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APPARATUS FOR DEVELOPING FINGERPRINTS WITH ULTRAVIOLET LIGHT

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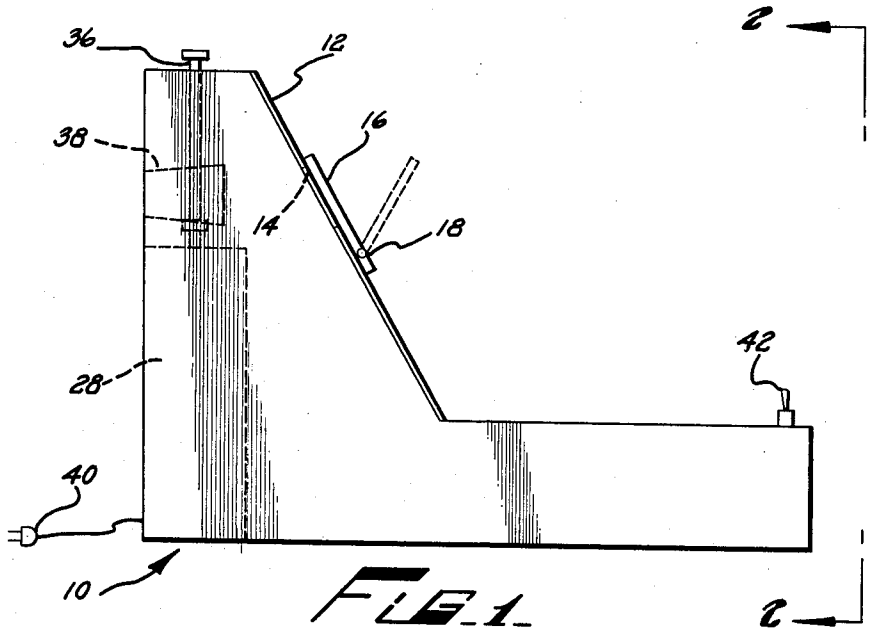


FIG. 1

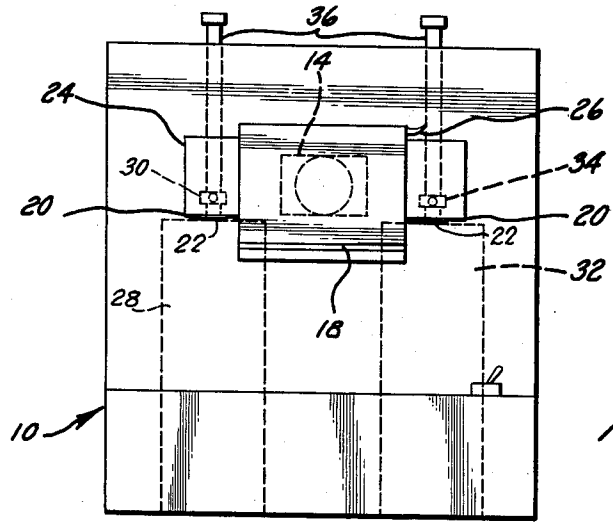
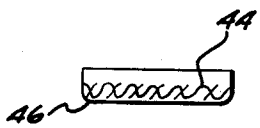


FIG. 2

FIG. 3



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APPARATUS FOR DEVELOPING FINGERPRINTS WITH ULTRAVIOLET LIGHT

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This invention relates to methods and apparatus for placing identifying fingerprints on pieces of paper such as checks and the like.

The passing of fraudulent checks is a constant source of trouble to all types of business, particularly retailers, who are called on daily to cash checks for strangers. Various types of positive identification systems have been proposed, but they each have disadvantages which have kept them from being widely used.

This invention provides a simple and inexpensive system for placing on a check the fingerprint of the person negotiating it. It is well known that fingerprints can be applied to paper by coating the finger tips with ink and then pressing the fingers on the paper before the ink dries. This procedure is messy and many retail customers would object to it. With the system of this invention, a person's fingerprint can be quickly and easily imprinted on a check without mess or inconvenience to the person fingerprinted.

In terms of method, a fingerprint of a person negotiating a check is printed on the check by pressing one of the finger tips, say the thumb, firmly onto an unused portion of the check. The natural oils and traces of moisture and body salts on the skin are transferred from the finger to the paper. Ordinarily, the moisture from a person's finger includes alkali metal halide salts such as sodium chloride and potassium chloride. These halide salts are left on the paper in a replica of the fingerprint, and are subsequently sprayed with a solution of silver nitrate which reacts with the halide to form a silver halide deposit on the paper where it was contacted by the finger. Thereafter, the silver ion in the silver halide is reduced to metallic silver to form a visible and permanent image of the print on the paper.

