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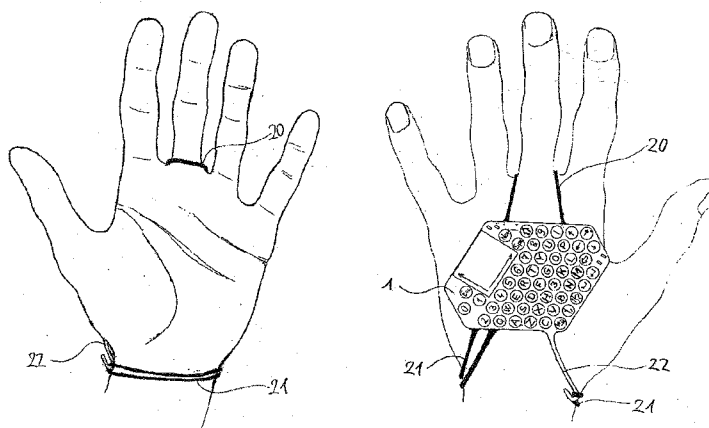
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[Continued on next page]

(54) Title: DATA INPUT DEVICE**Fig. 2**

(57) **Abstract:** The invention relates to a data input device for a system comprising an ambient display with which a user can interact by transmitting his/her unique ID code and a datastream in secured RF communication channel where the user may use said data input device continuously, and which data input device having a unique ID code and a secured communication channel for datastream in RF. The data input device (1) is physically separated from the ambient device, as an onhand wearable data input device (1) having a battery (35), a main substrate (30), electronic integrated circuits, and connecting pathways, furthermore a keyboard with numeric keys (3), alphabetic keys (4) and special mark and function keys (5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 6a, 6b, 6c, 6d) and with a touchpad (2), where the size of said data input device (1) is conform to the back of the hand for wearing it on the back of the hand, and is provided with fixing means for fixing it to the back of the hand or to the finger(s) and wrist of the hand.



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DATA INPUT DEVICE

The invention relates to a data input device for a system comprising an ambient display with which a user can interact by transmitting the unique ID code of the data input device and a datastream typed in by the user via a secured RF communication channel where the user may use said data input device continuously, and which data input device having a unique ID code and a secured communication channel for datastream in RF. The invention also relates to a system comprising an ambient display device, and a method for pairing of RF link capable devices in the system.

In the state of the art one can find many solutions for mobile built-in numerical keyboards or touchscreens in the case of mobilephones or smartphones, but these are limited in the size of the display, as the display is built together with the keyboard. Also several innovative means are known for non-traditional interfacing between a PC or mobilephone and the user which can substitute the traditional PC keyboard + mouse/touchpad, like eg. in the US 2005151673 patent application a mechanical button keyboard is proposed which consist of 2 separate 24 button structures fixed below the palmar side of fingers by means of one belt encircling the wrist and one the forearm. The whole solution is very bulky and obtrusive.

Virtual keyboards are known also and these let the user type in the air (ie. virtually). Other conventional "virtual keyboards" are known, such as (1) a device in which tactile and/or pressure sensors are installed in the fingertip portions of a glove or finger sacks (see Japanese Pat. Application, First Publication, No. Sho 63-126928, and Japanese Utility Model No. Sho 63-199327); (2) a device in which measures the angles of each finger joint and the palm of the hand by means of optical fibers and resistance fibers contained in the glove (see U.S. Pat. No. 4,937,444 and U.S. Pat. No. 5,079,252; data glove produced by VPL Research Co., Ltd.). Both of these glove based solutions are also uncomfortable for a whole-day wearing as the user becomes despoiled of the tactile sensory inputs in his fingers.

Several wearable, portable, and "ergonomic" keyboards are invented eg. as two half-keyboards each is strapped around thighs (a two-part device) or also as a one-part design, or also sewed in trousers instead of strapping. Such solutions are disclosed eg. in US 2005052420, or in CA 2408180 or a one-part device in CA 2465546. These devices limit the user in his/her dressing possibilities when sewed in the cloth, or might be uncomfortable for certain physical activities, eg. running after the bus, thus these cannot be considered as truly comfortably wearable devices.

In the United States Patent 6380923 having the filing date back in 08/30/1994 a "Full-time wearable information managing device" is presented in the form of a preferred embodiment deploying ring-like sensors on all fingers and on the wrist. The authors claim, that the immediate accessibility is improved without sacrificing the operational integrity, and information can be inputted anytime, anywhere, and immediately. The full-time wearable input device comprises a detector for detecting the shock generated at the time of striking the fingertips against a physical surface, and an analyzer for analyzing the timing at which the fingertips strike the aforementioned physical surface and determining the input information based on the detection signal detected by the aforementioned detector. As the above-mentioned detector, a shock sensor, acceleration sensor, sound sensor and myoelectric sensor can be used. The input information is then determined based on the change in the shock, acceleration, sound and/or myoelectric potential as detected by the sensors which are worn on each finger, wrist, or arm. This solution claims to be full-time wearable, but probably many users would be reluctant to wear rings on all fingers all the day.

Regarding the known wearable data input/data interface devices and wearable computers one can conclude that the degree of comfort and unobtrusivity has to still be increased for the widespreading of wearable computing, since the majority of users are reluctant to sacrifice their tactile sensorium in their hands/fingers (i.e. in the case of data gloves or other structures encircling the fingers/covering the palmar surface of fingers or bulky mechanics in the palm), their body mobility (i.e. in the case of bulky body attachable "boxes", like retina-displays, belt-worn mini PCs), their dressing intentions (in the case of in-trouser-sewn keyboards) or jewellery wearing intentions (in the case of sensor rings for all fingers and the wrist or the wristwatch-like skin-touchpad).

The second conclusion is, that losses in usability/performance compared to the routinely used keyboard + mouse/touchpad data input interface method could still be decreased in all the known eye-catching and promising concepts (ie. the projection of a limited 12 buttons keypad into the palm may work well for phone numbers but is not quick enough for typing texts. The fully virtual keyboards deploying motion-sensing on the hand and sensor fusion methods do not support the user with an optical feedback regarding the location of the target, namely, the buttons to 'point on/touch', thus need strong practise).

