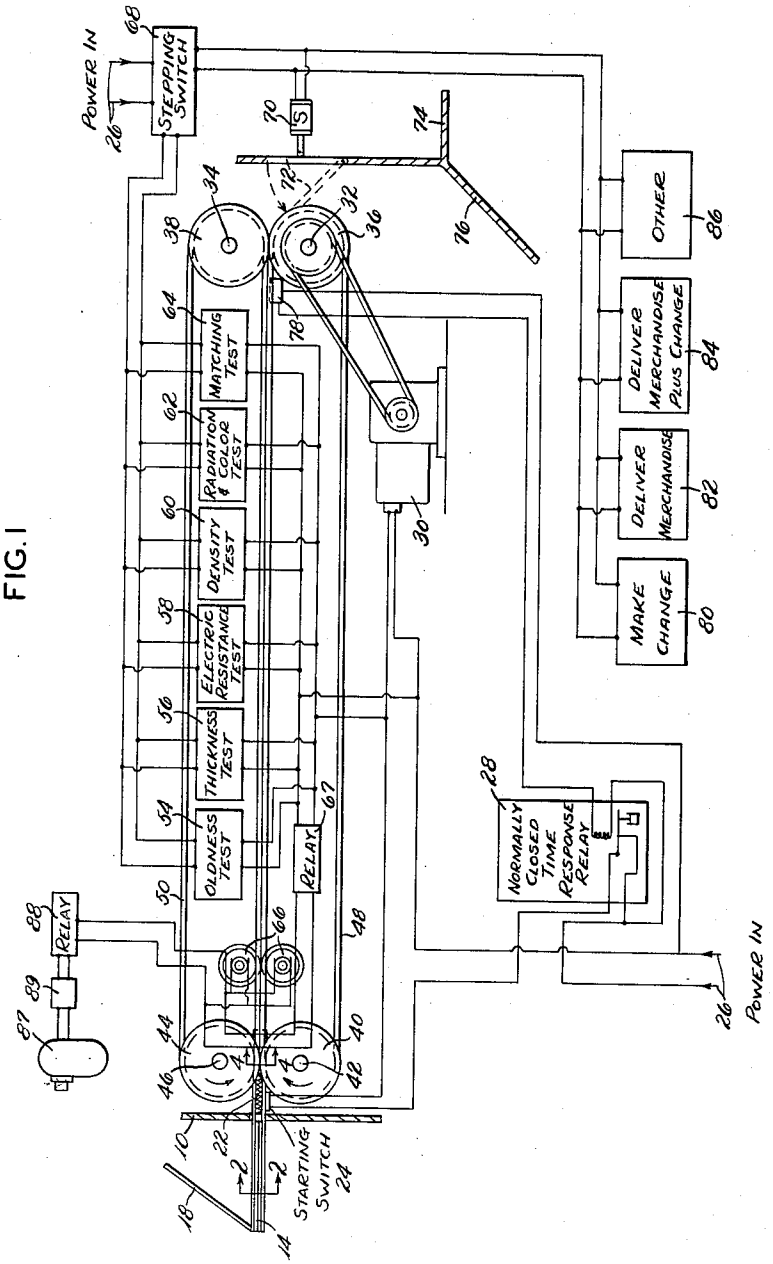
Aug. 30, 1960 R. L. TIMMS 2,951,164

APPARATUS FOR IDENTIFYING PAPER MONEY OR THE LIKE, AS GENUINE, AND FOR MAKING CHANGE OR THE LIKE

Original Filed Feb. 7, 1952 3 Sheets-Sheet 1

FIG. 1



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Original Filed Feb. 7, 1952 3 Sheets-Sheet 2

FIG. 2

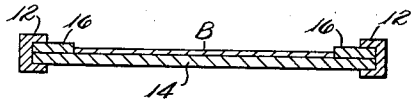
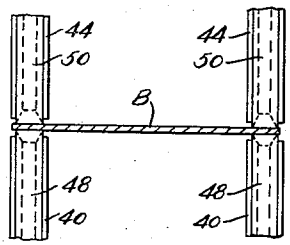


