United States Patent [19]

Novak et al.

[11] **3,916,194**

[45] **Oct. 28, 1975**

[54] **INFRARED NOTE VALIDATOR**

[75] Inventors: **Frank A. Novak**, Seven Hills; **Sanford C. Murck**, Gates Mills; **Kenneth T. Schreiber**, Bedford, all of Ohio

[73] Assignee: **Ardac, Inc.**, Willoughby, Ohio

[22] Filed: **Apr. 10, 1974**

[21] Appl. No.: **459,601**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 431,077, Jan. 7, 1974, abandoned.

[52] **U.S. Cl.** **250/338**; 250/556

[51] **Int. Cl.**[2] **G06K 5/00**

[58] **Field of Search** 250/338, 556

[56] **References Cited**

UNITED STATES PATENTS

2,941,187	6/1960	Simjian	250/556 X
3,492,490	1/1970	Bayha et al.	250/338
3,790,795	2/1974	Fletcher et al.	250/338

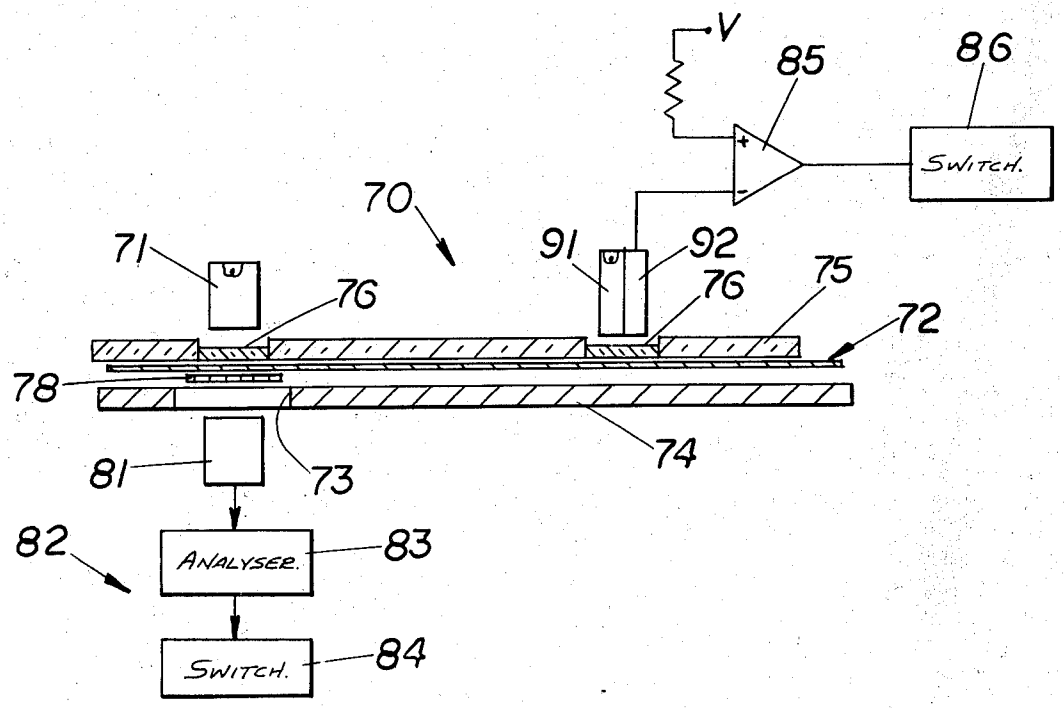
Primary Examiner—Archie R. Borchelt

Attorney, Agent, or Firm—Oldham & Oldham Co.

[57] **ABSTRACT**

An apparatus for validating notes utilizes a primary light source directed onto a portion of the note, a grid located juxtaposition to the note, a light detecting sensor for receiving the light directed upon the grid and note and having output signals indicative of the intensity of the light incident thereupon, a primary member for accepting or rejecting the note based upon the output signals, a secondary infrared light source directed onto an infrared sensitive portion of the note, an infrared detecting sensor receiving said infrared light and having output signals indicative upon the intensity incident thereupon and a secondary member for accepting or rejecting the note based upon the secondary light signal so that the note is accepted if both the primary and secondary accept or reject members accept the note.