Based on the foregoing the object of the invention is to design a truly unobtrusively wearable data input interface device for PCs, TVs, preinstalled public displays or any other RF link capable devices (smartphones, PDAs, modern refrigerators, modern home lighting systems etc.) which wearable data input interface has only as few limitations as possible regarding performance and usability when benchmarked to the routinely used PC keyboards + mouse/touchpad data input interface method. Such a device would be of great benefit in such cases, when a user demands/prefers larger displays (eg. for watching photos, movies, videoclips from a comfortable distance) than a tablet or smartphone allows which he/she can keep with, and wants to type in different texts/commands frequently.

Our invention is based on the recognition that if only such surfaces of the human body are occupied by an intentionally continuously wearable device which are not used for any significant purpose in the everyday activities of a person and if this surface area(s) is (are) large enough in order to allow a very flat design of a patch-like device and if it is well approachable by the user for the necessary manipulation/handling, then the comfort and the performance / usability of any continuously wearable device fitting to that surface(s) would be the least compromised. In addition to this a more specific recognition happened, namely that the dorsal surface of hands/fingers fulfil all three requirements above, ie. are typically not used by people during everyday manual activities or for wearing jewellery and are large enough and well accessible for such a wearable data input interface device, thus, the invention described below was formulated.

The present invention is, accordingly, a data input device for a system comprising an ambient display with which a user can interact by transmitting the unique ID code of the data input device and a datastream typed in by the user via a secured RF communication channel where the user may use said data input device continuously, and which data input device having a unique ID code and a secured communication channel for datastream in RF, and said data input device is physically separated from the ambient device, as an onhand wearable data input device having a battery, a main substrate, electronic integrated circuits, and connecting pathways, furthermore a keyboard with numeric keys, alphabetic keys and special mark and function keys and with a touchpad, where the size of said data input device is conform to the back of the hand for wearing it on the back of the hand, and is provided with fixing means for fixing it to the back of the hand or to the fingers and wrist of the hand. The thumb may also be defined as a finger.

In a preferred embodiment the data input device has resilient strings for fixing it to the hand.

In a further preferred embodiment the strings form loops, where one of the loops is suitable for slipping the whole hand and the wrist into it, and at least one other loop is
5 suitable for slipping one or more fingers into it.

It is advantageous if the loop at the wrist is connectable by a detachable joint to a hook which is fixed to the main substrate of the data input device.

In another preferred embodiment the fixing means of the data input device is a double sided adhesive foil.

10 In a further preferred embodiment the bottom surface of the data input device comprises supporting protrusions and ventilation trenches, preferably also comprises a ventilator fan on the main substrate.

In a further preferred embodiment the keys that means the touchsensors comprise optical windows and light sources for backlighting.

15 In a preferred embodiment the touchpad modul is oriented in such a way when fixed on the hand, that the 'Y' axis holds less than 90 degrees with the longitudinal axis of the 3rd metacarpus in a view from the ends of the fingers.

This invention relates to the interfacing of a user towards e.g. a computer display or
20 other electrical display device suitable for being controlled via a wireless link in his/her environment for the purpose of inputting data or sending control commands through a wireless radiofrequency (RF) communication channel (e.g. Bluetooth, ZigBee or WiFi) to said computer or said electrical device. The solution described here allows the user to solve this interfacing between himself and the compatible devices in his environment by
25 a novel comfortably wearable, self powered, full functionality keyboard + touchpad "patch", which has the majority of abilities in terms of possible commands and key combinations as a regular PC keyboard and a regular notebook touchpad, and is worn on the dorsal surface of the hand. The onhand-wearable data input device can be anchored onto the users skin by a double sided adhesive foil or an adhesive layer of biocompatible
30 glue or by looping a rubber string onto a finger and an other around the wrist or by looping velcro stripes in a similar manner or a combination of these. The positioning and fixing is to be done in such a way, that the contour lines of the patch-like onhand-wearable device and the means to anchor it leave free possibly/nearly the whole palmar

side of fingers and hand for the regular everyday manual activities. Additionally the flexibility/rigidity of the patch-like device and the flexibility/rigidity and shape of its anchoring means respect the anatomical shape and structural motility of the hand itself eg. by variations in thickness of the device, its layer structure, material composition or elasticity in certain regions, thus, the onhand-wearable device causes almost no discomfort and no limitations in usage of the hand to the user even when worn for a whole day.

The whole system in which the data input device according to the invention can be used comprises the onhand-wearable keyboard + touchpad device plus ambient devices with which the user can interact in his everyday life/working activities (typically large pre-installed displays for showing text messages, videoclips, movies, music to be watched/listened to by the user but other non-display type devices can be part of the system as well, eg. the fridge or lamps in ones house, air-conditioning of the office etc.). The system runs a digital RF link between the onhand-wearable data input device and any compatible ambient devices. The RF link can be eg. Bluetooth, ZigBee or a custom developed radio communication protocol and command set.

A compatible RF communication enabled ambient electrical device to be brought under wireless remote control can be also eg. an RF communication enabled (eg. Bluetooth ready) Smart TV or RF communication enabled computer display connected to the content of the World Wide Web via some regular internet browsers like Mozilla Firefox, Google Chrome or Internet Explorer.

The onhand-wearable keyboard + touchpad device comprises a main substrate holding conductive tracks and the necessary electronic circuitries (control circuitry, power management circuitry, accumulator/battery, radio transceiver circuitry, antenna, quartz crystal, optical feed back LEDs, resistors, capacitors, inductivities etc.) mounted on, button areas (keys), where sensor structures are prepared on the main substrate, which sensor structures can be based on several principles, eg. piezoresistivity, piezoelectricity, capacity change, resistance change, displaceable metallic contacts, MEMS-switches (Micro-Electro-Mechanical-Systems), accelerometers etc..

It is advantageous if the substrate or certain regions of it are flexible. It is advantageous if the substrate or certain regions of it are stretchable.

