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(54) **SCANNER WITH COUPON VALIDATION**

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(*) Notice: This patent is subject to a terminal disclaimer.

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Related U.S. Patent Documents

Reissue of:

(64) Patent No.: **Re. 35,117**
Issued: **Dec. 12, 1995**
Appl. No.: **08/245,892**
Filed: **May 19, 1994**

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(57) **ABSTRACT**

Which Is a Reissue of:

(64) Patent No.: **5,128,520**
Issued: **Jul. 7, 1992**
Appl. No.: **07/392,851**
Filed: **Aug. 11, 1989**

A point of sale (POS) bar code scanner such as in common use in retail stores includes provision for reading bar coded redemption coupons (or other bar coded documents redeemable for value) in a manner secure from a human operator. Integration of functions between the POS scanner and the coupon reader varies with different embodiments described. Through software associated with bar code decoding logic, a comparison is made between information on a validation coupon and information on items presented for purchase, and a decision is made as to whether the redemption coupon is valid and redeemable in this transaction. In one embodiment, the bar code scanner simply receives the redemption coupon face down on the product scanner window, and integrated decode logic of the scanner identifies the bar code as belonging to a redemption coupon, then makes the comparison and validation of the coupon for the particular transaction. In some embodiments of the invention, the POS product scanner has a special beam exit window through which the scanning beam is diverted when it is signified that a redemption coupon is to be read, with a coupon reading scan pattern. After validation the coupon may be punched or otherwise cancelled, and/or sent to a secure container. Several types of securing devices are disclosed, for preventing subsequent use of redeemed coupons.

U.S. Applications:

(63) Continuation of application No. 08/245,892, filed on May 19, 1994, now Pat. No. Re. 35,117.

(51) **Int. Cl.**⁷ **G02B 5/08**; G02B 26/00; G06K 7/10

(52) **U.S. Cl.** **235/462.36**; 235/462.37; 235/462.38; 235/375; 235/383; 235/487

(58) **Field of Search** 235/375, 383, 235/487, 462, 462.36, 462.37, 462.38, 462.39, 462.4; 364/401

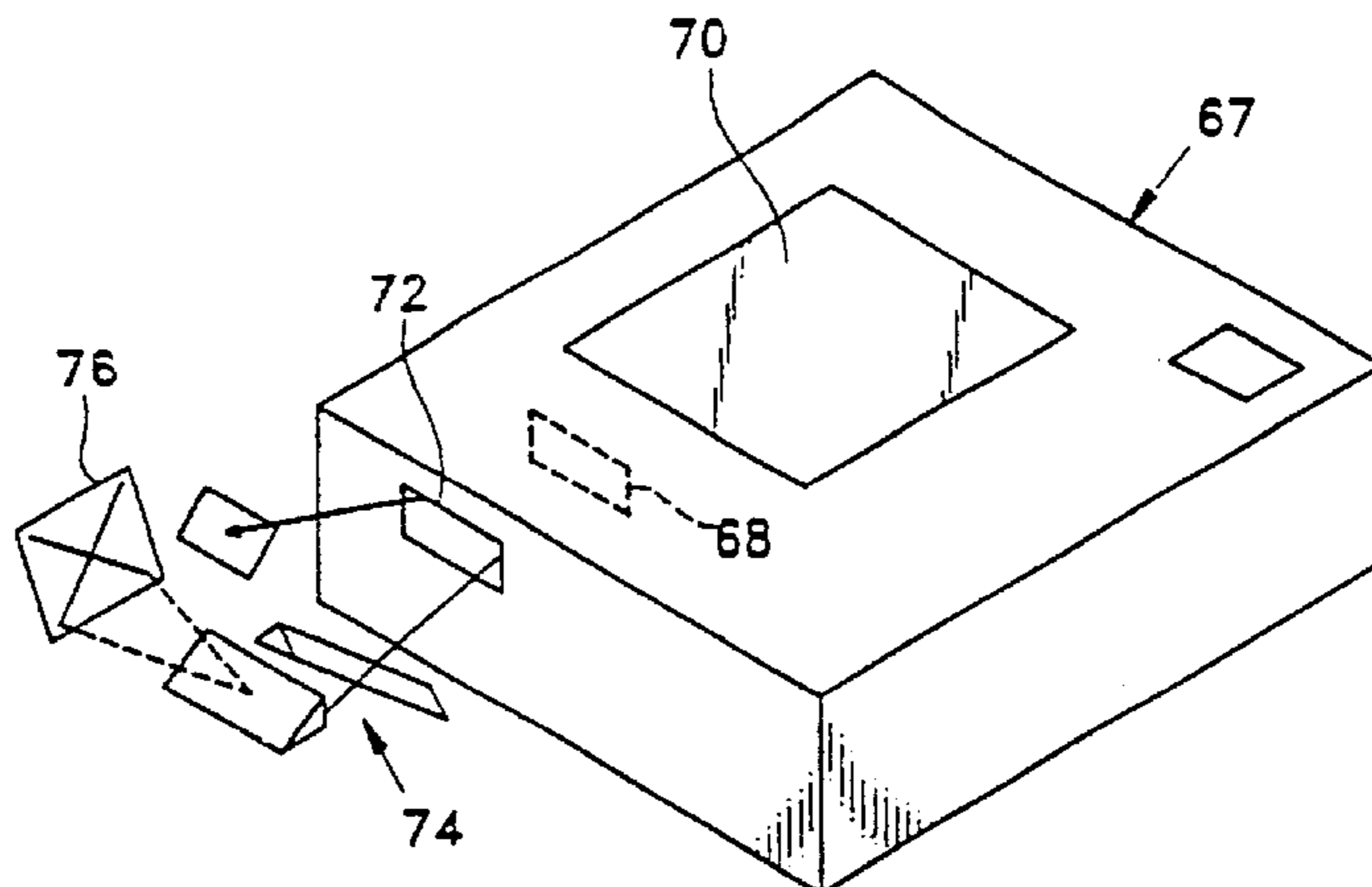
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75 Claims, 16 Drawing Sheets



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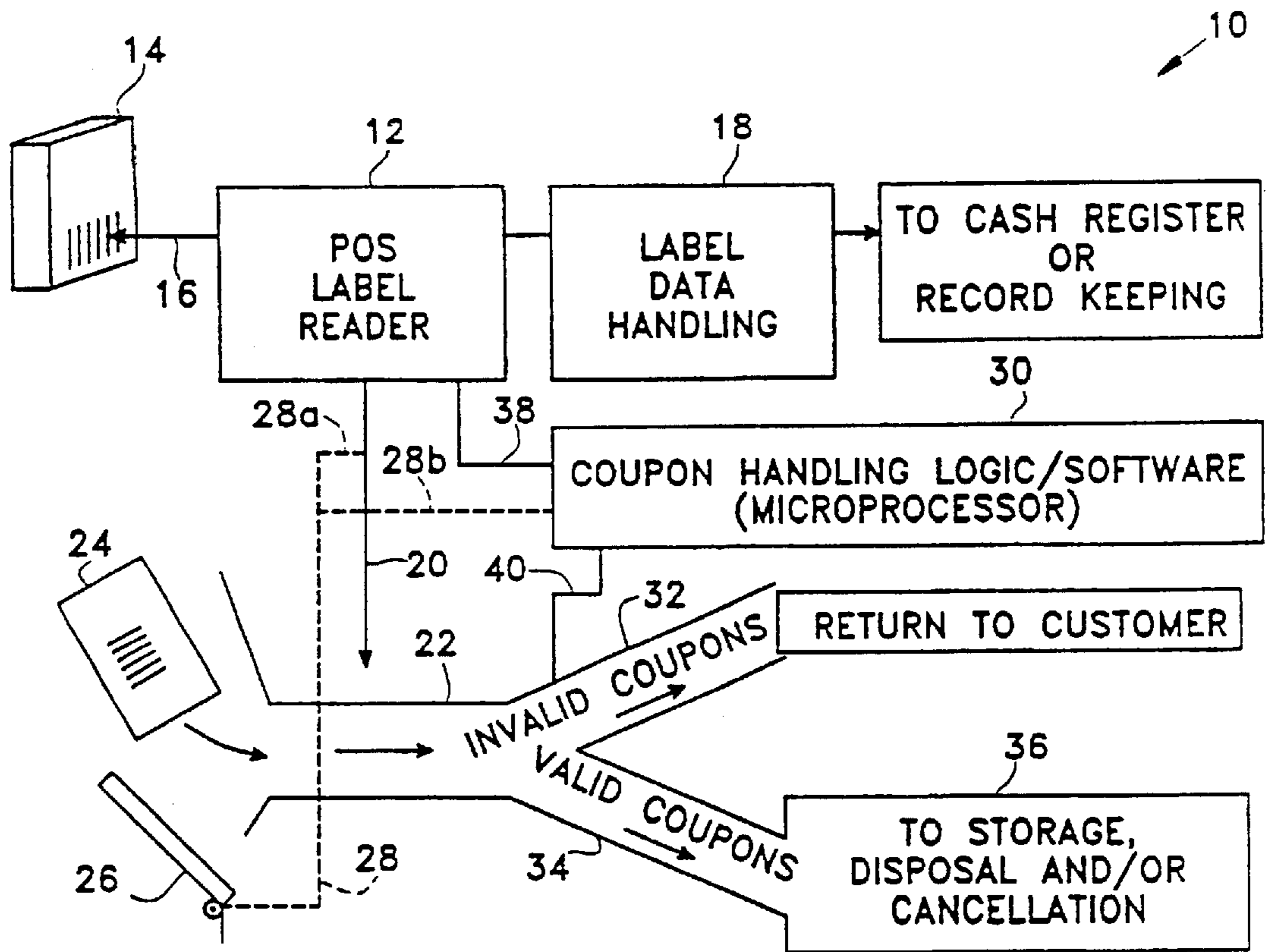