13 Claims, 6 Drawing Figures



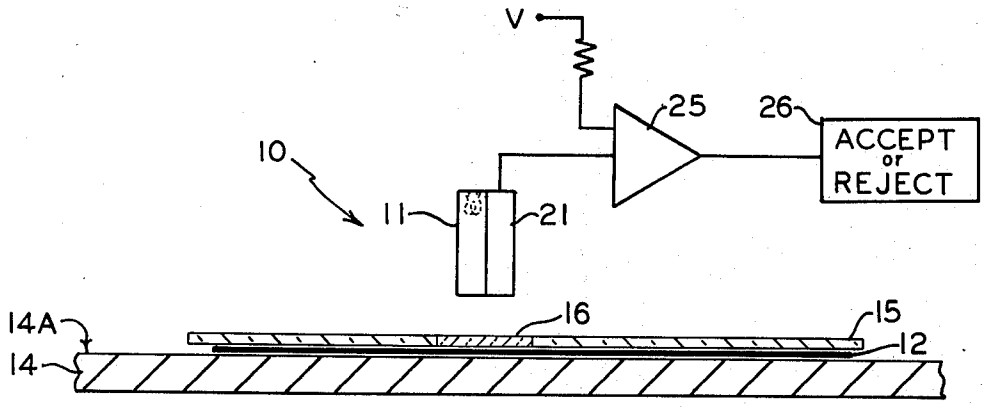


FIG - 1

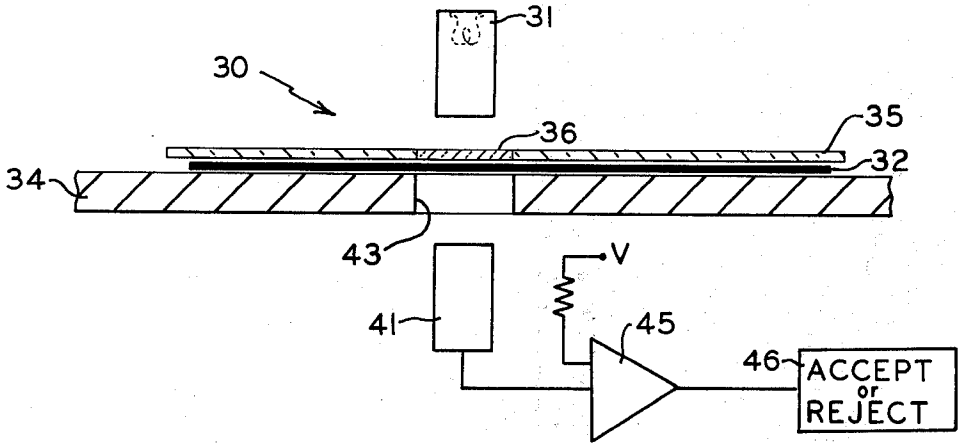


FIG - 2

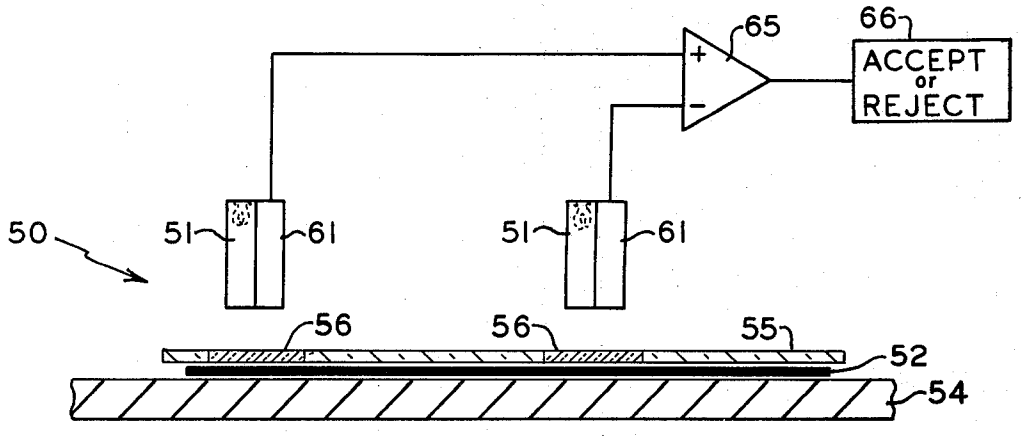


FIG - 3

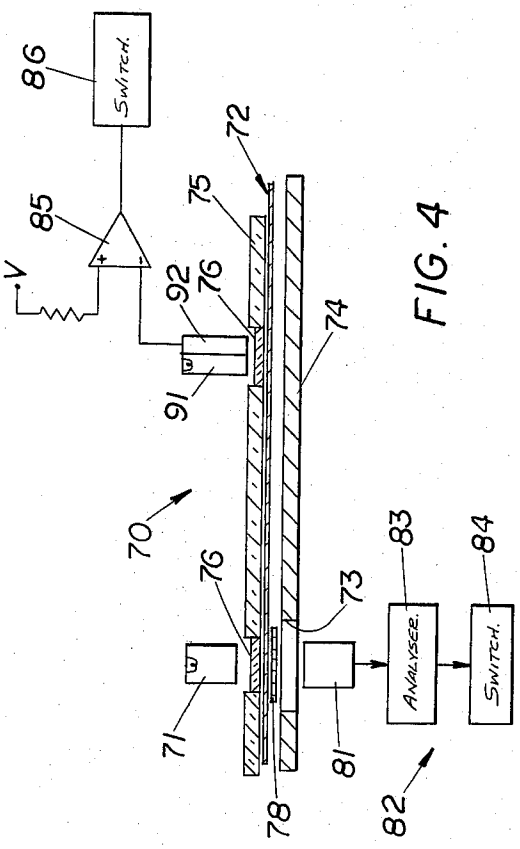


FIG. 4

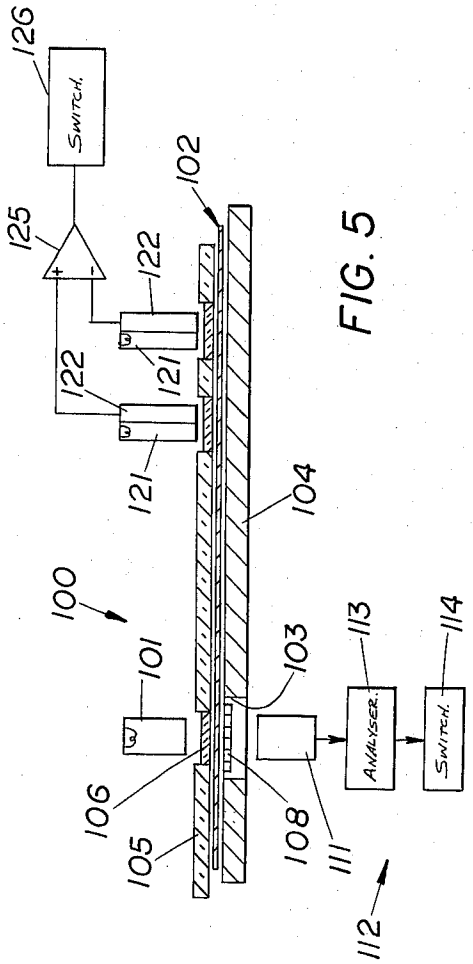


FIG. 5

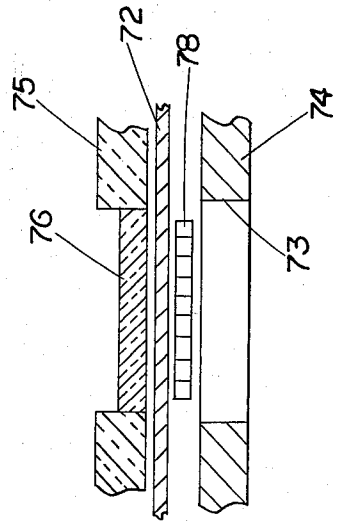


FIG. 6

INFRARED NOTE VALIDATOR

This patent application is a continuation-in-part application of our co-pending application bearing Ser. No. 431,077, filed Jan. 7, 1974 now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a note validating apparatus wherein infrared light is directed onto an infrared sensitive portion of a note to determine whether or not the note is authentic or genuine. More specifically, the present invention relates to a note validating apparatus wherein the infrared light which is directed onto the infrared sensitive portion of the note and received by an infrared sensor is compared with a predetermined value to determine whether the note should be accepted or rejected in a note-coin changer machine.

Still more specifically, the invention relates to a primary test utilizing a grid and to a secondary infrared test utilizing an infrared sensitive portion of the note whereby both tests must be passed if the note is to be accepted.

Heretofore, in the field of monetary validation such as in monetary note-coin changing machines, various methods and apparatus have been utilized to determine whether or not a particular note is valid or authentic. Generally, visible light is passed through a portion or through various portions of a note and the transmitted light is compared with a grid network by a photo sensitive cell to determine whether the note is genuine. The subjected portions of the note to light are generally pictorial or other sections wherein large amount of detail exists. Due to the existence of devices such as photo copying machines which duplicate such detail very accurately, other or secondary tests are required in order to determine whether the note is genuine or merely a photo duplication. Often these methods are not accurate enough to detect photo copied monetary notes.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide an apparatus utilizing infrared light for determining whether a monetary note is valid.

It is another object of the present invention to provide a monetary note validating apparatus, as above wherein infrared light is directed onto an infrared sensitive portion of the note and an infrared light sensor is positioned to receive a portion of the infrared light from the note.