Optionally energy harvester structures in the flexible or stretchable zones of the device (eg. above the finger joints, if such a version is realised which covers them too) can be

part of the device. The energy harvester structures can be based on different principles, eg. piezoelectricity or MEMS generators.

It is advantageous if the assembled parts of the device are covered with a conformal coating and encapsulation in order for watertight packaging. It is advantageous in some applications, if the conformal coating has elastic / stretchable regions. In one preferred embodiment an exchangeable double sided adhesive foil or a renewable adhesive layer is placed beneath the device onto the skin in order for comfortable fixing on the dorsal surface of hand. In certain applications a part of the dorsal surfaces of fingers and the side surface of index finger are also covered by the device.

In the typical usage the onhand-wearable keyboard + touchpad device is turned on by its on/off button and worn continuously whenever the user is awake and wishes so, and the keyboard + touchpad device has also a globally unique identification (ID) code, which is regularly/continuously communicated in the RF data-exchange process. Though the onhand-wearable data input device according to the invention has no alphanumeric or graphical display, the RF data-exchange can be initiated from both type of devices in the system. Either the ambient devices installed in the system (eg. in a smart house or a smart office) which regularly scans and checks, which users (handworn data input devices) are in their neighbourhood and to whom can they offer the RF control over them initiate the establishment of an RF link by presenting a text message with instructions for the pairing process on its display or alternatively the onhand wearable data input device can initiate it also.

The former case can be realised if eg. an ambient device like a Smart TV displays a message in a proactive way when the user with a certain handworn data input device having a globally unique ID code enters in its few meters proximity (eg. in the living room): "Should I open Your starting page on the Internet or You want to check Your emails?". A potential response from the user can be that he hits the letter 'I' on the onhand-wearable keyboard for the Internet or the letter 'E' on the onhand-wearable keyboard for his emails and the ambient display (Smart TV) mounted on the wall follows the command.

The latter case can be realised by sending out a short combination of identification numbers/letters (eg. 4 digit code) via the RF link which code is readable on the ambient device by the user (for example it can be. printed on the frame of the Smart TV or computer display). The ambient device short ID code and the handworn data input

device globally unique ID code are both transmitted in this method, thus, the ambient device can inform the certain user about the reception of the message and the establishment of the RF link.

The continuously comfortably wearable onhand data input device and the compatible ambient system according to the invention can primarily be applied in smart
5 houses/smart working environments of the future, where watching TV or browsing the web on a PC or adjusting something in the CAD drawing of an engineer colleague at the next desk without asking him to pass his mouse to us or watching Youtube videos from the jacuzzi will be performed instantly as these situations require only the data input
10 means' (ie. the keyboard and the touchpad) to be continuously available for actuation by the hand(s) (ie. worn) but the displays can stay part of the surroundings, as they either way become larger and larger nowadays as flat panel display technology advances.

The invention is also a system comprising an ambient display device where the system comprises a data input device according to the invention and where the ambient display
15 device has a 'quick ID' presented on it, by which the ambient display device and the data input device can be paired to each other.

The invention is also a method for pairing of RF link capable devices in a system according to the invention where a 'quick ID' presented on the ambient display device has to be typed into the data input device by the user and sent out via the RF link
20 together with the globally unique ID code of the data input device to initiate the pairing, and upon reception of the data transmission the ambient display device accepts the pairing and displays a uniquely data input device specific notification message about the fact that the RF link is successfully established and will be maintained between the data input device and the ambient display device until its termination.

Regarding the initiation of pairing of the wearable data input device and any compatible ambient device (eg. a display or a Smart TV) via the RF link a novel method is also the subject of the invention, namely, the onhand-wearable device, which has neither alphabetic nor graphical display means, thus, typically is not suitable to initiate and master a pairing eg. via Bluetooth, can become the initiator in such a way, that the
25 ambient device has and presents on a well viewable portion of it a "quick ID code" composed of a few letters, and if the user types in this quick ID code on the onhand worn data input device and presses the 'scan for compatible devices' button, it is transmitting also this information during the scanning for available compatible devices,

and then the ambient device upon reception of the message can immediately display a feedback message on its screen addressing directly the certain user. Afterwards the RF link is alive.

The ambient devices are typically large displays for text, videoclips, movies, music to be watched/listened to by the user but other devices can be part of the system as well, eg. the fridge or lamps in ones house, air-conditioning of the office, PC of a colleague). The keyboard + touchpad unit comprises a main substrate holding conductive tracks and the necessary electronic circuitries (control circuitry, power management circuitry, accumulator/battery, radio transceiver circuitry, antenna, quartz crystal, optical feedback LEDs, resistors, capacitors, inductivities etc.), button areas (keys), where sensor structures are realised on the main substrate, which sensor structures can be based on several principles, eg. piezoresistivity, piezoelectricity, capacity change, resistance change, displaceable metallic contacts, MEMS-switches (Micro-Electro-Mechanical-Systems), accelerometers etc. .

The assembled parts are covered with a conformal coating based encapsulation in order for watertight packaging. The conformal coating can be eg. polyurethan based or in order for elastic properties of the encapsulation can be based on 2-component moldable silicon rubber which is commercially available from several vendors.

An exchangeable double sided adhesive foil or a renewable adhesive layer is placed beneath the device onto the skin in order for comfortable fixing on the dorsal surface of hand. The exchangeable double sided adhesive foil or a renewable adhesive layer substituting this can be surely purchased in biocompatible versions from suppliers of pharmaceutical companies who have patch-style products in their palette (eg. nicotine or nitroglycerin dosing medical patches, or anti-snore patches attachable onto the nose).

The shape of the device is defined so, that the touchpad zone is oriented ergonomically when fixed on the hand, namely, the 'Y' axis holds less than 90 degrees with the longitudinal axis of the 3rd metacarpus in a view from the ends of the fingers.

It is advantageous if the substrate or certain regions of it are flexible in order for better comfort. The flexible substrate may be poly-imide based foil or other polymers available in the electronics industry for PCBs (Printed Circuit Boards), the conductive tracks may be of copper or silver plated copper or gold plated copper produced by eg. PCB or thin-film deposition or thick-film technology. It is advantageous if the substrate or certain regions of it are stretchable to a certain extent.