Fig. 1

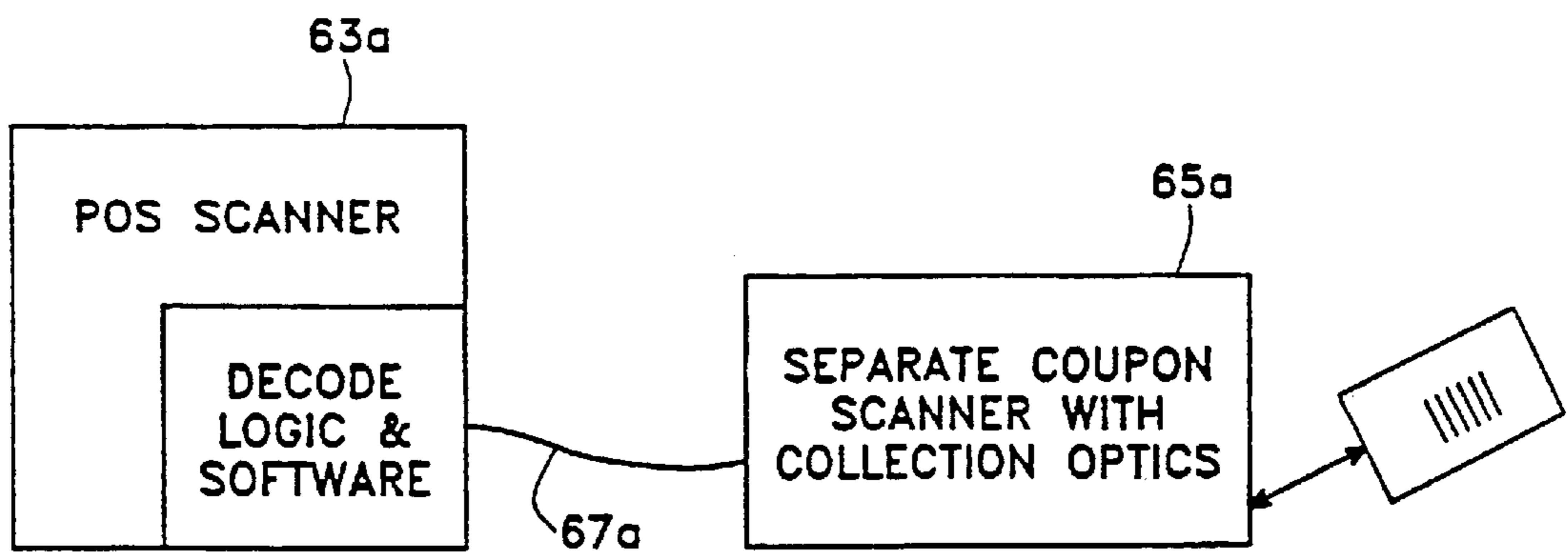


Fig. 2A

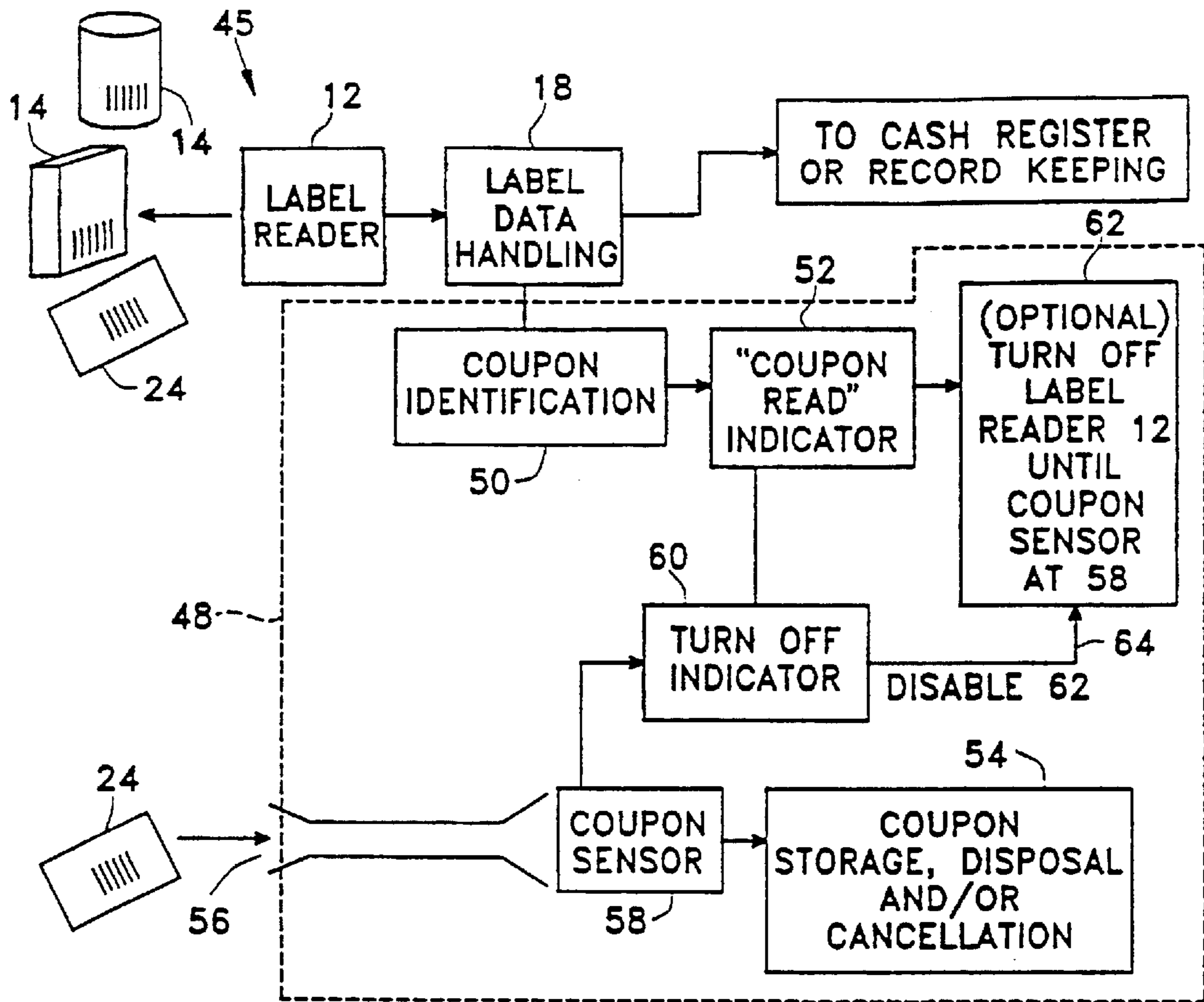


Fig. 2

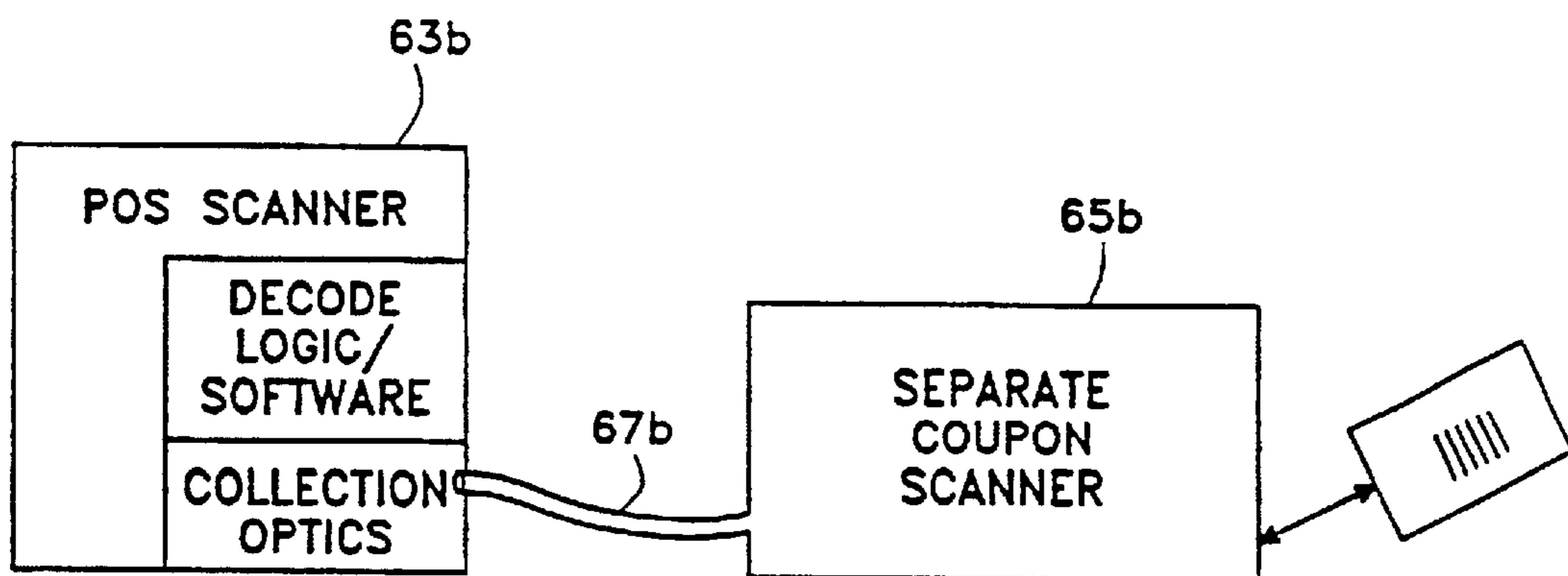


Fig. 2B

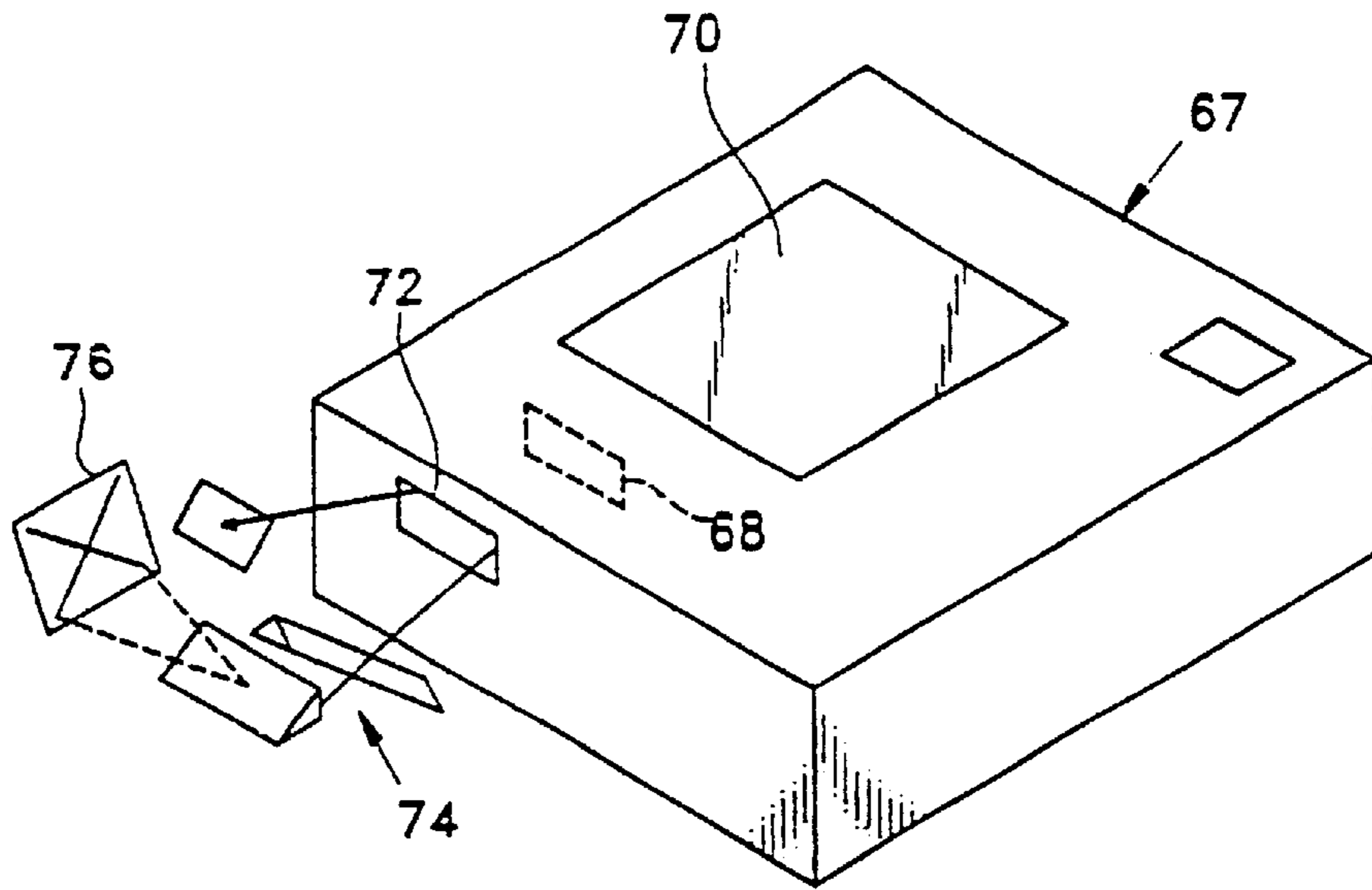


Fig. 3

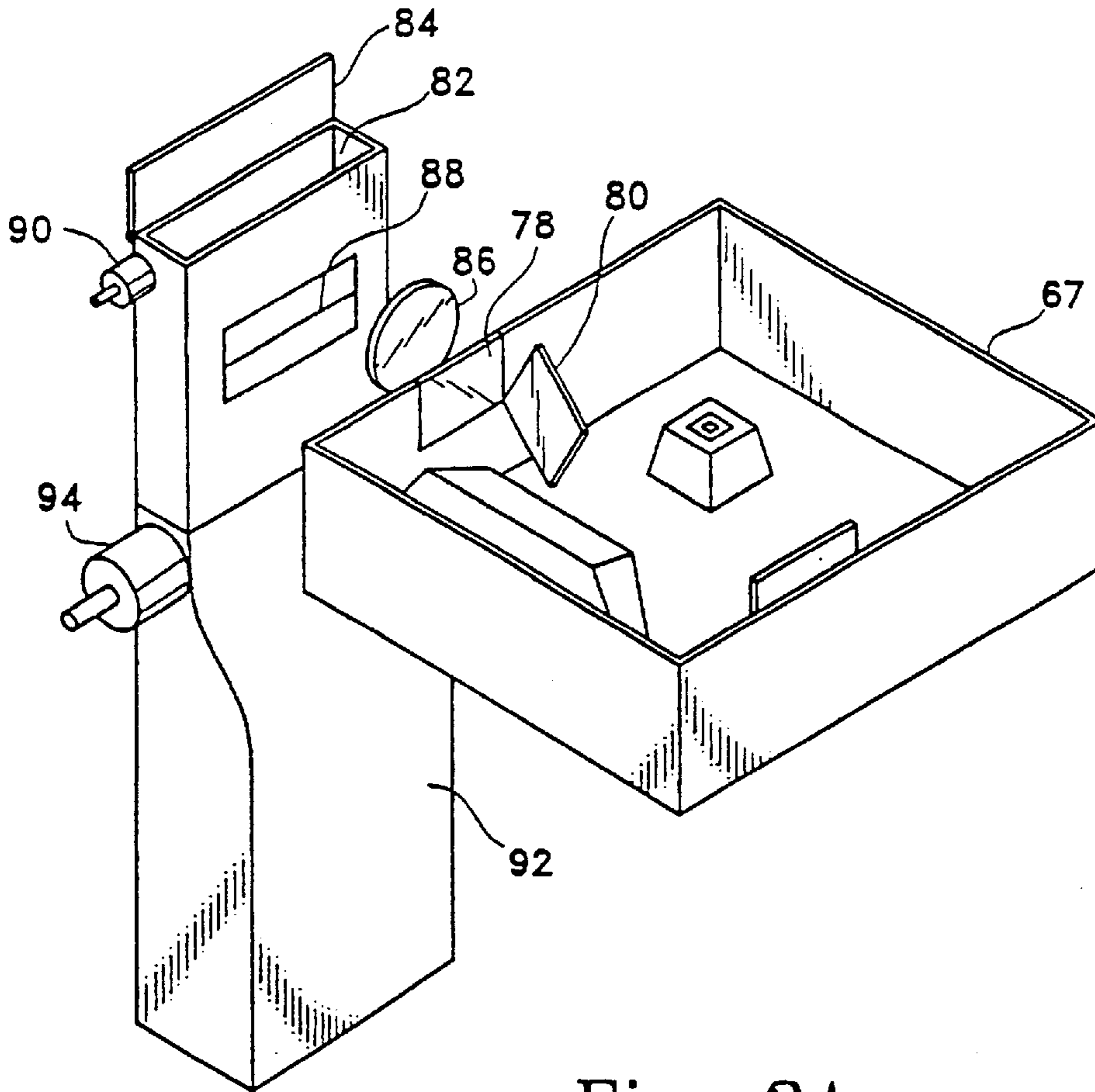


Fig. 3A

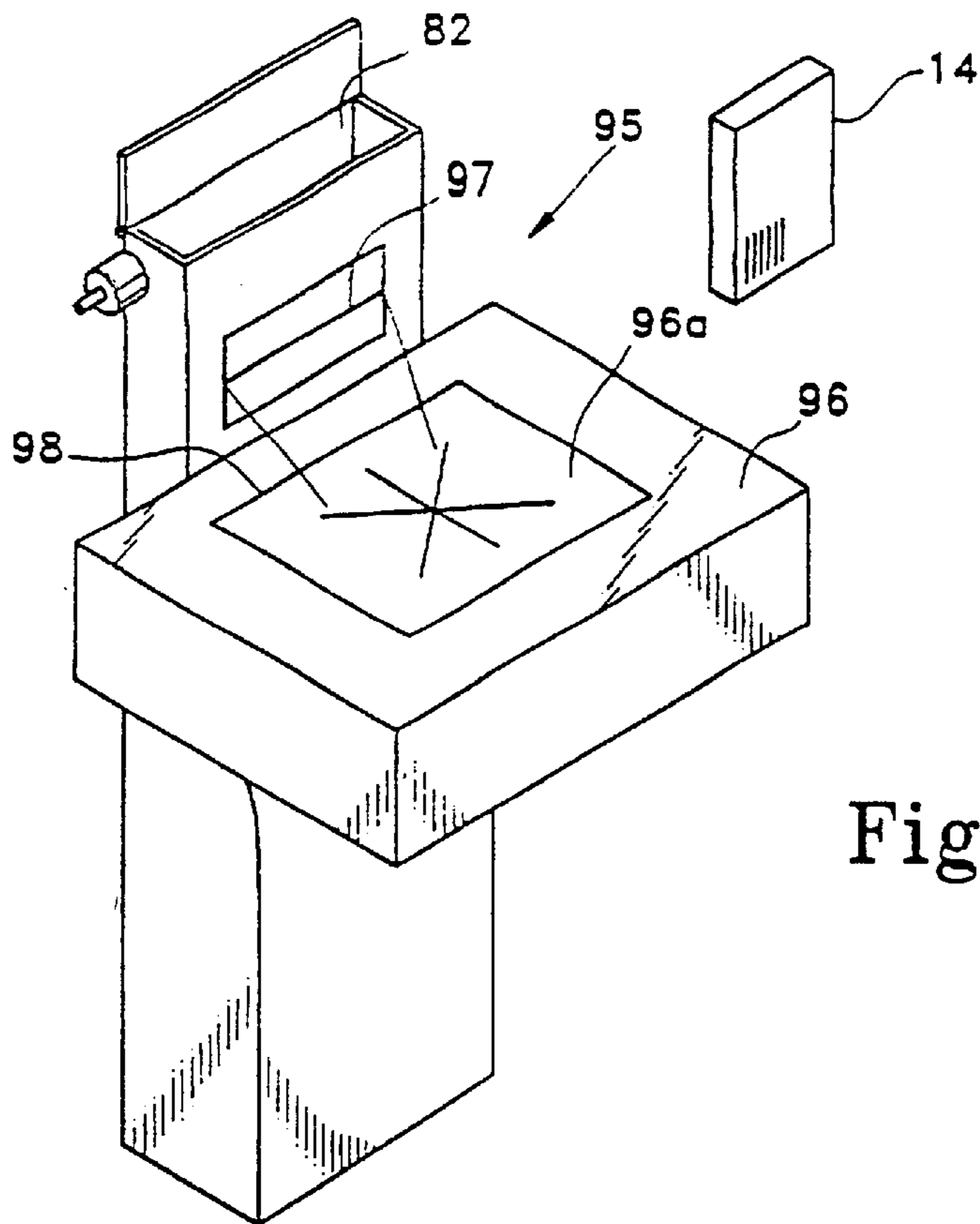


Fig. 3B

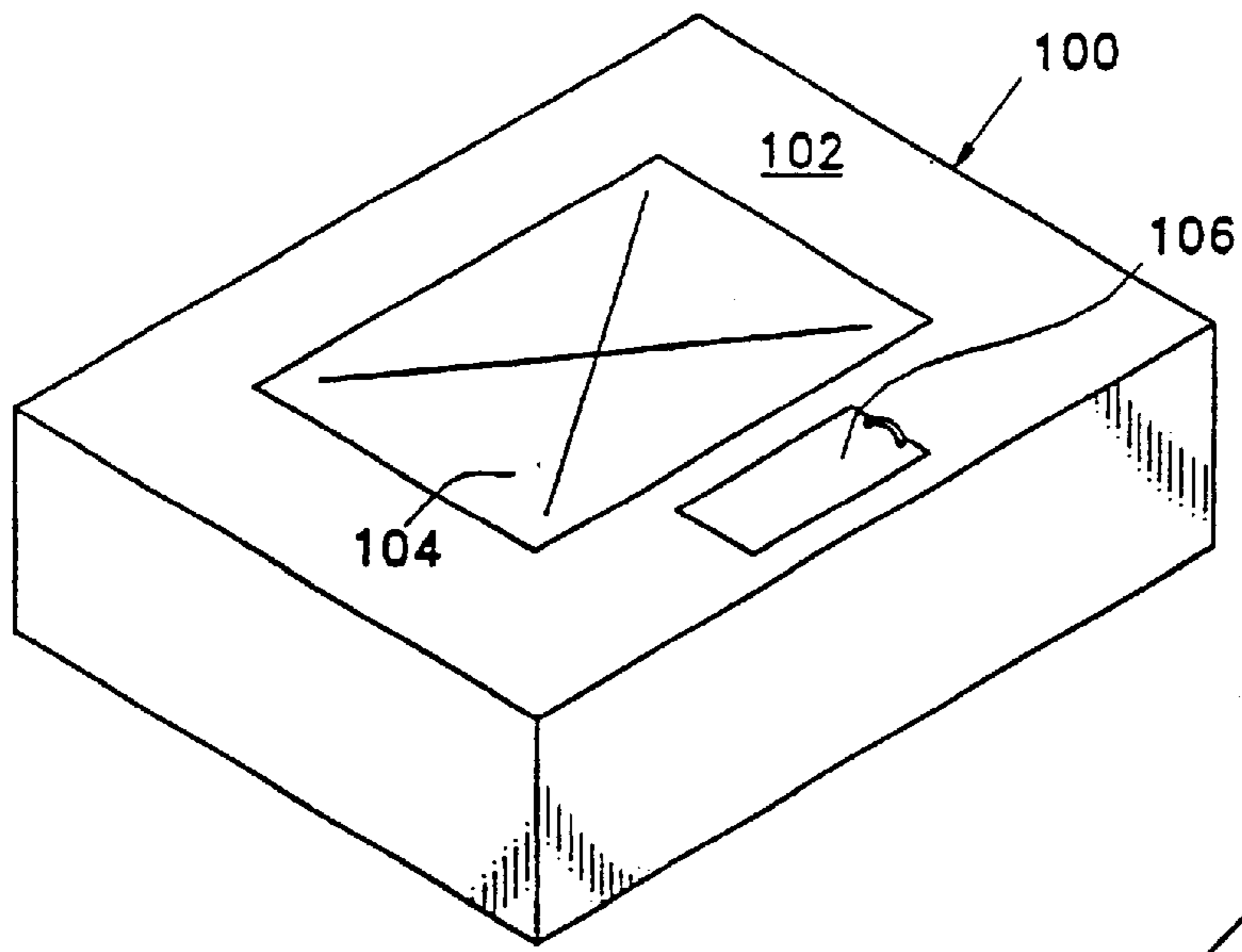


Fig. 4



Fig. 4A

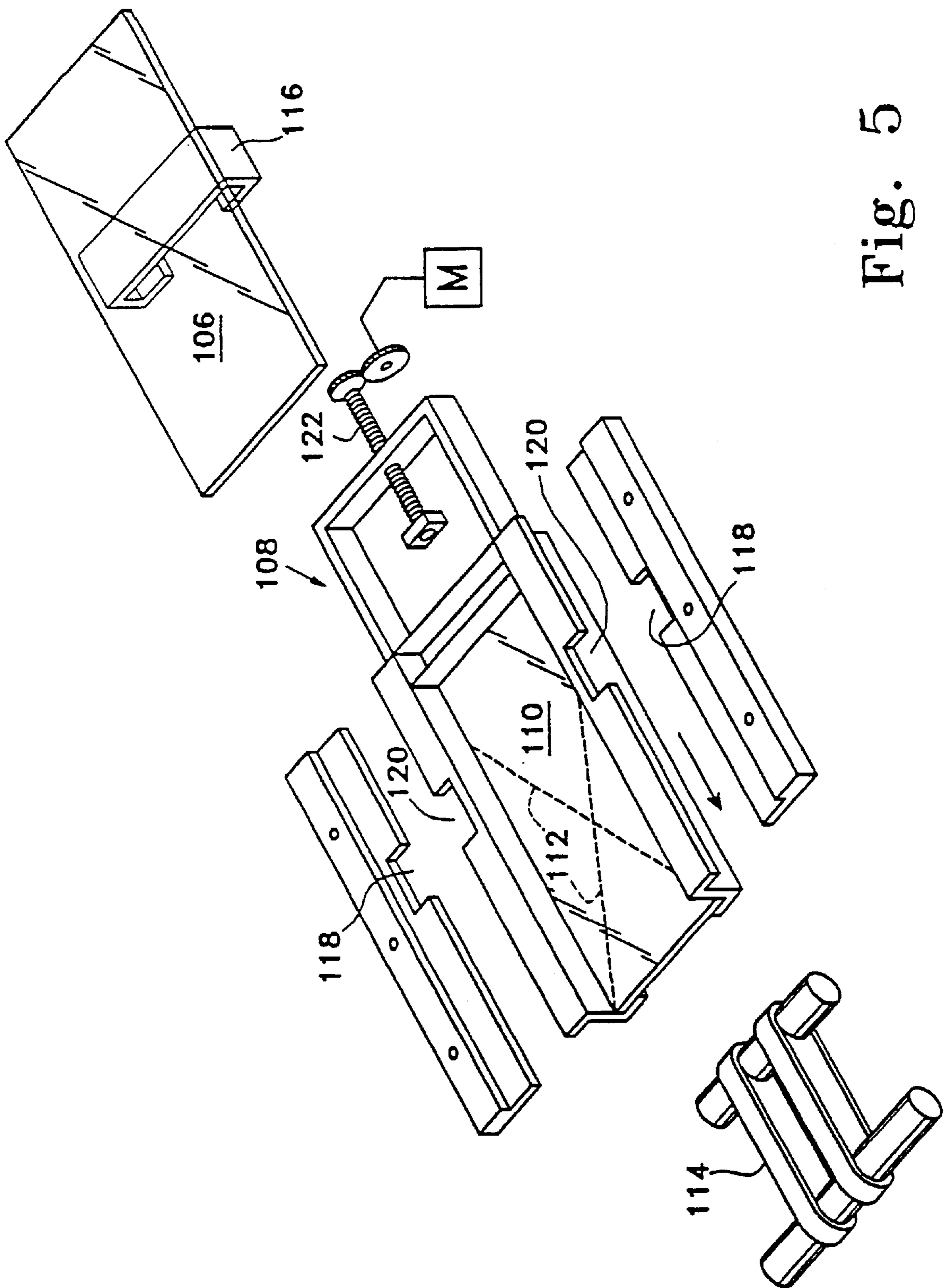


Fig. 5

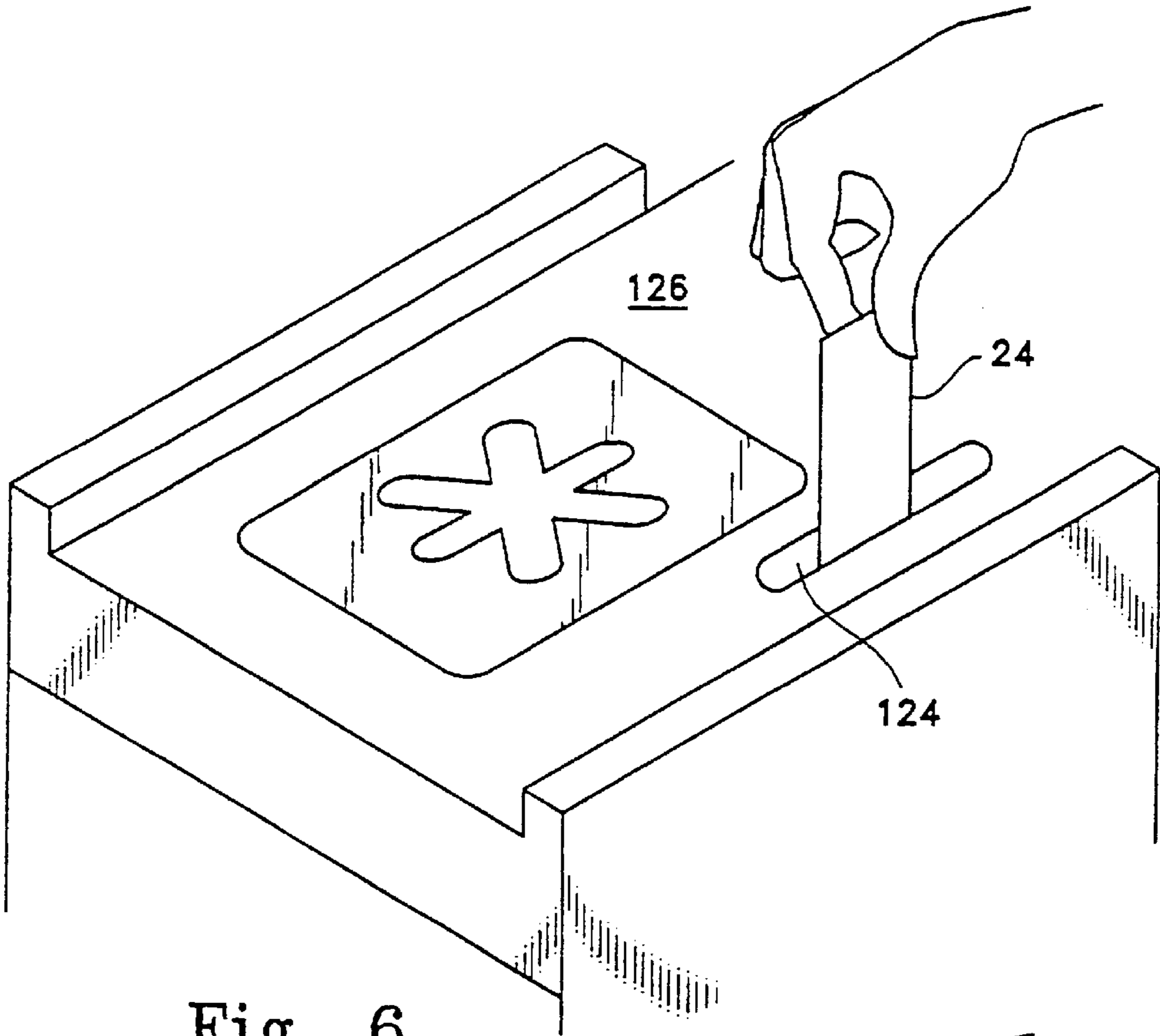


Fig. 6

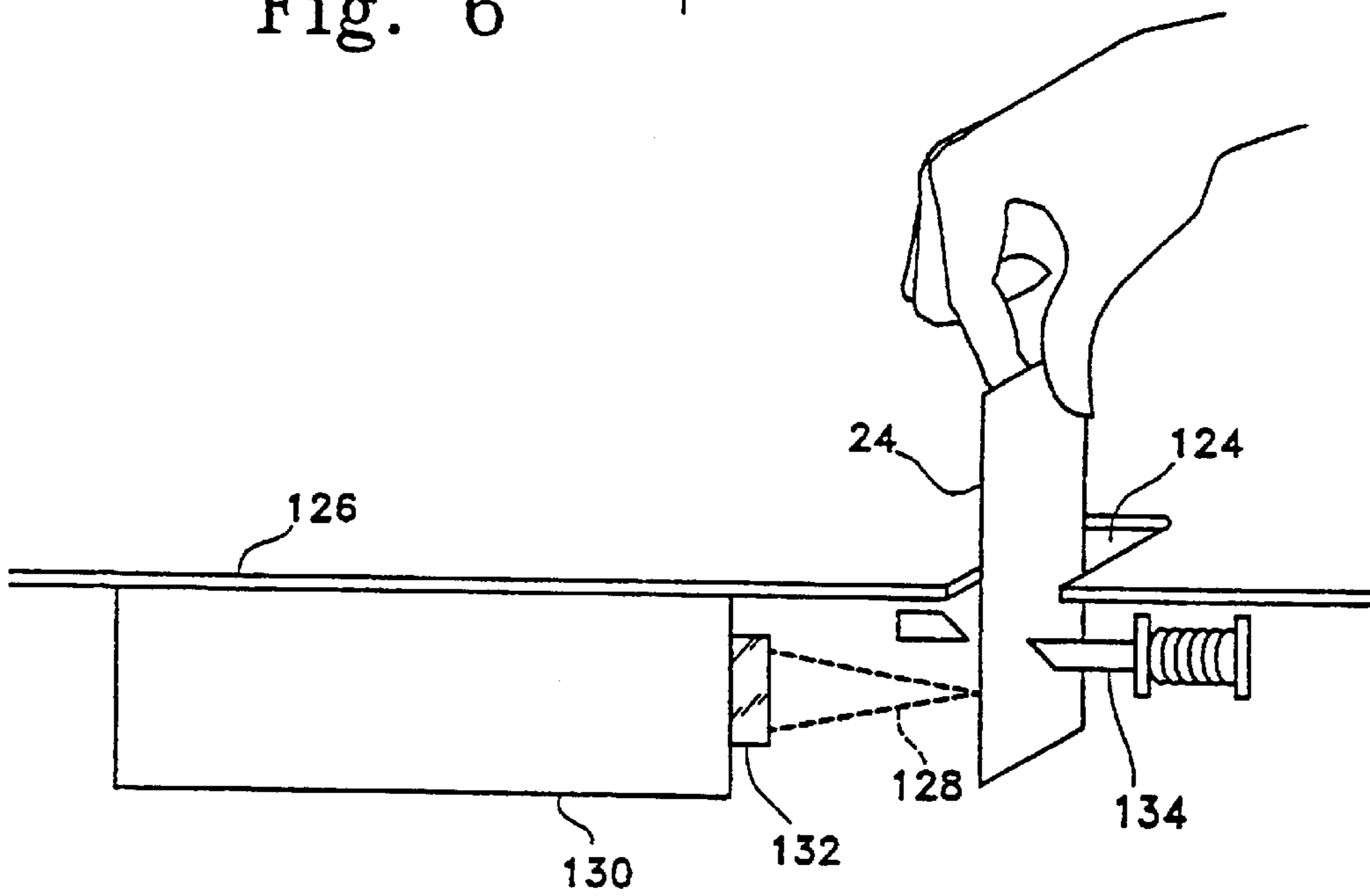


Fig. 7

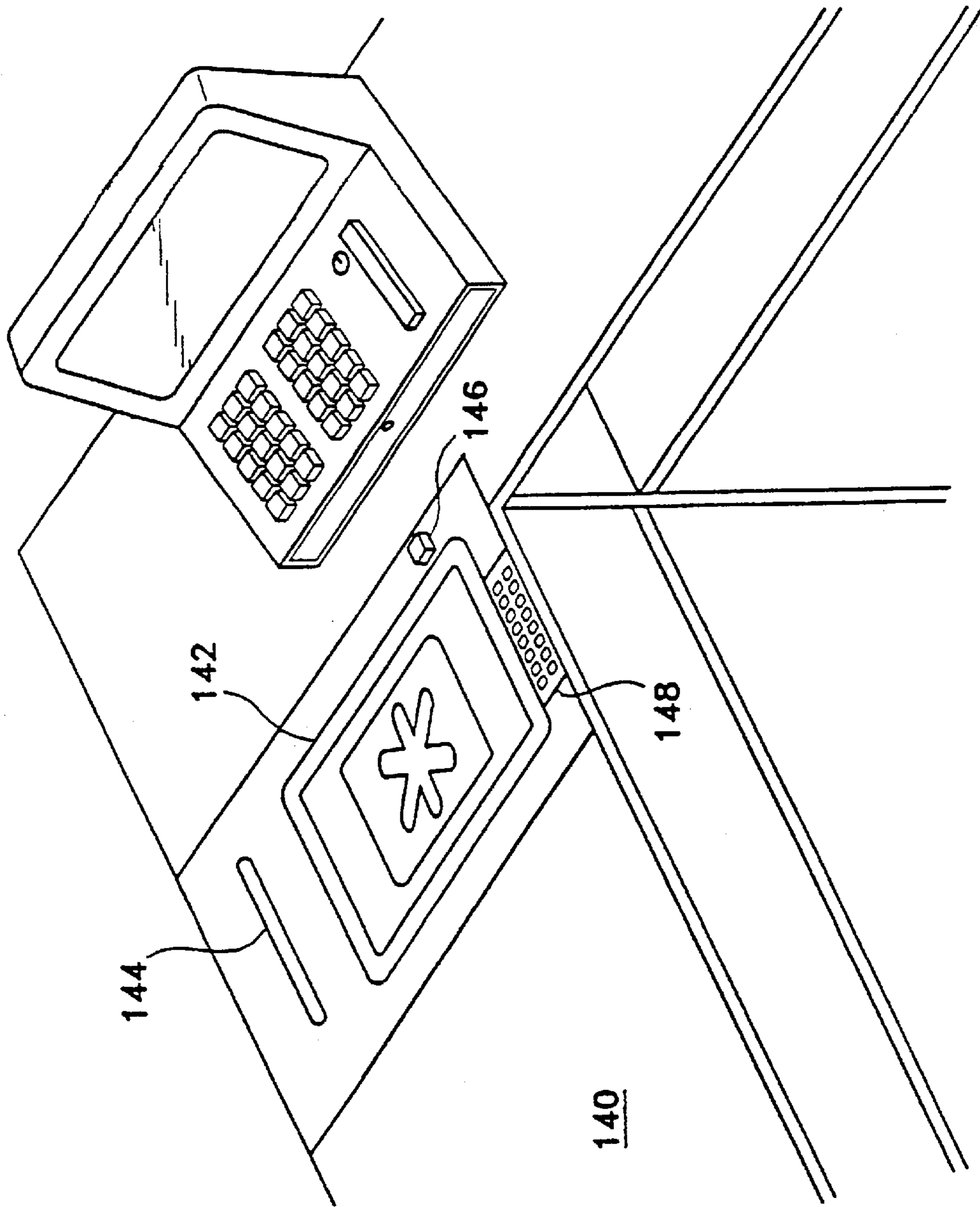


Fig. 8

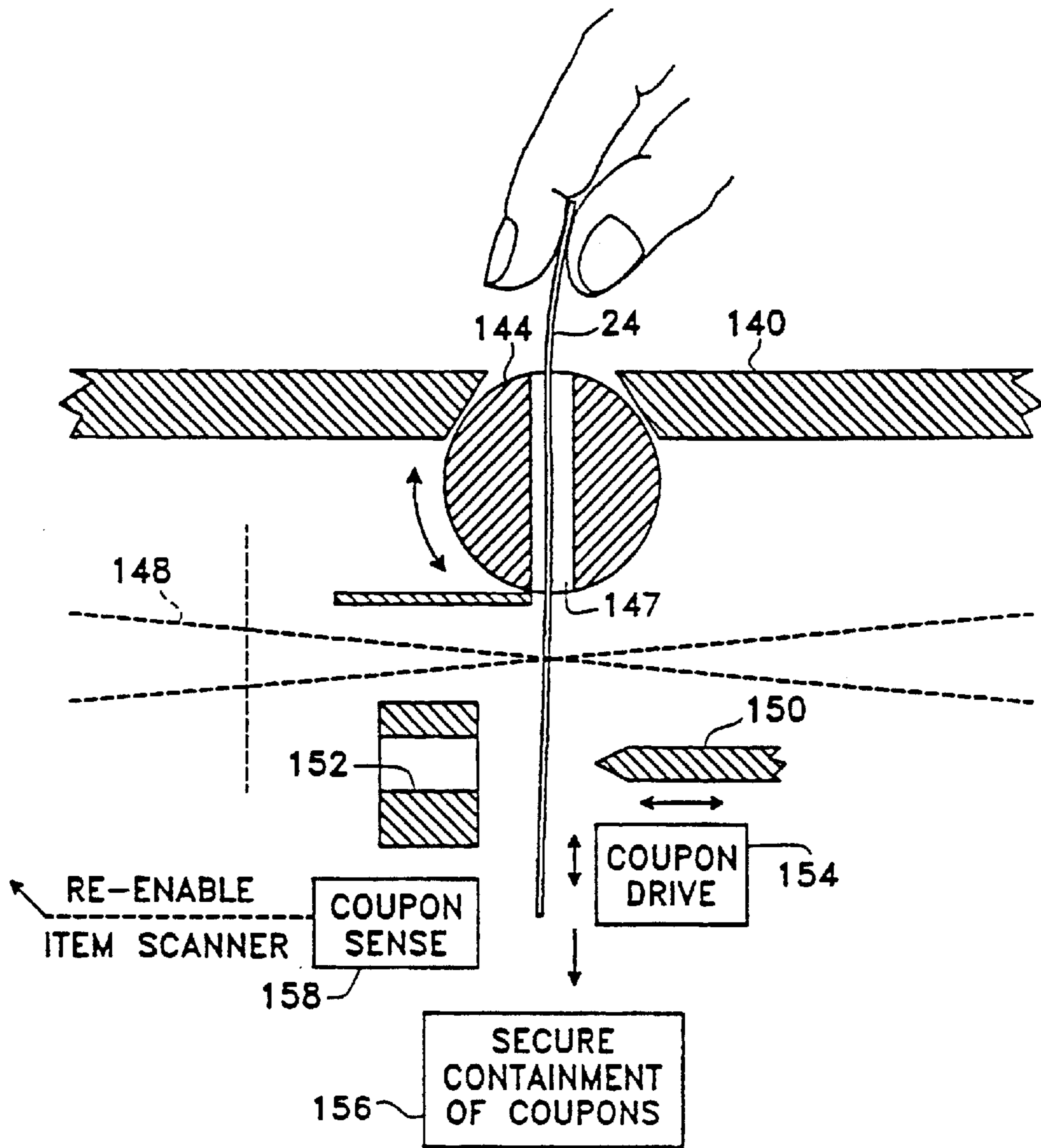


Fig. 9

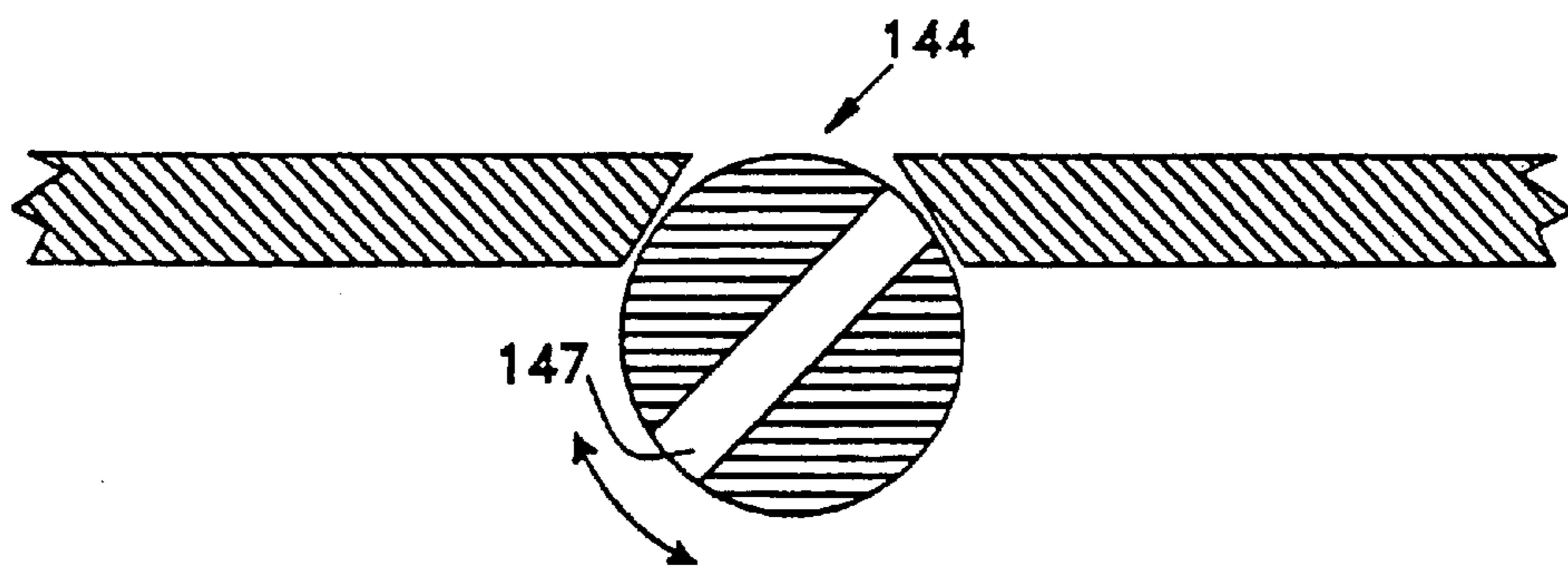


Fig. 10

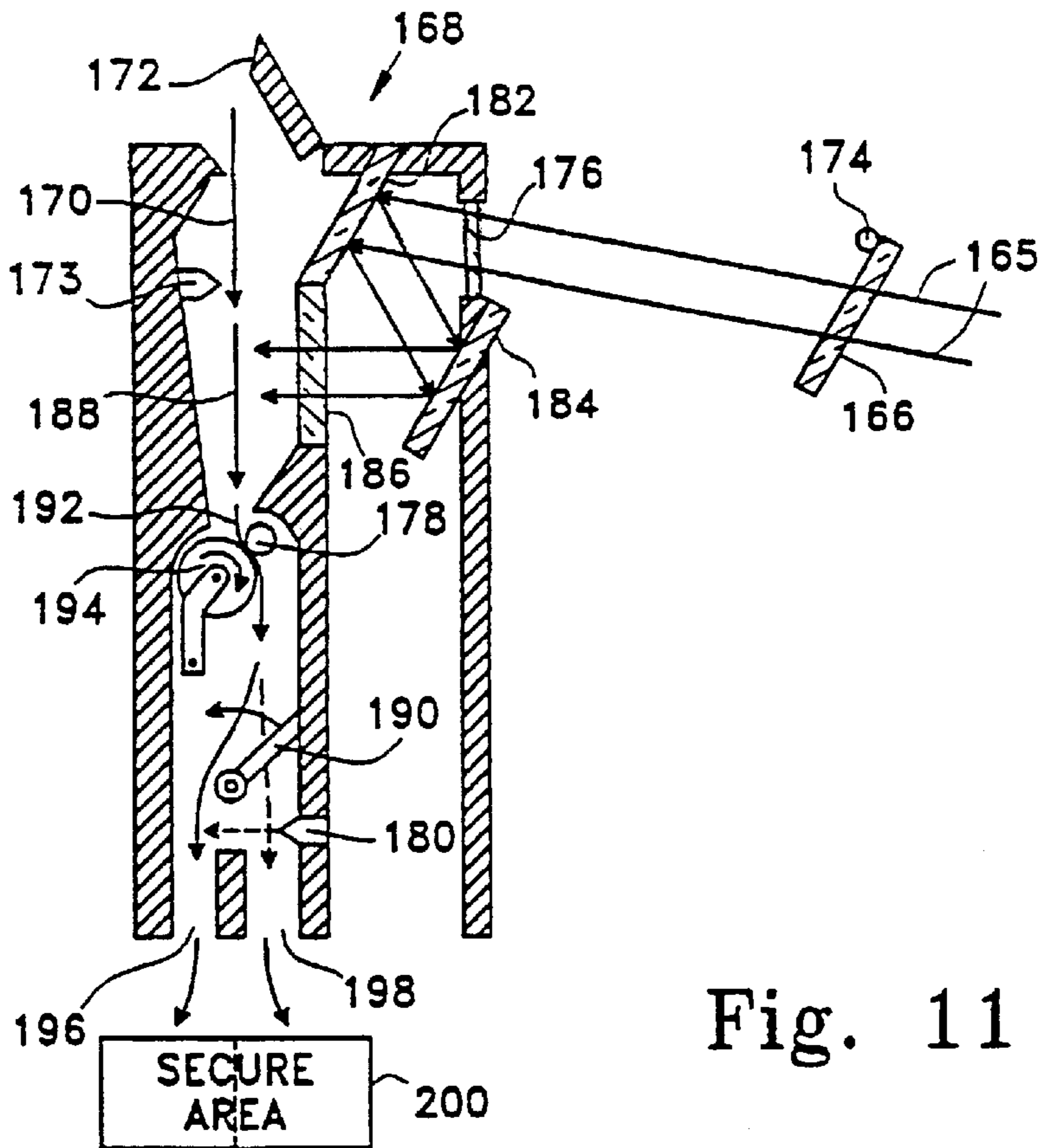


Fig. 11



Fig 12

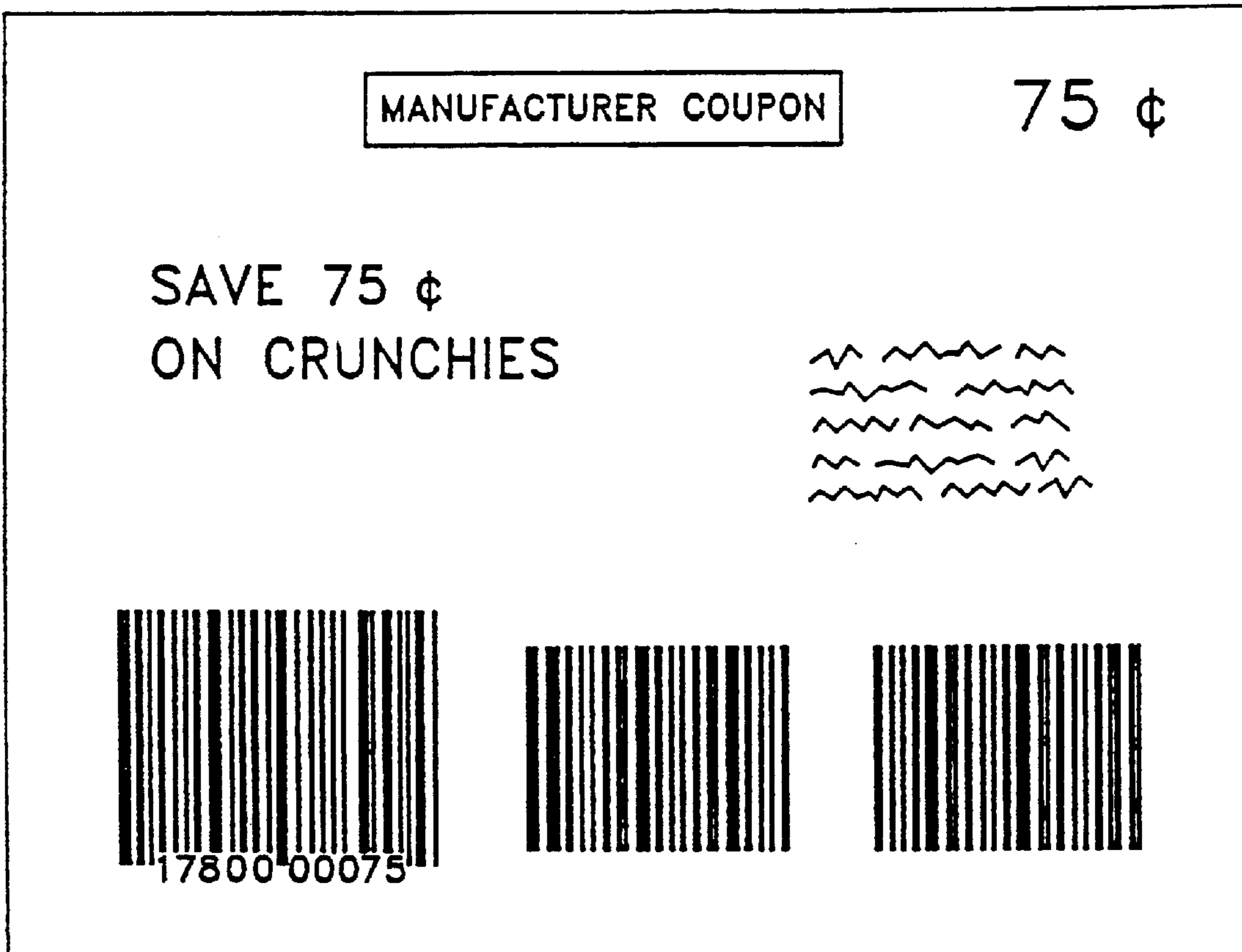


Fig. 13

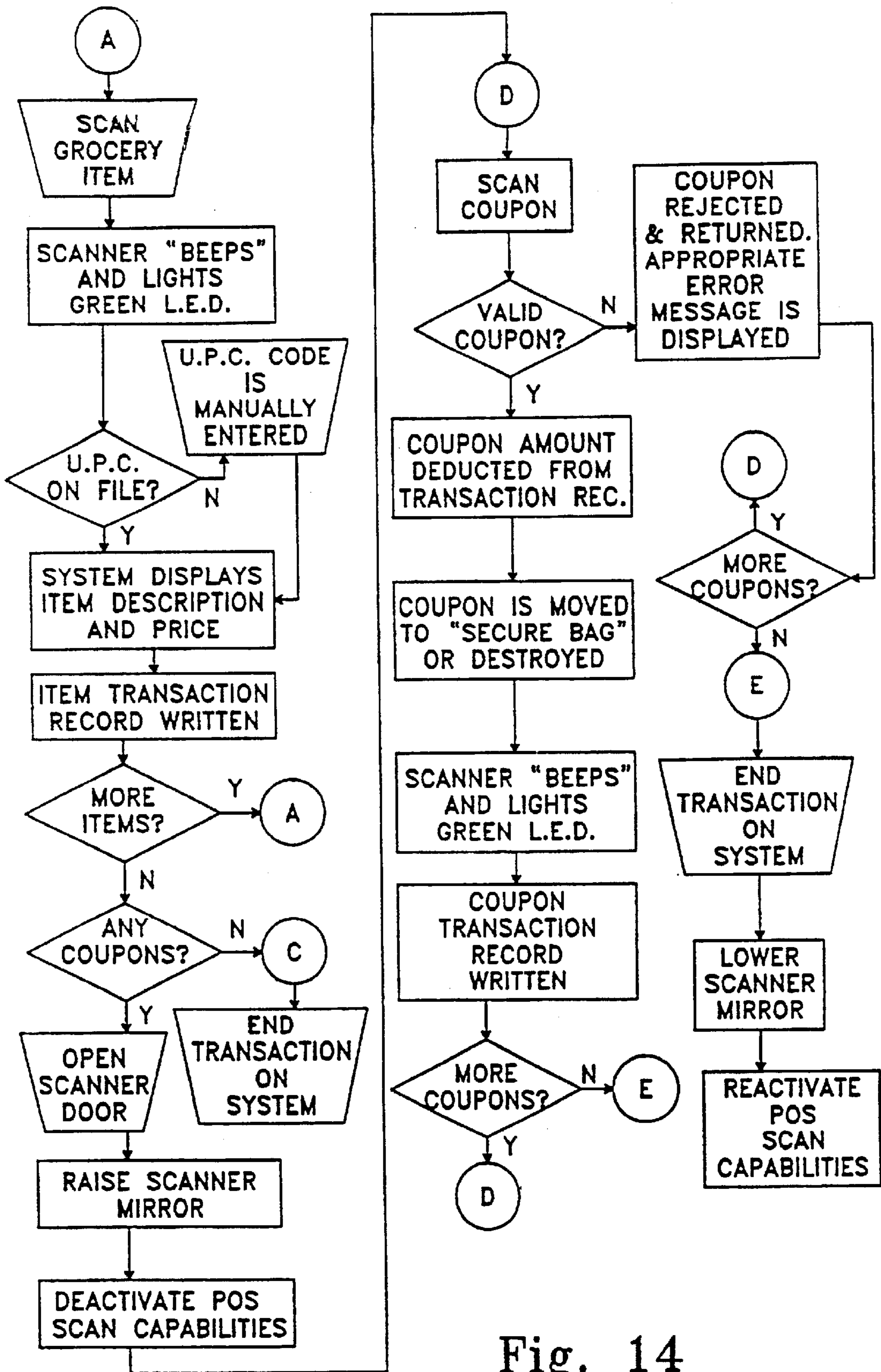


Fig. 14

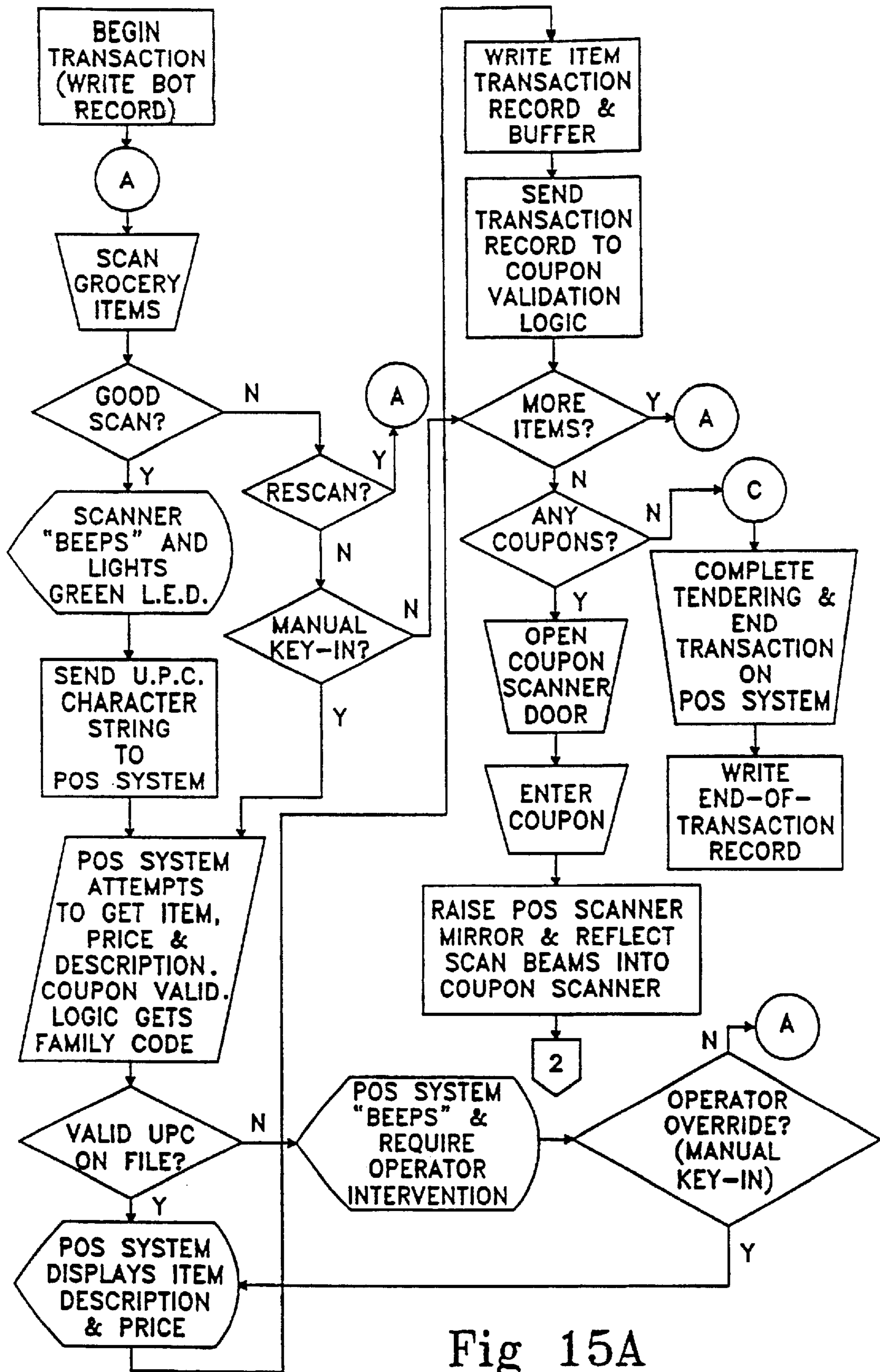


Fig 15A

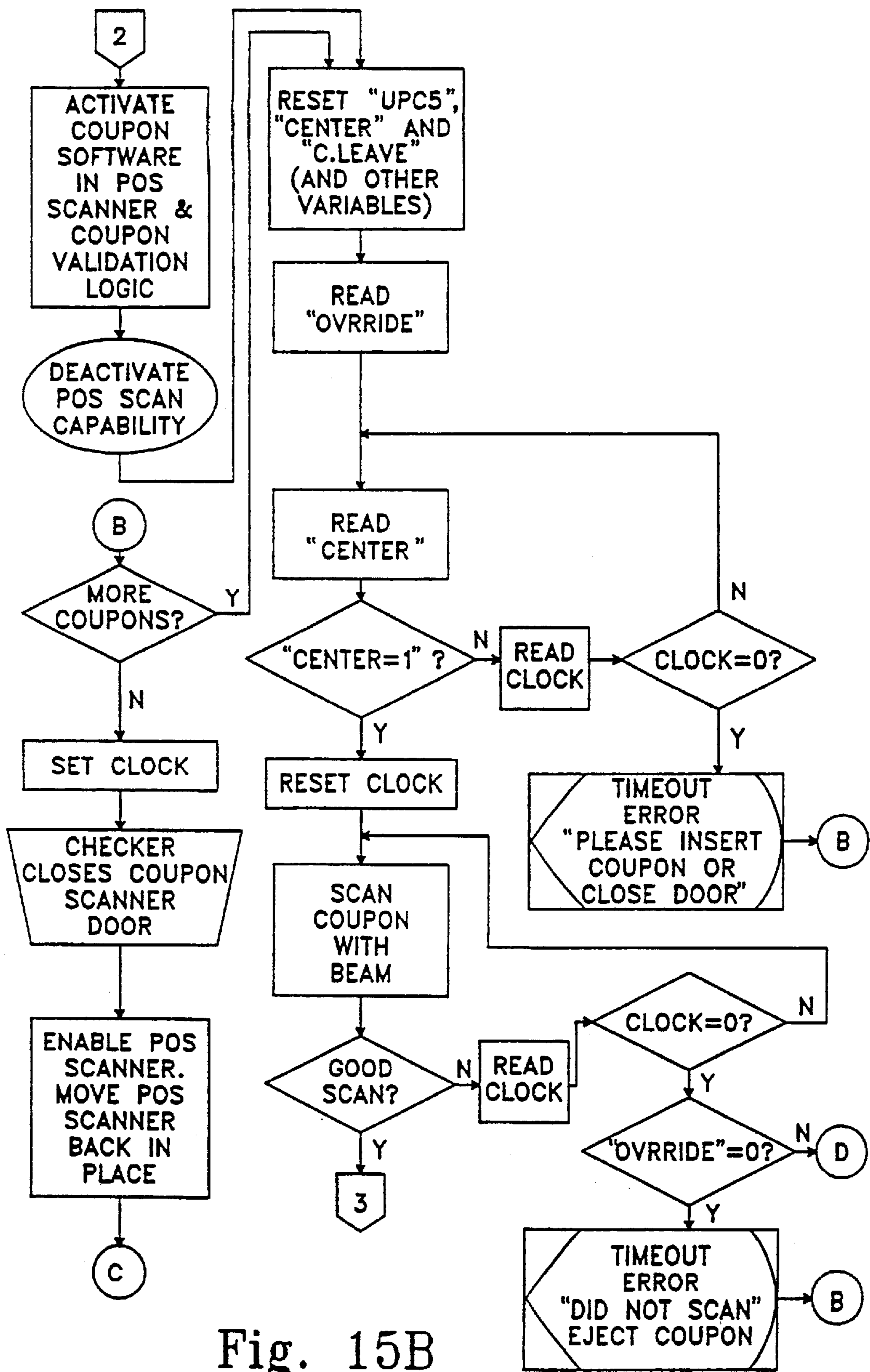


Fig. 15B

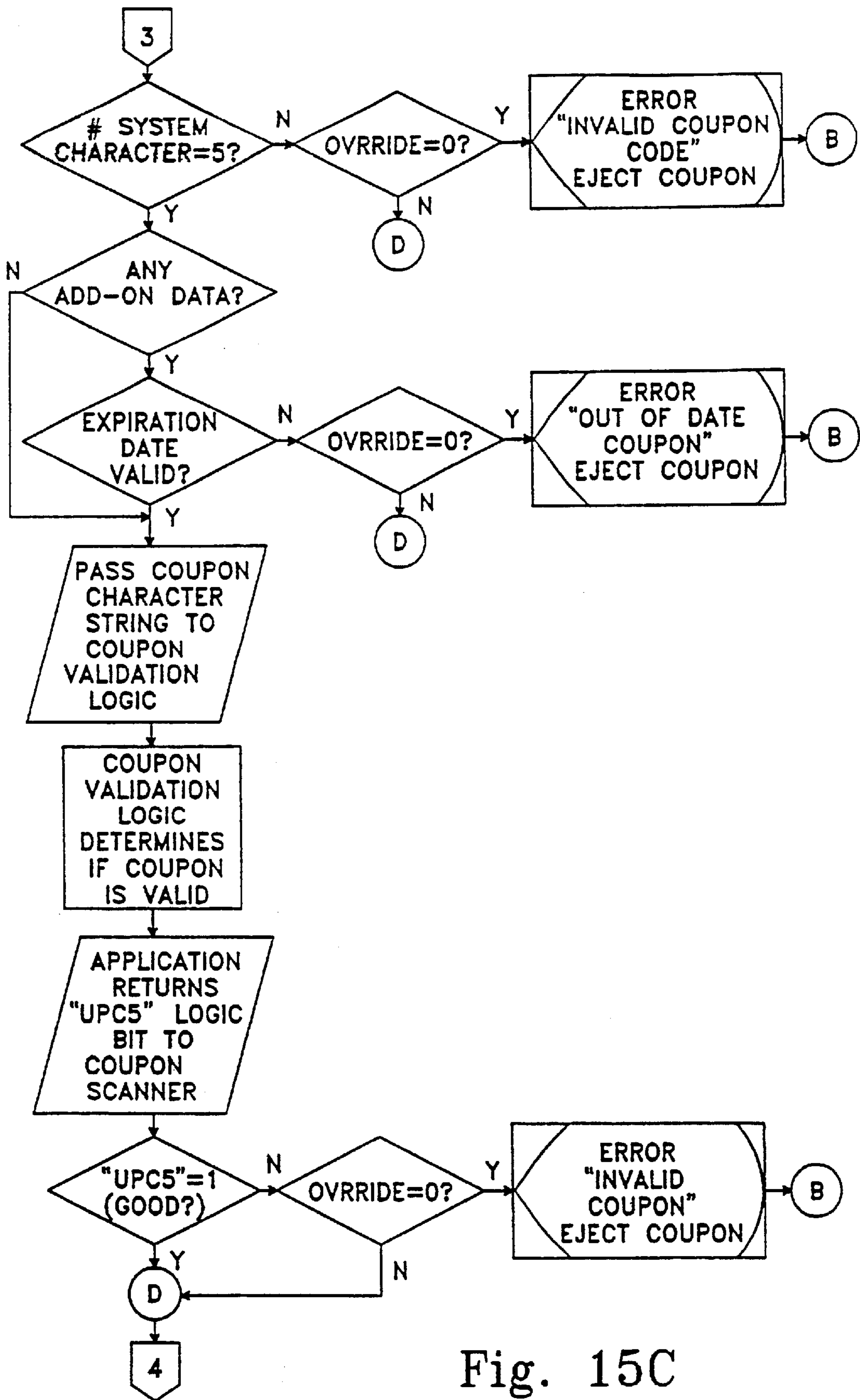


Fig. 15C

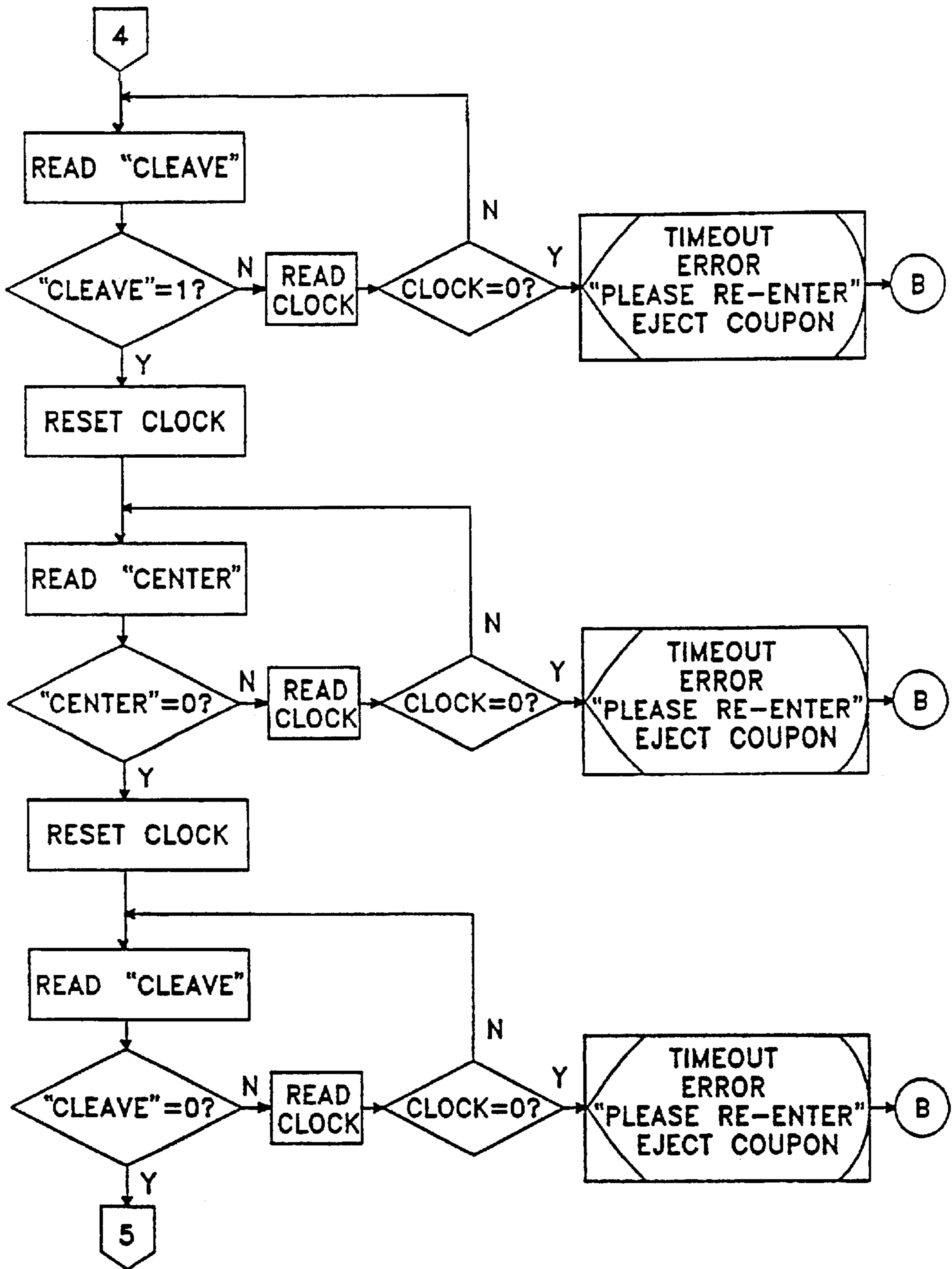


Fig 15D

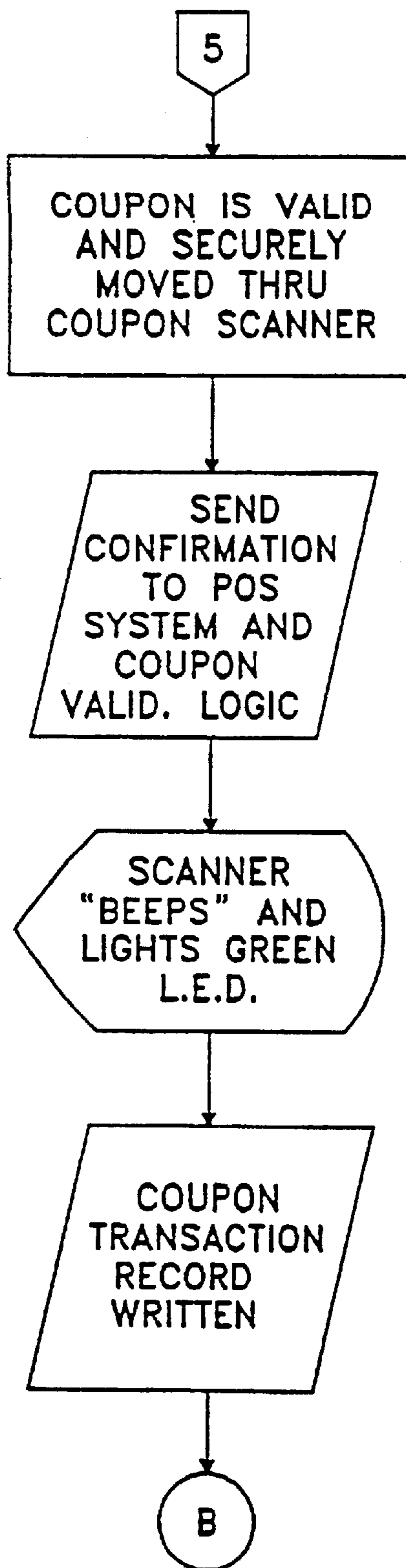


Fig. 15E

SCANNER WITH COUPON VALIDATION

Matter enclosed in heavy brackets [] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This application is reissue of application Ser. No. 07/392,851 filed Aug. 11, 1989 U.S. Pat. No. 5,128,520 and a continuation of application Ser. No. 08/245,892 filed May 19, 1994 patent U.S. Pat. No. Re. 35,117 which is a reissue of application Ser. No. 07/392,851 filed Aug. 11, 1989 U.S. Pat. No. 5,128,520.

BACKGROUND OF THE INVENTION

This invention is in the field of bar code scanners. More specifically, the invention relates to point of sale bar code scanners, and the problem of efficiently validating redemption coupons used at retail stores. More broadly, the invention is concerned with the redemption of anything of value bearing a bar code in a retail purchase transaction, including food stamps or other redeemable certificates.

Point of sale (POS) bar code scanners are in wide use in retail situations such as grocery stores, drug stores and general merchandising stores. Many of the stores which utilize or could utilize POS bar code scanners for scanning products for purchase also routinely honor coupons which grant the bearing customer a specified rebate on the purchase price of specifically identified items, usually within a prescribed period of time, prior to an expiration date. Each coupon usually specifies the item, its size, the value of the coupon against purchase of the item, and the expiration date. A customer may receive these coupons in several ways, such as from newspapers or magazines, from direct mail advertising, from purchase of another product, or of the same product at an earlier date, or from coupon books.

In typical use, these redemption coupons have been returned to the manufacturer or distributor of the affected products, for validation and reimbursement to the retail store by the manufacturer or distributor. The manufacturers or distributors have required this as a condition of reimbursement to the retailer.

However, this practice has been cumbersome and time consuming for the retailers and also for the manufacturers. Further, there was no guarantee to the manufacturer or distributor that the coupon was actually used within the allowed time period since there was a lag in time between redemption to the customer and return of the coupon to the manufacturer. The manufacturer did not even have sufficient control to assure that the proper purchase occurred for acceptance of the coupon.