FIG. 4



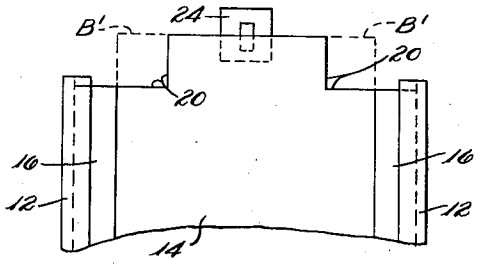
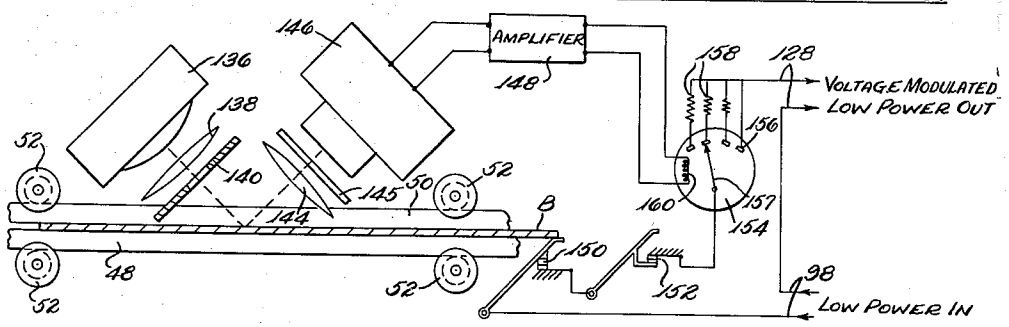


FIG. 3

FIG. 5

REFLECTED LIGHT TEST



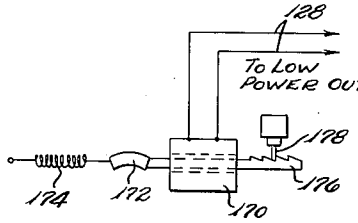


FIG. 6

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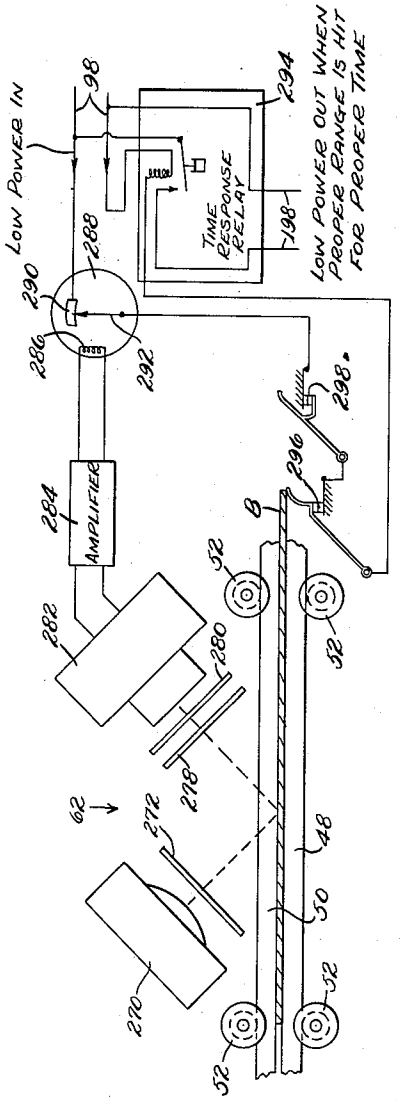


FIG. 7
FLOURESCENCE TEST

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United States Patent Office

2,951,164

Patented Aug. 30, 1960

2,951,164

APPARATUS FOR IDENTIFYING PAPER MONEY OR THE LIKE, AS GENUINE, AND FOR MAKING CHANGE OR THE LIKE

Ross L. Timms, Akron, Ohio, assignor of fifty percent to Alan Foster, Cincinnati, and five percent to Albert H. Oldham and five percent to Vern L. Oldham, Akron, Ohio

Original application Feb. 7, 1952, Ser. No. 270,326. Divided and this application May 20, 1958, Ser. No. 736,627

6 Claims. (Cl. 250—219)

This invention relates to apparatus for identifying paper money as genuine, and, more particularly, for making change, for performing a vending function, for counting the paper money, and the like.