Optionally energy harvester structures in the flexible or stretchable zones which can be based on different principles, eg. piezoelectricity or MEMS generators can be part of the device.

The packaging of the devices and the adhesive layer can be water resistant, in order to allow uncluttered usability eg. in a swimming pool. Certain regions of the elastic conformal encapsulation can incorporate metal contacts connected to the electronics inside for charging, data up and download or reprogramming purposes. The contourline of the patch-like devices can cover the back of more fingers or also longer regions on the fingers, ie. up to the nails or even a part of the sides of the fingers when design/performance trade-offs dictate so. Certain sensor structures/methods allow that there is no need to place a sensor structure underneath each button area (key). More feedback LEDs or certain even acoustic feedback means' may be part of the patch-like data input devices. The left and right hand devices can be substituted with each other based on the users preferences, thus, right handed sets and a left-handed sets will have to be designed and produced, and also some different sizes will have to be produced to adapt to all possible sizes of hands of men, women and children.

Solutions according to the present invention and their differences as compared to other modern data input interface devices are presented in detail with preferred embodiments by means of drawings.

Figure 1: The palmar side of a left hand and the dorsal side of the same hand onto which a preferred embodiment of the onhand-wearable data input device is attached by means of an exchangable double sided adhesive foil

Figure 2: The palmar side of the hand and the dorsal side of the same hand onto which an other preferred embodiment of the onhand-wearable data input device is attached by means of resilient strings looped around the wrist and the root of the middle finger

Figure 3: Bottom view of a preferred embodiment of the onhand-wearable data input device showing the double sided adhesive foil beneath the device

Figure 4: Bottom view of another preferred embodiment of the onhand-wearable data input device showing the supporting protrusions covered with skinfriendly material and the ventilation trenches inbetween

Figure 5: : Bottom view of an 3rd preferred embodiment of the onhand-wearable data input device showing the supporting protrusions covered with skinfriendly material, the ventilation trenches inbetween and the ventilator fan

Figure 6: Top view (left) and bottom view (right) of the assembled substrate before conformal coating and encapsulation of a preferred embodiment of the onhand-wearable data input device

Figure 7: Top view (left) and bottom view (right) of the assembled substrate before conformal coating and encapsulation of an other preferred embodiment of the onhand-wearable data input device which comprises backlighting of the keyboard and touch feedback LEDs

Figure 8: An example of an ambient display device having a 'quick ID' paired to a preferred embodiment of the onhand-wearable data input device based on the initiation from the onhand-wearable data input device

In Figure 1 we present the palmar side of a left hand (on the left) and the dorsal side of the same hand (on the right) onto which a preferred embodiment of the onhand-wearable data input device 1 is attached by means of an exchangable double sided adhesive foil 10. On its top surface the onhand-wearable data input device 1 comprises numeric keys 3, alphabetic keys 4, keys for punctuation marks and special functions 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, arrow keys 6a, 6b, 6c, 6d, status feedback LEDs 7a, 7b, 7c, 7d, a touchpad module 2, having an 'x' axis 9 and a 'y' axis 8.

In Figure 2 we present the palmar side of a left hand (on the left) and the dorsal side of the same hand (on the right) onto which a preferred embodiment of the onhand-wearable data input device 1 is attached by means of resilient strings 20, 21 looped around the wrist and the root of the middle finger. The loop created around the wrist has a detachable joint at the end of the resilient string 21 being at the wrist by means of a hook 22 fixed to the data input device 1.

In Figure 3 it is shown, that the onhand-wearable data input device 1 is covered on the majority of its bottom side surfacearea by the exchangable double sided adhesive foil 10, which has ventilation cut-outs 11 in order for not blocking completely the skin pores of the hand by means of the material of the double sided adhesive foil 10.

In Figure 4 it is shown, that the bottom side surface of the onhand-wearable data input device 1 comprises supporting protrusions 12 and ventilation trenches 13 in be in another preferred embodiment.

In Figure 5 a similar version is shown from its bottom view as in Figure 4, but here the ventilation is actively supported also by a ventilator fan 14

In Figure 6 the main substrate 30 of a preferred embodiment of the onhand-wearable data input device is shown from the top view (on the left) and from bottom view (on the right). The anchoring points 15a, 15b, 15c, 15d can be seen from both view. The touchsensors 31, and the touchpad 2 occupy the majority of the top of the device. Also some feedback LEDs 7a, 7b, 7c, 7d can be seen. From the bottom view, the main components are shown: on/off switch 34, battery 35, battery charging connector 40, master microcontroller 41, programming connector of the master microcontroller 42, slave microcontroller 43, programming connector of the slave microcontroller 44, debugging connector of the slave microcontroller 45, connector of the battery 46, radio frequency transceiver 50.

In Figure 7 similarly to Figure 6 again the main substrate 30 of the onhand-wearable data input device is presented in an embodiment from top and bottom views, in which there are optical windows 33 inside the area of each touchsensor 31, and apart from the similar components the version of Figure 7 has additionally a LED driver IC 60, slave #2 microcontroller 61, programming connector of the slave #2 microcontroller 62, debugging connector of the slave #2 microcontroller 63.

Figure 8: Shows an example of an ambient display device 80 having a 'quick ID' 81 paired to a preferred embodiment of the onhand-wearable data input device 1 based on an initiation from the onhand-wearable data input device 1 by typing in the 'quick ID' 81 according to the marker arrows 90a, 90b, 90c, 90d, 90e. The user is notified by a feedback message 82 about the fact that the RF link 70 is successfully established.

The invention presented here may be realised in many embodiments different from those described in the examples above but still remaining within the scope and spirit of the present invention, therefore, this solution cannot be regarded as limited to the examples.