Recently, there has been a move among manufacturers, coupon distributors and retailers toward a system in which return of the redeemed coupons to the manufacturer or distributor would not be necessary. A Joint Industry Task Force of food retailers and grocery manufacturers has been working on a uniform type of system for this purpose. The Task Force has been charged with setting standards and expediting the installation of coupon scanning and electronic clearing. It has been determined that bar codes will be put on redemption coupons. In such a system, strict validation and securing procedures would have to be followed at the point of sale, and with an appropriate reporting procedure to the manufacturer so that validated, genuine transactions could be accurately reported and reimbursed to the retailer, eliminating or reducing the discretion of the check-out person.

One ultimate aim of such automated coupon processing can be electronic clearing of redemption coupons, similar to electronic banking, wherein the manufacturer is debited and the retailer credited automatically, eliminating several levels of manual clearing.

In contemplation of such a retail point coupon validation system, Advanced Promotion Technologies has marketed a system under the name Vision 500 Coupon Eater which consists of a redemption coupon reader and invalidator. Invalidation can comprise shredding or inking. This piece of equipment was designed to be used in connection with a point of sale retail bar code scanner, with information from the POS scanner sent to the coupon reader/shredder as to the content of the consumer items presented for purchase. The auxiliary coupon reader and shredder could then validate the actual purchase of each item as specified in the coupons presented for redemption, and validation could be made electronically in this way, with credit issued to the customer for redeemed coupons.

While the described auxiliary coupon reader system would appear to address the problem of efficient coupon validation, it required an additional piece of equipment and a cable interconnection with a product bar code scanner. It was connected generally between the scanner and the POS system (the terminal or cash register), and as such potentially could degrade product bar code reading performance. In this sense, the described previous system was inefficient and costly as compared to the present invention described below.

Another device aimed at validation of coupons is disclosed in U.S. Pat. No. 4,839,507. However, the system of that patent involved a separate machine for dispensing coins in redemption of coupons and it involved insertion of two coupons simultaneously.

SUMMARY OF THE INVENTION

In accordance with the present invention, a point of sale bar code scanner integrates the functions of coupon scanning, validation and securing with a fixed POS scanner normally used for scanning items for purchase. In one embodiment, the scanner utilizes the same reading beam for the reading of bar codes on redemption coupons as well as on products for purchase by the consumer. The same scanner housing can incorporate both functions. In another embodiment, a different reading beam can be used for coupons, and a wholly separate scanner can be provided, but with the same decoding and/or operating software as well as hardware used for both functions.

Principal aims of the invention are to make the coupon redemption process faster than conventional methods, in order to speed the checkout process and make the clearing process more efficient, as well as to provide a space-efficient and ergonomically efficient system at the checkout stand.

