

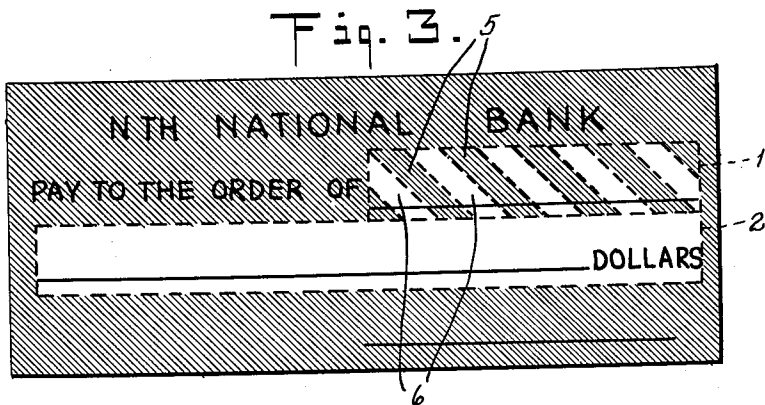
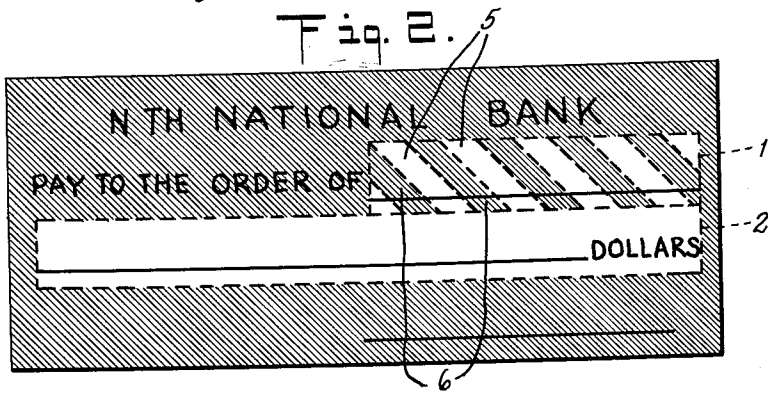
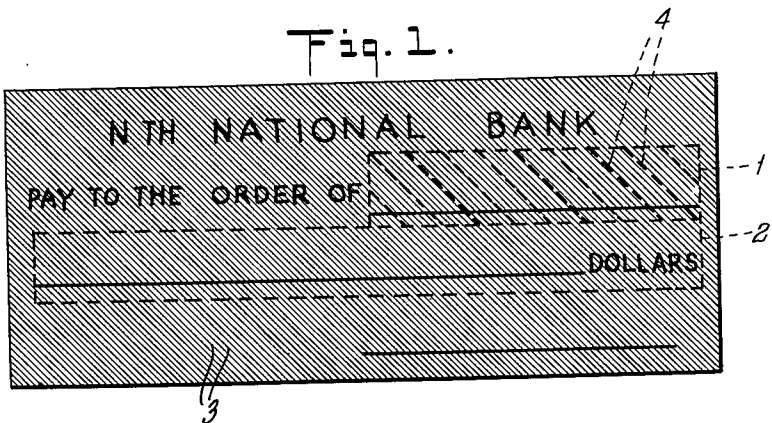
May 7, 1963

C. D. GUERTIN
SAFETY INKS AND DOCUMENTS

3,088,841

Filed March 1, 1960

2 Sheets-Sheet 1



INVENTOR.
CLIFFORD D. GUERTIN
BY *Lester H. Clark*
ATTORNEY

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C. D. GUERTIN

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2 Sheets-Sheet 2

Fig. 4.