CLAIMS:

1. Data input device for a system comprising an ambient display with which a user can interact by transmitting the unique ID code of the data input device and a datastream typed in by the user via a secured RF communication channel where the user may use said data input device continuously, and which data input device having a unique ID code and a secured communication channel for datastream in RF, **characterized in that** said data input device (1) is physically separated from the ambient device, as an onhand wearable data input device (1) having a battery (35), a main substrate (30), electronic integrated circuits, and connecting pathways, furthermore a keyboard with numeric keys (3), alphabetic keys (4) and special mark and function keys (5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h, 6a, 6b, 6c, 6d) and with a touchpad (2), where the size of said data input device (1) is conform to the back of the hand for wearing it on the back of the hand, and is provided with fixing means for fixing it to the back of the hand or to the fingers and wrist of the hand.
2. A data input device according to claim 1 **characterized in that** having resilient strings (20, 21) for fixing it to the hand.
3. A data input device according to claim 2 **characterized in that** the strings form loops, where one of the loops is suitable for slipping the whole hand and the wrist into it, and at least one other loop is suitable for slipping one or more fingers into it.
4. A data input device according to claims 1-3 **characterized in that** the loop at the wrist is connectable by a detachable joint to a hook (22) which is fixed to the main substrate (30) of the data input device (1).
5. A data input device according to claim 1 **characterized in that** the fixing means is a double sided adhesive foil (10).
6. A data input device according to claim 1-5 **characterized in that** the bottom surface of the data input device comprises supporting protrusions (12) and ventilation trenches (13).
7. A data input device according to claim 6 **characterized in that** the main substrate (30) holds a ventillator fan (14).
8. A data input device according to claim 1-7 **characterized in that** the touchsensors (31) comprise optical windows (33) and light sources for backlighting (32).
9. A data input device according to claim 1-8 **characterized in that** the touchpad modul (2) is oriented in such a way when fixed on the hand, that the 'Y' axis (8) holds

less than 90 degrees with the longitudinal axis of the 3rd metacarpus in a view from the ends of the fingers.

10. System comprising an ambient display device **characterized in that** the system comprises a data input device (1) according to claim 1 where the ambient display device (80) has a 'quick ID' (81) presented on it, by which the ambient display device (80) and the data input device (1) can be paired to each other.

11. Method for pairing of RF link capable devices in a system according to claim 10 **characterized in that** a 'quick ID' (81) presented on the ambient display device (80) has to be typed into the data input device (1) by the user and sent out via the RF link (70) together with the globally unique ID code of the data input device (1) to initiate the pairing, and upon reception of the data transmission the ambient display device (80) accepts the pairing and displays a uniquely data input device specific notification message (82) about the fact that the RF link (70) is successfully established and will be maintained between the data input device (1) and the ambient display device (80) until its termination.