Through software associated with bar code decoding logic, a comparison is made between information on a redemption coupon and information representing items already presented for purchase, as determined from decoded bar codes of those items, and a decision is made as to whether the redemption coupon is valid and redeemable in this transaction. The decision preferably is based on whether the correct specific item identified in the coupon bar code has actually been purchased. It can also be based on the current date, for determination as to whether the redemption coupon is currently valid or has expired.

In one embodiment, the bar code scanner simply receives the redemption coupon face down on the product scanner window, and decode logic of the scanner identifies the bar code as belonging to a redemption coupon, then makes the comparison and validation of the coupon for the particular transaction. A credit can be issued automatically for the coupon redemption amount. Software is included for making the coupon identification, comparison and validation.

Additionally, there may be included a validated coupon receiving slot, into which must be fed a validated coupon for

storage, shredding or other type of invalidation/cancellation before the scanner or cash register is enabled to complete the customer's transaction.

In another embodiment, the product scanner has a special beam exit window through which the scanning beam is diverted when it is signified that a redemption coupon is to be read. This diversion can be by a movable mirror.

There preferably is provided a special door for receiving redemption coupons. The opening and then closing of this coupon door may be connected to generate a signal that a redemption coupon rather than a purchased product is being read, to move a scan mirror from its normal position so as to divert the reading beam to form an alternate coupon reading scan pattern, and to enable a separate coupon decoding logic and comparison/validation logic. The latter logic compares the coupon bar code information with information on the list of products which are being purchased by the consumer in the transaction, and can also take into consideration the current date, and validates the redemption coupon on these bases.

The special coupon door in one embodiment opens to a slidable stage or tray which receives a coupon face down. Closing of the coupon door will cause the movement of the coupon stage to move the coupon across a field so as to assure a reading by the beam as scanned in the coupon reading scan pattern.

In this embodiment, provision preferably is also made for removing a coupon, once validated, to a storage or cancellation area to prevent the possibility of re-use.

In another embodiment, the special coupon door opens to a slot in a counter top or in the scanner itself or a side housing connected to the scanner. A sensor can be provided to sense the presence of an item in the slot, rather than relying solely on the opening and/or closing of the coupon door. The sensor then activates a motor which moves a mirror to divert a laser scan beam to pass through to the attached or integrated coupon reading device. As it passes through the slot, the coupon is scanned and read by the beam, which may be through a clear window which helps completely seal the coupon scanner from the entry of dirt and debris into the area of the beam, scanning mechanism and collection optics.

Once the coupon has been found valid and redeemable, the coupon can be fed through the slot with a motor and into a secure area beyond the reach of check-out personnel. This may be simply a secure bag or it may involve punching, shredding, inking or mutilating of the coupon to prevent a subsequent use. If the coupon is properly cancelled by physical indication of cancellation immediately after being found redeemable, it generally need not be placed in a secure container.