NTH NATIONAL BANK NTH NATIONAL BANK NTH NATIONAL BANK
 L BANK NTH NATIONAL BANK NTH NATIONAL BANK NTH NA
 NATIONAL BANK NTH NATIONAL BANK NTH NATIONAL BANK
 NK NTH NATIONAL BANK NTH NATIONAL BANK NTH NATI
 NTH NATIONAL BANK NTH NATIONAL BANK NTH NATIONAL
 IONAL BANK NTH NATIONAL BANK NTH NATIONAL BANK M
 BANK NTH NATIONAL BANK NTH NATIONAL BANK NTH
 NATIONAL BANK NTH NATIONAL BANK NTH NATIONAL
 NTH NATIONAL BANK NTH NATIONAL BANK NTH NAT
 NK NTH NATIONAL BANK NTH NATIONAL BANK NTH
 NATIONAL BANK NTH NATIONAL BANK NTH NATIO
 ONAL BANK NTH NATIONAL BANK NTH NATIONAL BA
 NK NTH NATIONAL BANK NTH NATIONAL BANK NA

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Fig. 5.

NTH NATIONAL BANK NTH NATIONAL NTH NATIONAL B
 L BANK NTH NATIONAL BANK NTH NATIONAL BANK M
 NATIONAL BANK NTH NATIONAL BANK NTH NATIONAL
 NK NTH TION ANK NATIO LB NTH NATIO
 IONAL B NT ATI ANK THM L BANK
 BANK NT AT LB NTH N ONZ AN TH ONAL
 NATIONAL A NA NAL B NT. ATIO LB K NTH
 NTH NATIO AN TH N/ ONA AN TH TIONAL
 NK NTH NA AL BA NATI AL TH NATI
 NATIONAL B KNTH N NAL B KN IONAL BA
 IONAL BANK NTH NATIONAL BANK NTH NATIONAL BANK
 ONAL BANK NTH NATIONAL BANK NTH NATIONAL BANK NTH N
 NK NTH NATIONAL BANK NTH NATIONAL BANK NTH NA

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Fig. 6.

NA	ALB	NTH	NA	ANK N
ANK H N	ONAL BA	N	ATIONA	
H N ION	ANK	ATI	LE KN	NATI
B NK	TIO	ANK	4 N	NA AN
NAL B	KN	ATI	LE	KN NA
TION	NK NTH	ON	BANK N	
AM	ATIO	AN	TH NAT	

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INVENTOR.
 CLIFFORD D. GUERTIN
 BY Lester H. Clark
 ATTORNEY

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3,088,841

SAFETY INKS AND DOCUMENTS

Clifford D. Guertin, River Vale, N.J., assignor to American Bank Note Company, New York, N.Y., a corporation of New York

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4 Claims. (Cl. 117—1)

This invention relates to safety paper, i.e., printed documents such as negotiable instruments, which are adapted for the insertion of names, amounts, etc., by hand, and which are sensitive to attempts to alter those names, amounts, etc., once they have been inserted. The invention includes documents having areas printed with inks designed to give the required sensitivity, methods of printing such documents, and inks having the characteristics necessary for such printing methods and documents. By sensitivity to attempted alteration, it is meant that such an attempt results in a marked change in appearance of the document, so as to alert a person receiving it to the fact that an alteration has been attempted.

For a long time prior to about 1945, most writing inks were water solutions whose coloring material was either a ferrous salt which oxidized to a ferric salt after writing, or aniline dye, or combinations of both a salt and a dye. The techniques of eradication of such inks were established many years ago. Where the dried ink was water soluble, such techniques simply involved the use of water as a solvent (so-called washable ink). Where the dried ink was not water soluble, the eradication techniques employed some type of bleaching reaction. The bleaching solutions (ink eradicators) for such inks are commonly sold.

Inks consisting of coloring material of one type or another dissolved in water are still in common use, and are hereinafter referred to as "conventional inks." Ball point pens, which came into use about 1945, use a different type of ink. Typically, a ball point pen ink is relatively stiff and heavy and may consist of one of the higher glycols as a vehicle, with an aniline dye for coloring material. Many of the ball point pen inks cannot be eradicated by either the water solvents or the bleaching methods. Until recently there has been no known effective means of eradicating such inks.