It is a still further object of the present invention to provide a monetary note validating apparatus, as above, wherein the infrared light received by the sensor can be either transmitted or reflected infrared light.

It is yet another object of the present invention to provide a monetary note validating apparatus, as above, wherein a second infrared light source and sensor are utilized.

It is yet a further object of the present invention to provide a monetary note validating apparatus wherein a thin material transparent to infrared light is utilized in order to cause the note to lie in a flat position.

It is an additional object of the present invention to provide a note validating apparatus wherein a primary test utilizes a grid to determine whether the note is valid and wherein a secondary test utilizes an infrared sensitive portion of the note to determine whether the note is genuine so that both tests must be met before the note is accepted.

It is still an object of the present invention to provide a note validating apparatus, as above, wherein said grid detecting system utilizes infrared light.

These and other objects of the present invention, together with the advantages thereof over existing prior art forms which will become apparent from the following specification, are accomplished by the improvements hereinafter described and claimed.

In general, a note validator for authenticating a note is achieved by a primary light source directed onto a portion of the note, a grid located juxtaposition to said light source, a light detecting sensor receiving said primary light from the note and grid and having output signals indicative of the intensity of the light incident thereupon, primary means for accepting or rejecting the note based upon said output signal, a secondary infrared light source directed onto an infrared sensitive portion of the note, an infrared detecting sensor receiving said secondary light from the note and having an output signal indicative of the intensity of the light incident thereupon, secondary means for accepting or rejecting the note based upon said secondary light signal so that the note is accepted if both said primary and secondary accept or reject means accept the notes.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of an infrared note validation apparatus.

FIG. 2 is a schematic view of the apparatus showing a sensor located on the opposite side of the note.

FIG. 3 is another schematic view of the apparatus disclosing an embodiment wherein two infrared sources and sensors are utilized.

FIG. 4 is a schematic view of the apparatus utilizing a primary testing member having a grid and a secondary infrared testing member.

FIG. 5 is another schematic view of the apparatus using a primary testing member and a secondary testing member wherein two infrared sources and sensors are utilized.

FIG. 6 is an enlarged view of FIG. 5 showing the relationship of the grid and note.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In general, an infrared note validation apparatus according to the concepts of the present invention is generally indicated by the numeral **10.** In the embodiment as shown in FIG. **1,** a conventional source of infrared light generally indicated by the numeral **11** is positioned on one side of a monetary note generally indicated by the numeral **12.** Note **12** may be positioned upon a support **14** which may be a metal framework, plastic, wood or other supporting structure. Of course, support surface **14A** is preferably smooth to allow note **12** to be slid into position for examination and then removed as well as to permit the notes to lie flat. To further insure that monetary notes **12** lie flat upon support **14,** aa sheet **15** is located juxtaposition to the note amd may be connected to structure, not shown, causing the sheet to bear against the note. This insures that crumpled, wrinkled or otherwise unflat bills are positioned against support **14** in a flat condition. Sheet **15** may be made from a material which may be transparent to infrared light such as glass, or transparent plastic. Preferably, a portion **16** of sheet **15** in the vicinity of light source **11** is made from natural or synthetic sapphire,

transparent ceramic or other hard infrared transparent materials since such materials are very hard and have high abrasion resistance. For example, sapphire has a rating of 9.0 of a MOH skill rating of 10.0. Such portion **16** of sheet **15** prevents the constant contact of the crumpled ridges or folds of a monetary note from scratching the portion and obstructing the passage of the infrared light. Although the thickness of the scratch resistant sheet **16** may vary with the thickness of cover sheet **15**, as shown (e.g. one-fourth inch to one-half inch), a desirable size is about 0.002 to about 0.004 inches since sapphire or other such materials are expensive.

According to the present invention, it has been found that monetary currency very often has portions which are sensitive to infrared light. That is, portions of note **12** are transparent to infrared light. It is generally thought that such phenomenon is due to the use of various types of inks utilized, some of which evidently are transparent to infrared light. For example, in various denominations of United States currency, the grean seal located to the right of the portrait is fairly transparent to infrared light. Similarly, in various foreign currency certain portions of the monetary notes have been found to be infrared sensitive or transmit infrared light more readily than other portions. Such infrared sensitive portions of notes may be readily utilized to validate the notes. Of course, such principle is generally readily applicable to numerous documents and legal papers in addition to monetary notes. For example, the present invention can be utilized to validate stocks, bonds, as well as various local, State, and Federal documents such as passports, and the like which contain infrared sensitive areas. Although the present invention can be used as a primary means of validation, it generally is desirable as a quick and ready secondary validation test.