It is therefore among the objects of the present invention to enable automated and reliable validation of redemption coupons (and other bar-coded items redeemable for value) at point of sale retail stores, without the need for returning of redeemed coupons by the store to the manufacturer. An accompanying object is to accomplish this using a single bar code reading beam, i.e. the beam already provided with the POS bar code scanner, and/or common collection optics or decode software, so as to result in an economical and efficient system with minimal space requirements.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what are now considered to be the best modes contemplated for applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used

and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram and schematic indication of principal components in one embodiment of a retail bar code scanner with coupon validation, according to the principles of the invention.

FIG. 2 is a block diagram similar to FIG. 1, but showing another embodiment of the invention wherein a different arrangement is employed for reading redemption coupon bar codes.

FIGS. 2A and 2B are simplified block diagrams showing different embodiments of systems of the invention.

FIGS. 3 and 3A are schematic views in perspective, showing a counter top bar code reader and indicating two arrangements for interrupting a bar code reading beam to divert it from a normal product scan window and to form a coupon reading scan pattern at another location.

FIG. 3B is a simplified schematic view in perspective similar to FIG. 3A, and showing a variation of the embodiment shown in FIG. 3A.

FIGS. 4 and 4A are perspective views showing a counter top with a product bar code reader and a separate door in the counter top for coupons, as in the embodiment of FIGS. 1 and 3. FIG. 4A shows the door in an open position.

FIG. 5 is a schematic perspective view, exploded, showing one embodiment of a coupon reading and handling apparatus, such as may be used in conjunction with the coupon door shown in FIGS. 4 and 4A.

FIG. 6 is a schematic perspective view showing another form of coupon receiving and reading apparatus in conjunction with a counter top bar code reader, again corresponding to the embodiment of FIG. 1.

FIG. 7 is a sectional elevation view, partially in perspective, showing the system of FIG. 6.

FIG. 8 is a perspective view showing a retail point of sale counter situation incorporating coupon reading into a POS scanner.

FIG. 9 is a sectional elevation view showing a part of the system of FIG. 8.

FIG. 10 is a view similar to a portion of FIG. 9, but showing a different position of a coupon receiving slot.

FIG. 11 is a sectional side elevation view showing another preferred embodiment of the invention, relative to coupon handling through a door.

FIG. 12 is a view showing a "Code A" UPC coupon bar code.

FIG. 13 is a view showing a proposed new JCode 128" bar code extension/for additional data.

FIG. 14 is a simplified flow chart representing a system in accordance with the invention for product bar code reading and coupon reading.

FIGS. 15A, 15B, 15C, 15D and 15E comprise an expanded flow chart diagram representing the system of the invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

In the drawings, FIG. 1 indicates schematically, and partially in block diagram form, principles of one embodiment of a redemption coupon reading system, in conjunction with a product bar code reading system, in accordance with the principles of the present invention.

As illustrated in FIG. 1, the system 10 has a product bar code label reader indicated by the block 12, preferably of a

counter top type typical of point-of-sale bar code readers. Its function of reading a product **14** presented for purchase is indicated by the arrow **16**.

