July 5, 1938. F. J. SIRCHIE 2,122,589

PRINT LIFTER AND METHOD

Filed Aug. 21, 1934

Fig. 1.

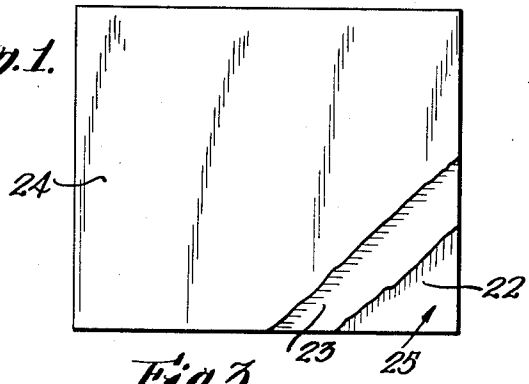


Fig. 2.

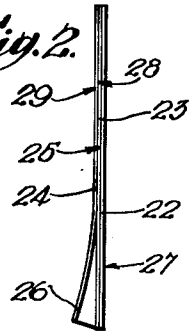


Fig. 3.

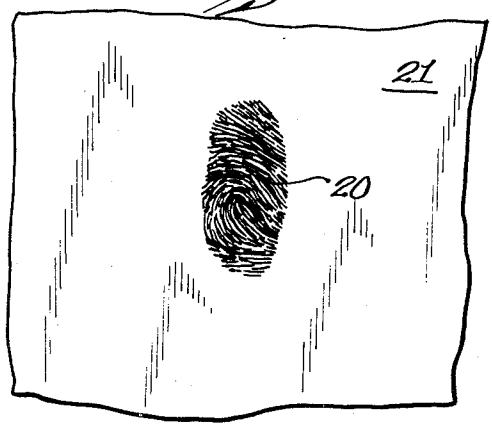


Fig. 4.

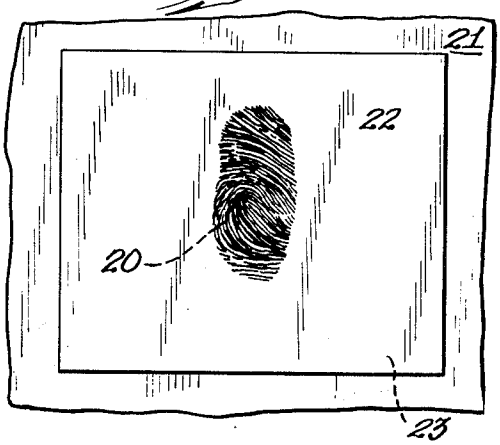


Fig. 5.

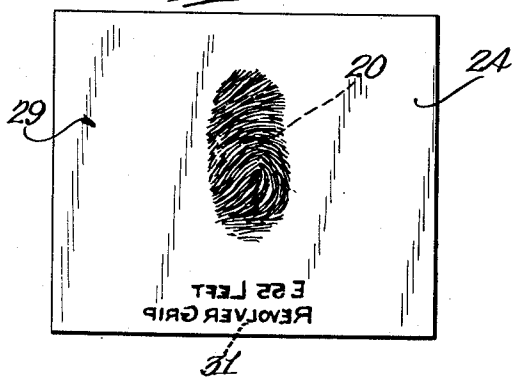


Fig. 6.

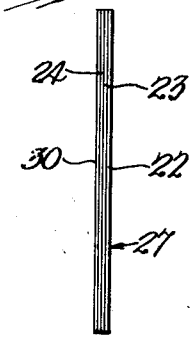
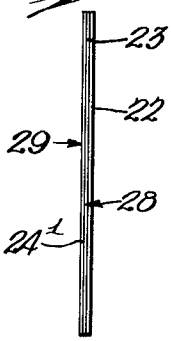


Fig. 7.



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UNITED STATES PATENT OFFICE

2,122,589

PRINT LIFTER AND METHOD

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Application August 21, 1934, Serial No. 740,752

4 Claims. (Cl. 41—4)

My invention relates to lifters for finger prints and other prints, and to methods of lifting prints.

A purpose of my invention is to produce a transparent finger print lifter, comprising a transparent base sheet, a transparent coating of adhesive material on the base sheet and a transparent cover sheet over the adhesive material, so that finger prints and similar prints may be taken up upon the transparent material, and subsequently protected by the cover sheet, and may be photographed or inspected by transmitted light passing through the lifter.

A further purpose is to provide a transparent base sheet having a permanently plastic adhesive surface for a finger print lifter.