As shown in FIG. **1**, a conventional infrared sensor generally indicated by the numeral **21** receives and detects the amount of infrared light incident upon it. In this embodiment, the light detected by infrared sensor **21** is that which is reflected from the infrared portion of the note. Since much of the infrared light will travel through the note, a small amount of infrared light is received by the sensor.

Generally, as noted both the source of infrared light **11** and the infrared sensor **21** may be any conventional apparatus available to the art. A specific infrared emitting source and recieving sensor for detecting reflected infrared light according to the embodiment shown in FIG. **1** is a light reflection emitter/sensor array. This particular device has a gallium arsenide infrared emitting diode and a silicon NPN photo transistor wherein both the axial radiant intensity of the diode and the axial response of the photo transistor are perpendicular to the face of the note. Thus, the photo transistor responds to the radiation emitted from the diode only when a reflective object or surface is in the field of the photo transistor. The diode emits an intense, narrow band of radiation peaking at approximately 900 millimicrons (non-visible) and the photo transistor or sensor **21** is sensitive to radiation over the wavelength range of 400 to 1,100 milli-microns. Preferably in the present apparatus, the infrared sensor **21** is shielded from any outside source of infrared or visible light.

The amount of infrared light received by sensor **21** is, of course, converted to an electrical signal which is fed into any conventional electrical comparator device generally indicated by the numeral **25**. Such a device may be any of numerous commonly available operation amplifiers. This device receives the signal of the sensor and compares it with a predetermined value, or more specifically, a predetermined range value of a valid note or the specific document being tested. If the signal received from sensor **21** is within the predetermined range, a signal will be transmitted to a switch or gate means **26** which will accept the note. Thus, gate means **26** such as a logic gate or a simple transistor in a note-coin changer machine will permit the monetary note to be accepted and affect change. Should the signal from sensor **21** not be within the predetermined range, a different signal will be conveyed to gate **26** causing the note to be rejected.

Similarly, and preferably, comparator **25** may operate upon the principle that the signal from sensor **21** must be of a value below a reference value V in order for the note to be accepted due to absorbance of the infrared light by support **14**. Thus, if more light is reflected than from a genuine note as with photocopied notes or counterfeit notes lacking transparent ink, comparator **25** will emit a signal to gate means **26** causing the note to be rejected.

The operation of the validation apparatus according to the present invention is as follows. A note is positioned upon support **14** and a sheet transparent to infrared light is placed over the note to flatten it out. A source of infrared light **11** is placed over an area of a note which is infrared sensitive and a beam of infrared light directed onto the sensitive portion. Infrared sensor **31** receives reflected infrared red light and transmits a signal to comparative device **25**. The comparative device compares the signal received with a range of light for a valid note and transmits a particular signal to gate **25** accepting a note if the signal from sensor **21** is within predetermined range or below a reference value. Another signal is transmitted if the signal is not within the predetermined range or above a reference value. Thus, notes, documents and other items can be readily validated through the use of infrared light according to the present invention.

Several other embodiments of an infrared note detector can be made utilizing the concepts of the present invention. Two such embodiments are set forth below. In these embodiments it is to be understood that the various elements can be similar or identical to those set forth above.

Turning now to the embodiment shown in FIG. **2**, an infrared note validator generally indicated by the numeral **30** comprises a note generally indicated by the numeral **32** positioned on a support generally incidated by the numeral **34**. A sheet **35** may be positioned over note **32** and further may be pressed against the note to cause the note to lie in a flat position. Sheet **35** may be transparent to infrared light and preferably contains an infrared transparent portion **36** which may vary in thickness and is made of a hard nonabrasive material such as sapphire. A source of infrared light such as a conventional infrared emitter **31** is positioned above nonabrasive portion **36** and an infrared sensitive portion of the note, and an infrared sensor generally indicated by the numeral **41** is positioned below or on the other side of the note in line with emitter **31**. An aperture **43** or a portion of the structure which is transparent to infrared light (not shown) such as sapphire exists within support **34** to permit infrared light which passes

through an infrared sensitive portion of the note to be received by sensor **41.** The sensor then transmits a signal to a conventional comparative device generally indicated by the numeral **45.** This device compares the received signal with a predetermined range of an authentic note. If the received signal is within the predetermined range, an accept signal is transmitted to switch or gate **46.** Otherwise a rejected signal is transmitted.