The POS bar code label reader **12** is electronically connected to a label data handling system shown in the block **18**, including decode logic and software for the handling of the decoded data and interfacing it with the cash register and/or transaction storage at a central processor, for example.

FIG. **1** also indicates the diversion of the normally scanned bar code reader beam from the label reader **12**, at an arrow **20**. The arrow **20** indicates the reader beam being taken out of the normal product scanning optics and diverted to a redemption coupon reading area **22**. Into this coupon reading area **22** a redemption coupon **24** is inserted, then read by the beam **20**. In some embodiments of the present invention, it will be necessary to open a coupon reader door **26**, in some form, for insertion of the coupon **24**.

FIG. **1** also shows that the opening and closing of the coupon reader door **26** may be coupled electronically and/or mechanically, via dashed lines **28**, **28a** and **28b**, to effect the diverting of the beam **20** for the coupon reading function (as by moving a mirror); and to activate coupon handling logic and software (microprocessor) indicated in the block **30**. The opening and closing of the door **26** may also activate further mechanical coupon handling, as described below with respect to several embodiments. In FIG. **1** this is indicated by movement of the redemption coupon **24** through the reading area **22** and then through one of two indicated handling branches: a branch **32** through which the coupon has returned to the customer (or to the clerk) because it has been found to be invalid for one reason or another as discussed above; or a second branch **34** for valid coupons, which may be sent automatically to a secure storage and/or disposal location **36**, or simply for cancellation (physical marking, e.g. mutilation or inking). This is to prevent validated coupons from being re-used. Further branches could be included, as for classifying coupons by different types or products or different manufacturers.

As also indicated in FIG. **1**, the coupon handling logic/software **30** is connected to the product bar code reader **12**, indicated by a line **38**, for several purposes. The data read from the bar code of the redemption coupon **24** is via collected light picked up in the reader **12**, and this signal must be sent via the line **38** to the coupon handling logic/software **30**. Also, once decisions are made in the logic/software **30**, signals may be sent via the line **38** back to the label reader **12** so that the validation decision and its effect may ultimately be interfaced with the cash register, for properly crediting the customer on the purchase receipt. The coupon decode logic and software may be integrated with the software of the product label scanner system, as described below.

As also indicated, the coupon handling logic **30** is connected via a line indicated at **40** to the actual mechanical coupon handling, e.g. the sending of the coupon through the branch **32** or the branch **34**.

The system **10** shown generally in FIG. **1** can be built by adding components **18**, **22**, **26**, **28**, **36**, etc. to a laser product scanner system **12**. The scanner **12** must be modified for the beam diversion **20**, and certain software must be modified for interfacing the coupon logic/software **30** with the label reader **12** and with the cash register and transaction receipt printer.

FIG. **2** shows in block diagram form a system **45** which differs in some respects from the system **10** illustrated in FIG. **1**. The system **45** of FIG. **2** utilizes a conventional product label scanner **12** connected to label data handling **18**, but without any special door or slot for inserting coupons for reading. Instead, in this embodiment the coupon **24** is

simply placed adjacent to the product label reader **12** in a position to be read, and scanned in the same manner as consumer products **14** for purchase. The label data handling is simply programmed to include recognition of bar codes on redemption coupons **24**, and to specifically recognize them as redemption coupons.

As indicated in FIG. **2**, new hardware (and some software) added to the standard label reading system, to enable functions of the modified system **45**, can include those items indicated inside the dashed-line box **48**. This includes software confirming that a coupon has been identified, shown in the block **50**, a "COUPON READ" indicator **52** to visually or audibly indicate to the check-out clerk and the customer that a redemption coupon has been read, and a location **54** for coupon storage and/or disposal. As indicated, there may be included a slot **56** for the clerk to insert a coupon **24** which has been read and validated, so that the coupon cannot be re-used. The "COUPON READ" indicator can serve as a signal that the coupon is valid for redemption in this particular transaction (i.e. the correct item or items were purchased to enable a redemption credit), which will constitute a signal that a credit will be issued via the label data handling **18** as interfaced with the cash register; in this case if an invalid coupon has been presented and identified this could be signified by no reaction from the label reader **12**. Alternatively, there can be one indicator signifying simply that a coupon has been identified and a separate indicator signifying that the coupon is valid for redemption in this transaction. In this case the second indicator simply would not be activated in the event of an invalid coupon.

As shown in FIG. **2**, the hardware can include a coupon sensor **58** en route to the disposal area **54**, confirming that a coupon has been inserted for disposal (cancellation or secure storage). This can trigger the turning off of the "COUPON READ" indicator **52**, as shown by the box **60**. Sensors and software can also determine whether the coupon has jammed in the system or whether the coupon has been removed before scanning.

FIG. **2** shows an optional feature illustrated by the block **62**. Once the "COUPON READ" indicator has been activated by the presence of a redemption coupon at the label reader **12**, this can cause the label reader **12** to be turned off, disabling it from further functions and disabling the cash register from completing the consumer transaction, until a coupon is sensed at **58** as having been sent to the disposal/cancellation area. Therefore the system optionally can require a validated coupon to be inserted into a cancellation device or an inaccessible storage area before the consumer transaction can be completed, tending to prevent fraud in the use of the redemption coupons. Cancellation can be effected automatically on validation, as disclosed below in further embodiments. Once the coupon is sensed at **58**, the block **62** is disabled, i.e. the label reader **12** is re-enabled, as illustrated in FIG. **2** by the arrow **64**.

FIGS. **2A** and **2B** are block diagrams showing conceptually different embodiments of the present invention. The systems of these figures show alternate embodiments wherein a POS scanner **63a** or **63b** is connected to a separate coupon scanner **65a** or **65b**. These scanners are indicated as scanning redemption coupons and as sending information back to the POS (purchased item) scanner.

In the case of FIG. **2A**, the separate coupon scanner **65a** includes its own collection optics, as indicated. These optics generate electrical signals which are carried over an electrical conductor **67a** to decode logic/software incorporated in the POS scanner **63a**. In FIG. **2B** the separate coupon scanner **65b** does not include collection optics, but rather returns the collected light from the coupon via a fiber optic connector **67b**, to collection optics incorporated in the POS scanner **63b**.

Thus, as illustrated in the simplified block diagrams of FIGS. 2A and 2B, the principles of the invention include integrated systems wherein some element in the chain of scanning and decoding coupon bar codes is common with the parallel function of the POS scanner. The common element can be the light source or reading beam, the beam scanning equipment, the beam collection optics, the decode logic and software, or simply a common housing which reduces space requirements.

FIG. 12 shows a UPC (Universal Product Code) coupon bar code symbol as it can be applied to redemption coupons. This is a "Code A" type bar code of the type which is in conventional use for purchased products.

The following table identifies the function of different areas of the bar code as applied to coupons as compared to items for purchase.

TABLE 1

UPC Code Field Definitions			
Field Definition	Field Position	Item Definition	Coupon Definition
Number System	1	0, 6, 7	5
Manuf. Id. (1)	2-4	Namuf.'s I.D. Number	Manuf.'s I.D. Number
Item Number (2)	7-11	Item Number	NA
Family Code (2)	7-9	NA	Family Code
Value Code (3)	10-11	NA	Value Code
MOD10 Check Digit	12	Check Digit	Check Digit

Notes.

(1) Assigned by UCC

(2) Assigned by Manufacturer

(3) Fixed table of 100 soluble values defined by UCC

FIG. 13 shows the proposed "Code 128" bar code extension for use with coupons. This has been proposed by the Joint Industry Task Force as a supplemental code for additional data desirable to be included on coupons. The particular layout of these Code 128 extensions has not yet been standardized.

The following table identifies assignment of UPC symbols for this Code 128 supplement.

TABLE 2

Proposed Add-On Bar Code Field Definitions		
Field Position	Number of Characters	Definition
1-5	5	Marketing Information, free format.
6-8	3	Expiration month/year. Table that is good for 80 years.
9-10	2	"Open"
11-18	8	Household ID.
19-20	2	"Open"

The integrated systems of the present invention described herein, in preferred embodiments, can include scanning optics for reading the extended Code 128 format bar codes.

FIG. 3 shows schematically a POS scanner 67 which may be modified to produce a diverted beam and separate redemption coupon scan at a different location, in accordance with the invention. The scanner 67 may comprise, for example, the Spectra-Physics "Freedom Scanner", which is a scanner having low-profile scanning optics.

As shown schematically in FIG. 3, the scanner 67 includes a horizontal scan generating mirror 68, as part of the normal scanning optics for producing a scan pattern at the normal beam exit window 70.

In a system of this invention, the horizontal scan generating mirror 68 (or another mirror or a holographic scan

element, on a different type of scanner) becomes a movable mirror which will shift in position under the influence of a motor or solenoid to allow the scanning beam to exit the scanner 67 through a coupon reading beam exit window 72. The mirror 68 can be moved out of the way of the beam entirely or it can be reoriented to a different angle appropriate for diverting the beam through the coupon reading exit window 72.

When the beam is being diverted out the exit window 72, it is directed by appropriate scanning optics indicated generally at 74, so as to produce a coupon reading scan pattern 76. FIG. 3 shows a cross pattern 76 as an example for coupon scanning. The multiple scan line geometry eliminates or reduces the need for the operator to orient the coupon.

FIG. 3A shows schematically another form of coupon reader in conjunction with a beam scanner 67, again with the reading beam being diverted through a coupon reading exit window 78 when a coupon is to be read. Again, the scanner 67 can comprise, for example, the Spectra-Physics "Freedom Scanner". A mirror 80 which forms a part of the normal label reading scanning optics is movable to enable the beam to be diverted through the exit window 78.

In this embodiment, there is shown a coupon entry slot or channel 82, with a coupon entry door 84. When the coupon door 84 is opened, this signifies that a coupon is to be read, and causes the scanner mirror 80 to be moved so as to divert the scanning beam through the exit window 78 and through an auxiliary lens 86 to form a scan line 88. The scan line 88 is projected into the interior of the coupon channel or slot 82, where the coupon's bar code will be read as it passes by the scan line 88. Preferably, the slot 82 is configured so as to orient the coupon properly for its bar code to be read in a single pass by the scan line 88. A driven transport roller 90 is indicated in FIG. 3A, as moving the coupon at a prescribed speed past the scan line 88, activated by opening of the coupon entry door 84.

As also shown in FIG. 3A, there is a coupon disposal secure container 92 into which redemption coupons are deposited once read and validated. In the event the scanning of the coupon's bar code indicates that it is not valid for this particular transaction, the transport roller will be reversed to send the coupon back up and out of the slot 82. If the coupon is found valid, on the other hand, the transport roller can send the coupon on down toward the inaccessible coupon container 92. There may be included a coupon mutilating roller 94 en route to the container 92, providing a further security against re-use of a validated redemption coupon.

FIG. 3B shows a variation of the system of FIG. 3A. In an item and coupon scanner 95 of FIG. 3B, a POS scanner 96 which normally projects a set of scan lines through a scanner window 96a, with beam waist generally at the window, there are provided optics for projecting an additional scan line 97 outwardly through the window 96a to a location where the scan line 97 can read coupons fed through a coupon receiving slot 82. It is important that the beam producing the coupon reading scan line 97 be sufficiently close to a far edge 98 of the window that plenty of area remains for scanning of grocery items 14. It is also important that the optics of the scanner 96 provide for the occurrence of the beam waist of the coupon scan line 97 to be substantially at the coupon reading location, rather than at the point this beam exits the scanner window 96a. In this embodiment, no switching or change of mode of the beam optics of the POS scanner 96 are needed.

FIGS. 4, 4A and 5 show variations to the embodiments discussed with respect to FIG. 3 and 3A. In the label scanner and redemption coupon reader 100 of FIGS. 4 4A and 5, the counter top 102 has a normal product label scanner window 104, and a coupon door 106 which is opened (FIG. 4A) to insert a redemption coupon to be read.

As in the other embodiments, the customer's goods are first scanned using the product scanner **104**. When a coupon is presented, the clerk or check-out person opens the coupon door **106**, which may be a small door of glass, or having a transparent window, for revealing the coupon under the closed door. The operator takes the redemption coupon, opens the door **106** and places the coupon on a platform or stage **108** under the counter. The stage **108** has a glass bottom **110** so that scan lines **112** from below will be directed onto the face-down coupon.

When the door **106** is closed, this closure activates a motor **M** which slides the platform or stage **108** in a direction (to the left as viewed in FIG. **5**) to advance the coupon over the scanning beam **112**, which is also activated by closure of the door **106**.

If the coupon is valid for this transaction, the motor advances the stage **108** further until a belt **114** or a vacuum pulls the coupon off the stage and disposes of it, either by storing it for future reference and disposal or by destroying it, such as by shredding.

If, on the other hand, an invalid label is read or no label is read after the door is closed, the stage **108** reverses its direction and returns to its original position which allows the door to be opened. The operator can see through the glass door **106** that the coupon has not been removed. The operator can then return the coupon to the customer.

FIG. **5** indicates a means for locking the door **106** when the stage **108** is moving and an attempt is being made to read a coupon. The door **106** may have a pair of downwardly extending locking flanges **116** which pass through notches **118** in fixed rails secured to the counter top. These locking flanges **116** will also pass through corresponding notches **120** in the movable stage **108**, when the stage is in its initial position. However, when the stage is advanced to read a coupon, the stage notches **120** will be displaced from the locking flanges **116**, and the door will be prevented from opening until the stage again returns to the initial position.

Thus, the structural arrangement shown in FIG. **5** prevents an operator from removing the coupon except at the proper time. The coupon advancing and reading structure is of shallow design so that it does not require much depth in the counter. The movement of the stage gives maximum scanning capability, so that the scan lines **12** sweep the entire coupon to find a bar code located anywhere on the coupon.

FIG. **5** shows the movement accomplished with a stepper motor **M**, appropriate gearing and a lead screw **122**, but other appropriate mechanisms can be employed. It should also be understood that a button or switch can be provided for manual activation of the coupon scanning and recording function, rather than having this function triggered by opening and/or closing of the door **106**.

FIGS. **6** and **7** show another variation to the invention, with regard to the manner in which a redemption coupon **24** is placed in the system and read. A relatively long slot (which may be about six inches long) **124** is provided in the counter top **126** to allow the checker to draw a coupon **24** through by its edge as shown in FIG. **6**.

Below the counter top, as indicated schematically in FIG. **7**, is a diverted scanning beam **128** from the product scanner **130**. The beam **128** has been diverted to exit the scanner **130** through a window **132**, and this is accomplished preferably by a moving mirror as explained above with reference to FIGS. **3** and **3A**. The window **132** is sealed so as to prevent paper dust and other dirt and debris from entering the scanner.

The motion of pulling the coupon **24** through the slot **124** is reminiscent of the motions of normal scanning of consumer goods by the checker. The system of FIGS. **6** and **7** may be activated by opening a door of the slot (such as a

lightweight door which pushes open by insertion of a coupon), or by a separate switch (not shown).

When the coupon **24** has been validated using the scanning beam **128** and the decode logic of the scanner **130**, an electronically controlled knife or scissors **134** preferably cuts the coupon **24** off just below the counter, cancelling the coupon and making it invalid for future use. The cut off portion of the coupon may simply fall into a wastebasket below the counter. The cutting knife or scissors **134** is far enough from the beam exit window **132** that any debris from the cutting of the coupon does not collect on the window **132**. Alternatively the cancelling device **134** can simply comprise an ink applicator to physically mark the coupon and indicate its cancellation. Preferably the applied ink affects the coupon's bar code to prevent its being read again.

The system of FIG. **7** can effect the immediate cancellation of the coupon upon its being determined valid and redeemable. If this is done by ink cancellation, for example, the operator can simply retrieve the cancelled coupon and then dispose of the coupon or place it in storage for auditing if desired.

FIGS. **8** through **10** show another embodiment of an integrated POS scanner and coupon reading system of the invention. In FIG. **8** a counter top **140** is shown with a POS scanner **142** whose top is substantially flush with the counter. This arrangement is somewhat similar to what is shown in FIGS. **6** and **7**, with some differences. The embodiment of FIGS. **8** to **10** includes a form of coupon door **144** which differs from those shown previously and which may be operated by a button **146** within the control of the check-out operator. Although the door **144** is shown at the remote side of the scanner **142** in FIG. **8**, it is generally preferable to locate it closer to the operator, such as between the keyboard and the scanner.

In addition, FIG. **8** indicates schematically a flat, substantially flush small keyboard **148** which may be included with the POS scanner **142**, in the counter top. The purpose of the small keyboard **148** is to manually key-in data from a product or from a coupon, in the event the checker cannot get a good read from the purchase item bar code and, in the case of a coupon, if he is given the power to override the coupon reading system in the event of error (or change in policy with respect to a particular type of coupon). The small override keyboard **148** is connected directly into the POS scanner **142** and enters the manually keyed-in data to be handled by the scanner system in the same manner as if the bar code were correctly read. Direct entry at the scanner enables the operator to make the key-in without turning to the cash register, and more importantly, where coupon validation is not in the cash register this allows the keyboard to communicate directly to the POS system, eliminating potential delay or errors. The manual key-in option, in the case of bad scans, will be discussed further below with reference to the flow charts of FIGS. **14** and **15A-15E**.

FIGS. **9** and **10** show the operation of the door **144** of FIG. **8**, and other elements of a system in accordance with this embodiment of the invention. In FIG. **9** a coupon **24** is being moved through the door mechanism **144**, which comprises in this embodiment a rotatable cylindrical member with a through slot **147**. The cylindrical member is rotated via a motor (not shown) activated by the button **146** shown in FIG. **8**. It is sealed against the counter **140** in a water tight seal at both sides.

FIG. **10** shows the coupon door **144** in the closed position, with the slot **147** rotated to a position wherein the door is sealed closed.

A reading beam **148**, which preferably is diverted from the POS scanner **142** as in the above embodiments, is scanned across the bar code of the coupon **24** through a

sealed window as shown. This, in conjunction with the sealed door member **144**, prevents moisture and debris from entering the POS scanner mechanism and electronics.

The coupon scanner of this embodiment preferably requires a sweeping motion of the coupon, as described in the embodiment of FIGS. **6** and **7**. Alternatively, the beam scan can occur at an appropriate rate to pick up the coupon's bar code as it is moved vertically down through the slot **147**.

FIG. **9** also shows a perforating punch or inking device **150** which may be used to cancel and invalidate against any future use all coupons which have been validated by the scanning system. The perforating punch can work in conjunction with a receiving aperture **152**, as shown. Once a coupon has been validated and cancelled by punching, inking or other physical cancellation, a coupon drive device **154** may engage the coupon and move it into a secure container **156**.

However, if the coupon is not found valid by the scanning and reading procedure, the coupon will not be punched and the coupon drive **154** will be signalled by the logic system to engage the coupon and push it back upwardly through the door slot **147**, in position to be retrieved by the operator.

FIG. **9** also shows a coupon sensor **158** which senses that the coupon has gone beyond the point of retrieval and will inevitably be delivered into the secure container **156**. Once this is sensed, the coupon sensor **158** can send a signal to the POS item scanner to reenable the item scanning function, assuming no further coupons are presented within a selected period of time.

