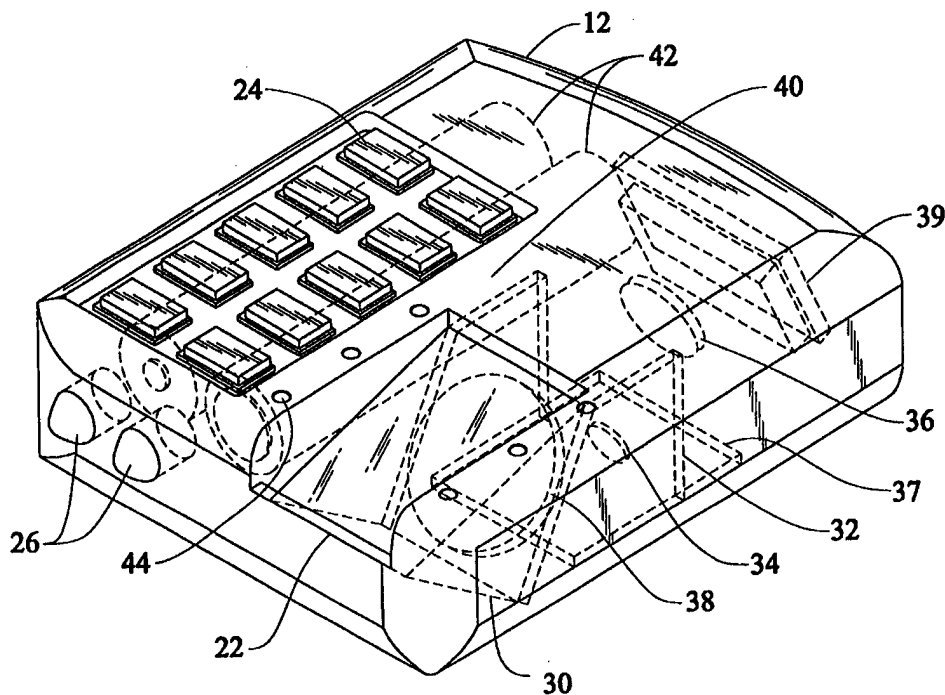




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/US98/07227</p> <p>(22) International Filing Date: 10 April 1998 (10.04.98)</p> <p>(30) Priority Data: 08/839,934 17 April 1997 (17.04.97) US</p> <p>(71) Applicant (for all designated States except US): CROSS CHECK CORPORATION [US/US]; East Tower, Suite 1200, 777 South Flagler Drive, West Palm Beach, FL 33401 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): SCOTT, Walter, Guy [NZ/US]; 11662 Lake Shore Place, North Palm Beach, FL 33408 (US). DAVIS, James, E. [US/US]; 13188 Flamingo Terrace, Palm Beach Gardens, FL 33410 (US). BETENSKY, ELLis [US/CA]; 1008-61 St. Clair Avenue, West, Toronto, Ontario M4V 2Y8 (CA).</p> <p>(74) Agent: SLAVIN, Michael, A.; McHale &amp; Slavin, P.A., Suite 402, 4440 PGA Boulevard, Palm Beach Gardens, FL 33410 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>	

(54) Title: HAND-HELD FINGERPRINT RECOGNITION AND TRANSMISSION DEVICE



## (57) Abstract

A portable fingerprint recognition transmitter that is compact, being less than the size of a cigarette pack, allowing the fingerprint recognition transmitter to be carried by an individual in a pocket or purse. The fingerprint recognition transmitter operates to take the image of the fingerprint and formulates a fingerprint image capable of transmitting through infrared or radio frequency to a receiver having previously stored fingerprint images so as to cause a comparison between the image taken and the image stored for purposes unlocking a security area.

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HAND-HELD FINGERPRINT RECOGNITION AND TRANSMISSION DEVICEField of the Invention

5 The instant invention is directed to the field of security control and, in particular, to a hand-held fingerprint recognition and transmission device.