This application is a division of my copending application bearing the same title, filed February 7, 1952, under Serial No. 270,326, and, more specifically is concerned with light reflective and fluorescence test apparatus shown in Figs. 6 and 10 of said parent application.

It is well known to vend various merchandise automatically by coin-controlled apparatus. However, the average purchaser of merchandise or services does not carry, and ordinarily cannot conveniently get a sufficient quantity of metal coins so as to extend the range of the vending equipment to a monetary value approaching or above a dollar. For example, before making from a pay phone a long distance telephone call which may cost several dollars or more, it is necessary for the caller to fill his pockets with quarters or other metal coins, and sometimes no source for coins is available near the pay telephone which the caller wishes to use, and even if a cigar counter or other source of change is available, the change is often given grudgingly or not at all.

As a result, the automatic vending of merchandise or services above twenty-five cents or so has been complicated by the potential customer's lack of metal coins, and the vending of merchandise and services of higher price, for example of one dollar or more, has been decidedly handicapped.

The determination of genuine metal coins has progressed in the art to the point where known devices are very satisfactory, but so far as I am aware, no automatic apparatus is available for discriminating between genuine and spurious paper currency. Metal coins are, of course, much more stable than paper money which becomes dirty, moisture-laden, folded and wrinkled to materially complicate automatic determination.

It is the general object of my invention to avoid and overcome the foregoing and other difficulties of and objections to prior art practices and limitations by the provision of relatively simple, easily operated, self-contained automatic apparatus for receiving and identifying as genuine a piece of paper money, followed by the performance of a function, such as the making of metal coin change for the paper money, the vending of merchandising or service, the vending of a merchandise or service plus the making of change, or by the counting of the paper money.

Another object of my invention is to provide in apparatus of the character described an oldness test which may take the form of a reflected light determination from which data can be derived concerning the newness or oldness of the paper money so that determinations of the genuineness of the bill can be reached and also the genuineness limit of subsequent tests can be rearranged to compensate to handle either a new or an old piece of paper money.

Another object of my invention is the provision of radiation and color test apparatus for paper money and including an examination of money with ultra-violet light and pick-up means for measuring the reradiation and color of the paper money under the ultra-violet light.

The foregoing objects of my invention, and other objects which will become apparent as the description proceeds, are achieved by the apparatus about to be described, typical embodiments of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a diagrammatic and schematic illustration in vertical section, in part, of one embodiment of the assembled test apparatus of my invention;

Fig. 2 is an enlarged fragmentary vertical cross-sectional view, taken substantially on line II—II of Fig. 1 and showing the paper money or bill receiving slide of the apparatus of Fig. 1;

Fig. 3 is a fragmentary top plan view showing the inner end of the paper money or bill receiving slide of Fig. 2;

Fig. 4 is an enlarged fragmentary vertical cross-sectional view, taken substantially on line IV—IV of Fig. 1, and illustrating the belts and pulleys for conveying the paper money or bill through the test apparatus of Fig. 1;

Fig. 5 is a diagrammatic illustration, partially in vertical longitudinal section, of a reflected light type of test apparatus;

Fig. 6 is a view of a typical mechanism for effecting the repositioning of test limits in a later test apparatus by a modulated output from an earlier test apparatus;

Fig. 7 is a view similar to Fig. 1 of typical color and reradiation testing apparatus of my invention.

The term "paper money" has been largely used heretofore in referring to the article or articles to be identified by my testing apparatus, and this term is intended to include paper currency of all sizes, denominations, and countries of origin, and, in addition, to include bonds, documents, or other paper, textile, or colored articles which might be subjected to test for genuineness, weave, composition, gloss or the like, by equipment of the character herein described and claimed. However, the apparatus of my invention is primarily designed for the determination of genuineness of United States paper money in lower denominations, for example, one-dollar, five-dollar, and ten-dollar bills. In order to shorten the designation of the article being tested it has been designated in the drawings as a bill and will be so described in the specification.