In the system generally as shown in FIG. **9** the coupon drive **154** and the secure container may optionally be eliminated. If cancellation by inking, punching or other mutilation occurs immediately on validation, reuse will be prevented and the coupon can simply be retrieved by the operator after some indication of the validation and cancellation. Such a system is simple, with few moving parts. If desired the coupon drive can operate to pull the coupon down somewhat on insertion, then to push it back out for retrieval by the operator after handling by the system (whether valid or not).

Another embodiment of a coupon scanner, as integrated with a POS item scanner in accordance with the invention, is shown in the side elevation sectional view of FIG. **11**.

The system of FIG. **11** is integrated to an in-counter, multi-directional POS scanner, a scan beam **165** of which is shown in the drawing. The drawing also shows a POS scanner mirror **166** which will normally reflect the beam scans **165** through a path which will generate the POS scan lines, but which can be moved when coupon scanning is to take place.

The coupon scanner (generally identified by the reference numeral **168**) preferably is positioned at the side nearest to and parallel with the laser tube in a POS scanner such as the Spectra-Physics Freedom Scanner, although it could be used with any high performance slot scanner provided it is positioned for efficient use of the scanning laser beam of the POS scanner. The coupon scanner device **168** is integrated to such a POS scanner by adding it to the side of the scanner, modified as described in order to allow the laser beam to pass through.

In normal operation the check-out clerk or operator scans items for purchase in the normal way by passing them across a POS scanner window (not shown) through a dense array of laser beam scan lines, which may be generated from the beams **165** shown in FIG. **11**. When a coupon (or other bar coded document redeemable for value) is presented, the check-out clerk places the coupon in the device at the position **170**, which may be by pushing the coupon through a hinged door **172** which triggers a sensor **173** positioned

somewhat below the door (this is the "C. ENTER" sensor as discussed below).

The sensor **173** activates a DC motor **174** which moves the POS scanner mirror **166** upwardly, allowing the laser beams **165** to pass through to the attached and integrated coupon scanning device **168**. The beams pass through an opening or window **176** at the side of the coupon scanner **168**.

At this point, firmware or software of the system activates a DC motor and capstan **178**, and a further sensor at **180** ("C. LEAVE") begins the mechanical process of securing the coupon and detecting that it has properly passed through the scanning device, as explained further below.

The laser beam or beams **165** are reflected off a first mirror **182**, then a second mirror **184** and through a clear window **186**, by which the coupon passes at a position **188**. The clear window **186** is a part of a structural arrangement which completely seals the scanning system from dirt, debris and paper dust that could enter from the coupon travel area.

The mirrors **182** and **184** are positioned at angles such that the laser beams from the POS scanner are directed down and back within the height dimensions of the POS scanner, and also to add path length of approximately six to eight centimeters to the beams **165**, in order to bring the waist of the laser beams into the proper focal length for reading bar codes. In other words, the travel distance of the beams is approximately the same in reaching the coupons as it is in reaching purchase items when the beams are not being diverted to the coupon scanner.

The coupon will be oriented by the operator such that the bar code on the coupon faces in the direction of the scanning laser beams, with the bars and spaces of the bar code roughly perpendicular to the surface of the POS scanner and such that they are crossed by the laser scanning means as the bar code passed the window **186** at position **188**. The bar code on the coupon is "read" via the detection, signal processing and decoding hardware and software of the POS scanner based on the reflected laser light of the laser beams **165**.

Additional firmware or software, using the digital architecture of the POS scanner, is added to control the validation input/output and other functions of the coupon scanner, as further indicated below. This is possible in most cases without the addition of further hardware except for hardware to provide analog to digital conversions from the sensors **173** and **180**, DC motors **174** and **178** and a diverter mechanism **190**. Additional EPROM or RAM may be used to expand the logic capabilities of the system, operating under the POS scanner operating system, as part of the integration of the two functions.

As the coupon is placed in the coupon scanning device by the push from an operator and gravity, and as it moves through positions **170** and **188**, it will then be "secured" at a position **192** and mechanically moved through the device by engagement with the motor/capstan **178** and a cooperating pinch roller **194**. The pinch roller **194** may be spring loaded to apply pressure to the capstan **178**, causing it to rotate in complement to the capstan **178**, and also allowing the clearance between the capstan and roller to expand and compensate for varying widths and media of coupons.

The logic of the POS scanner will determine when a valid bar code is read from a coupon, and the coupon will then be transported to one of two exits **196** and **198**.

If an invalid coupon is entered or no bar code is read, the POS scanner logic will signal the motor/capstan **178** to be reversed, thereby rejecting and reversing the coupon's direction of movement, backing it up and out of the scanner.

If a valid coupon is read, the POS scanner then signals the diverting mechanism **190** to direct the coupon to the proper

exit position (196 or 198) through which the coupon exits the coupon scanner. The sensor 180 detects, via reflected light, the passing of a coupon through the coupon scanner, thereby assuring a validated coupon has completed travel through the system.

The travel of an invalid coupon through this system, which may be due to a paper jam or invalid coupon size/media combination, or the absence of any signal for a valid coupon, which might be due to a paper jam or intentional holding and removal of a coupon by the operator, would be detected by the sensor 180 in conjunction with the firmware logic, causing a special error condition as explained further below. (This error could be signalled, for example, as a flagged field in an electronic transaction record.)

The diverting device 190 is shown as selecting one of several possible exits 196 or 198 (or possibly more). This represents a system for categorizing coupons as desired. Controlled by logic within the POS scanner logic, these diverters can include further downstream diverters in serial relationship, so as to provide a considerable number of exit locations. In this way, coupons can be categorized by manufacturer or product, or other bar coded documents redeemable for value, such as lottery tickets or food stamps, can be mechanically sorted based on the relationship between the bar code and logic contained in the POS scanner. A secure container 200 is shown schematically, optionally having several categorized departments, for receiving coupons exiting through the exits 196 and 198 of the coupon scanner and handling device.

FIG. 14 is a simplified flow chart diagram showing operation of an integrated POS scanner/coupon validation system in accordance with the invention.

In FIG. 14, the POS scanner is shown first scanning the bar codes of ordinary grocery items. In the absence of a readable bar code, the POS scanner may normally have activated a red indicator light. As shown in the diagram, when a readable bar code is passed by the POS scanner, the scanner "beeps" and activates a green indicator light, such as an LED. The system then checks to see if there is a UPC code corresponding to the read code on file in a data base. If not, the operator has an opportunity to enter the numbers and information corresponding to the bar code information manually, either on the cash register or on the scanner, in some embodiments of the present invention (see FIG. 8, showing a scanner keyboard).

Once the POS scanner has read the bar code, or the information has been entered manually, the system displays the item description and price (derived from a POS system database), usually on the cash register. An item transaction record is generated internally and stored in memory, and at the same time, ordinarily the transaction record, or a portion of the transaction record, will be printed on a cash register receipt which is being generated during the transaction. Next, if there are more purchased items to be scanned, the loop continues as indicated. If not, i.e. the last purchased item has been scanned, the question arises as to whether the customer has any redemption coupons to present. If not, as indicated in the flow chart, the transaction is ended. If there are coupons, the scanner door is opened, which preferably has the effect of automatically raising a scanner mirror in the POS scanner, for redirecting the scanned beam to a position for reading coupons. At the same time this deactivates the POS scan capability of the system, in accordance with this preferred embodiment of the invention.

In the coupon scanning sequence, beginning at D in the flow chart, the coupon is scanned at the coupon scanning location. If the coupon is not valid and redeemable for this transaction, it is rejected, and an appropriate error message is displayed indicating that the coupon is not redeemable in

this transaction, and the coupon is returned or rejected. If more coupons are then presented, the coupon scanning loop begins again. If no more coupons are presented, the transaction is ended, the scanner mirror is lowered into the normal POS scanning mode and POS scanning capability returned.

If a valid, redeemable coupon is read, the coupon amount may be automatically deducted from the record of the entire transaction, with this deduction shown on the register receipt.

It is important that the validated coupon be removed from the hands of the customer or operator. Once validated, it is automatically moved through the system to a "secure bag" or punched, mutilated or destroyed, preventing future use. When this has occurred, the scanner "beeps" and preferably activates a green light (LED) to indicate that the coupon has been validated and moved to the secure area. A coupon transaction record is written and stored in memory, and this may be substantially concurrently with the deduction of the coupon redemption amount from the total transaction.

If there are more coupons the system loops back to D, and if not, it goes to position E, i.e. the end of the transaction and the return to POS scanning mode.

In POS scanner and coupon validation systems in accordance with the invention, there are two important objectives to be accomplished when coupons are being validated.

1. Scanning of the data on the coupon, making of decisions and passing the coupon data to the coupon validation logic, which determines whether the coupon is properly redeemable. This is accomplished by the system's scanning the coupon, doing some simple tests on the coupon data and passing the data to the coupon validation logic. The coupon data ordinarily does not require any further system database lookup as does the completion of a purchase item transaction. The coupon validation logic must then signal the coupon scanning apparatus as to whether to move the coupon through the system (if redeemable) or return it to the operator (if not redeemable).
2. Securing of the validated coupon and assuring that the paper travels through the system to a secure area, so that the coupon cannot be removed and reused. It must be assured that the physical coupon is directly related to the validation process. This is accomplished in preferred embodiments through the use of two sets of sensors which are used to detect the proper movement of a piece of paper (coupon) in the system.

The expanded flow chart of FIGS. 15A-15E more completely describes the system and software flow, and should be considered along with the following logic signals truth table.

TABLE 3

Truth Table for Logic Signals			
Coupon Enter	UPCS Valid	Coupon Leave	Definition
0	0	0	Reset
1	0	0	Coupon has passed sensor (entered device)
1	1	0	Coupon has entered and scanned and validated by the coupon validation logic to
1	1	1	Valid coupon has travelled into device and is "secure"
0	1	1	Valid coupon moving correctly.

TABLE 3-continued

Truth Table for Logic Signals			
Coupon Enter	UPCS Valid	Coupon Leave	Definition
0	1	0	Ending state for valid and secure coupons.
0	0	1	Error: Invalid coupon has passed.
1	0	1	Invalid coupon: reverse coupon motor and eject coupons.

The flow chart of FIGS. 15A-15E shows a sequence similar to that described with FIG. 14, but in greater detail and with further steps described in some cases. When the transaction begins, a beginning of transaction record is written. Grocery (or other retail) items are scanned in the normal manner as indicated. In the event a good scan is not obtained of an item, the operator has a choice of re-scanning the item or manually keying in the information on the product, as discussed previously. If this is done, the POS system then receives the information on the item, price and description as indicated, and the "coupon validation logic" receives the family code, indicating the item. If a good scan has occurred (meaning that a bar code was recognized and read by the system), this is indicated as shown in the flow chart and the UPC character string is sent to the POS system. The POS system then attempts to get the item description and price, and the "coupon validation logic" gets the family code if available. Next this information is checked, which may be in a central computer and data base, to be sure that there is a valid UPC on file for the label as read. If not, the system "beeps" and requires operator intervention. If the operator elects to override the system, he will manually key in the information, whereupon the POS system can display the item description and price. As indicated in the flow chart, if the system does find a valid UPC on file then the system automatically generates the item description and price and displays this information.

Next, the item transaction record is written and put in a buffer, and the record is sent to the "coupon validation logic".

If there are more items for purchase, the system loops back to the A point. If not, and if there are no coupons presented, the transaction is ended and a record written. If there are coupons presented, the coupon scanner door is opened, the coupon is entered and, as described above, the POS scanner mirror in a preferred embodiment is moved to reflect the scan beams properly into the coupon scanner area.

In preferred embodiments, the operator must open a door to start the coupon scanning system. This (or the opening and the closing of the door) may signal a motor to move the mirror which makes coupon scanning active in the coupon slot of the device, and also activates the coupon software and may deactivate the ability to scan other items in the POS mode, as indicated in FIG. 15B below the location "2". At this point, a repeating process begins which is used for all coupons. All "logic bits" (i.e. "UPC5", "C.ENTER", "C.LEAVE", "OVERRIDE", and "CLOCK") will be reset prior to entering each new coupon.

When a coupon is to be read, the operator places the coupon in the device. The system software checks to see whether the operator has chosen to manually override the system, as indicated in the box in the flow chart. If an override is in effect, the coupon validation logic will have sent a logic bit "1" to the device. This bit will be checked periodically to determine what to do.

Next the system reads the "C.ENTER" or "CENTER". This is the first sensor near the top of the coupon chute in the device (see FIG. 11). The system checks when (and whether)

the coupon was entered into the device. A clock function is shown in the flow chart, representing a simple timing sequence to assure that excessive time does not occur before a beam is scanned. If the allowable clock time is exceeded, a message is displayed such as "please insert coupon or close door".

The coupon is scanned by the system as soon as it is available, as indicated in the flow chart. If the bar code is read correctly, then the data is buffered and a series of simple validation checks are performed as described below, preferably in the scanner device since the checks are simple and can be accomplished quickly. First, as indicated in the chart under the location "3" (FIG. 15C), the first character of the code is checked to be sure it is "5" (representing a coupon). If not, a signal is sent to the coupon validation logic that there is an error, and this is displayed as indicated in the flow chart.

Also a check is preferably made for any additional data bar coded on the coupon, beyond the standard bar code (see FIG. 13, e.g.). That information can also be read by the scanner and passed to the coupon validation logic. (Certain variations, such as the inclusion of an expiration date in the coded data, can be handled by software in the device, as accomplished with the number system described above.)

The data is passed to the coupon validation logic, which will determine whether the coupon correlates to any of the items purchased. This can be accomplished in any of several locations—cash register, software, controller software that runs the cash registers, or a separate device such as a PC computer attached to the network. It can also be in the POS scanner device itself. The important thing is that the correlation have access to the UPC number with family code and price.

As indicated in the flow chart, the coupon validation logic sends a logic bit back to the scanner device signalling one of two things: (1) the coupon is valid, therefore execute further logic to assure the coupon passes through the device to the secure area, or (2) the coupon is not valid, therefore reverse the motor and reject the coupon.

If the coupon is not "valid" or redeemable, the operator may still be given the power to override this manually, as indicated.

At location "4" in the flow chart, FIG. 15D, it is indicated that the coupon scanner system now reads "CLEAVE" to be sure that the coupon passed the second sensor (FIG. 11) in the pathway to the secure area, indicating correct travel through the device. See also Table 1, above. This is also subject to a clock loop as indicated, assuring that excessive time does not pass (as if the coupon is not properly moving through the system).

Next, the scanner system again reads "CENTER", after a clock reset, in order to assure that the coupon is not removed and it has passed properly through the system. The first sensor along the path should be reset (back to "0"), before CLEAVE transitions back to "0".

If this transition does not occur in this logical order, the conclusion is that the coupon was removed by the operator, or the system is jammed. A normal error condition message is displayed, and the device attempts to reject the coupon, as indicated in the flow chart.

Next, a signal is generated that the coupon is valid and has securely moved through the coupon scanner, as indicated under "5" in the flow chart. Confirmation is sent to the POS system and the coupon validation logic. The device then preferably indicates this by a "beep" and the activation of a green signal light, which can advantageously be the same signalling the operator receives when a purchase item is read. A coupon transaction record is written, and the system returns to the location "B", i.e. if there are more coupons it loops through the same procedure again and if not, the clock is set, the coupon scanner door is closed and the normal POS scanner is re-enabled.

The coupon transaction record includes all relevant information about the transaction, the UPC number of the item purchased and of the coupon, the amount of credit, the time of the transaction and other required data. The record is stored for later batch reconciliation, or it may be used in an on-line fashion for electronic clearing, wherein the manufacturer will be debited and the retailer will be credited. This electronic clearing or electronic data interchange system is advantageous in eliminating one or more levels of clearing in the usual coupon clearing system.

While we have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification and we therefore do not wish to be limited to the precise details set forth, but desire to avail ourselves of such changes and alterations as fall within the purview of the following claims.

We claim:

[1. A point-of-scale bar code reader for retail stores, having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising,

redemption coupon receiving means associated with the housing of the bar code reader,

coupon detection means for signifying in the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means associated with the scanning optics of the bar code reader for scanning and reading a redemption coupon using the same reading beam used in the scanning optics, when a redemption coupon is placed at said redemption coupon receiving means,

the coupon receiving means including a slot configured to receive a coupon, coupon sensing means at the slot, activation means for placing the bar code reader in a coupon reading mode when a coupon has been placed in the slot and sensed by the coupon sensing means, means for drawing the coupon through the slot for the coupon to be read, and associated means for interrupting a normal product reading scanning pattern generated by the scanning optics to divert a reading beam to the position of the redemption coupon, serving as said coupon reading means,

means for decoding the redemption coupon's bar code using the same bar code decoding software used for purchased products, and

correlation means for comparing the decoded information from a redemption coupon bar code with a list of purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether the appropriate qualified item has been purchased to qualify for coupon redemption.]

[2. A point-of-sale product and coupon bar code reader system for retail stores, including a product bar code reader having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising,

redemption coupon receiving means associated with the bar code reader,

coupon detection means for signifying in the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means connected to the bar code reader for scanning and reading a redemption coupon when a redemption coupon is placed at said redemption coupon receiving means,

decode means for decoding the redemption coupon's bar code using the same bar code decoding software used for purchased products,

correlation means for comparing the decoded information from a redemption coupon bar code with information representing purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for coupon redemption, and

the coupon reading means including movable door means providing an opening for insertion of a coupon, serving as said redemption coupon receiving means, beam diverting means for diverting the product bar code reader's reading beam to scan a coupon when it is placed through the coupon opening, and coupon securing means for engaging a coupon and delivering it into a secure area after the coupon has been determined to be valid and redeemable.]

[3. The system of claim 2, further including coupon cancellation means for making a physical indication of cancellation on the coupon after it has been determined to be valid and redeemable.]

[4. A point-of-sale product and coupon bar code reader system for retail stores, including a product bar code reader having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising,

redemption coupon receiving means associated with the bar code reader,

coupon detection means for signifying to the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means connected to the bar code reader for scanning and reading a redemption coupon when a redemption coupon is placed at said redemption coupon receiving means,

decode means for decoding the redemption coupon's bar code using the same bar code decoding software used for purchased products,

correlation means for comparing the decoded information from a redemption coupon bar code with information representing purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for coupon redemption, and

the redemption coupon receiving means comprising an openable door adjacent to the product bar code reader for receiving coupons entered by an operator, and wherein the coupon reading means comprises movable mirror means for diverting the reading beam of the product bar code reader to a coupon scanning location when a coupon is to be read, and further including isolation means for sealing the scanning optics of the

product bar code reader from a path through which the coupon travels.]

[5. The system of claim 4, further including means for engaging the coupon after it has been scanned and determined to be valid and redeemable, and for drawing the coupon away from the coupon receiving means and out of the reach of the operator.]

[6. The system of claim 5, further including a secure container, and including a means associated with the coupon engaging means for delivering the validated coupon into the secure container.]

[7. The system of claim 6, further including coupon diverting means for directing the validated coupon in either of two flow paths after validation, leading to different areas of the secure container depending upon classification of the coupon.]