Similarly and preferably, comparator **45** may operate upon the principoe that the signal from sensor must be above a reference valve V for the note to be accepted. This is, based upon the fact that infrared light from source **31** will largely pass through note portion **36** and strike sensor **41** rather than being largely absorbed by the note as in the case of counterfeit or photocopy notes

Either of the apparatus as shown in FIG. **1** or FIG. **2** can readily detect the non-genuine or "phony" note as made by photocopying since although the detailed characteristics of a seal, portrait or other item is copied with great precision, the phony note will not transmit infrared light. Moreover, even should the note be forged as on engraving plates and printed as a counterfeit note, unless an ink which is transparent to infrared light is used and such inked portion tested, the counterfeit note will be readily detected. Thus, the device according to the concepts of the present invention will readily detect counterfiet notes which otherwise appear to be genuine.

Another embodiment of the invention as shown in FIG. **3** utilizes at least two sensors to detect reflected infrared light. More specifically, an infrared note validator apparatus generally indicated by the numeral **50** contains a note or document generally indicated by the numeral **52** and a source for emitting infrared light generally indicated by the numeral **51.** The note is positioned on a support generally indicated by the numeral **54** which may be made of metal, wood or plastic and a sheet **55** such as plastic or glass is generally located above the note and may exert pressure on the note to cause it to lie flat against the support. a portion **56** of sheet **55** in the vicinity of source **51** preferably is made from a hard infrared transparent abrasive resistant material such as sapphire which may vary in thickness from about 0.002 inches to the thickness of sheet **55** which may be about one-fourth to one-half inch. An infrared sensor generally indicated by the numeral **61** receives reflective light from the emitter and transmits a signal to a comparator generally indicated by the numeral **65.** In this embodiment, the infrared emitters and sensors may be of any conventional type and preferably are located adjacent to one another. Thus, the same type of emitter sensor unit as described with respect to FIG. **1** may also be utilized. One of the emitter sensor units is positioned above an infrared sensitive or transparent portion of the note whereas a second emitter sensor unit is positioned above a non-sensitive or a portion of the note which is not transparent to infrared light. The signals from the two sensors are fed to comparator **65.** A difference in signals of a genuine note within a certain range should be received by comparator **65** which then transmits an accept signal to gate **66.** Otherwise, if a difference within a predetermined range is not received, a reject signal will be transmitted.

Similarly and preferably, the comparator may operate upon the simple basis that a signal of greater magnitude received from the sensor placed above a non-infrared sensitive portion of the note from the other sensor will indicate the presence of a valid note. That is, if the note is valid, a large amount of the infrared light will be reflected to the sensor placed above the non-infrared transparent portion of the note whereas generally a much smaller amount of light will be reflected to the sensor placed above the infrared transparent portion of the note since much of the infrared light is absorbed by the support.

Thus, as previously noted, should a photocopy of a note be utilized, since it will not contain an infrared sensitive portion, both signals reaching the comparator will be the same or very similar, that is approximately zero, and thus the note will be rejected in either case. This is also true for notes produced by engraving plates then printed wherein ink sensitive or transparent infrared are not utilized. Additionally, instead of two units used as disclosed in FIG. **3,** three or more units may be utilized to detect various portions of a note wherein infrared sensitive areas are compared against non-infrared sensitive areas. Hence instead of checking one area against a second area, multiple photo sensitive areas to insure a comprehensive validating device.

Another and highly desirable embodiment of the invention is shown in FIG. **4.** Basically, this embodiment combines a primary grid detection system which preferably utilizes infrared light with a separate infrared detection system as hereinabove described. The note validator apparatus according to this embodiment is generally indicated by the numeral **70** and contains a note or document such as a monetary bill or a check generally indicated by the numeral **72.** Considering the grid detection system, it comprises a primary light emitting source **71,** a grid **78** and a light detecting sensor **81.** Although primary light source **71** may emit any type of light, an infrared light source in this particular embodiment is preferred. Hence, light source **71** may be any conventional infrared emitting unit such as the gallium arsenide infrared emitting diode set forth above. Note **72** is positioned on a support **74** which may be made of conventional materials such as metal, wood or plastic and an aperture **73** in the support permits the light to pass through the support. Sheet **75** such as plastic or glass is generally positioned above the note to exert pressure to cause the note to lie flat on support **74.** As in the other embodiments, a portion **76** of sheet **75** desirably is made from a hard abrasive resistant material such as sapphire and may vary in thickness from a minimum of about 0.002 inches to approximately a thickness of sheet **75** which may range from about one-fourth to about one-half inch. Sheet portion **76** is transparent to light including infrared and, of course, is located in the vicinity of the primary light emitting source **71.** Light detecting sensor **81** preferably is located on the opposite side of note **72** from light emitting source **71** and may be any conventional photocell such as a silicon NPN photo transistor. Such a photocell will emit a signal generally proportional to the amount or intensity of the light incident thereupon which is transferred to an accept or reject member generally indicated by the numeral **82.**