General combination

Having reference to Fig. 1 of the drawings, the numeral 10 indicates a casing 10, largely broken away and housing the test apparatus of the invention. The front end of the casing 10, as shown in Figs. 1, 2 and 3, is provided with opposed horizontally positioned channels 12 which slidably receive a slide 14 to which a frame 16 is secured. The frame 16 defines at three sides a space adapted to receive a bill B shown in exaggerated thickness in Fig. 2, the bill being adapted to be held in flat position within the frame 16 by a lid 18 hinged to the slide 14 adjacent its outer end. The innermost corners of the slide 14 and lid 18 are cut away at 20, as seen in Fig. 3 so that corners B' of the bill B stick out in the manner indicated in dash-lines in Fig. 3.

When the slide 14 with bill therein is pushed into the casing 10 against the compression springs 22, the end of the slide 14 strikes a starting switch 24, of the self-locking type, to connect a power-in circuit 26 to normally closed relay 28 to drive a motor 30. In order to pick up the bill B from the slide and to carry it

through the apparatus, suitable mechanism is provided which includes a drive connection from motor 30 to a shaft 32 geared by means (not shown) to a shaft 34 positioned parallel to and vertically above shaft 32. Shaft 32 carries a pair of pulleys 36, and shaft 34 carries a pair of pulleys 38, and the pulleys 36 are in alignment with pulleys 40 carried on a shaft 42, and the pulleys 38 are in alignment with pulleys 44 carried on a shaft 46 which is positioned above and parallel to shaft 42. The pulleys 36 and 40 carry a pair of suitable belts, such as V-belts 48, and pulleys 38 and 44 carry a second pair of belts, usually V-belts 50.

Fig. 4 illustrates that the pulleys 40 and 44 and V-belts 50 and 48 carried by the pulleys are positioned in association with the end of the slide 14 so that as it is moved by the customer into the casing 10 to first start the driving motor 30, as described, the corners B' of the bill are moved into the bight of the V-belts 48 and 50, whereby the end of the bill is gripped and progressively pulled out of the slide and into a gripped position between the belts. The stretches of the V-belts 48 and 50 between the spaced pulleys are supported by small pulleys or rollers designated by the numeral 52 throughout the figures of the drawings illustrating the individual pieces of testing apparatus, it being understood that the additional supporting rollers 52 are employed in opposed or in mere supporting relation wherever it is found necessary or desirable upon the stretches of the V-belts.

In the manner described, the bill B is conveyed by the belts 48 and 50 to and through one or more tests which may include oldness test apparatus 54, thickness test apparatus 56, electric resistance test apparatus 62, and matching test apparatus 64.

It may be desirable to subject the bill B to a drying and pressing action prior to passing it to any one of the test apparatus. This is preferably accomplished by positioning one or more pairs of heated rollers 66 on opposite sides of the bill in its travel between the pulleys 40 and 44 and the first piece of test apparatus. If only a drying action is desired, the heated rollers 66 may be replaced with infra-red lamps or other suitable heating means adapted to bring the bill to a desired moisture content condition. Flow of electric current to the rollers 66 may be cut off automatically by a relay 67 after they have performed the desired pressing and drying operation.

It will be seen that the various pieces of test apparatus are electrically connected with the power-in circuit 26 so that they are energized to perform their respective test operations. The output of the several test apparatus 54, 56, 58, 60, 62, and 64 are electrically connected to a stepping switch 68 which is adapted to be advanced one step each time the bill B successfully passes a test. The stepping switch can be set so that it connects the power-in circuit 26 to an operating solenoid 70 when a selected number of the tests are passed by the bill B being examined. For example, if six tests are performed on the bill B the stepping switch 68 may be set to operate on the sixth tap of the stepping switch and only after the bill B has successfully passed each test with the stepping switch being advanced one stop or tap after successful completion of each test. On the other hand, I particularly contemplate that if the bill B successfully passes some lesser number of the tests to which it is subjected, for example, say four or five of the tests, that the stepping switch 68 will be advanced only to the fourth or fifth tap, but this will be connected with the power-in circuit 26 so that the solenoid 70 is operated.

I have found, in this connection, that I am able to distinguish counterfeit from genuine bills by a series of tests of the character herein described even though the genuine bill does not pass every test to which it is subjected, and even though the counterfeit bill may pass one or even more of the tests. Each test not only serves to perform its function, but acts together with other tests to define a true line of demarcation between the genuine and a counterfeit bill. Of course, I likewise contemplate using a smaller number of tests than the number herein shown and described, and this is particularly true when the tests are employed which have been found to be most excellent in distinguishing between genuine and counterfeit bills. With certain of the test apparatus as hereinafter described a single test has been found to distinguish substantially 100% between genuine and counterfeit bills. In any event, it is the teaching of my invention as herein disclosed that the commercial embodiment of my apparatus may include any one or more of the tests and testing apparatus described, with the stepping switch 68 being connected to operate if the bill being tested successfully passes the test or a selected number of the tests to which it is subjected.

