon.

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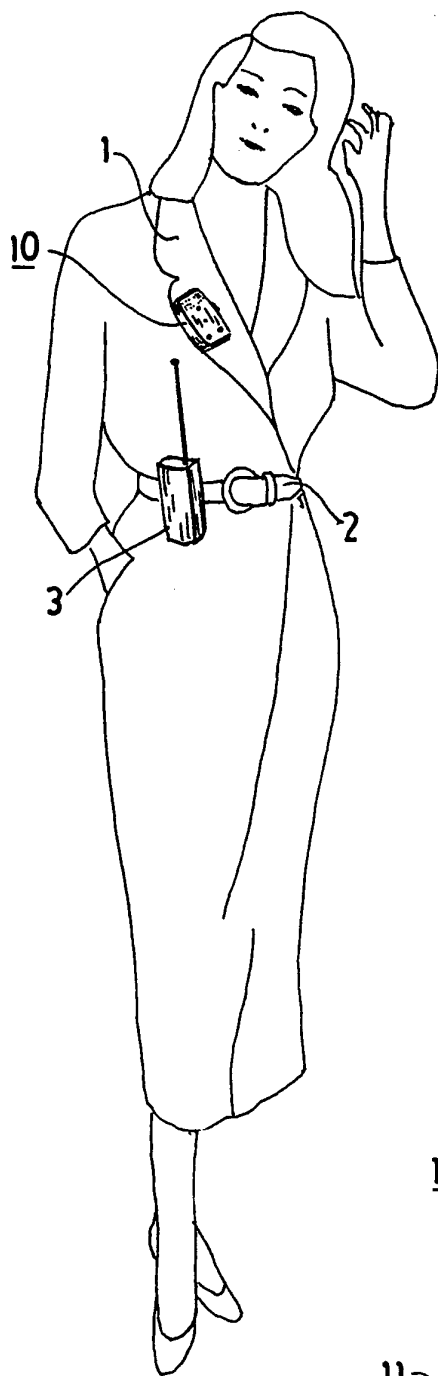