Background of the Invention

10 Access to most any secure area is commonly limited by use of a locking device. The locking device may consist of a mechanical lock or software security password. A mechanical lock has a finite amount of combinations for use in gaining access to the secured area and requires the use of a key that can be duplicated. A software style password has an infinite  
15 amount of combinations available, however, the more complicated the password, the need exists to record the password in a tangible form. Once placed in a tangible form, if a stranger has access to the password, it is simple to enter the secured area.

20 A password can be used as a locking mechanism wherein the password is interpreted by the computer processor which operates as a decoder to compare the password against a stored code. For instance, a computer processor can deny access to files by use of a password wherein the operator of the computer  
25 must insert the correct password in order to access the files. It is also known that such passwords can be "hacked" wherein a computer operator can use the computer processor itself in order to generate sufficient password combinations to gain access to the files. Thus, even though passwords provide  
30 infinite variables, they can be shared thereby defeating their confidentiality. In addition, the more complex the password, the greater the need to place the password in a tangible format to prevent loss.

Home security is another example of where locking mechanisms are employed to prevent an individual from entering a home or detecting when entry is made. Such locking mechanisms can be easily defeated. For instance, a key can be duplicated wherein neighbors, previous owners, and so forth may all have access to a home otherwise thought to be secured. In many instances, home owners place a key under the door-mat or alongside the entryway so that younger children will have access to the home without the necessity of carrying a key. The alarm system may supplement the locking mechanism and include an alpha-numeric keypad requiring passwords leading to the aforementioned security problem.

Yet still another example are automobile door locks remotely unlocked by use of an IR or RF transmitter. Such a device operates as a convenience to the owner, but facilitates car theft by providing a device that can be easily copied and used for opening multiple vehicles as the amount of combinations of radio frequencies and/or infrared signals is limited. Once a thief is in an automobile, the ignition lock may easily be removed.

In effect, the prior art is replete with locking mechanisms that have either a finite amount of combinations or consists of a password that can be shared by others.

Fingerprint identification systems involve the use of a computer which provide an identification probability for a match of a fingerprint to a prerecorded fingerprint held in a data base. In this manner, fingerprint recognition devices have been employed for accessing high security areas but are impractical for use with a conventional home, automobile, computer and so forth. This ineffectiveness is due to the cost of having a fingerprint recognition system installed in each area requiring security.

Thus, what is needed in the art is a portable device having the individual locking characteristic provided by a fingerprint, without the need for placing a fingerprint recognition device on each item requiring security.

5

Summary of the Invention

The instant invention is a hand-held portable fingerprint recognition and transmission device that approximates the size of a cigarette pack allowing for complete portability. An individual may place their finger over a recognition reader wherein the reader scans the fingerprint, codes the image, and transmits the fingerprint code by infrared (IR) or radio frequency (RF) transmission to a receiver located on the item to be secured. For example, a fingerprint recognition device may be carried by an individual and if an automobile receiver has been programmed to open upon detection of an individual's fingerprint code, that individual may use a device to send a coded transmission to the automobile for use in unlocking the doors and/or ignition switch. In this manner, only individuals that have authorized access to a vehicle would have their fingerprint scanned into a memory module stored in the vehicle. The vehicle would have a receptacle located on the outside of the vehicle which awaits initiation by the aforementioned pocket-sized recognition transmitter.

In operation, an individual would place their finger over the fingerprint scanner of the instant invention, which would initiate the transmission to project the coded image to the receiver located on the vehicle. An individual may use a shared recognition transmitter for the vehicle will only open if the signal decoded matches a previously coded individual's fingerprint. In furtherance of this example, should an individual lose their transmitter, they may borrow another transmitter, for once their fingerprint is scanned by the

30

transmitter and pointed towards a receptacle, the receptacle will release the locking mechanism only if the fingerprint transmission matches the stored image.