Assuming that the bill B being tested has successfully passed the selected number of tests to which it is subjected and that the stepping switch 68 has connected the power-in circuit 26 to operate the solenoid 70, the operation of the solenoid 70 throws a gate 72 from the full-line position shown in Fig. 1 to the dotted line position illustrated and the bill B falls into a drawer or compartment 74 adapted to receive genuine bills. If the bill B has not passed the required test or tests, the gate 72 is not operated and the bill B after passing pulleys 38 and 36 falls into a reject chute or return passage 76. Return belts may be provided, if desired, to return the rejected bill to the front of the casing 10.

In the passage of the bill B from the last test apparatus to the pulleys 36 and 38, the front edge of the bill contacts a tripping switch 78 which operates through the normally closed, time response relay 28 to release the self-locking starting switch 24 so that the driving motor 30 comes to a stop and the apparatus is thus returned to its initial inoperative position. It will be understood that when switch 78 is closed by the front edge of the bill striking it, the time delay feature of the relay 28 causes it not to open until after a sufficient time delay so that the bill is carried on out from between the pulleys 36 and 38 to fall either into the genuine bill compartment 74 or into the reject chute 76. Perhaps I should also make clear that after the bill B has been introduced into the apparatus in the manner previously described by the customer it is necessary that the slide 14 be held in the casing for a period of several seconds, but then the customer can release the slide 14 so that it is automatically pushed out to its original position by means of the compression springs 22 previously mentioned.

It will be recognized that various functions can be performed by the bill-identifying apparatus described. For example, the power in circuit 26 can be connected by the stepping switch 68 not only to the solenoid 70 but to a make change apparatus 80, to a deliver-merchandise apparatus 82, to a deliver-merchandise plus change apparatus 84, or to some other apparatus 86, such as a counter mechanism. More specifically, if a dollar bill has been identified by the apparatus of my invention, the make change apparatus 80, of which there are various known types, can be adapted to deliver to the customer four quarters, ten dimes, or any other desired combination of metal coin change equaling the value of the bill examined. Or the deliver-merchandise mechanism 82 can be adapted to deliver a dollar's worth of merchandise or service to the customer, and mechanism of this type is likewise known. Still again, the mechanism 84 can be actuated to deliver merchandise plus metal coin change to the customer, for example, an eighty-nine cent article plus eleven cents in change. Or other mechanism 86, for example, a counter can be actuated, and particularly it might be noted that when actuating simple mechanism, such as a counter, that the number of tests employed in the apparatus can be reduced and mechanism can be associated with the front of the V-belts 48 and 50 for continuously feeding bills into the apparatus.

It may sometimes be desirable to photograph the users

of the apparatus, for example, in case of an outbreak of attempts to falsely obtain money or merchandise from the apparatus. Thus, I may incorporate a movie camera **87** in the apparatus in a position to take a picture of the user of the apparatus, a few frames of movie film being taken of each user by a relay **88** and operating solenoid **89** connected in the circuit to motor **30**. The relay **88** is of the tripping type which fires for a short time interval only and automatically resets itself.

Reflected light test apparatus

The test apparatus of Fig. 5 is, in one embodiment or application of the principles of my invention, another type for testing oldness or relative deterioration of a bill, this apparatus being of the reflected light type and including a bill B gripped between V-belts **48** and **50**, and with supporting rollers **52** being shown in opposed relation for aligning and supporting the V-belts.

The apparatus includes a light source **136** positioned at an angle, for example 45°, with the surface of the bill and directing a light beam through a lens or a lens system **138** and a shield **140** having an open center **142** against the surface of the bill. The reflected light from the bill passes through a lens or a lens system **144** to a photo cell pick-up **146** connected to an amplifier **148**. A low-power-in circuit **98** is connected through a micro-switch **150** which is normally open and through a normally closed micro-switch **152** and through a galvanometer **154** to a low-power-out circuit **128**.