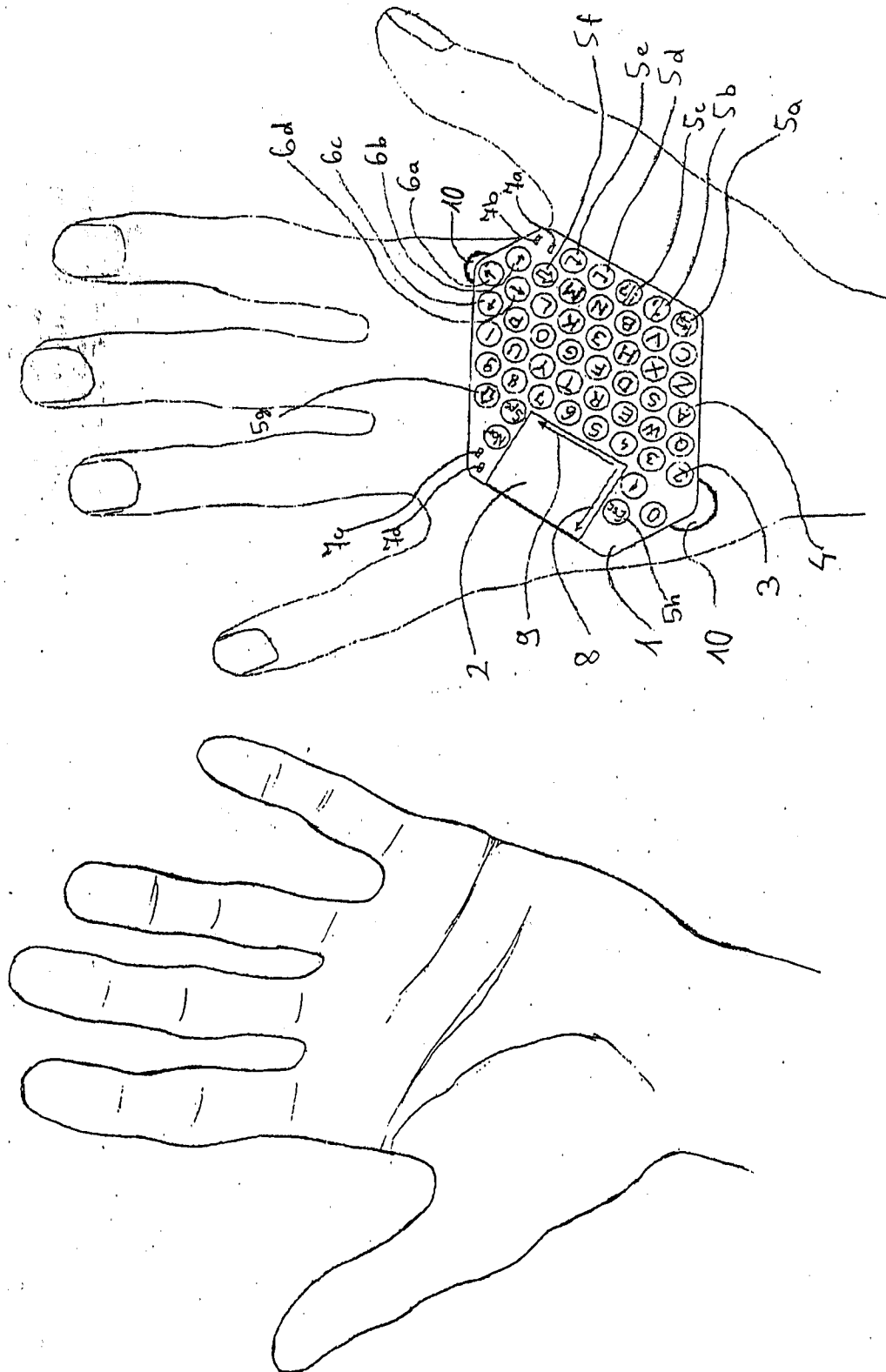


Fig. 1

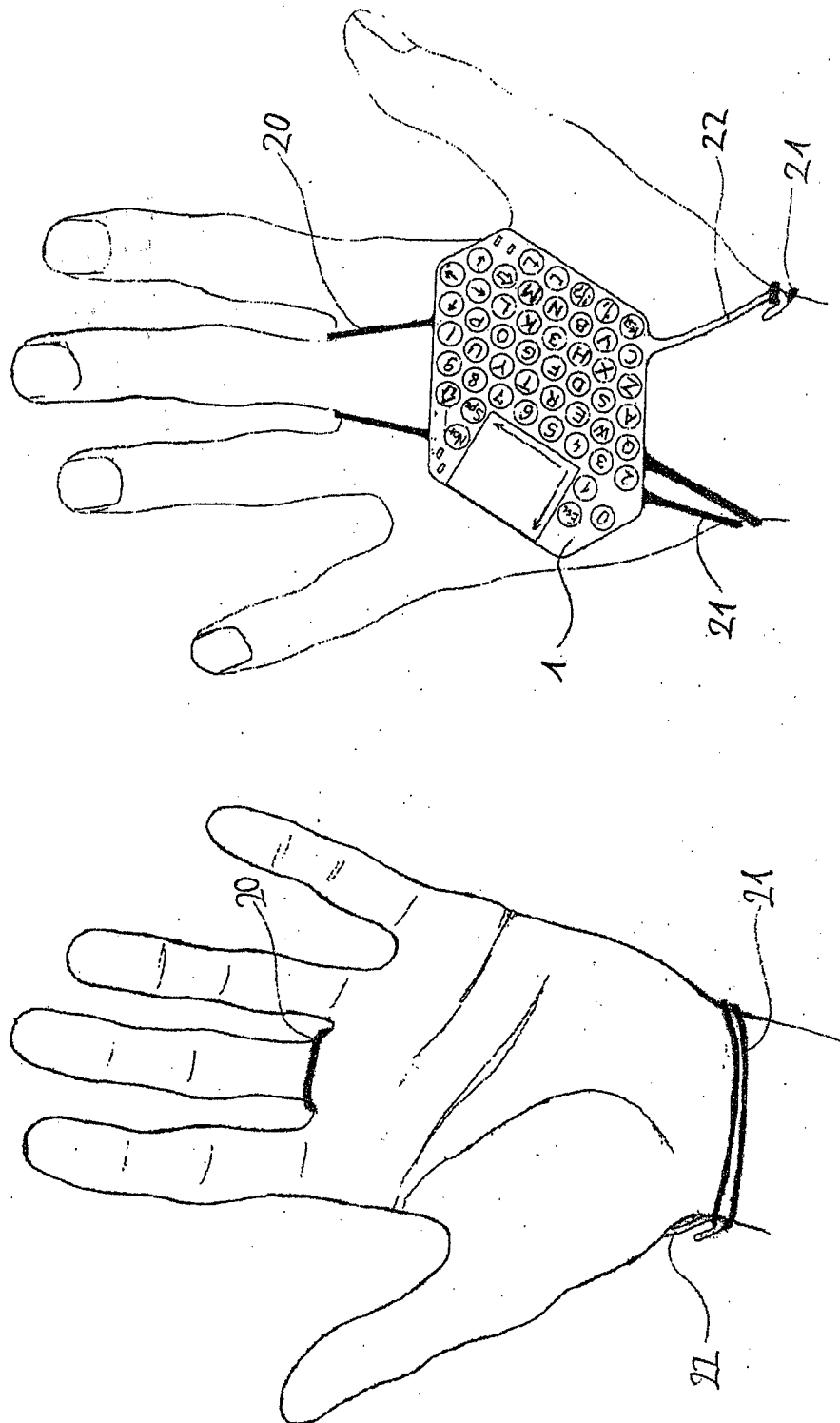


Fig. 2

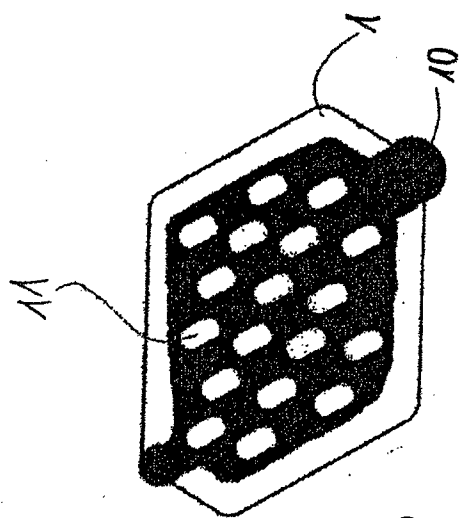


Fig. 3