In the preferred method, the area surrounding the portion of the paper which is contacted by the finger is covered to prevent excessive wetting of the paper or check with the silver nitrate solution. Preferably, the portion of the paper wetted with silver nitrate is rinsed with distilled water and a wetting agent to remove excess silver nitrate and produce a clear image of the fingerprint. The silver ion on the paper can be reduced to metallic silver with a conventional photographic developer, such as hydroquinnone, but preferably it is reduced by exposure to actinic light such as short wave ultraviolet.

On dry days, or for people who do not normally secrete enough moisture and oil to make a good print, an auxiliary supply of suitable water soluble halide salts is kept on hand and applied to the finger tip before it is pressed into contact with the paper. Conveniently, the auxiliary supply of halide salts is in the form of a sponge or blotter saturated with a water solution of sodium chloride.

In terms of apparatus, the invention includes a frame having an opening through it. Means are provided for supporting the paper on one side of the frame over the opening so that the portion of the paper with the trace

of moisture, oils and salts is exposed through the opening to the opposite side of the frame. Means are provided for spraying silver nitrate solution from the opposite side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide salt present on the sprayed portion of the paper. Means are also provided for reducing the silver ion on the sprayed portion to form a visible image on the paper. In the preferred form of the apparatus, the frame is mounted on one wall of an enclosed box which includes an aerosol bomb of silver nitrate solution with a nozzle directed toward the frame opening. An aerosol bomb of water with a wetting agent dissolved in it is also mounted in the box with the discharge nozzle aimed at the frame opening. Separate means are provided for sequentially operating the silver nitrate and water aerosol bombs to spray the piece of paper mounted over the frame opening. An ultraviolet light is mounted in the box to shine toward the frame opening, and a suitable circuit end switch is provided for controlling the operation of the light.

These and other aspects of the invention will be more fully understood from the following detailed description taken in conjunction with the accompanying drawing, in which:

FIG. 1 is a side elevation, partly broken away, showing the presently preferred embodiment of the invention;

FIG. 2 is a view taken on line 2—2 of FIG. 1; and

FIG. 3 is a sectional view showing a sponge saturated with sodium chloride and glycerin.

Referring to FIGS. 1 and 2, an enclosed box **10** includes an inclined front wall or frame **12** which has a rectangular opening **14** in it. A pressure or retaining plate **16** is mounted over the frame opening **14** and secured at its lower edge to a horizontal hinge **18** located under the frame opening. A pair of horizontal support bars **20** are mounted on opposite sides of the plate at a level just below the frame opening. Each support bar includes an upwardly extending flange **22** to receive the lower edge of a piece of paper such as a check **24**. A handle **26** on the upper right (as viewed in FIG. 2) corner of the pressure plate permits the plate to be pivoted away and toward the opening. With the pressure plate swung out to the dotted line position shown in FIG. 1, the piece of paper or check can easily be mounted over or removed from the frame opening **14**. When the plate is moved to the solid line position, it presses against the portion of the frame surrounding the opening, and holds the check firmly over the opening.

A first aerosol bomb **28** containing a 3% solution of silver nitrate is mounted in the box with a spray nozzle **30** aimed toward the frame opening **14**. A second aerosol bomb **32** of distilled water and a suitable wetting agent, say sodium alkyl aryl sulfonate, is mounted in the box with a discharge nozzle **34** aimed toward the frame opening. Each of the discharge nozzles is controlled by a separate respective vertical push rod **36** which extends up from each nozzle through the top of the box. An ultraviolet lamp **38** is mounted in the box between the two aerosol bombs to shine toward the frame opening. The light is supplied power from a plug **40** through a conventional circuit (not shown) controlled by switch **42**.

Referring to FIG. 3, a sponge or bloter **44** is disposed in a flat dish **46** which contains a mixture of glycerin and

sodium chloride water solution. The sodium chloride concentration can be of any suitable value. Preferably, it is at least 5% by weight and something less than fully saturated to prevent crystallization of the sodium chloride. The solution may contain 2% to 10% glycerin by volume to aid in the adherence of the sodium chloride solution to the finger and to the paper when used to supplement the natural salt on the skin of the finger.