Considering now grid **78** of the grid detection system or in other words, the validating system located in the lefthand portion of FIG. **4,** the lines located on the grid may be in accordance with any conventional grid detecting system. That is, the lines of grid **78** may be iden-

tical to the lines of a specific portion of note **72** so that when a genuine note is tested by causing relative motion between the grid and the note, a blinking effect will be achieved between the light source **71** and the sensor **81.** A forged note or document will not provide for the same characteristic blinking effect and hence the signals sensed by the sensor **81** will not be of such nature as to actuate the switch **84.**

An example of a grid detecting system which may be used in the present invention is set forth in U.S. Pat. No. 3,457,421, granted July 22, 1969, which is hereby incorporated by reference as to the control logic, type of equipment and analysis process required to emit an accept or reject signal to switch **84.** As mentioned above, this particular grid detecting system generally operates on the principle of relative movement between the note and grid and counting the number of background lines on a particular portion of a note. Another example of a conventional grid detecting system is the system utilized in U.S. pat. application Ser. No. 394,863, filed Sept. 6, 1973, and which application is also incorporated by reference as to the control logic, type of equipment and analysis process required to emit an accept or reject signal. This particular grid detecting system generally operates on the same principle as above but the grid utilized therewith contains diagonal rather than horizontal or vertical lines. Of course, many other systems may be used.

Regardless of the particular grid detection system utilized, output signals from detector sensor **81** are conveyed to analyser **83** which analyses the signals in accordance with any of the above conventional systems and emits an accept or reject signal to switch **84.** That is, analyser **83** determines from the output signals received whether the note is to be accepted or rejected and convey such a signal to switch **84** to effect such a result.

In the preferred embodiment of FIG. **4,** validation apparatus **70** has an infrared detection system which is used as a secondary test and is similar to the embodiment of FIG. **2.** This system has an infrared light emitting source **91** which is directed onto an infrared sensitive portion of note **72.** Infrared light source **91** may be any such conventional source as previously noted. In order that the light may be detected by any conventional infrared detecting system such as a photocell **92** above noted, the portion **76** of sheet **75** above the area of the infrared sensitive note portion is transparent to the infrared light. Although secondary infrared sensor **92** may be located adjacent to infrared source **91** as shown in FIG. **4** and comprise a specific unit as set forth above, it may also be located on the opposite side of note **72** in which situation support **74,** of course, will have another opening or aperture **73.** Infrared sensor **92** has an output signal indicative of the intensity of light incident thereupon which signal is conveyed to comparator **85.** As previously noted, comparator **85** may be so arranged such that an accept signal will be emitted to switch **86** only if a signal from sensor **92** is within a predetermined range. A more preferable set up for comparator **85** is that it generate an accept signal if the signal from sensor **92** is below a specific value. Comparator **85** preferably is designed to emit a reject signal if the signal from sensor **92** is the same or very similar to the specific reference value.

Thus, according to the embodiment of FIG. **4,** note **72** will only be accepted if it passes the primary grid test and the secondary infrared test. Otherwise, should it pass the primary test but fail to pass the infrared test as in the case of a photocopy which is not transparent to infrared light, the phony note will be rejected.

Turning now to FIG. **5,** an embodiment is disclosed which is similar to the embodiment of FIG. **4** with the exception that the secondary infrared detection system contains two or more infrared detecting sensors. Thus, the above comments with respect to FIG. **4** are generally applicable to the embodiment of FIG. **5.** Briefly, the note validation apparatus denoted generally by the numeral **100** has a primary light emitting source **101,** preferably infrared, which is directed upon a note, generally indicated by the numeral **102.** An aperture **103** is provided in note support **104** to permit the infrared light to strike an infrared light detecting sensor **111.** A sheet **105** transparent to light is provided above note **102** to hold it against support **104** as well as to cause the note to lie flat. A portion **106** of sheet **105** may be of a special material which is highly abrasive to scratching such as sapphire and generally only a thin amount of material is required such as 0.002 to 0.004 inches. Generally positioned juxtaposition to note **102** such as directly below it as shown in FIG. **5** is a grid network **108** which may be in accordance with any general grid detection system. For example, grid **108** may be the same as the grid in U.S. Pat. No. 3,457,421 or U.S. Ser. No. 394,863 filed Sept. 6, 1973, hereby incorporated by reference which contains a number of equally spaced and parallel lines wherein relative movement according to any conventional manner occurs between the grid and the note. The light striking sensor **111** produces a signal generally of a magnitude proportional to amount of light incident upon the sensor. This signal is then sent to an analyzing member generally indicated by the numeral **112** containing any conventional analyzer **113** such as that set forth in U.S. Pat. No. 3,457,421 wherein the number of lines per inch on the background of a note are counted. Analyzer **113** then sends an accept or reject signal to switch **114.**