The term galvanometer, galvanometer unit, or meter, is used throughout the specification and claims to denote any type of suitable response element capable of actuating control circuits in proportion to the input applied thereto.

The meter **154** has a plurality of arcuately-short contacts **156** positioned in slightly separated arcuate alignment with each other and adapted to be engaged in turn by the needle or arm **157** of the meter. Each one of the contacts **156** is connected through a different resistance **158** with the low-power-out circuit **128**. The output of the amplifier **128** is connected to the coil **160** for moving the arm **156** of the meter.

It should be noted that the various components in the test apparatus herein described and to be described, such as light source **136** and amplifier **148** in Figure 5, may all be simultaneously energized by additional contacts on starting switch **24**, Figure 1, or may be individually energized as the bill B passes into each test along its path through additional contacts on the various switches such as micro-switch **150**, Figure 5. The choice would depend upon warm-up time requirements, the number of tests being employed, and the consequent length of time the various components would be energized without being used.

In the operation of the apparatus of Fig. 5 as the front edge of the bill B moves into engagement with the micro-switch **150** to close it, the low-power-in circuit **98** is connected to the low-power-out circuit **128** through the needle **157** and one of the contacts **156** and its associated resistor **158**. The position of the needle **157** on the meter **154** is determined by the amount of light reflected from the bill B, the light passing from the light source **136** through the lens system **138** against the surface of the bill, back through the lens system **144** and into the photo-cell **146**. The amount of light is measured by the photo-cell and the output of the photo-cell passing to the amplifier **148** produces a current flow in the meter coil **160** connected to the output of the amplifier to position the needle **157** of the meter **154**. The position of the needle **157** thus determines the amount of voltage flowing in the low-power-out circuit **128**, and this voltage is proportional to the amount of light reflected from the bill.

I preferably position the micro-switch **150** and the light-producing and pick up mechanism so that the bill is examined on a normally white portion thereof lying, for example, to the left of the center picture of the bill and above or below the bill center so as to stay away from any possible creases in the bill and away from any printing on the bill. Usually the older the bill is, the dirtier is the white portion of the paper of the bill and the less is the output of the amplifier **148** so that the needle **157** of the meter **154** is towards the left side of the series of contacts **156** forming its scale. Dependent upon the positioning of the resistors **158**, the voltage flowing in the low-power-out circuit **128** can be either low for an old bill and successively higher for progressively newer bills, or vice versa.

In the test of Fig. 5 on the bill B, it is evident that the bill is not stopped in its travel with the belts **48** and **50**, although it could be if desired. The positioning of the normally open micro-switch **150** and the normally closed micro-switch **152**, together with the positioning of the light source and the photo cell, determines the portion of the bill subjected to this test. The closing of micro-switch **150** initiates the test, and the test is stopped as the front edge of the bill strikes the micro-switch **152** to open it and terminate the flow of electric current from the low-power-in circuit **98** to the low-power-out circuit **128**.

The test on the bill accomplished by the apparatus of Fig. 5 can be used to operate stepping switch **68** if the bill being tested is within the required limits, but more often, the apparatus of Fig. 5 is utilized to reposition the limits of other test apparatus hereinafter to be described in order to compensate for the oldness or deterioration of the bill being tested. By way of example only, and illustrative of what I may do with the voltage modulated or determined low-power-out circuit **128**, reference should be had to Fig. 6, in which I have illustrated the low-power-out circuit **128** connected to a solenoid **170** which has its plunger secured to a contact plate, such as contact plate **172** (or contact plate **290** of Fig. 7), the other end of the contact plate being connected to a tension spring **174**. The solenoid **170** has a portion of its plunger formed as a ratchet rack **176** with an electrically released locking pawl **178** being provided to hold the solenoid plunger and contact in the position to which it has moved by the voltage in the low-power-out circuit **128**. The electrically released pawl **178** is released when the self-locking starting switch **24** is opened after the test run of the bill has been completed.

