Jan. 10, 1961 W. A. PATZER 2,967,452

CURRENCY TESTING AND SELECTING DEVICE

Filed May 2, 1958 2 Sheets-Sheet 1

FIG. 5

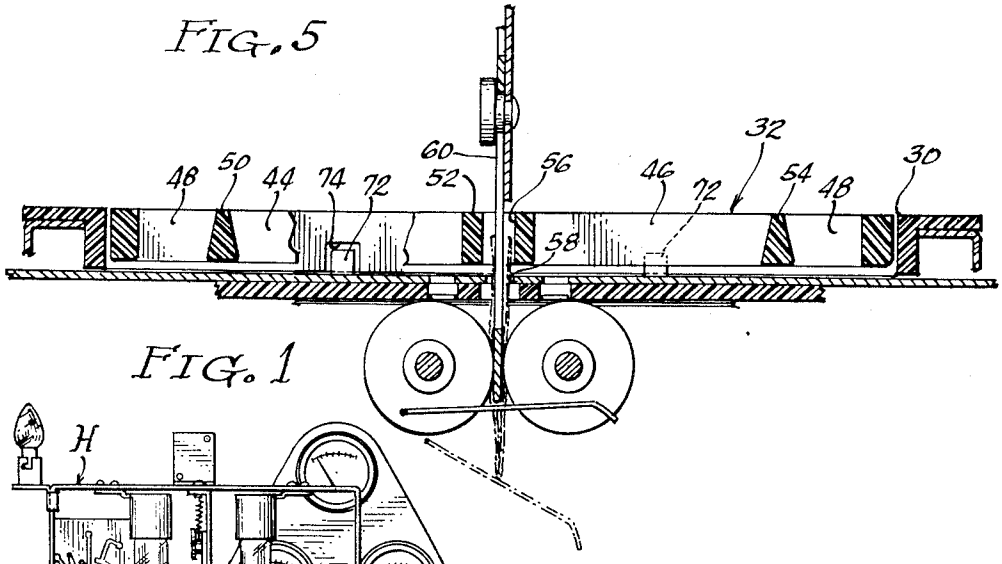


FIG. 1

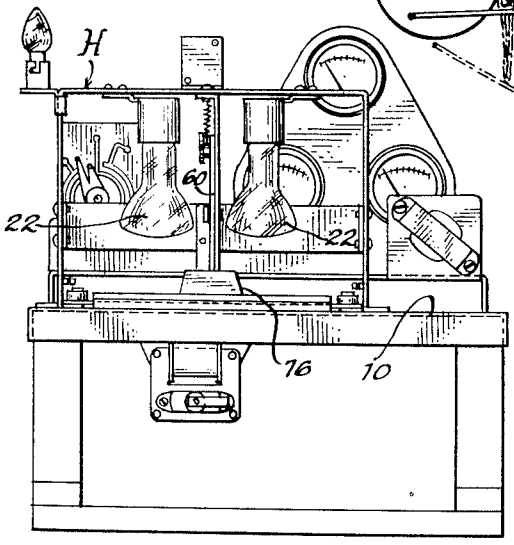
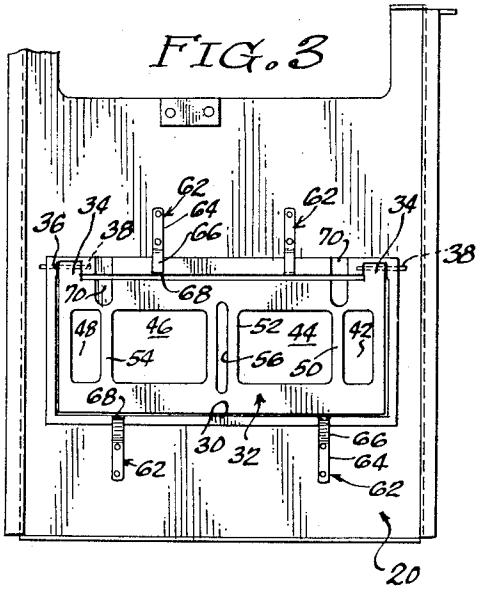