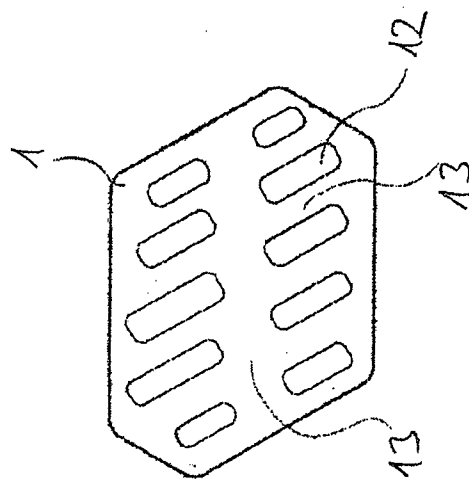


Fig. 4

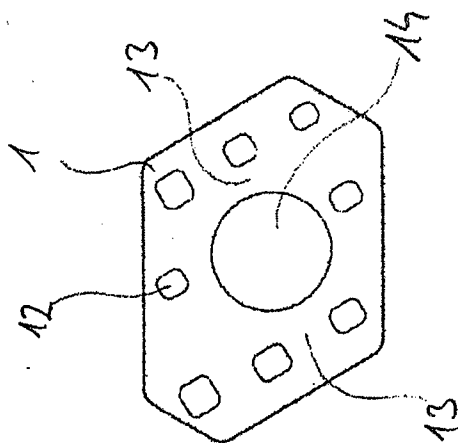


Fig. 5

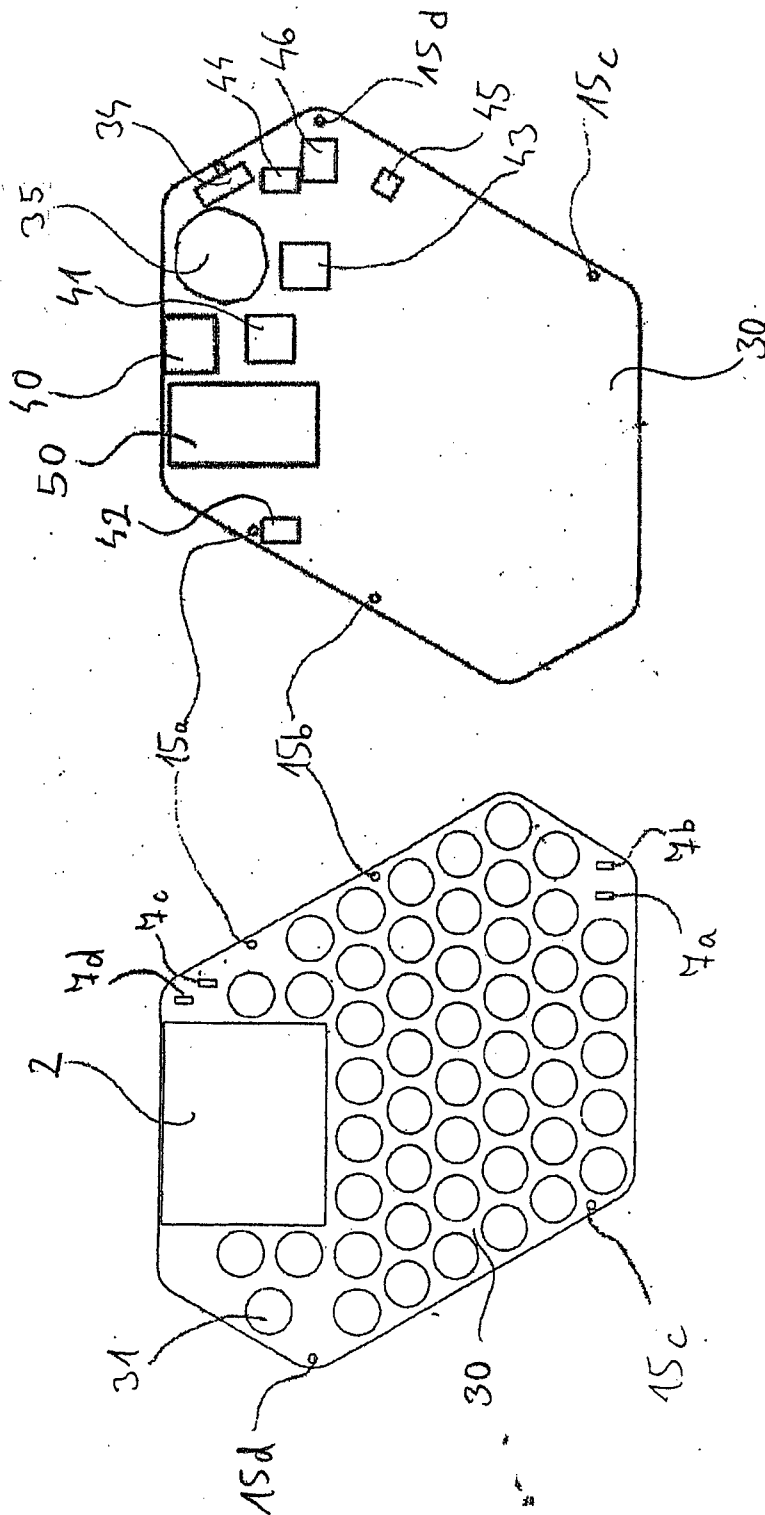
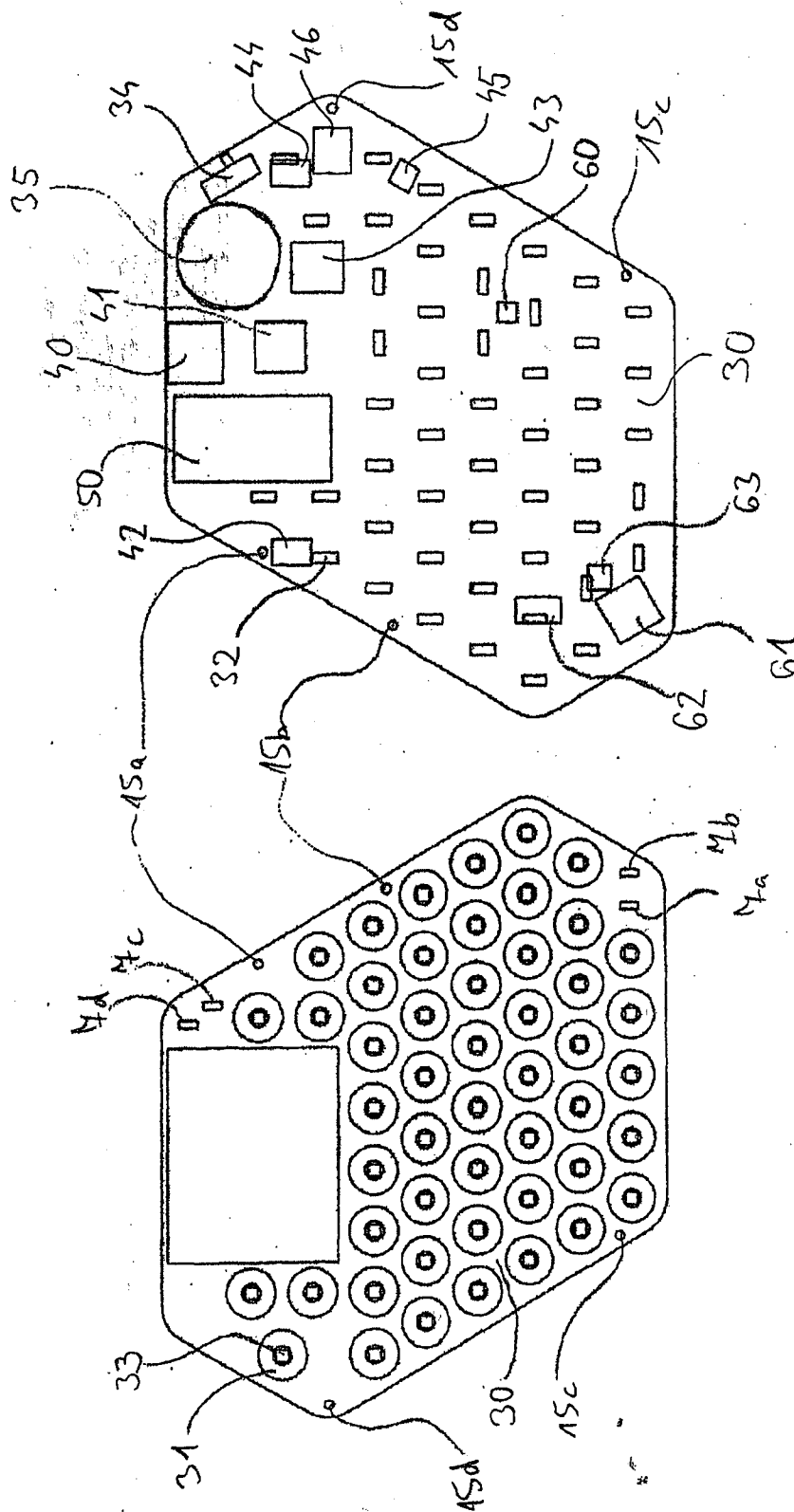