5 In yet another example, a homeowner may allow only family members access to the home. A microprocessor stores previously scanned fingerprints into a receiver which will only allow access to the home if the receiver has received a scanned fingerprint that matches one of the previously stored fingerprint images. If a child has a problem holding onto  
10 keys, a fingerprint recognition transmitter may be left outside the home for it would be of no use to anybody except for the child or another family member who has a stored fingerprint code. The child would place their finger over the scanner of the transmitter to provide the ability to unlock the home. If  
15 the transmitter has been lost or stolen, the child can borrow a transmitter as the locking mechanism is dependent upon the fingerprint, not the transmitter. An alpha-numeric keypad further provides access only to those areas desired, despite the unlocking by the fingerprint. For instance, key 1 may  
20 transmit the print and open all doors on a car, key 2 may transmit the print and open only the drivers door on a car. This keypad may also be used to disable the device to prevent theft of the individual transmitter.

The computer industry has standardized on an IR receptacle  
25 in a similar fashion as the standardized serial port. In this manner, the transmitter could be used to scan the fingerprint image and transmit the coded fingerprint image wherein the computer will have stored those fingerprint images that have access to the computer files. If an image matches, computer  
30 access is allowed. In addition, the use of a keypad may further allow security into individual areas.

The apparatus permits personalized recognition for banks and businesses, verification of identity at the point of sale transactions, authorization of financial and contractual transactions, and so forth.

5           Thus, an object of the instant invention is to provide a fingerprint transmitter capable of coding the image of an individual's fingerprint and transmitting it to a receiving device for comparing the transmission to a stored fingerprint for use in granting access to a secured area.

10           Yet another object of the instant invention is to provide a security transmitter that is universal allowing any individual to share the transmitter wherein only the fingerprint of the individual will allow the transmitter to open a secured area.

15           Still another object is to provide an alpha-numeric keypad in combination with a portable fingerprint recognition allowing the use of passwords in addition to the scanned image.

          Other objects and advantages of this invention will become apparent from the following description taken in conjunction  
20           with the accompanying drawings wherein are set forth, by way of illustration and example, certain embodiments of this invention.

The drawings constitute a part of this specification and include an exemplary embodiment of the present invention and illustrate various objects and features thereof.

5 **Brief Description of the Drawings**

Figure 1 is a perspective view of the fingerprint recognition transmitter; and

Figure 2 is a perspective view of the fingerprint recognition transmitter illustrating individual component parts.

10 **Detailed Description of the Preferred Embodiment**

Figure 1 depicts the fingerprint recognition transmitter 10 of the instant invention having a housing 12 approximating the size of a cigarette pack. The housing 12 has an upper surface 16, sidewalls 18, and a lower surface, not shown. The upper surface 16 includes a fingerprint recognition area 20 having a transparent cover 22 or direct access to a prism beneath the recognition area 20. An individual can grasp the housing 12 and place a finger over the cover 22 so as to allow fingerprint image to be read through the cover 22. A proximity switch allows operation of the device once a finger is properly positioned.

The upper housing 12 includes an alpha-numeric keypad having depressible switches 24 for use in combination with the fingerprint recognition allowing for manipulation of data. For instance, the switches 24 may be used to input a password to turn on the transmitter making it worthless if stolen. The



switches may be configured to send a password code to accompany a fingerprint image for purposes of accessing additional security locations. For instance, the keypad may initiate functions that are secured and transfer empowerment to a) initiate the transfer once the fingerprint has been stored and the device is pointed at a receiver; b) to instruct the receiver to perform certain functions such as I) key 1 transmits the print and opens all doors on a car; ii) key 2 may transmit the print and open only the drivers door on a car; iii) key 3 may start the engine; iv) key 6 may allow the print immediately following the owners print (valet) to lock and start the car over the following 24 hours; v) key 9 may allow the print immediately following the owner print (valet) to become the new owner. The keypad type is only an example for the device may have keypad operation similar to a cellular phone with menus and so forth, including an alphanumeric display.