FIG. 3



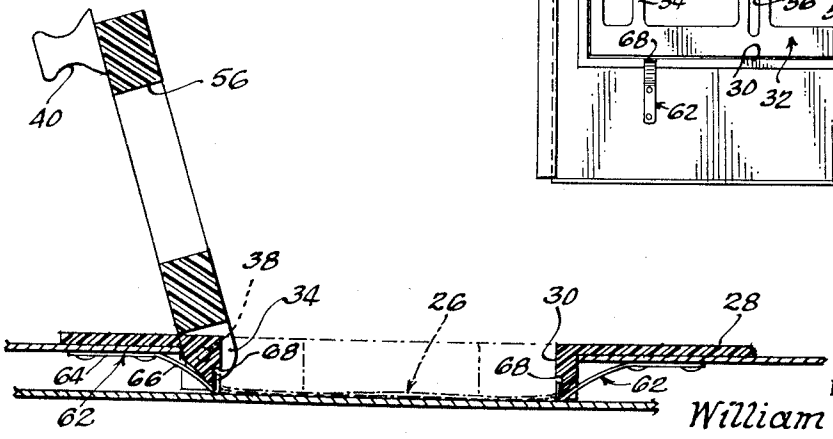


FIG. 4

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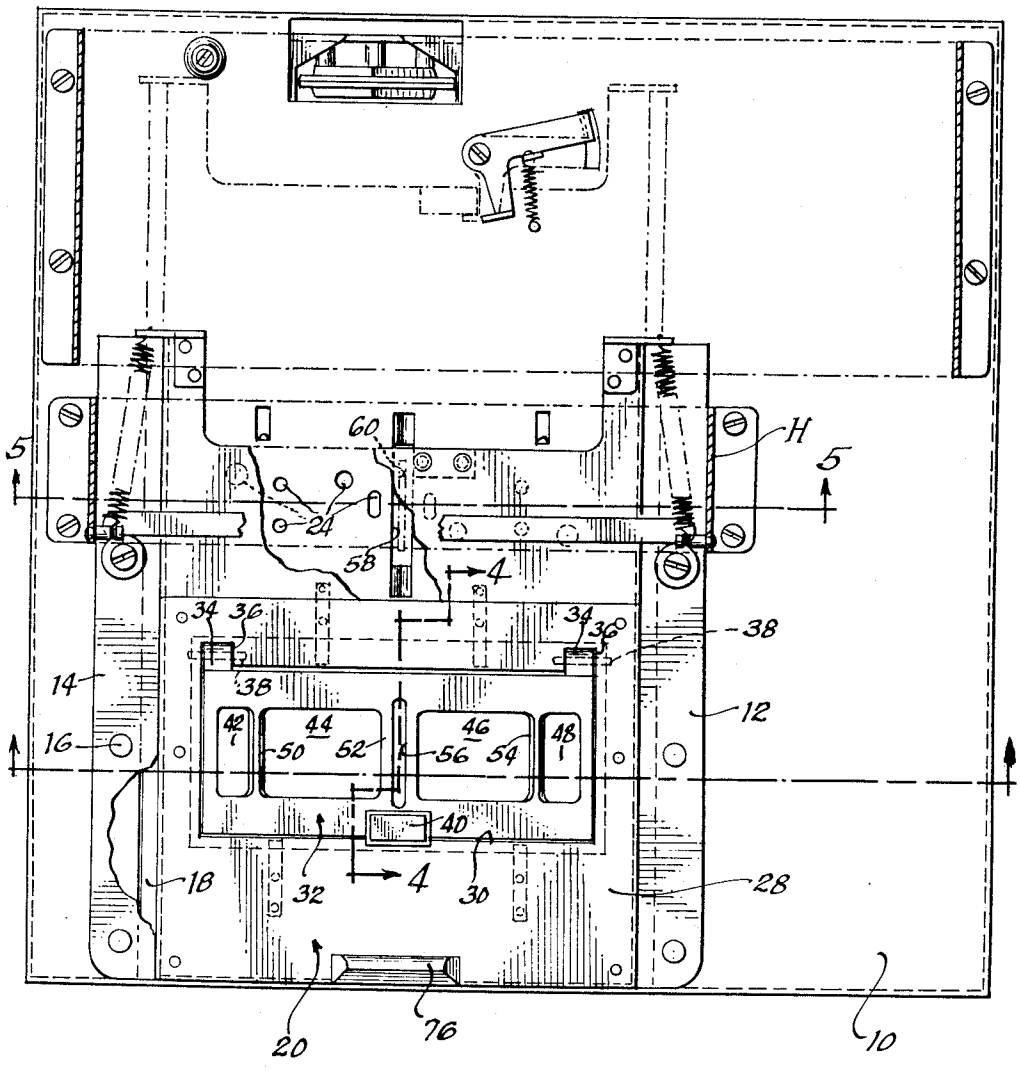
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CURRENCY TESTING AND SELECTING DEVICE