A further purpose is to produce a finger print lifter having a transparent base sheet with an adhesive coating on the active side and a matte surface on the reverse side, so that writing, with a pencil or similar implement, may be applied to the matte surface and will appear in the normally written manner upon a photograph taken toward the active side by transmitted light through the transparent base. The finger print on the lifter when viewed from the active side is reversed with respect to the latent finger print, and the photograph of the finger print taken from the active side of the base sheet will be unreversed, as will be the photograph of the writing on the matte surface.

A further purpose is to eliminate photographic highlights by providing a matte surface upon the exposed face of the transparent cover sheet of a finger print lifter.

A further purpose is to improve the composition of the adhesive coating of a finger print lifter by the use of latex, or of a resin of the polyhydroxy alcohol-polybasic acid type, with a suitable plasticizer, or of the phenol-formaldehyde type with a suitable plasticizer or of a cellulose plastic with a suitable plasticizer.

A further purpose is to employ an adhesive coating on a finger print lifter which is not less than 10 one-thousandths of an inch thick, and not more than 50 one-thousandths of an inch thick.

Further purposes will appear in the specification and in the claims.

In the drawing I have chosen to illustrate but a single embodiment of my invention, with a minor variation which has proved to be desirable in certain instances.

Figure 1 is a partially broken top plan view of a finger print lifter embodying my invention.

Figure 2 is a right side elevation of the finger print lifter of Figure 1, having the cover sheet partially separated from the base sheet at one corner.

Figure 3 is a top plan view of a powdered finger print.

Figure 4 is a top plan view of the same finger print, to which the finger print lifter has been applied.

Figure 5 is a front view of the finger print lifter of Figure 4, which has been removed from the finger print, has had the cover sheet applied and has had identifying markings placed upon its reverse side.

Figure 6 is a right side elevation of the finger print lifter of Figure 5, with photographic printing paper for making a contact print.

Figure 7 is a variation of Figure 6.

In the drawing like numerals refer to like parts.

The science of finger printing has become so general as an aid to crime detection, and has so captivated the imagination of the public, that it is deemed unnecessary to dwell upon the use made of finger prints and the importance of this subject.

It will suffice to say that the contours of the projections and depressions upon the human cuticle are individual to the particular person, and that the mere act of touching a surface, even quite lightly and when the skin is apparently clean, will transfer to that surface the contours of the cuticle in an oily substance present on the skin. Notwithstanding that the latent finger print thus produced may be wholly invisible to the naked eye, it has long been known that the latent finger print may be made visible by powdering it with some substance which will adhere at the locations where the oil from the cuticle is present, and will not adhere at other locations. After the powder has been applied to the latent print, the excess powder may be removed by brushing lightly with a camel's hair brush, or by other suitable means well known in the art. The result will be as shown in Figure 3, which illustrates a finger print **20** on a surface **21**, the finger print having been made visible by powdering in a suitable manner well known in the art.

The particular powder used has no importance in the present invention. At various times a great many different finger print powders have been employed, such as powdered bronze, powdered aluminum, lampblack, chalk, etc. The most successful powders involve mercury, which seems to assist the powders in adhering to the latent finger print and prevent them from adhering to other parts of the surface in such man-

ner as to cause a smear. The product known in pharmacy as "mercury with chalk", which appears by a colloidal suspension of chalk in mercury, or, as an alternative, a colloidal suspension of carbon black in mercury, have been found by me to be the most efficient finger print powders.

It will be noted, however, that, since the base sheet of my lifter is transparent, and the finger print on the lifter can be photographed by transmitted light, it is wholly immaterial whether a black or a white powder be used with my lifter, as contrast of color is not of importance.

In the prior art, when the latent finger print had been made visible by powdering, it was normally photographed in place to obtain a permanent record. This necessitated that every finger print expert be a skilled photographer, and carry a photographer's equipment with him.

As a great many finger prints are usually obtained at the scene of a crime which later prove to be wholly innocent (finger prints of occupants of the premises, police officers, etc.) the photographic method involved taking and developing a great many unnecessary pictures which could have been avoided if it were possible to compare the finger print with other finger prints without photography.

In cases where the finger print was in a space too small to receive the camera, or upon a curved surface such as a drinking glass, a gun stock, an automobile steering wheel, etc., it was difficult or impossible to obtain proper permanent record by photography.

To avoid these difficulties, finger print lifters have been devised which normally comprise a sheet of material having a slightly adhesive surface, which, when pressed against the powdered latent finger print, will by contact take up some of the powder, but will not stick so firmly to the surface as to prevent subsequent removal. Thus finger print lifters have been made from photograph film, from which the silver had been removed by a solution of sodium thiosulphate prior to use. Likewise, rubber sheeting similar to that used for automobile tire patches has been employed for finger print lifters. This sheeting formed the base sheet, and a cover sheet of linen or similar material was used to prevent the rubber surface from losing its tackiness before it was employed.