FIG. 1

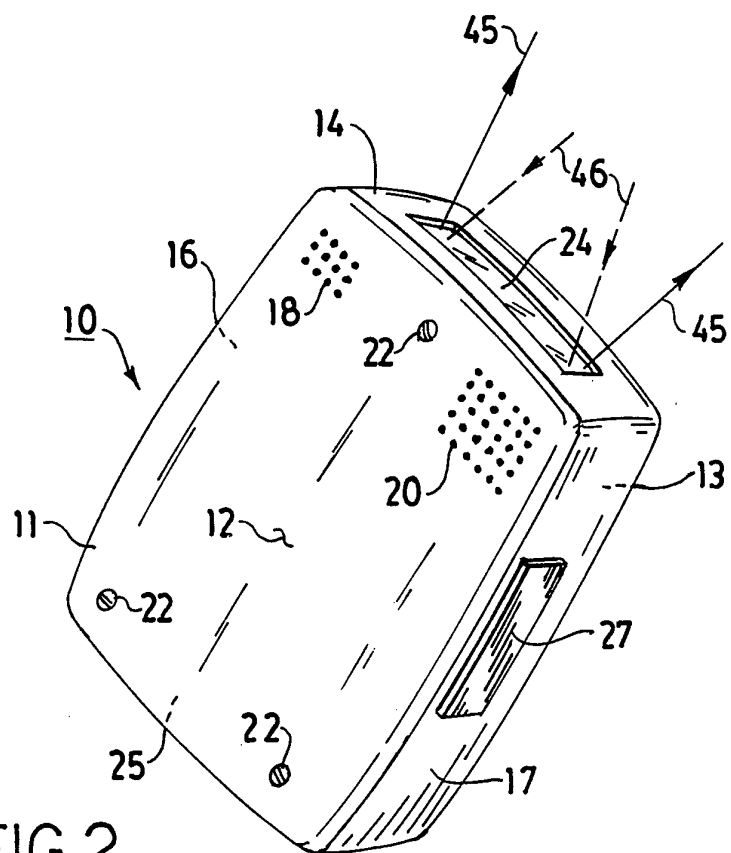
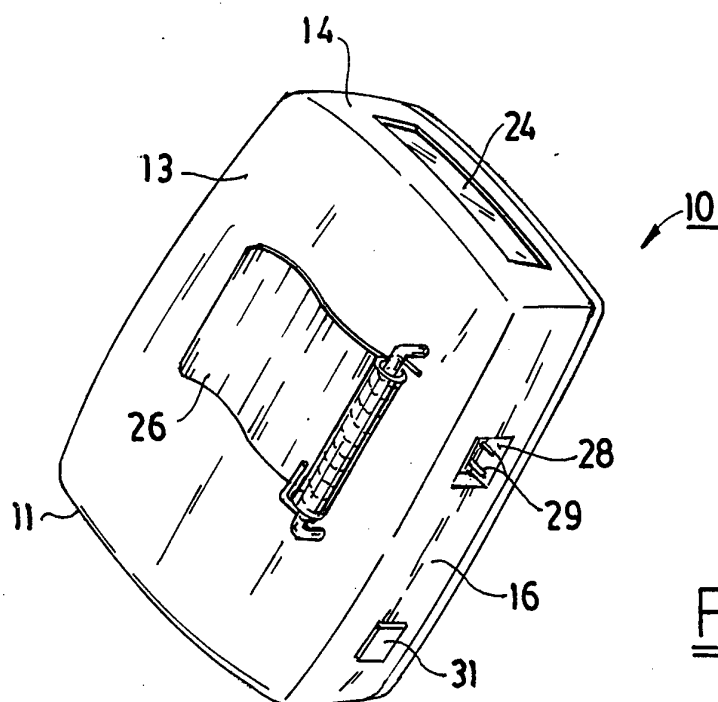
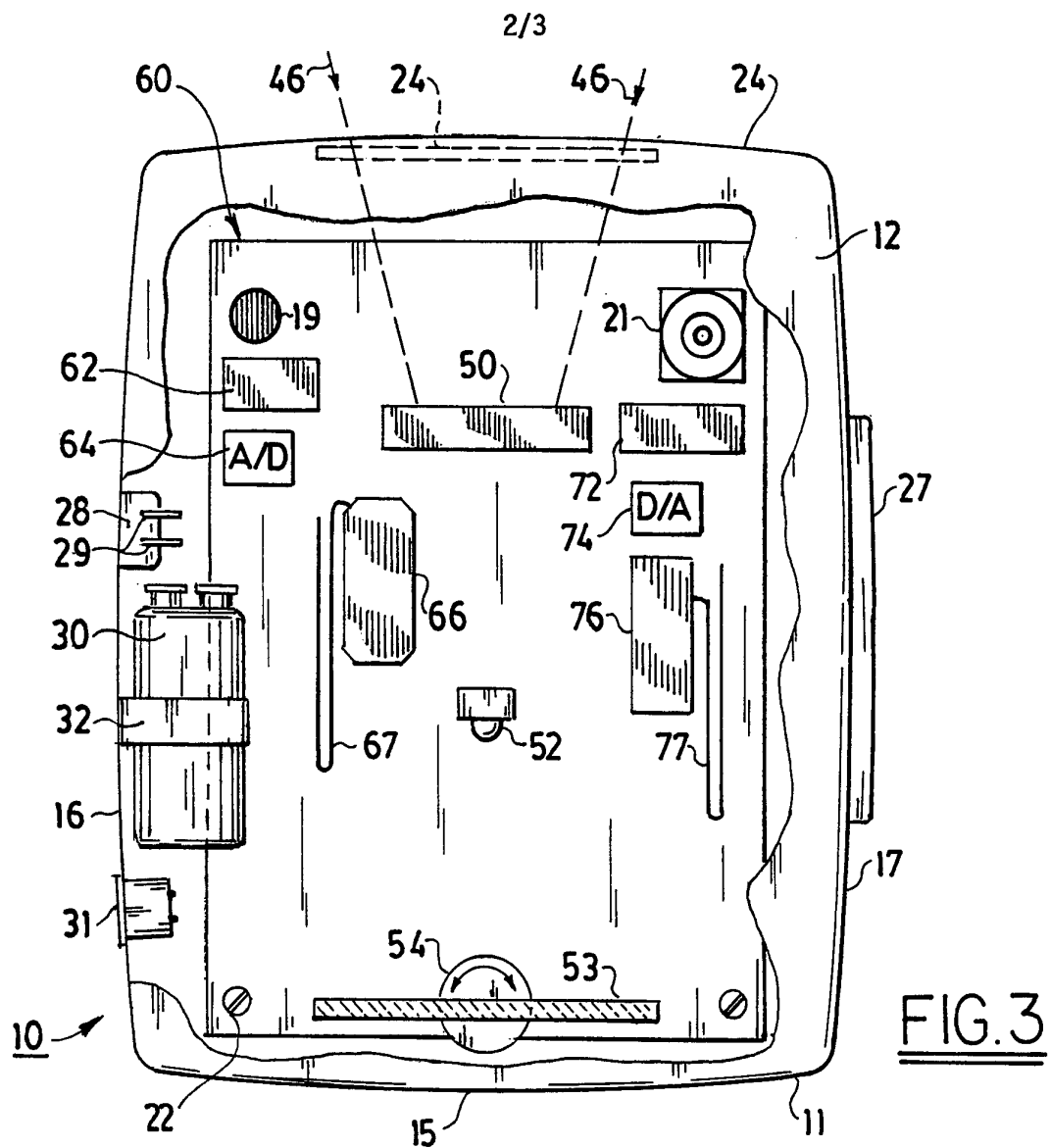
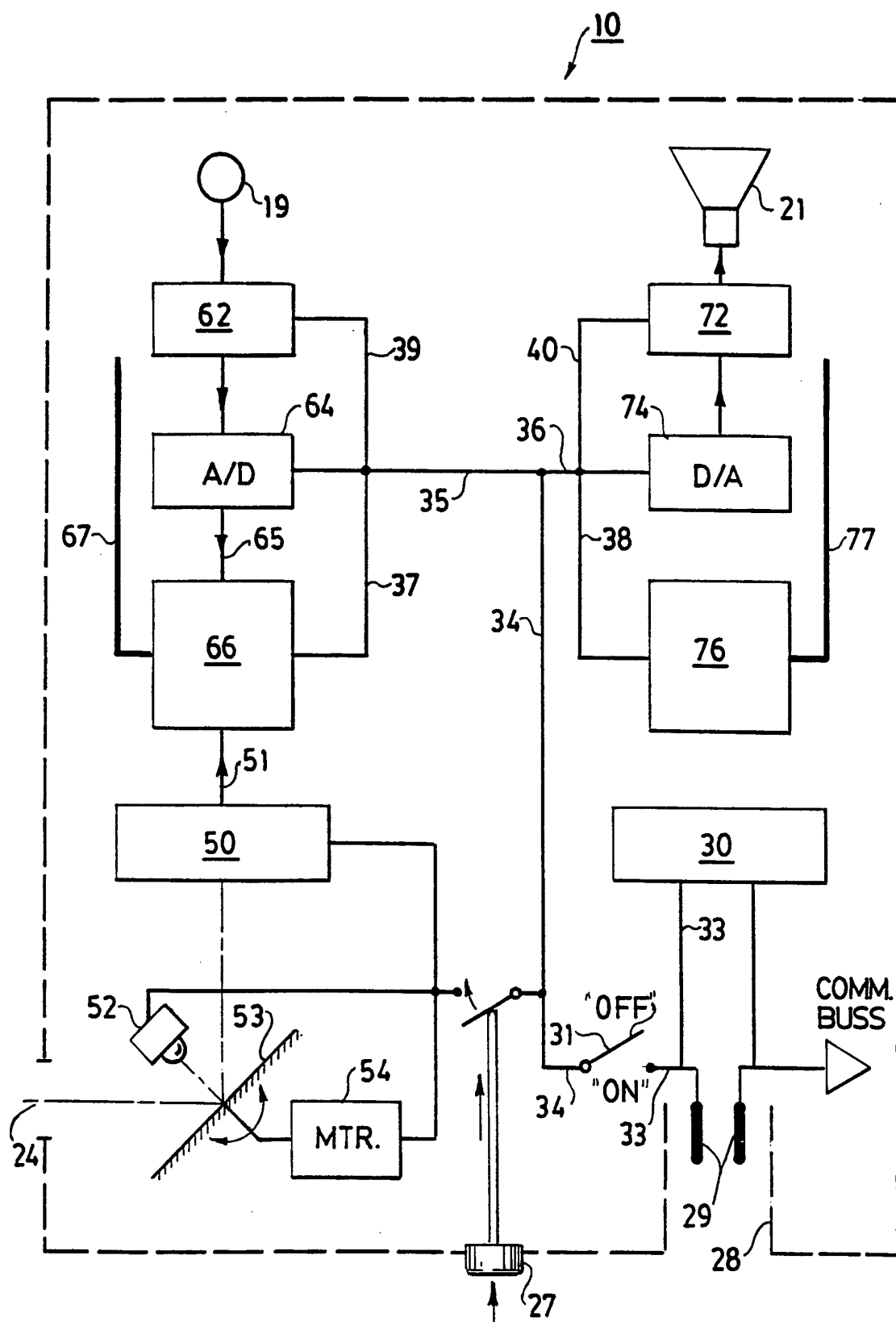


FIG. 2



FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US94/01903

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) : G06F 7/06, 3/16, 15/20, 15/74; G06K 7/10

US CL : 340/825.3, 825.34; 235/472; 364/403

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)

U.S. : 340/825.15, 825.3, 825.31, 825.34; 235/380, 383, 472; 364/401, 403

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)

USPTO APS

search terms: hook, loop, velcro, data, terminal, collection, pocket, belt, clip, clasp, pager

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US, A, 5,227,614 (DANIELSON et al.) 13 July 1993, (13.07.93) figures 1-7, column 1, line 64 - column 3, line 50	1-12
Y, P	US, A, 5,218,187 (KOENCK et al.) 08 June 1993, (08.06.93) figure 2, item 50 column 4, lines 45-47	1-12
Y	US, A, 5,187,646 (KOCH) 16 February 1993, (16.02.93) figures 5-6, items 72-73 column 5, lines 47-50	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*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
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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US, A, 4,471,218 (CULP) 11 September 1984 (11.09.84)	1-12
A	US, A, 3,876,863 (BOONE) 08 April 1975, (08.04.75)	1-12