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FIG. 2



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CURRENCY TESTING AND SELECTING DEVICE

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Filed May 2, 1958, Ser. No. 732,673

10 Claims. (Cl. 88—14)

This invention relates broadly to a device for use to effect a selection of separation of paper or the like material having indicia or other configration written or imprinted thereon, and it relates more particularly to a device of the type descibed and an element thereof for support of the paper in position for testing during operation of the device.

The device and elements thereof will hereinafter be described with reference to its use in the testing of currency to separate dollar bills of one denomination from others, and for accepting dollar bills of the desired denomination while rejecting counterfeits and the like substitutes. It will be undertstood that the device may be adapted for a variety of other uses wherein one paper can be distinguished from another by indicia or configurations on the surfaces thereof, as in a banking operation for the separation of checks in accordance with the institution, the amount, the account or the like, all of which will become evident from the following description.

In my copending application Serial No. 676,527, filed August 6, 1957, description is made of a new and novel concept for the testing of paper currency wherein use is made of the light transmission characteristics of the printed and unprinted portions of the currency to control the operation of switch members through a series of light-responsive cells underlying the test areas. In the described concept, one or more light-responsive cells are arranged to be positioned adjacent areas of the currency incapable of an amount of light transmission sufficient to activate the cells to make the corresponding switch members in electrical connection therewith. Other light-responsive cells are arranged adjacent areas of the currency known to permit light transmission in an amount to cause activation of the cells sufficient to make the switch members in electrical connection therewith. Still other light cells responsive to the green coloration in the currency or unprinted portions of the currency having high light transmission can be employed either in series or in parallel with one or more of the others to give the desired response. By locating the respective light cells adjacent areas of known light transmission characteristics in the currency desired to be selected by the device, it becomes possible to separate a dollar bill for acceptance while rejecting currency of other denominations having different light transmission characteristics in the selected areas. It becomes possible to separate a dollar bill for acceptance while rejecting counterfeits or other papers not having the predetermined combination of light transmission characteristics in the preselected test areas.

In the case of a dollar bill or the like, areas can be preselected having the desired characteristics of light transmission independently of the arrangement of the bill as long as the entire surface of the bill is properly presented for testing. Thus, the dollar bill can be inserted face up or face down, or right side up or right side down, thereby to eliminate the necessity for exact placement in the device for testing.

Just as the cells are arranged to underlie areas of low light transmission and high light transmission in currency to separate a bill of one denomination from another, or to separate legitimate from illegitimate currency, the cells can be arranged to underlie areas of low light transmission and high light transmission as controlled by lettering or other indicia to separate checks of one bank from another and to provide for the selection of checks, stubs, tickets and the like of one bank or of one number, or embodying a series of numbers, from others.

Having briefly described the broad field of application and the general characteristics of the operation of the device, it will be apparent that the device must embody a means for presentation of the paper or currency for testing and that such presentation means should permit the easy insertion and removal of the paper or currency while permitting displacement thereof into and out of the test section in a manner which enables the light transmission test to be effected on preselected portions of the paper or currency. This invention is thus addressed to such positioning means for use in presentation of the paper or currency for testing.

It is an object of this invention to produce a test device of the type described, and it is a related object to produce a test device of the type described having a positioning means or holder which is adapted to receive the paper or currency in a position for testing; which enables ready insertion and removal of the paper or currency; which enables the light tansmission tests to be effected; which properly presents the paper or currency for testing; which enables automatic removal by the machine of acceptable paper or currency while returning others, and which is simple and durable in construction and easy in operation.