In using the apparatus to place an identifying fingerprint on a paper such as a check, the negotiator of the check places his thumb in firm contact on some unused corner or edge of the check. If there are insufficient natural oil and traces of moisture on his finger, he first places his finger in contact with the pad 44 saturated with glycerin and sodium chloride solution. Preferably, the pad does not carry free water, so that only a thin film is deposited on the negotiator's finger. If an excessive amount is applied, it is easily wiped off or blotted on suitable blotting paper (not shown) provided for that purpose.

After a finger has been pressed firmly in contact with the check, that portion of the check is mounted over the frame opening by disposing the lower edge of the check on the bars 20. The pressure plate is pushed to the closed position so that the check is held firmly in place. Thereafter, the nozzle on the silver nitrate aerosol bomb is opened by pushing the proper push rod 36. This causes a fine spray of sodium nitrate solution to wet the exposed portion of the check. The surrounding area of the check is prevented from getting wet because it is covered by the frame. Ordinarily, the exposed portion of the check need be sprayed for only a few seconds to obtain the desired wetting. The sodium nitrate nozzle is then closed. The silver nitrate solution can be of any satisfactory strength. It usually should be at least 3%, and ordinarily need not be more than 5%. Development of the image is better controlled and danger of "burning" the paper is reduced if a moderate solution, say less than 5%, is used. The sodium nitrate in the solution sprayed onto the check reacts with the halide ions deposited by the finger to form a silver halide, which is laid down in a pattern corresponding to the fingerprint on the paper. Thereafter, the distilled water aerosol bomb nozzle is opened for a few seconds to rinse away excess silver nitrate solution. The ultraviolet lamp is turned on and causes the silver ion in the silver halide on the check to be reduced to elemental silver, which forms a visible image that is a replica of the fingerprint. The ultraviolet light preferably has an output in the range of 2537 Angstrom units.

If desired, the rinse with distilled water can be omitted, but it is preferred because it reduces the possibility of stains from excess silver nitrate. Instead of irradiating with ultraviolet light, the image can be developed by spraying the silver chloride on the check with conventional developer solution, such as hydroquinnone in a convenient aerosol bomb (not shown). The ultraviolet light can be left on as long as desired, but ordinarily exposure for 5 to 10 seconds is adequate to develop an identifiable fingerprint.

After irradiation with ultraviolet light, or other suitable reduction of the silver, the pressure plate is swung out and the check is removed. If necessary, the relatively small portion of the check which was sprayed may be blotted dry. The check now has on it a permanent fingerprint of the person who negotiated it.

What is claimed is:

1. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, means for spraying a silver nitrate solution from the other side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, and means for reducing the silver ion on the sprayed portion to form a visible image.

2. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising an enclosed box, a frame disposed as at least part of a wall of the box and having an opening through it, means for supporting the paper on the outside of the box and over the frame opening, means for spraying a silver nitrate solution from the inside of the box through the frame opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, and means for reducing the silver ion on the sprayed portion to form a visible image.

3. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, means for spraying a silver nitrate solution from the other side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, means for spraying water on the said portion of the paper to remove excess silver nitrate, and means for reducing the silver ion on the sprayed portion to form a visible image.

4. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, a plate mounted on the frame to be movable over and away from the opening, means for spraying a silver nitrate solution from the other side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, and means for reducing the silver ion on the sprayed portion to form a visible image.

5. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, means for spraying a silver nitrate solution from the other side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, and means for irradiating the silver halide with ultraviolet light to reduce the silver ion on the sprayed portion to form a visible image.

6. Apparatus for developing an image of an object on a piece of paper such as a check or the like, the apparatus comprising a source of water soluble halide salt to apply to the object which is thereafter pressed into contact with the paper to deposit a halide ion on it in a pattern corresponding to the object, a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, means for spraying a silver nitrate solution from the other side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, and means for reducing the silver ion on the sprayed portion to form a visible image.

7. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, an aerosol bomb of silver nitrate solution mounted for spraying the

solution from the other side of the frame through the opening and against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, and means for reducing the silver ion on the sprayed portion to form a visible image.

8. Apparatus for developing an image such as a fingerprint on a piece of paper such as a check or the like, which has a halide salt deposited on it in a pattern corresponding to the image, the apparatus comprising a frame having an opening through it, means for supporting the paper on one side of the frame over the opening, an aerosol bomb of silver nitrate solution mounted for spraying the solution from the other side of the frame through the opening and

against the portion of the paper overlying the opening to form silver halide with the halide on the sprayed portion of the paper, an aerosol bomb of water mounted for spraying water through the frame opening and against the portion of the paper overlying the opening to rinse away excess silver nitrate solution, and means for reducing the silver ion on the sprayed portion to form a visible image.

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