Safety papers and safety printing techniques have been developed in the past which are reasonably sensitive to attempted eradication of one of the conventional inks, so as to warn a person to whom an altered document was presented that an attempt had been made to alter it. Such papers and printing techniques are not sensitive to eradication techniques directed at ball-point inks. Until recently, no particular difficulty has been encountered with these safety papers and printing techniques, when used with ball point writing, because there has been no commonly known effective technique for eradicating the ball-point ink.

Recently, banks and other institutions using printed documents of this type have encountered situations where ball point writing had been successfully eradicated, and it has become apparent that at least some individuals are aware of techniques for eradicating at least some of the ball point pen inks. While the details of all processes which might eradicate ball point pen inks are unknown, it has been determined that all processes so far known involve the use, at some stage of the process, of a solvent selected from the lower alcohols or lower ketones. By "lower" is meant that the chain of carbon atoms in the particular alcohol or ketone is no longer than eight.

There have been recognized in the past two general techniques of eradication, which may be classified as "line" eradication and "sheet" eradication. Line eradica-

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tion involved the application of eradicating solution only to the particular line or lines to be eradicated. In sheet eradication, the entire sheet or document was immersed in the solvent or other agent used. The line eradication technique was the one most frequently employed in connection with conventional inks. It has been determined that the ball point pen inks require, in all the known processes, the sheet eradication technique.

It is also known that the factor of time is very important in the ball point ink eradication techniques. To be successful, the eradication must be completed within a relatively short time, of the order of thirty seconds. If the eradication has not been completed in that time, then the solvent in use may start to spread the ball-point ink into the paper, thereby frustrating the attempted eradication.

An object of the present invention is to provide a printed document which is sensitive to attempted alteration by either the conventional eradication techniques which are useful with water based writing inks or by the newer eradication techniques which may be used with ball point pen inks.

The foregoing objects are attained, in the preferred embodiment of the invention described herein, by printing background elements in a document adapted to be written upon according to two different techniques. In one area of the document, which may be the area where the name of the payee is to be inserted, background elements (fine lines, dots, etc.) are printed from two complementary plates. One of the two plates may print the fine lines in a portion of the area which defines a plurality of parallel bars. The other of the two plates may print the rest of the area, filling in the unprinted spaces between the parallel bars of the first plate. The first plate is printed with an ink which is eradicated by any of the conventional eradication techniques, principally bleaching and/or dissolving in water. The second plate is printed with an ink sensitive to any of the new ball point ink eradication techniques.

Other objects and advantages of the invention will become apparent from a consideration of the following specification and claims, taken together with the accompanying drawings.

In the drawings:

FIG. 1 is a plan view of a bank check printed in accordance with the invention;

FIG. 2 is a plan view of the check of FIG. 1 after it has been subjected to a conventional eradication technique;

FIG. 3 is a plan view of the check of FIG. 1 after it has been subjected to a ball point eradication technique;

FIG. 4 is an illustration of a background design for an alteration sensitive document printed in accordance with a modification of the invention;

FIG. 5 is a plan view of the background of FIG. 4 after it has been subjected to a ball point ink eradication technique; and

FIG. 6 is a plan view of the background of FIG. 4 after it has been subjected to a conventional ink eradication technique.

Referring to FIGS. 1 to 3, there is shown in each of these figures a bank check having a blank for the insertion of the name of the payee. The area in which the payee's name is to be inserted is enclosed in a dotted rectangle 1. Another area, in which the amount of the check is to be inserted is enclosed in a second dotted rectangle 2. Both of the areas 1 and 2, and in fact the entire face of the bank check has printed thereon spaced background elements, shown for purposes of illustration as straight lines 3. The background elements may alternatively be dots or the dots may be run into one another so as to produce a half-tone effect.

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The dotted rectangle 1 is shown as being traversed by a plurality of dotted diagonal lines 4. Neither of the rectangles 1 and 2 nor the dotted diagonal lines 4 are printed on the face of the check, but are simply employed to illustrate the present invention.