These and other objects of this invention will hereinafter appear and for purposes of illustration, but not of limitation, an embodiment of the invention is shown in the accompanying drawings, in which:

Figure 1 is an elevational view of a device embodying the features of this invention;

Figure 2 is a top plan view of the device shown in Figure 1 with portions broken away for better illustration of the components thereof;

Figure 3 is a top plan view in detail of the holder means employed in the device of Figure 1;

Figure 4 is a sectional view taken along the line **4—4** of Figure 2, and

Figure 5 is a sectional view taken along the line **5—5** of Figure 2.

Referring now to the drawings, the device comprises a horizontally disposed, relatively flat table **10** having a pair of elongate laterally spaced-apart guide members **12** and **14** in the form of channel sections secured by screws **16** onto the top surface of the table to provide grooves **18** adapted slidably to receive the lateral edge portions of a flat drawer **20** mounted for shifting movement over the top surface of the table between normal or retracted position and forward or test position. For practical purposes, it is desirable to enclose the test position within a housing H to prevent access thereto and it is desirable to locate the normal position outside of the housing to permit free access to the drawer for insertion or removal of the paper or currency which is subject to test.

One or more light bulbs **22** or other sources of light are mounted preferably within the housing to direct the light rays onto the surface of the table in the test area. The underlying portions of the table are provided with a combination of openings **24** having light-responsive cells mounted therein for activation by the amount of light entering the openings upon transmission through the

underlying portion of the paper or currency **26**, when in the test area.

The drawer can be formed of a continuous strip of sheet metal, wood or plastic, dimensioned to have a width corresponding to the spaced relation between the guide flanges and a length which is preferably less than the length of the table. Instead of forming the drawer **20** of a continuous sheet of metal, plastic, wood or the like, the drawer may be divided into joined sections of metal and plastic with the plastic portion **28** of a greater thickness forming the rearward portion of the drawer.

In the rearward portion of the drawer, intermediate the edges, the drawer is formed with an opening **30** extending therethrough to receive the paper or currency to be tested. For this purpose, the opening **30** is shaped to correspond with the shape of the paper or currency, and dimensioned to be slightly greater in length and width than the paper or currency to enable the latter to be positioned flatwise within the opening.

The paper or currency **26** is held flatwise in the opening for examination by means of a door **32** which is dimensioned and shaped to enable displacement into and out of the opening to press the paper or currency onto the underlying surface of the table. In the illustrated modification, the door **32** is hingedly mounted for rocking movement about its forward edge between a raised position, as shown in Figure 4, and a lower position within the opening, as illustrated in Figures 1, 2, 3 and 5. Where the device is adapted for the examination of a dollar bill or other rectangularly-shaped paper or currency, the opening and the door will preferably be formed of a similar rectangular shape and of corresponding dimension. Various conventional means can be employed for hingedly mounting the door for rocking movement. One such means illustrated in the drawings comprises spaced projections **34** integral with the forward edge of the door and which are received in fitting relation within aligned slots **36** in the drawer. Pins **38** extend crosswise through openings in the extension in registry with openings in the adjacent walls of the drawer pivotally to mount the door in the drawer.

It will be understood that the door may be otherwise hinged for rocking movement either about its rearward edge, its forward edge, or one or the other of its side edges. In the alternative, the drawer may be mounted for vertical movement into and out of the opening. Manual operating or gripping means, as represented by the knob **40**, are desirably provided on the upper surface for engagement manually to rock the door between raised and lowered positions of adjustment.

It is essential to provide openings in the door in endwise alignment with the light-responsive cells and to overlie the cells when the drawer is in test position to enable light from the source to strike the surface of the paper or currency opposite the cells to measure the transmission of light therethrough. While it is possible to provide for a continuous window extending crosswise in the door beyond the outermost of the light-responsive cells, it is preferred to subdivide the opening into a number of laterally spaced-apart windows **42, 44, 46** and **48** to provide interconnecting sections or bars inbetween which operate more effectively to hold down the underlying paper or currency while in the drawer. The cross-bars **50, 52** and **54** are arranged in a position to clear the light-responsive cells so as not to interfere with the intensity of light directed upon the portions of the paper or currency on which the tests are to be made.