It should be noted that if the results of the reflected light test fall outside the selected limits that no compensating bias or resetting of the limits of subsequent tests will take place. This failure of compensating bias may be used directly to reject the bill being tested or the subsequent compensating tests may be relied upon to reject the bill depending upon the number of tests being used in the particular embodiment and the degree of accuracy required. Or, the reflected light test may merely form part of the series of tests performed with the bill being tested being required to pass a selected number of these tests before being accepted.

In a second embodiment or application of the principles of my invention with respect to the reflected light test apparatus of Fig. 5, I may include a Polaroid screen **145** in the assembly in advance of the photo cell **146**, and with the screen being turned in its own plane usually so that the minimum amount of light is passed to the photo cell. I have found this test to be more effective in determining the genuineness of a document than the test without a Polaroid screen, and the output of the test with the Polaroid screen can be used to operate the stepping switch **68**.

Color and radiation test apparatus

The apparatus of Fig. 7 tests for color and reradiation, and in this test the bill B can either be stopped for the test, for example, with means such as previously de-

scribed, or the bill can be continuously moved with the test mechanism only functioning to measure over a limited area or areas of the bill being tested, for example, by the use of the on and off micro-switches 150 and 152 of the test apparatus of Fig. 5.

More specifically, this test apparatus of Fig. 7 might likewise be designated as fluorescence test apparatus in that it includes an ultra violet light source 270 positioned at an angle, such as an angle of 45° with the surface of the bill B. The ultra violet light from the source 270 passes through a filter or a filter system 272 and a lens or a lens system 274 before it strikes the surface of the bill, and with the reflected light or reradiation from the fluorescence of the bill passing at a similar angle, for example 45°, through a lens or a lens system 276, a Polaroid screen 278, and a filter or a filter system 280 to a photo cell pick-up 282.

The output of the photo cell 282 is connected to an amplifier 284 and its output is connected to the operating coil 286 of a galvanometer 288 having an arcuately short contact plate 290 adapted to be engaged through the arc of the contact plate by the needle 292 of the galvanometer. A low-power-in circuit 98 is connected through the contact plate 290 and needle 292 to the operating coil of a time response relay 294 which when actuated for the proper time closes or fires to operate the low-power-out circuit 198 to operate stepping switch 68. Contact plate 290 can be arcuately repositioned by the oldness test apparatus, as previously described, if desired.

However, in series with the operating coil of the relay 294 are normally open micro-switch 296 and normally closed micro-switch 298 adapted to be engaged in turn by the front end of the bill B. The position of the micro-switches 296 and 298 is such that the bill B is examined for fluorescence on one or more areas of the bill, and I have found that this test is most effective when performed upon the seal area of the United States currency and upon a white portion of the bill. A second pair of micro-switches, like switches 296 and 298, can be utilized to get a separate response from a second portion of the bill, or as above indicated, the bill may be stopped in turn to take first a reading on the seal area and second on a white area of the bill.

The ultra violet light source 270, as employed in one particular embodiment of my invention, employed a so-called small wave length ultra violet light, ca. 3650 A. U., filtered through a 2 mm. Corning 5874 filter glass identified in the drawing by the numeral 272. The actual source of the ultra violet light was a General Electric AH–4 100-watt mercury arc. The Polaroid screen 278 comprised a piece of Polaroid-J film in a suitable frame so that the Polaroid screen could be revolved through 90° in its own plane. The filter system 280 is generally a narrow band pass filter similar to those described to limit the wave length of the light passing to the photo cell 282. The maximum intensity of the light passing to the photo cell 282 was determined by rotating the Polaroid-J film screen 278, and with this position of the film designated as the perpendicular, the Polaroid screen was turned to angles of 45° and 90° from the perpendicular. It was discovered that the best results were obtained with the Polaroid screen 278 at 90° from the perpendicular, which was found to cut out extraneous wave lengths and improperly reflected light, and very excellent results were then obtained in distinguishing between genuine and counterfeit bills.

While in accord with the patent statutes, I have particularly illustrated and described certain best known embodiments of my invention, it is to be particularly understood that I am not to be limited thereto or thereby.