The dotted lines 4 may be said to separate the area within the rectangle 1 into a plurality of diagonal bands or bars. One set of alternate bars between the dotted lines 4 have their background lines 3 printed in an ink which is preferably both bleachable and water soluble, although some protective advantages of the invention may be secured by using an ink which is bleachable only or an ink which is water soluble only. This ink should be insoluble in organic solvents. Alternatively, a bleachable ink could be used for some of the bars and a water soluble ink for other bars. The bars whose background elements are printed in the bleachable, water soluble ink may be the bars shown at 5 in FIG. 2, which appear blank in that figure.

The bars 6, located between the bars 5, and forming with the bars 5 complementary portions of the area within the rectangle 1, are printed in an ink which is not water soluble nor bleachable, but which is soluble in organic solvents. In particular, the printing ink should be soluble in organic solvents selected from the class having not more than eight carbon atoms and consisting of the lower alcohols and lower ketones. There are two principal reasons for so limiting the class of organic solvents. One reason is that the alcohols and ketones as defined above are the ones which are most readily available commercially and most likely to be used by a person attempting to alter a document such as a check. Another reason is that the higher ketones and alcohols do not act rapidly enough as solvents, and spread the ink into the paper instead of carrying it away. Consequently, a person seeking to alter such a document is frustrated if he attempts to use any of the higher alcohols or ketones.

The area within the rectangle 2 has its background lines printed in an ink which is soluble both in water and in organic solvents of the class described above, and is also bleachable.

If a person seeking to alter a document such as that shown in FIG. 1 uses on the document a bleach or solvent solution including water, then while he may successfully remove the handwriting, depending upon the particular writing ink which was used, he will also remove the printing ink from the bars 5 and from the space within the rectangle 2 so that the document will then have the appearance illustrated in FIG. 2. If he uses the lines altering technique rather than the sheet altering technique, then the background elements will disappear from some parts of the lines and not from others in the area within the rectangle 1, whereas the background lines will disappear completely wherever the line technique is used within the rectangle 2. The forger's problems of completing a successful alteration are thereby made extremely complex, since he must, if he wishes to pursue his efforts, replace the background lines which have been eradicated. This becomes extremely difficult where part of the background lines remain and only part of them have been taken out.

If the person seeking to alter the document uses one of the organic solvents of the class identified above, applying the sheet technique, then the check assumes the appearance illustrated in FIG. 3, wherein the bars 6 have their background lines eradicated, and the background lines remain in the bars 5. In the area within the rectangle 2, the background lines are completely eradicated.

The background lines in the parts of the check outside the areas 1 and 2 may be printed in an ink which is neither bleachable nor soluble in water nor in an organic solvent of the class described.

FIGS. 4 to 6

These figures illustrate another modification of the invention wherein the background elements are printed

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employing a slightly different technique. The background elements in FIGS. 4 to 6 are shown as consisting of a repeated phrase "Nthnational Bank." The lines of printing are staggered so that the words do not appear under one another. The complete area to be written upon, which is shown at 7 in FIG. 4, is printed from two plates, which cover complementary areas of the design. One plate, when used alone, prints the background elements as shown in FIG. 5, leaving spaces on the paper which spell out the word VOID. The second plate prints only those parts of the design which fill in the spaces in FIG. 5, namely the word VOID. The plate which prints the portion of the area shown as printed in FIG. 5 should be printed with a bleachable, water soluble printing ink, which is not soluble in organic solvents, and the plate which prints the portion of the area shown in FIG. 6 should be printed with an organic solvent soluble printing ink, which is not bleachable nor soluble in water. Of course, the order of using the inks on the respective plates may be reversed, so that the organic solvent soluble printing ink is used on the plate of FIG. 5, whereas the water soluble printing ink is used on the plate of FIG. 6.

After a complete document, or a writing area of a document has been printed as shown in FIG. 4, then if an alteration is attempted using a bleach or water, then the document or writing area appears as shown in FIG. 6, with the word VOID appearing. If on the other hand, an organic solvent alteration technique is used, then the appearance of the writing area is changed to that of FIG. 5, so that the word VOID appears in blank spaces against the printed background elements.