The door **32** is further provided with an elongate slot **56** extending lengthwise through the door in the central portion thereof for registry with an underlying slot **58** in the table in the test position. The aligned slots enable an actuator ram **60** to be displaced vertically through the door and drawer to effect removal of the paper or currency upon acceptance. The means for removal from the drawer upon acceptance will not be described in detail since it constitutes the subject matter of a separate application for Letters Patent. Suffice it to say that displacement is effected by a ram **60** which is mounted for shifting movement between a normal, raised position in which its lower edge is clear of the drawer, and a lowered position in which the lower edge of the ram is displaced endwise vertically downwardly through the aligned slots in the drawer to cause the paper or currency to be folded about the lower edge of the ram for continued displacement therewith downwardly through the slot to beyond the lower edge of the drawer and into engagement with means to complete removal. Thereafter, the ram is returned to its normal raised position to clear the drawer for return to normal position, all as illustrated in Figure 5.

Since the paper or currency rests directly on the top surface of the table upon insertion into the opening, it is desirable to embody means within the drawer which will block movement of the paper or currency relative to the drawer. For this purpose, the drawer is provided with one or more laterally spaced apart spring clips **62** which are secured at their outer edge portions **64** to the underside of the drawer while the free edge portions **66** extend downwardly into resilient engagement with the top surface of the table and then turn upwardly substantially perpendicularly into recesses **68** provided in the drawer contiguous with the opening. Similar spring clips and recesses are provided for operation in the rearward edge and in the forward edge of the opening. Thus, the spring clips tend to scrape over the top surface of the table to prevent the forward or rearward edges of the paper or currency from becoming dislodged into any space between the drawer and the table, thereby to insure full displacement of the paper or currency with the drawer during movement to test position and back.

Instead of making use of spring clips or other scrapers, it is contemplated that the drawer can be formed with an opening which does not extend continuously therethrough, thereby to provide a pocket or slot having a bottom wall contiguous with the drawer on which the currency is received. Under such circumstances, the remaining bottom wall of the pocket or slot would be formed with openings to register with the openings in the table to enable the passage of light transmitted through the paper or currency.

When the device is provided with a testing means to determine the presence of a paper or currency of the desired dimension in the drawer, as described in my copending application Serial No. 732,672, filed May 2, 1958 and entitled "Test Device for Printed Papers and Elements of Same," it is desirable to embody a further modification in the drawer construction. Such modification includes laterally spaced-apart recesses **70** in the underside of the drawer in endwise alignment with test fingers **72** which extend upwardly beyond the top surface of the table into the path of the leading edge of the paper or currency positioned within the opening. Corresponding recesses **74** are provided in the underside of the door in endwise alignment with the recesses **70** to provide a continuous path into which the fingers project for engagement by the leading edge of the paper or currency during displacement of the drawer toward test position.

Actuation of the drawer for displacement between normal and operated positions can be effected automatically in response to closing of the door or in response to a push button or the like. It is preferred, however, to adapt the unit for manual operation and, for this purpose, an abutment **76** is formed in the upper surface of the drawer, preferably adjacent the rearward edge portion thereof.

It will be apparent that in use, the dollar bill **26** will be inserted in the drawer by first raising the door **32** to its raised position. After the dollar bill has been placed in the opening, the door is rocked to its lowered position to confine the bill in the opening between the lower surface of the door and the top surface of the table. As

indicated, it is desirable to provide a spaced relation therebetween to enable the dollar bill to be received loosely within the drawer.

Next, the drawer is displaced forwardly to test position, and means are provided automatically to activate the light source when displaced thereto. The dollar bill will be displaced with the drawer to the test position and it will be held in that position until the lights go on and the test is completed. If the dollar bill is acceptable, it will be displaced from the drawer, as previously described, while the drawer is in test position and the drawer will be returned empty for another cycle of operation. If the paper or currency is unacceptable, it will remain in the drawer for displacement with the drawer upon return to starting position. When this occurs, the door 32 can be raised to provide access to the rejected paper or currency for removal.

It will be understood that the drawer described may also be employed in other devices for the advancement of paper or currency in the direction toward and away from a test position or test station embodying other means for testing as illustrated by comparisons, thread count, chemical analysis, physical analysis, photographic analysis, and the like.

As used herein, the term "paper or currency" is meant to include any sheet or film stock formed of paper, board, plastic, metal or the like having configurations, color or design either imprinted on the surface thereof or embodied within its structure and which, for the light transmission tests described in the preferred application of the invention, is characterized by differences in light transmittability depending upon the composition, configurations, or colors embodied in or on the paper or currency.