In some cases the cover sheet was of transparent material. This had the advantage that the cover could be replaced after the finger print had been lifted, and the finger print could be photographed by reflected light through the cover sheet.

I have discovered that a vastly superior finger print lifter may be produced by using a transparent base sheet and transparent adhesive or permanently tacky material on the base sheet, with a transparent cover sheet. I illustrate in Figure 1 a base sheet **22** formed of any suitable transparent sheet material which is sufficiently pliable for this use. I have found celluloid, cellulose acetate or thick "cellophane" (liberated cellulose) to be desirable materials for the base sheet. The thickness of the base sheet should be 2 to 10 one-thousandths of an inch, preferably 5 one-thousandths of an inch. The base sheet **22** has on its active side or face a coating **23** of adhesive or permanently tacky material, which is sufficiently adhesive to pick up the powder of the powdered finger print, but not sufficiently adhesive to adhere firmly to the surface upon which the finger print is found. The adhesive material is preferably light in color but it need not necessarily be light in color provided it is transparent. There are of course various degrees of transparency, but it is sufficient that the lifter pass transmitted light which is strong enough to produce a photograph. When I refer to the lifter as "transparent", I mean to include also the condition sometimes known in other arts as "translucent", provided sufficient light can pass through the lifter to take a photograph or to permit inspection by transmitted light. The degree of stickiness of the adhesive coating may vary considerably with the material used and with the age of the particular finger print lifter, but it should not change so much that the adhesive material becomes at any time very sticky (as in hot weather) or very nonadhesive.

It will be understood that my finger print lifter will be used upon occasion to lift other prints, such as palm prints, foot prints, etc., and also to lift writing and signatures. For the latter use no powder is employed, the ink or other writing material adhering slightly to the adhesive material of the lifter. The adhesive quality of the adhesive material may vary somewhat to suit these special uses.

I have in mind a wide selection of adhesive materials which may be used. Attempts have been made in the past to apply a solvent to the base sheet and use the softened surface of the base sheet as an adhesive surface, but this has not been found to be very satisfactory. One adhesive material which I have used with some success is gelatin. I have in some cases mixed the gelatin with glue, and in other cases with sugar. In most instances I find that the glue or sugar, where used, should not be more than 20% of the weight of the gelatin. The amount of water added to dissolve the gelatin at the time that the gelatin is applied is a matter of discretion and depends upon the thickness of film to be produced. Equal parts of gelatin and water are usually satisfactory. Gelatin has the disadvantage that it melts when subjected to considerable heat during photographing.

I have found that coagulated latex makes a quite satisfactory adhesive material to be applied to the active side of the base sheet. Coagulation may be produced merely by evaporation of the continuous phase.

A desirable adhesive material may be made from resins of the polyhydroxy alcohol-polybasic acid type, such as glycerol-phthalic acid resin, to which suitable plasticizers have been added. Of the plasticizers which are satisfactory, I suggest vegetable oils, such as castor oil, mineral oils, and fatty acids such as stearic acid, oleic acid and palmitic acid. The quantities of plasticizers to be used will depend, of course, upon the particular plasticizer, but sufficient plasticizer should be added to make the resin permanently plastic, so that it will remain plastic even after a period of many months.

Resins of the phenol-formaldehyde type, with proper plasticizers, may also be used for the adhesive material.

The most desirable adhesive material, of which I know, is made from cellulose nitrate (pyroxylin) with a suitable plasticizer. The placticizer may comprise a vegetable oil such as castor oil, or dibutyl phthalate or diethyl phthalate or butyl tartarate or triacetin, or any well known pyroxylin plasticizer.

A specific composition which has been found very successful comprises ten parts by weight of pyroxylin, thirty parts by weight of castor oil, and one part by weight of tricresol phosphate, diluted to spraying consistency by a suitable solvent. The solvent which I have found most successful comprises by weight 65% of toluol, 15% of butyl alcohol, 10% of methyl-ethyl-ketone, 5% of ethylene-glycol-mono-ethyl ether and 5% of the acetate of ethylene-glycol-mono-ethyl ether. It will be understood, of course, that a wide variety of other solvents may be suggested by any plastic chemist.

The polyhydroxy alcohol-polybasic acid type, phenol-formaldehyde type and cellulose nitrate type adhesives are specifically the invention of Lawrence R. Dallett.