The front wall of the housing includes an IR transmitter and receiver 26. Alternatively, this may include an RF transmitter, as a replacement or addition to the IR, depending upon the type of receiver to be used with the device. The fingerprint recognition transmitter may be made as a dual function being able to send either an encoded fingerprint in either an IR or RF signal allowing manufacturers to incorporate either type of receiver in the item to be secured. Thus, automobiles that currently have the RF receiver may be modified to include a fingerprint recognition module wherein the existing system is in receptive to the transmission of a fingerprint image. Similarly, computer manufacturers who have standardized an IR input port would allow use of the device for gaining access to the computer. The transmitter 10 may also have a receiver to verify coding transfer, especially when used in an IR format. With present microprocessor power, the

instant device will not recognize the prints by itself. The devices initial function is to capture and transmit prints with instructions to a receiver which will have sufficient power to recognize the prints. The receiver functions as a transmission  
5 controller as if a small packet of the transmission is lost, due to movement of the transmitter, the receiver could ask for a re-transmission of the packet. The ability to have the hand-held device recognize the prints is deemed within the scope of this invention as the current inability is due only to the non-  
10 commercial availability of an affordable microprocessor having sufficient power and sized to fit within the device housing.

Referring to Figure 2, the housing 12 shown in a partial perspective view wherein prism 30 is located beneath the recognition area wherein a proximity sensor 32 initiates  
15 operation of a CCD or CMOS camera 39 to focus the fingerprint image by use of a first plastic aspheric lens 38, which is directed through a second plastic aspheric lens 34 for reflection off a mirror folding optics 37 for direction through a third plastic aspheric lens 36. The prism 30 operates to  
20 change the focal of the fingerprint allowing for ease of interpretation through the CCD or CMOS camera as conventionally performed by fingerprint recognition devices. The IR LED transmitter and receiver 26 transfers a coded image from the microprocessor memory controller 40 coupled to the camera. The  
25 device may operate on replaceable batteries 42, or include a recharge battery.

The portable fingerprint recognition device 10 of the instant invention allows an individual to carry the recognition device on its person and allows the individual to use the  
30 fingerprint as the unique locking key for any secured area that has a receiver based upon an infrared or radio frequency receptacle. If an individual's automobile, home, and business

each have fingerprint recognition receptacles, the individual may have a fingerprint scanned into each one of the receptacles thereby allowing the use of a single key in order to access each one of the aforementioned locations. In essence, the device may be used to eliminate the use of mechanical keys allowing the individual to carry a single individual fingerprint recognition transmitter.

The alpha-numerical keypad as depicted by switches 24 allows the transmitter to be further individualized so as to make the transmitter worthless to an individual who has stolen the transmitter as well as allow for additional security by allowing the use of a software password so as to allow further combinations of the lock as provided by the fingerprint when necessary. The housing 12 includes a plurality of status indicator LEDs 44, which may be used for depiction of operation of the transmitter. For instance, an LED may indicate low battery, transmitter on status, transmitter activation, fingerprint recognition and, successful fingerprint scanning and transmission, as well as verification of lock opening.

A receiver, not shown, is used for receipt of the wireless transmission and comparing the transmitted fingerprint image to a stored image. The receiver may consist of a finger print scanner for when frequent changes are required, such as in a rental vehicle or a motel room. Alternatively, a scanner by used for capturing an image for insertion into the receiver, wherein the receiver operates only as a storage device and for use in comparing the stored image to the transmitted image.

It is to be understood that while a certain form of the invention is illustrated, it is not to be limited to the specific form or arrangement of parts herein described and shown. It will be apparent to those skilled in the art that  
5 various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown in the drawings and described in the specification.

10

**CLAIMS****WHAT IS CLAIMED IS:**

1. A portable fingerprint recognition and transmitter apparatus comprising: a housing means; a fingerprint reader means having a prism with a first side surface exposed through  
5 a surface of said housing means with a second side surface of said prism positioned in said housing; a plurality of aspheric lens optically coupled to said prism for collimating a fingerprint image; camera means for capturing the fingerprint  
10 image focused through said aspheric lens; microprocessor means for encoding the fingerprint image captured by said camera means; a transmitter means for the wireless transfer of a captured encoded fingerprint image; and a receiver means for receipt of said wireless transfer, said receiver means  
15 including a microprocessor having a memory for storing fingerprint code images wherein said receiver compares said transfer to said stored images to determine if a match occurs.

2. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said housing means  
20 includes an upper surface having a keypad operatively associated with said microprocessor means; wherein said keypad provides a manual means for inputting authorization data into said microprocessor.

25

3. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said housing means includes a battery power supply.

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4. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said housing means includes a plurality of indicator lamps.

5. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said camera means is a CCD camera.

5 6. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said camera means is a CMOS camera.

10 7. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said transmitter means is defined as an infrared transmitter.

15 8. The portable fingerprint recognition and transmitter apparatus according to Claim 1 wherein said transmitter means is defined as a radio frequency transmitter.

20 9. A portable fingerprint recognition and transmitter apparatus comprising: a portable housing means; a fingerprint reader means having a prism with a first side surface exposed through a surface of said housing means with a second side surface of said prism positioned in said housing; at least three aspheric lens optically coupled to said prism and placed within a mirror base for collimating a fingerprint image; camera means for capturing the fingerprint image focused  
25 through said aspheric lens; microprocessor means for encoding the fingerprint image captured by said camera means; a keypad operatively associated with said microprocessor means; a transmitter means for the wireless transfer of a captured encoded fingerprint image; a battery power supply; and a  
30 receiver means for receipt of said wireless transfer, said receiver means including a microprocessor having a memory for

storing fingerprint code images wherein said receiver compares said transfer to said stored images to determine if a match occurs.

5           10. The portable fingerprint recognition and transmitter apparatus according to Claim 9 wherein said housing means includes a plurality of indicator lamps.

10           11. The portable fingerprint recognition and transmitter apparatus according to Claim 9 wherein said camera means is a CCD camera.

15           12. The portable fingerprint recognition and transmitter apparatus according to Claim 9 wherein said camera means is a CMOS camera.

20           13. The portable fingerprint recognition and transmitter apparatus according to Claim 9 wherein said transmitter means is defined as an infrared transmitter.

25           14. The portable fingerprint recognition and transmitter apparatus according to Claim 9 wherein said transmitter means is defined as a radio frequency transmitter.