Fig. 6



7.
b.
E.

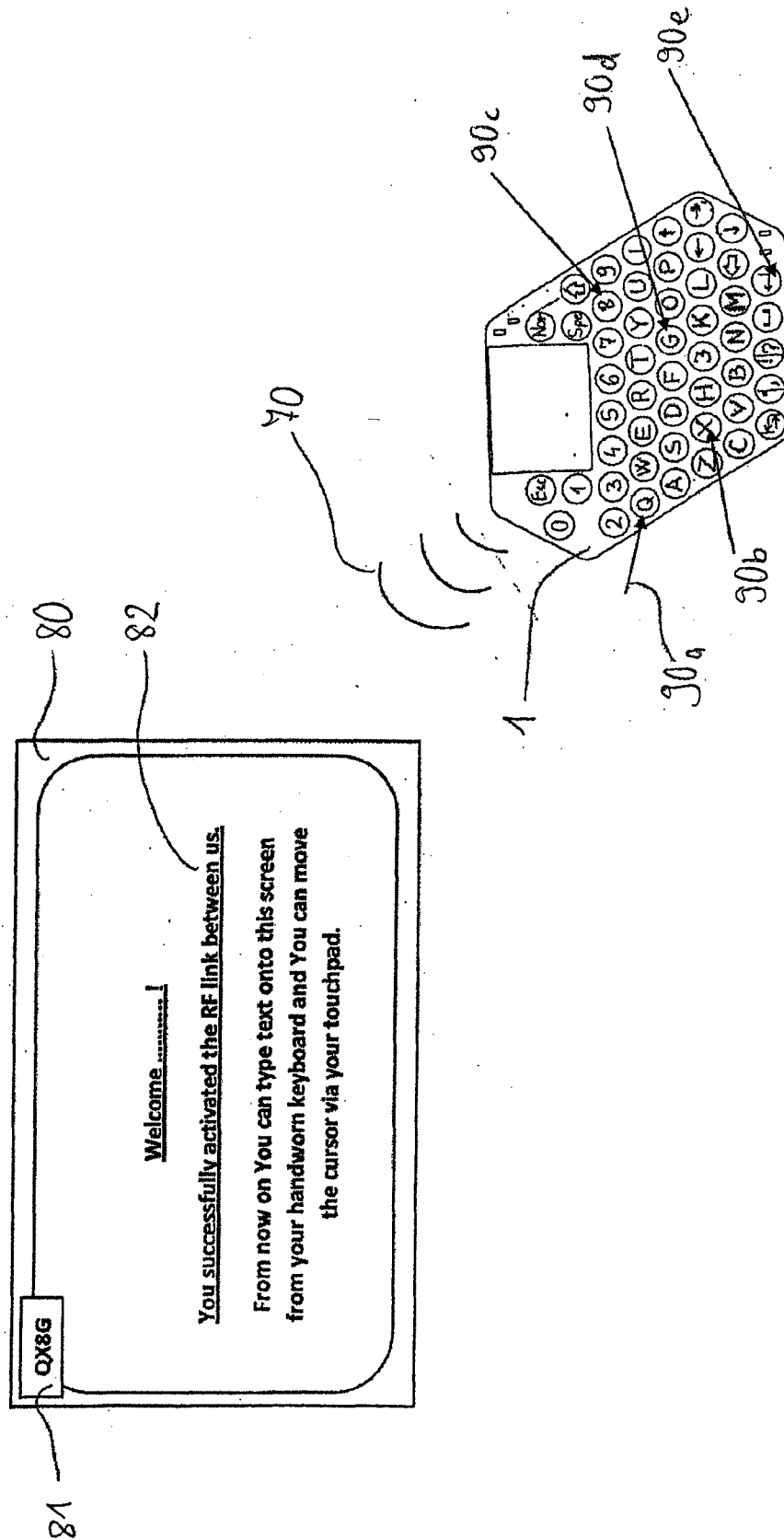


Fig. 8