Whatever adhesive material is used, I will apply a cover sheet **24** to the adhesive coating as soon as the adhesive coating has been spread across the base material, the cover sheet **24** assisting in preventing the adhesive coating from drying by excluding the air at all points except the edges. As explained above, where I am employing an adhesive material which has a tendency to become permanently dry and nonadhesive, I will prevent this by suitable plasticizers, as explained. From the standpoint of the plastic chemist, the plastic used in my adhesive material, where a plastic is employed, will be "overplasticized."

As a result of a careful study of the film thickness of the adhesive coating, I have discovered that adhesive coatings which would otherwise be satisfactory may fail because of their excessive thinness. The surface upon which the finger print is placed almost invariably has minute irregularities to which the finger producing the finger print more or less conforms when it is pressed against the surface. If the finger print lifter is to pick up the finger print perfectly, the adhesive surface must also conform to these irregularities. In the past, where the base sheet of the lifter was rubber, the base sheet was capable of conforming to irregularities in the surface regardless of the thickness of the adhesive coating, provided sufficient pressure was applied. Unfortunately, however, the rubber is resilient besides being pliable, and, where it is supported by two projections from the surface containing the finger print, the rubber will extend directly across from one projection to another, due to its resilience, rather than bend down into the depression between the projections, unless extreme care be taken to apply pressure to the rubber exactly back of the depression. It has therefore resulted, as a practical matter, that the prior art lifters would faithfully reproduce the finger print on the projections of the surface but would miss the detail or miss altogether the portion of the finger print in minute depressions of the surface.

I have discovered that this difficulty may be corrected by substantially increasing the thickness of the adhesive coating **23**, so that, when the lifter is applied to the surface, the minute projections on the surface will penetrate the adhesive coating and the adhesive coating will be forced into the minute depressions. As a result, the adhesive coating which carries the lifted finger print may have a few thousandths of an inch variation in thickness where it has been rendered thinner by a projection or rendered thicker by a depression into which it is forced, but the adhesive material will faithfully pick up the finger print both on the projections and in the depressions of the surface.

I have discovered that the adhesive coating **23** should be at least 10 one-thousandths of an inch thick, and preferably 20 one-thousandths of an inch thick. The upper limit of thickness of the adhesive material is much less important than the lower limit of thickness, but I find that objectionable distortion during photography is produced where the adhesive coating **23** is thicker than 50 one-thousandths of an inch.

To obtain a uniform coating of the desired thickness, let us say 20 one-thousandths of an inch, I find that the most convenient way is to spray the adhesive material upon the active side **25** of the base sheet **22**. The adhesive coating may desirably be applied to a large sheet, which, after doubling with a large cover sheet, can be cut into a great number of pieces each of suitable size for a single lifter. Where spraying is accomplished at a uniform rate, a layer of a few-one thousandths of an inch may be deposited each time the spray passes over the sheet, and the thickness of the adhesive coating may be accurately determined by the number of times that the spraying is repeated. The adhesive coating may also be distributed by a roll, running the base sheet under a knife edge to remove any excess thickness.

It will be understood that the manner of application of the adhesive material is not of vital importance in the present invention, providing the adhesive material is firmly attached to the base sheet, the distribution is reasonably uniform and the desired film thickness is obtained.

Where irregularities on the surface cannot be cared for by the thickness of the adhesive coating, it will of course be evident that the base sheet **22**, which will preferably comprise one of the cellulose nitrate, cellulose acetate or cellulose, transparent pliable materials, can by its pliable nature conform to the irregularities of the surface.

When preparing to use my novel lifter, I will first powder the finger print, palm print, foot print, etc., as in the prior art. Where writing is to be lifted, no powdering is used. I will then remove the cover sheet **24**, preferably by turning up one corner **26** with the finger nail, and place the cover sheet aside for further use. I will then apply the base sheet 22 to the powdered finger print with the adhesive coating **23** directly against the finger print. This is shown in Figure 4, where the finger print **20** is covered by the base sheet **22**, the active face **25** of the base sheet being toward the print. With the base sheet and adhesive material in the position of Figure 4, the lifter will be pressed firmly against the surface **21** desirably by running the finger over the rear side **27** of the lifter, applying gentle pressure to the lifter.

The base sheet and adhesive coating are then removed from the surface **21**, using care to lift the adhesive coating away from the surface and not slide the adhesive coating along the surface in such manner as to smear the print. As soon as the base sheet **22** and adhesive coating **23** are removed from the surface **21** with the lifted finger print, the cover sheet **24** is carefully replaced, preferably returning the surface **28** which was formerly in contact with the adhesive coating, to its former position against the adhesive coating. The lifter is then as shown in Figure 5 where the cover sheet face **29** is uppermost.