[8. A point-of-sale product and coupon bar code reader system for retail stores, including a product bar code reader having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising:

redemption coupon receiving means associated with the bar code reader,

coupon detection means for signifying to the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means connected to the bar code reader for scanning and reading a redemption coupon when a redemption coupon is placed at said redemption coupon receiving means,

decode means for decoding the redemption coupon's bar code using the same bar code decoding software used for purchased products,

correlation means for comparing the decoded information from a redemption coupon bar code with information representing purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for coupon redemption, and

the coupon reading means including movable door means providing an opening for insertion of a coupon, serving as said redemption coupon receiving means, beam diverting means for diverting the product bar code reader's reading beam to scan a coupon when it is placed through the coupon opening, and coupon cancellation means for cancelling the coupon and preventing future use of the coupon after it has been determined to be valid and redeemable.]

[9. The system of claim 8, wherein the coupon cancelling means comprises means for mutilating the coupon to the extent that it cannot be read as valid in a future transaction.]

[10. The system of claim 8, wherein the coupon cancelling means comprises means for applying ink to the coupon to prevent reading of the coupon's bar code in a future transaction.]

[11. A point-of-sale bar code reader for retail stores, having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising,

redemption coupon receiving means associated with the housing of the bar code reader,

coupon detection means for signifying in the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means associated with the scanning optics of the bar code reader for scanning and reading a redemption coupon using the same reading beam used in the scanning optics, when a redemption coupon is placed at said redemption coupon receiving means,

means for decoding the redemption coupon's bar code, and correlation means for comparing the decoded information from a redemption coupon bar code with a list of purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for coupon redemption, and

the coupon reading means including movable door means providing an opening for insertion of a coupon, serving as said redemption coupon receiving means, beam diverting means for diverting the product bar code reader's reading beam to scan a coupon when it is placed through the coupon opening, and coupon securing means for engaging a coupon and delivering it into a secure area after the coupon has been determined to be valid and redeemable.]

[12. The system of claim 11, further including coupon cancellation means for making a physical indication of cancellation on the coupon after it has been determined to be valid and redeemable.]

[13. A point-of-sale bar code reader for retail stores, having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising,

redemption coupon receiving means associated with the housing of the bar code reader,

coupon detection means for signifying in the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means associated with the scanning optics of the bar code reader for scanning and reading a redemption coupon using the same reading beam used in the scanning optics, when a redemption coupon is placed at said redemption coupon receiving means,

means for decoding the redemption coupon's bar code, and correlation means for comparing the decoded information from a redemption coupon bar code with a list of purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for coupon redemption, and

the redemption coupon receiving means comprising an openable door adjacent to the product bar code reader for receiving coupons entered by an operator, and wherein the coupon reading means comprises movable mirror means for diverting the reading beam of the product bar code reader to a coupon scanning location when a coupon is to be read, and further including isolation means for sealing the scanning optics of the

product bar code reader from a path through which the coupon travels.]

[14. The system of claim 13, further including means for engaging the coupon after it has been scanned and determined to be valid and redeemable, and for drawing the coupon away from the coupon receiving means and out of reach of an operator.]

[15. The system of claim 14, further including a secure container, and including means associated with the coupon engaging means for delivering the validated coupon into a secure container.]

[16. The system of claim 15, further including coupon diverting means for directing the validated coupon in either of two flow paths after validation, leading to different areas of the secure container depending upon classification of the coupon.]

[17. A point-of-sale bar code reader for retail stores, having a housing, a reading beam, scanning optics for producing scan lines with the reading beam, collection optics and bar code decoding software, and for reading and verifying the use of redemption coupons bearing bar codes, as well as reading items for purchase in a consumer transaction, comprising,

redemption coupon receiving means associated with the housing of the bar code reader,

coupon detection means for signifying in the decoding software that a redemption coupon is being read, as opposed to a purchased item,

coupon reading means associated with the scanning optics of the bar code reader for scanning and reading a redemption coupon using the same reading beam used in the scanning optics, when a redemption coupon is placed at said redemption coupon receiving means,

means for decoding the redemption coupon's bar code, and correlation means for comparing the decoded information from a redemption coupon bar code with a list of purchases as determined from bar codes of purchased items in the same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for coupon redemption, and

the coupon reading means including movable door means providing an opening for insertion of a coupon, serving as said redemption coupon receiving means, beam diverting means for diverting the product bar code reader's reading beam to scan a coupon when it is placed through the coupon opening, and coupon cancellation means for cancelling the coupon and preventing future use of the coupon after it has been determined to be valid and redeemable.]

[18. The system of claim 17, wherein the coupon cancelling means comprises means for mutilating the coupon to the extent that it cannot be read as valid in a future transaction.]

[19. The system of claim 17, wherein the coupon cancelling means comprises means for applying ink to the coupon to prevent reading of the coupon's bar code in a future transaction.]

20. A point-of-sale reader for reading bar codes on redemption coupons as well as reading bar codes on items being purchased in a consumer transaction, for use in a system capable of determining whether a redemption amount associated with the redemption coupon should be credited based on whether a qualified item has been purchased, comprising

a housing having a first window oriented generally horizontally and a second window oriented generally vertically,

a laser beam source generating a reading beam, scanning optics contained within the housing for producing scan lines with the reading beam, wherein the scanning optics pass scan lines through the first window and pass scan lines through the second window, and wherein the scanning optics scan a redemption coupon using the same reading beam used to scan bar codes on items being purchased,

collection optics and bar code decoding software.

21. A point-of-sale bar code reader, comprising a housing having a first window oriented generally horizontally and a second window oriented generally vertically,

a scanning mechanism contained within the housing for producing a first group of scan lines which are directed through the first window and a second group of scan lines which are directed through the second window, collection optics and bar code decoding software.

22. A point-of-sale bar code reader according to claim 21 further comprising a single laser beam, the same laser beam used for scanning bar codes on items being purchased is used for scanning bar codes on redemption coupons.

23. A point-of-sale bar code reader according to claim 22 further comprising mirrors which selectively direct scanning beams formed from the laser beam through a selected one of the first window and the second window.

24. A point-of-sale bar code reader according to claim 21 wherein a laser beam is used to scan items being purchased and a different laser beam is used to scan a bar code on a redemption coupon.

25. A point-of-sale bar code reader according to claim 21 further comprising

means for reading and verifying redemption coupons bearing bar codes, as well as reading items being purchased in a consumer transaction,

correlation means for comparing decoded information from a redemption coupon bar code with information relating to the items being purchased as determined from bar codes of items scanned in a same consumer transaction, and for determining whether a redemption amount associated with the redemption coupon should be credited based on whether a qualified item has been purchased,

means for decoding a bar code on a redemption coupon using the same bar code decoding software used for decoding bar codes of items being purchased.

26. A point-of-sale bar code reader according to claim 21 wherein items being purchased are scanned by scanning beams passing through the first window and the redemption coupons are scanned only by scanning beams passing through the second window.

27. A point-of-sale bar code reader according to claim 21 wherein the second window is positioned above and to one side of the first window.

28. A point-of-sale bar code reader according to claim 21 wherein the scan mechanism comprises a rotating element, the reader further comprising a movable mirror which shifts in position to divert scanning beams from the rotating element through the second window.

29. A point-of-sale bar code reader according to claim 21 wherein the scanning mechanism comprises a rotating element having a plurality of mirrors.

30. A reader for reading bar codes on redemption coupons as well as reading bar codes on items being purchased in a consumer transaction, comprising

a housing having a first window and a second window; optics contained within said housing for directing a first scan pattern through the first window and for directing a second scan pattern through the second window;

means for selectively switching operation of the reader between a first operation mode which enables reading bar codes with the first scan pattern through the first window and a second operation mode which enables reading bar codes only with the second scan pattern through the second window;

collection optics and bar code decoding software.

31. A reader according to claim 30 further comprising means for determining whether a redemption amount associated with the redemption coupon should be credited based on whether a qualified item has been purchased.

32. A reader according to claim 30 wherein the reader comprises a laser scanner having a single reading beam, wherein bar codes on redemption coupons are read using the same reading beam which is used to scan bar codes on items being purchased.

33. A reader according to claim 30 further comprising means for decoding the redemption coupon's bar code using same bar code decoding software used for decoding bar codes of the items being purchased.

34. A reader according to claim 30 wherein the items being purchased are read by scanning beams passing through the first window and the redemption coupons are read only by scanning beams passing through the second window.

35. A reader according to claim 30 wherein said means for selectively switching comprises a manually actuated switch.

36. A reader according to claim 30 wherein said means for selectively switching comprises manipulation of the reader by a user.

37. A reader according to claim 30 further comprising a door in said housing, wherein manipulation of the reader comprises opening said door.

38. A reader according to claim 30 wherein in said first operation mode, the first scan pattern is generated and directed out the first window and the second scan pattern is generated and directed out the second window.

39. A reader according to claim 30 wherein in said first operation mode, the first scan pattern is generated and directed out the first window and the second scan pattern is not generated.

40. A reader according to claim 30 wherein the first window and the second window are positioned on different sides of said housing.

41. A reader according to claim 30 further comprising a movable mirror which shifts in position to divert scanning beams through the second window.

42. A bar code reader according to claim 30 wherein the scanning mechanism comprises a rotating polygon mirror.

43. A method for reading bar codes on objects, comprising the steps of

producing a first scan pattern from a reader housing;

optimizing the first scan pattern for a first mode of operation;

producing a second scan pattern from the reader housing;

optimizing the second scan pattern for a second mode of operation, the second scan pattern being different from the first scan pattern;

determining a type of object to be read;

selectively switching from reading bar codes using the first scan pattern to reading bar codes using the second scan pattern based upon the type of object having been determined.

44. A method according to claim 43 further comprising producing the first scan pattern comprised of intersecting scan lines and the second scan pattern comprised of a single scan line.

45. A method according to claim 43 wherein said step of selectively switching comprises actuating a manual switch located on the reader.

46. A method according to claim 43 wherein said step of selectively switching comprises manipulating the reader which causes the reader to switch from the first mode to the second mode.

47. A method according to claim 46 wherein manipulating the reader comprises opening a door on the scanner.

48. A method according to claim 43 further comprising reading bar codes on redemption coupons and on items being purchased in a consumer transaction;

decoding bar codes on the redemption coupons using same bar code decoding software used for decoding bar codes on the items being purchased.

49. A method according to claim 48 further comprising determining whether a redemption amount associated with the redemption coupon should be credited based on whether an appropriate qualified item has been scanned in a same consumer transaction.

50. A method according to claim 43 further comprising passing the first scan pattern through a first window of a reader housing and passing the second scan pattern through a second window of the reader housing.

51. A method according to claim 43 further comprising generating the first scan pattern and the second scan pattern with a common scanning element.

52. A point-of-sale system for retail stores, for reading and verifying the use of coupons bearing coupon bar codes as well as reading items being purchase in a consumer transaction, comprising

an item reader for reading item bar codes on the items being purchased;

a coupon reader positioned proximate said item reader for reading coupon bar codes on coupons being presented;

a storage device for receiving and storing the coupons, said storage device being coupled to said coupon reader and including

a receiving means for receiving a coupon, and means for drawing the coupon through said receiving means to allow the coupon bar code to be read by said coupon reader;

means for decoding the coupon bar code; and

correlation means for comparing decoded information from the coupon bar code with a list of purchases as determined from bar codes of purchased items in a same consumer transaction, and for determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for redemption.

53. A reader, comprising

a housing having a first window and a second window; optics contained within said housing for directing a first scan pattern through the first window and for directing a second scan pattern through the second window;

wherein the reader is selectively operable in a first operation mode which enables reading with the first scan pattern through the first window and a second operation mode which enables reading with the second scan pattern through the second window.

54. A reader according to claim 53 wherein the reader comprises a laser scanner having a single reading beam, wherein bar codes on redemption coupons are read using the same reading beam which is used to scan bar codes on items being purchased.

55. A reader according to claim 53 wherein said reader includes a manually actuated switch for selectively switching the reader between the first and second modes.

56. A reader according to claim 53 wherein said means for selectively switching comprises a switch actuated via manipulation of the reader.

57. A reader according to claim 56 further comprising a door in said housing, wherein the manipulation of the reader comprises opening said door for providing access to the second window.

58. A reader according to claim 53 wherein in said first operation mode, only the first scan pattern is generated and in the second operation mode, only the second scan pattern is generated.

59. A reader according to claim 53 wherein in said first operation mode, only reading via the first scan pattern is enabled.

60. A reader according to claim 53 wherein the first window and the second window are positioned on different sides of said housing.

61. A reader according to claim 53 wherein the first window and the second window are positioned on a same side of said housing.

62. A reader according to claim 53 wherein the first window is oriented generally horizontally and the second window is oriented generally vertically.

63. A reader according to claim 53 further comprising a movable mirror which shifts in position to divert scanning beams through the second window.

64. A reader according to claim 53 wherein the optics include a scanning mechanism comprising a rotating polygon mirror.

65. A method of scanning items comprising the steps of producing a first scan pattern which is optimized for a first mode of operation and passing the first scan pattern out through a first window;

producing a second scan pattern which is different from the first scan pattern and which is optimized for a second mode of operation and passing the second scan pattern out through a second window;

selectively switching between (1) operating in the first mode of operation comprising scanning an item with the first scan pattern, obtaining data therefrom, and decoding the data and (2) operating in the second mode of operation comprising scanning an item with the second scan pattern, obtaining data therefrom, and decoding the data.

66. A method according to claim 65 further comprising generating the first scan pattern comprised of intersecting scan lines and the second scan pattern comprised of a single scan line.

67. A method according to claim 65 wherein the first mode of operation comprises using the first scan pattern for data reading and wherein the second mode of operation comprises using the second scan pattern for coupon reading.

68. A method according to claim 65 wherein said step of selectively switching comprises actuating a manual switch located on the reader.

69. A method according to claim 65 wherein said step of selectively switching comprises manipulating the reader.

70. A method according to claim 69 wherein manipulating the reader comprises opening a door on the reader.

71. A method according to claim 65 further comprising reading bar codes on redemption coupons and on items being purchased in a consumer transaction using a common element selected from the group consisting of: a light source, a reading beam, a beam scanning mechanism, beam collection optics, decode software, and a common housing.

72. A method according to claim 65 further comprising reading bar codes on redemption coupons and on items being purchased in a consumer transaction;

decoding bar codes on the redemption coupons using same bar code decoding software used for decoding bar codes on the items being purchased.

73. A method according to claim 65 further comprising employing a common scanning element for generating the first scan pattern and the second scan pattern.

74. A method according to claim 65 further comprising employing a common reading beam for producing the first scan pattern and the second scan pattern from the same reading beam.

75. A method for reading and verifying coupons bearing coupon bar codes as well as reading items being purchase in a consumer transaction, comprising the steps of

positioning an item reader at a point-of-sale location for reading item bar codes on the items being purchased;

positioning a coupon reader proximate said item reader for reading a coupon bar codes on coupons being presented;

receiving and storing the coupons in a storage device, said storage device being coupled to said coupon reader;

presenting a coupon to the coupon reader;

drawing the coupon through the coupon reader to allow the coupon bar code to be read by said coupon reader;

decoding the coupon bar code; and

comparing decoded information from the coupon bar code with a list of purchases as determined from bar codes of purchased items in a same consumer transaction; and

determining whether the consumer should be credited in a redemption amount associated with the coupon, based on whether an appropriate qualified item has been purchased to qualify for redemption.

76. A method of scanning items comprising the steps of generating a reading beam;

directing the reading beam onto a scanning mechanism; generating a first scan pattern comprised of a plurality of intersecting scan lines optimized for a first mode of operation;

generating a second scan pattern comprised of a single scan line optimized for a second mode of operation;

manually actuating a switch to select between operating in the first mode of operation where the first scan pattern is enabled to read and operating in the second mode of operation where the second scan pattern is enabled to read.

77. A method according to claim 76 wherein the switch is actuated by opening a door on the reader.

78. A method according to claim 76 further comprising passing the first scan pattern through a first window of a reader housing and passing the second scan pattern through a second window of the reader housing.

79. A method of scanning items with a reader, comprising the steps of

producing a first scan pattern optimized for a first mode of operation and passing the pattern out of a reader housing;

producing a second scan pattern which is different than the first scan pattern and optimized for a second mode of operation and passing the pattern out of the reader housing;

automatically switching the reader from the first mode of operation to the second mode of operation in response to manipulation of the reader housing.

80. A method according to claim 79 wherein manipulation of the reader comprises opening a door on the reader.

81. A method according to claim 79 further comprising passing the first scan pattern through a first window of a reader housing and passing the second scan pattern through a second window of the reader housing.

82. A method according to claim 79 further comprising generating the first scan pattern with a scanning mechanism; generating the second scan pattern with the same scanning mechanism.

83. A method according to claim 79 wherein the first scan pattern is optimized for scanning bar codes on a first type of items and the second scan pattern is optimized for scanning bar codes on a second type of items.

84. A method according to claim 83 wherein the first type of items comprises products being purchased in a consumer transaction and the second type of items comprises coupons.

85. A method according to claim 79 wherein the step of operating in a first scanning mode comprises producing a first scan pattern consisting of a plurality of intersecting scan lines; the step of operating in a second scanning mode comprises producing a second scan pattern different than the first scan pattern.

86. A method according to claim 79 further comprising generating a reading beam and using said reading beam for producing both the first scan pattern and the second scan pattern.

87. A method of bar code scanning, comprising the steps of operating in a first operation mode comprised of generating a first scan pattern optimized for scanning a bar codes on a first type of item; detecting presence of a second type of item to be scanned and;

in response to detecting said presence of the second type of item, automatically switching to operating in a second operation mode comprised of generating a second scan pattern optimized for scanning the second type of item.

88. A method of bar code scanning according to claim 87 further comprising focusing the first scan pattern in the first operation mode at a first focal distance; focusing the second scan pattern in the second operation mode at a second focal distance different than the first focal distance.

89. A method of bar code scanning according to claim 87 further comprising passing the first scan pattern through a first scanner window and passing the second scan pattern through a second scanner window.

90. A method of bar code scanning according to claim 87 further comprising disabling generating of the first scan pattern while operating in the second mode of operation.

91. A method according to claim 87 further comprising generating the first scan pattern with a scanning mechanism; generating the second scan pattern with the same scanning mechanism.

92. A method according to claim 87 wherein the first type of item comprises a product being purchased in a consumer transaction and the second type of item comprises a coupon.

93. A method according to claim 87 further comprising generating the first scan pattern consisting of a plurality of intersecting scan lines; generating the second scan pattern consisting of a single scan line.

94. A method according to claim 87 further comprising generating a reading beam and using said reading beam for generating both the first scan pattern and the second scan pattern.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : RE 37,166 E
DATED : May 8, 2001
INVENTOR(S) : Rando et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,

Related U.S. Application Data” before “[64] Patent No. RE 37, 166” change
“Reissue of” to -- Continuation of --.

Signed and Sealed this

Sixteenth Day of July, 2002

Attest:

A handwritten signature in black ink, appearing to read "James E. Rogan", with a horizontal line underneath it.

Attesting Officer

JAMES E. ROGAN
Director of the United States Patent and Trademark Office