It will be further understood that numerous changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. In a light transmission test device, the combination of a housing, a light source within the housing, light responsive cells spaced from the light source in a test area within the housing, a means for displacement for the element to be tested for light transmission between a normal position outside of the housing to a test position within the housing to position the element between the light source and the cells comprising a drawer mounted for shifting movement endwise relative to the housing, an opening within the top surface of the drawer dimensioned to correspond with the dimension of the element to be tested, a door dimensioned to be received within the opening and means mounting the door on the drawer for displacement between inoperative position outside of the opening for enabling free access thereto to operative position within the opening to hold the element in test position.

2. A test device as claimed in claim 1 in which the door is pivotally mounted on one of its edges to the drawer for rocking movement between inoperative and operative positions.

3. A test device as claimed in claim 1 in which the opening extends continuously through the drawer and in which the door covering the opening is provided with openings extended therethrough in endwise alignment with the light responsive cells and in position to lie between the light source and the cells when in test position to enable passage of light therethrough.

4. A test device as claimed in claim 3 in which the door is provided with an opening which extends crosswise from beyond the cells at one end to beyond the cells at the other.

5. A test device as claimed in claim 3 in which the door is provided with laterally spaced openings in endwise alignment with the cells and with interconnecting members therebetween to provide elements holding down the element to be tested.

6. In a device for testing paper or currency, the combination of a housing and test means within the housing, a drawer, an opening within the drawer dimensioned to receive the paper in position for test, means mounting the drawer for shifting movement between normal and test position with the opening located outside of the housing in normal position and within the housing in test position, a table which extends into and out of the housing and over which the drawer is displaced from normal to test position, channel guides laterally spaced apart on the table by an amount corresponding to the width of the drawer slidably to receive the lateral edges thereof for guiding the drawer in movement over the table between normal and retracted position, and blocking means shiftable into and out of the opening between blocking and unblocking position respectively to rest on the paper in the opening when in blocking position and to permit free access to the opening for the insertion or removal of paper when in unblocking position.

7. A test device as claimed in claim 6 which includes means on the drawer having portions in resilient engagement with the surfaces of the table adjacent the forward and rearward edges of the opening to engage the paper inserted within the opening for displacement with the drawer.

8. In a device for testing paper or currency, the combination of a housing, means within the housing for testing the paper or currency, a means for displacement for the element to be tested between a normal position outside of the housing and a test position within the housing comprising a drawer mounted for shifting movement endwise relative to the housing, an opening within the top surface of the drawer dimensioned to correspond with the dimension of the element to be tested, a door dimensioned to be received within the opening having an opening dimensioned to correspond with the area of the element to be tested, and means mounting the door on the drawer for displacement between inoperative position outside of the opening for enabling free access thereto to operative position within the opening to hold the element in test position.

9. In a light transmission test device for paper or currency, the combination of a housing, a light source within the housing, light responsive cells spaced from the light source in a test area within the housing, a means for displacement of the paper to be tested for light transmission between a normal position outside of the housing to a test position within the housing between the light source and the cells including a drawer mounted for shifting movement endwise relative to the housing, a holder within said displacement means for removably receiving said paper in position of test outside of the housing when in normal position, a table over which the drawer is mounted for sliding movement between normal and test position and which is provided with openings therethrough in the test area corresponding to the positions of the cells to enable light transmitted through the paper to strike the light responsive cells and channel guides laterally spaced apart on the table by an amount corresponding to the width of the drawer slidably to receive the lateral edges thereof for guiding the drawer in movement over the table between normal and test position.

10. In a light transmission test device for paper or currency, the combination of a housing, a light source within the housing, light responsive cells spaced from the light source in a test area within the housing, a means for displacement of the paper to be tested for light transmission between a normal position outside of the housing to a test position within the housing between the light source and the cells including a drawer mounted for shifting movement endwise relative to the housing, a holder within said displacement means for removably receiving said paper in position of test outside of the housing

when in normal position, a table over which the drawer is mounted for sliding movement between normal and test position and which is provided with openings therethrough in the test area corresponding to the positions of the cell to enable light transmitted through the paper to strike the light responsive cells, and means on the drawer having portions in resilient engagement with the top surface of the table adjacent the forward and rearward edges of the openings to prevent slippage of the paper from the drawer during displacement between normal and test positions.

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