The finger print may now be studied in detail by the technician, who will preferably observe

it from the rear side 27 of the base sheet. The print as seen from the side 29 of the cover sheet is reversed with respect to the print 20 on the surface 21. By analogy to photography, the print of Figure 3 is the "image", the print as seen in Figure 5, from the side 29 of the cover sheet (or from the active side 25 of the base sheet) is a "negative" (from the standpoint of its being right side left, not of color), and the print as seen in Figure 4 from the rear side 27 of the base sheet is the "positive" (from the standpoint of its being right side right). The technician may observe the finger print as a "positive" by looking at the rear side 27 of the base sheet, without the necessity of photographing the finger print to change it to a "positive".

On the other hand, where a permanent photographic record is desired, the photograph should be taken from the side 29 of the cover sheet (the "negative" side of the lifter), so that the photograph obtained will be a "positive". In obtaining a photograph of the lifted finger print, it is not necessary to use a camera, as the photographic printing paper 30 may merely be placed against the side 29 of the cover sheet, as shown in Figure 6, making a contact print. Whether a contact print is made, or a photograph is made by means of a camera, I refer to the photographic reproduction as a "photograph". Where an enlargement is to be taken in one step, the photograph should also be taken from the side 29 of the cover sheet, so that the enlargement will be a "positive".

As most of the finger prints obtained are intended for use as evidence, it is highly important that the finger prints be identified in a manner which cannot be criticized by opposing counsel. The identification markings should preferably appear as part of the permanent photographic record. This can readily be accomplished by my invention. I preferably employ a base sheet whose rear side 27 has a matte or "frosted" surface. This gives a gray background against which the finger print may be observed from the side 29 of the cover sheet, regardless of whether light or dark colored powder is used. If the cover sheet 24 is not provided with a matte surface, the matte surface upon the base sheet aids in distinguishing the base sheet from the cover sheet. The matte surface on the base sheet also eliminates highlights in photography and reduces the transmitted light intensity sufficiently to permit the making of contact prints from standard printing papers without a camera, and without danger of over-exposure. The matte surface also will receive writing very acceptably, especially from a pencil. In Figure 5 I show writing 31 upon the rear side 27 of the base sheet, which side has a matte surface. When viewed from the side 29 of the cover sheet, the writing 31 is reversed, but this agrees with the position of the finger print, which is a "negative" when viewed from that side. When a photograph is obtained from the side 29, it will be a "positive", both in respect to the finger print and to the writing.

It may in some instances be desirable to employ a matte surface on the side 29 of the cover sheet 24' (Figure 7) to avoid highlights in photography, when photographing from that side, in case a matte surface is not to be used on the base sheet.

Where the latent finger print is to be compared in court with the suspect's finger print, a photographic enlargement of the suspect's finger print must be obtained. My improved lifter may be used to produce an enlargement directly without intervention of the copying camera or of the finger print camera. I simply ink the suspect's finger and apply the ink print to the adhesive coating 23 of the lifter, replacing the cover sheet 24 after the ink dries. I may then enlarge the ink print in the lifter directly by placing the lifter in the enlarging frame.

The base and cover sheets may desirably have a thickness of about 5 one-thousandths of an inch. It will be understood also that advantage may be obtained from any one of the enumerated features of my invention, without necessarily using the others, although the most desirable form of my invention will employ all of the advantageous features.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of obtaining a permanent record of a latent finger print, which consists in powdering the finger print, in applying pliable transparent material having a transparent adhesive face to the finger print, in removing said material to lift the finger print, in applying pliable transparent covering material to the adhesive face, in placing writing on such part of the material as will make the writing visible as a "positive" on the side on which the lifted finger print is visible as a "positive" and visible as a "negative" on the side on which the lifted finger print is visible as a "negative", and in making a photograph of the lifted finger print and the writing.

2. The method of obtaining a permanent record of a latent finger print, which consists in rendering the latent finger print transferable by contact, in bringing an adhesive surface of pliable transparent material into contact with the finger print, in removing the pliable transparent material from the finger print and thus lifting the finger print, in applying writing to the opposite side from the adhesive side of the pliable transparent material and in making a photograph of the finger print and the writing from the adhesive side of the pliable transparent material, whereby the photograph is a "positive" both of the finger print and of the writing.

3. A finger print lifter comprising a base sheet of pliable transparent material having an adhesive surface on one side and a matte surface capable of receiving writing on the other side.

4. A finger print lifter comprising a pliable transparent base sheet, a coating of adhesive material on one side of the base sheet, and a cover sheet of pliable transparent material upon the adhesive coating, said cover sheet having a matte surface upon the side away from the adhesive material.

FRANCIS J. SIRCHIE.