Considering the secondary infrared test portion of the embodiment disclosed in FIG. **5,** preferably, infrared emitting light sources **121** and infrared sensors **122** are placed above specific portions of the note. Preferably, a first infrared light source-sensor detecting unit is placed above a non transparent portion of the note whereas the second light source-sensor detecting combined unit is placed above a transparent portion of the note. Thus, the first sensor should detect the large amount of reflected infrared light since it is above the reflection portion of the note whereas the second sensor being placed above the transparent portion of a note wherein the infrared light is absorbed by support **104,** will detect a small amount of infrared light. Thus, the signal from the first unit will generally be much greater than that received from the second unit. Such signal when received by comparator **125** will emit an accept signal to switch **126** so that the note is accepted. As above noted, comparator **125** operates upon the basis that the signals will be different. Should the signals from the first and second sensor be relatively the same, the comparator preferably is designed to reject the note. Thus, should the note not be authentic, the difference in signals transmitted to comparator **125** will be substantially the same since a counterfeit or photocopy note will give similar responses to both the first and second light emitting source-sensored technique

units. In this event, switch **126** will reject the note. Thus, in order for a note to be accepted, it must pass both the primary grid test and the secondary infrared test. Of course, it is within the spirit of the present invention to use a plurality of secondary infrared light emitting and sensing units for comparing infrared sensitive portions to non-infrared sensitive portions. Moreover, light emitting-sensor detecting units need not be combined but may be separate as shown in FIG. **2**.

It should thus be evident that an infrared note validating apparatus according to the concepts of the present invention, as described herein, accomplishes the aforementioned objections. While according to the patent statutes, the best mode and preferred embodiments have been set forth, it will be apparent to those skilled in the art that many other modifications can be made without departing from the spirit of the invention herein disclosed and described; the scope of the invention being limited solely by the scope of the attached claims.

What is claimed is:

1. A note validator for authenticating a note, comprising,

a primary light source directed onto a portion of the note,

a grid juxtaposition to said light directed portion of the note,

a light detecting sensor receiving said primary light from the note and said grid and having output signals indicative of the intensity of the light incident thereupon,

primary means for accepting or rejecting the note based upon said output signals,

a secondary light source directing only infrared light onto an infrared sensitive portion of the note,

an infrared detecting sensor receiving said secondary light from the note and having output signals indicative of the intensity of only infrared light incident thereupon,

secondary means for accepting or rejecting a note based upon said secondary output signal so that a note is accepted if both said primary and said secondary accept or reject means accepts the note.

2. A note validator according to claim **1**, wherein said infrared sensitive portion of the note is transparent to infrared light and said secondary infrared light source and sensor are located on opposite sides of the note.

3. A note validator according to claim **1**, wherein said infrared sensitive portion of the note is transparent to infrared light and said secondary infrared light source and sensor are located on the same side of the note.

4. A note validator according to claim **1**, wherein said primary light source emits infrared light and said primary light sensor detects infrared light.

5. A note validator according to claim **1**, including means for effecting relative movement between said grid and the note.

6. A note validator according to claim **1**, wherein said note is positioned on a support and a light and infrared transparent sheet is positioned over the note so that the note lays against said support.

7. A note validator according to claim **1**, wherein said secondary accept or reject means is a switch and a comparator having a reference level.

8. A note validator according to claim **1**, wherein said primary accept or reject means is an analyzer and a switch.

9. A note validator according to claim **1**, including a second infrared emitting source directing infrared light onto a portion of the note, a second infrared detecting sensor receiving the light from said second light source and having an output signal indicative of the intensity of light incident thereupon, said means for accepting or rejecting the note is a switch and a comparator receiving the first infrared sensor output signal and receiving said second infrared sensor output signal.

10. A note validator according to claim **9**, wherein said first infrared emitting source and infrared sensor are positioned with respect to a non-infrared transparent portion of the note and second infrared emitting source and infrared sensor are positioned with respect to an infrared transparent portion of the note.

11. A note validator according to claim **10**, wherein said first and second infrared emitting source and detecting sensors are positioned on the same side of the note.

12. A note validator according to claim **10**, wherein said first and second infrared emitting source and detecting sensors are positioned on opposite sides of the note.

13. A note validator according to claim **10**, wherein said comparator emits an accept signal to said switch upon receiving a relative difference in signals from said first and second output sensor signals.

* * * * *