FIG. 1

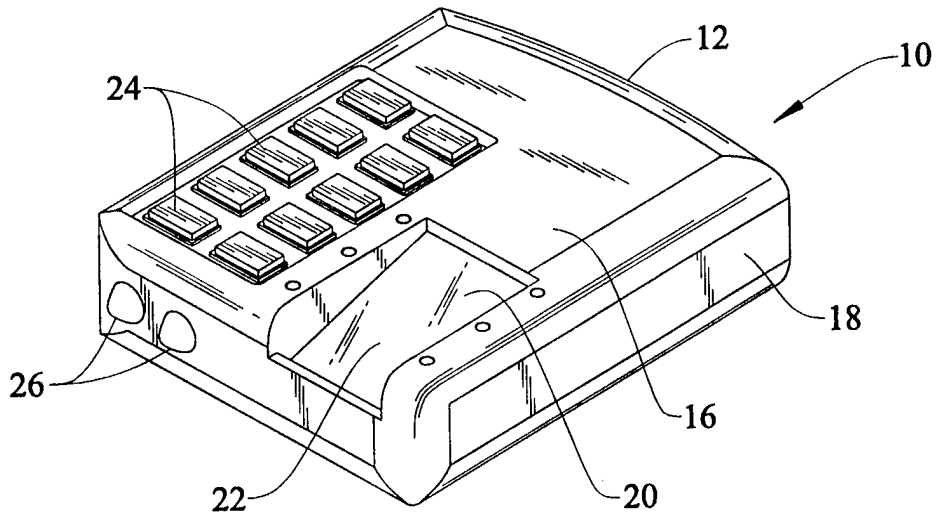
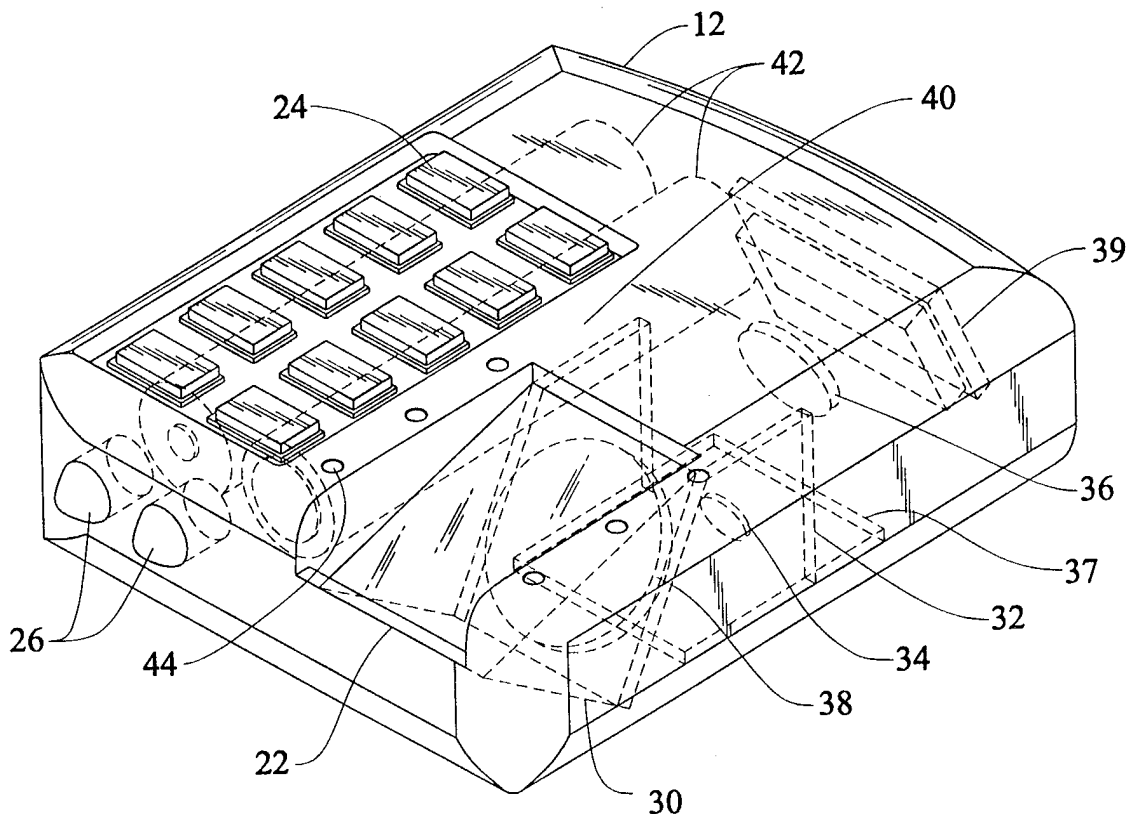


FIG. 2



SUBSTITUTE SHEET (RULE 26)



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/07227

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 6 G06K9/00				
According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>				
Minimum documentation searched (classification system followed by classification symbols) IPC 6 G06K				
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 practical, search terms used)				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
A	WO 94 22371 A (DIGITAL BIOMETRICS INC) 13 October 1994 see page 13, line 20 - line 24; figures 1,6 ---	1-14		
A	US 5 596 454 A (HEBERT RAY) 21 January 1997 see abstract ---	1-14		
A	DRAKE M D ET AL: "WAVEGUIDE HOLOGRAM FINGERPRINT ENTRY DEVICE" OPTICAL ENGINEERING, vol. 35, no. 9, September 1996, pages 2499-2505, XP000633939 Section "3. Imaging System for the Prototype HoloFED" Section "4. Fingerprint Recording System" see abstract ---	1-14		
-/--				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <span style="margin-left: 200px;"><input checked="" type="checkbox"/> Patent family members are listed in annex.</span>				
* Special categories of cited documents :				
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Inte .onal Application No  
PCT/US 98/07227

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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Information on patent family members

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