I claim:

1. The combination in oldness test apparatus for paper money and the like of a light source, means for moving the money to be tested relative to the light source to position the light source to direct a beam of light against the money, photo cell means for picking up the light reflected from the money, amplifier means connected to the output of the photo cell, galvanometer means having its operating coil connected to the output of the amplifier, a plurality of short arcuate contact plates on the galvanometer means adapted to be engaged in turn by the needle of the galvanometer means, a different resistance connected to each contact plate, a power-in circuit triggered by the selected relative position of the money and light source and connected through the needle, contact plates and resistances of the galvanometer means to a power-out circuit.

2. Fluorescence test apparatus for documents such as paper money and the like including a small wave length ultra violet light source, slide mechanism for receiving the document, conveyor mechanism to position a selected portion of the document to subject it to the light of the light source, filter means associated with the light source to restrict the wave length of light emitted, photo cell means for picking up the light reflected from the document and the fluorescence created thereon by the light source, narrow band pass filter means positioned between the document and the photo cell means and capable of passing only a narrow band of frequencies and within the range generated by a genuine piece of paper money when struck by the small wave length ultra violet light, mechanism associated with the photo cell means for indicating the light pickup by the photo cell means, and contact means operated by the indicating mechanism when the amount of light is within preselected upper and lower limits.

3. In apparatus for determining as genuine paper money and the like, fluorescence test apparatus including an ultra violet light source, positioning means adapted to receive the money and to position a selected portion thereof so as to subject it to the light of the light source, photo cell means for picking up the light reflected from the money and the fluorescence created on the money by the light source, Polaroid screen means positioned between the money and the photo cell means, said screen being turned in its own plane to and held at an angle to pass a minimum of light to the photo cell means, narrow band pass filter means positioned between the screen and the photo cell means to pass only a narrow wave length of light frequencies to the photo cell means indicating means associated with the photo cell means for indicating the light picked up thereby, contact means operated by the indicating means when the amount of light is within preselected upper and lower limits, and control means for positioning the money so as to test it on a printed portion and on an unprinted portion thereof.

4. In a device for indicating the genuineness of paper money and the like, fluorescence test apparatus including a small wave length ultra violet light source of a wave length of about 3650 A.U., means for receiving the money, means for effecting relative movement between the light source and the money receiving means to position a selected portion of the money in the light of the light source, filter means associated with the light source to restrict the wave length of light emitted, photo cell means for picking up the light reflected from the money and the fluorescence created on the money by the light source, a narrow band pass filter means positioned between the money and the photo cell means and capable of passing only a narrow band of frequencies and within the range generated by a genuine piece of paper money when struck by the small wave length ultra violet light, Polaroid screen means positioned between the money and the photo cell means, said screen being turned in its own plane to an angle about 90° from that passing a maximum of light to the photo cell means, means associated with the photo cell means for indicating the light picked up by the photo cell means, switch means operated by the indicating means when the amount of light is within preselected upper and lower limits, a time responsive relay

operated by the switch means when the switch means are closed for a preselected time, and means for positioning the money for tests on a printed portion and on an unprinted portion thereof.

5. In apparatus for determining the genuineness of documents, such as paper money or the like, comprising a light source, means for effecting relative movement between the document and the light source to illuminate a desired spot on the document, a light responsive means to pick up the light reflected from the document, a Polaroid screen positioned between the document and the light responsive means and turned in the plane of the screen to and held in a position to reduce to substantially a minimum the amount of the light picked up by the light responsive means, filter means between the screen and the light responsive means and capable of passing only a narrow band of frequencies and within the range generated by a genuine document when struck by the light source and an output circuit adapted to be energized if the amount of reflected light picked up by the light responsive means is within selected limits.

6. In a device for indicating the genuineness of paper money and the like, fluorescence test apparatus including a small wave length ultra violet light source of a wave length of about 3650 A.U., means for receiving the money, means for effecting relative movement between the light source and the money receiving means to position a selected portion of the money in the light of the light source, filter means associated with the light source to restrict the wave length of light emitted, photo cell means for picking up the light reflected from the money and the fluorescence created on the money by the light source, a narrow band pass filter means positioned between the money and the photo cell means and capable of passing only a narrow band of frequencies and within the range generated by a genuine piece of paper money when struck by the small wave length ultra violet light, Polaroid screen means positioned between the money and the photo cell means, said screen being turned in its own plane to an angle about 90° from that passing a maximum of light to the photo cell means, and means associated with the photo cell means for indicating the light picked up by the photo cell means.

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