Note that in the background of FIGS. 1 to 3, the fine background lines 3 are made parallel to the long dimension of the diagonal bars 4. The spacing between these lines is somewhat uneven. Furthermore, the lines are commonly made with irregular wiggles. By making the lines so irregular and by making them parallel to the bars 4, the problem of securing registration between the two separate plates which print the two sets of bars, is considerably eased.

Correspondingly, in FIGS. 4 to 6, note that each of the two printing plates contains complete letters. No letter is broken so that part of it is printed by one plate and part by the other. This also contributes to the ease of registration between the two plates. Note that the outlines of the letters in the word VOID are irregular. This irregularity makes it difficult and in fact practically impossible for any one to recognize the fact that, in the two complementary portions of the document, the background elements are printed in different printing inks of the same visible color but different physical and chemical properties.

In the foregoing description, the phrase "writing ink" is used broadly to include both conventional inks and ball point pen inks.

While reference has been made to the printing inks themselves as being water soluble or organic solvent soluble, the characteristics of the printing inks themselves are not so important in this respect as the characteristics of the lines printed in those inks. The lines consist essentially of coloring material, which may be either pigments, dyes or lakes or a mixture thereof, and a residue of a printing ink vehicle. Where a printing ink is spoken of as being soluble in a certain solvent, either both the coloring material and the vehicle residue should be so soluble, or the coloring material or the vehicle residue must be sufficiently soluble to "bleed" substantially when the solvent is applied. On the other hand, where a printing ink is spoken of as being insoluble in a certain solvent, then that insolubility can be attained by using either an insoluble coloring material, or an insoluble vehicle, or both.

Many printing inks are known which are not soluble in water nor organic solvents of the class described and which are also not bleachable. A common example of

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such an ink would be one using carbon black as the coloring material and bodied linseed oil as the vehicle.

Printing inks which are soluble in water and which are bleachable are also common. An example of such an ink would be one including 1 to 2 parts by weight of Tartrazine yellow, i.e., the sodium salt of benzeneazopyrozone-carboxy-disulfonic acid, as a coloring material and 20 to 25 parts by weight of a vehicle. The vehicle may consist of 2 to 4 parts by weight of glycerine and 1 part by weight of potato dextrine.

Many inks can be formulated using vehicles and coloring materials common in the printing ink art, which are soluble in organic solvents of the class described, and insoluble in water and not bleachable. Two examples of such inks, both of which were found suitable for use in connection with the present invention, are set forth below.

Organic Solvent-Soluble Ink—Example I

One part by weight of a spirit soluble dye, such as a sulfonated condensation product of a phthalocyanine blue and guanidine and one to three parts by weight of a vehicle consisting of a high molecular weight glycol. For example, octylene glycol, or 1 to 3 butylene glycol, or mixtures of the two may be used. Hydroabietyl alcohol may be added to the vehicle to increase its viscosity—any desired range of proportions may be used.

Organic Solvent-Soluble Ink—Example II

40 to 60 parts by weight of a vehicle consisting of linseed oil oxidized or otherwise bodied to produce a suitable viscosity, 30 to 50 parts by weight of magnesium carbonate, used as an extender, and 5 to 10 parts by weight of a blue coloring material of the type known as a "toner." For example, this toner may be a monosulfonic acid derivative of phenylated rosaniline, for example, Alkali Blue.

It is also possible to use known vehicles and coloring materials common in the printing art to produce printing inks which will be both bleachable and soluble in water and in organic solvents of the class described. One example of such an ink which has been found suitable for use in connection with the present invention consists of 50 to 70 parts by weight of sulfonated castor oil as a vehicle, 20 to 50 parts by weight of an extender which may be aluminum hydrate, or calcium silicate or magnesium silicate or mixtures thereof, and 6 to 12 parts by weight of coloring material which may be a dye of the diaminothriphenylmethane group, for example, Malachite Green.

While I have shown and described certain preferred embodiments of my invention, other modifications thereof will readily occur to those skilled in the art, and I therefore intend my invention to be limited only by the appended claims.

I claim:

1. A printed document sensitive to attempted alteration comprising an area adapted to be written upon in ink and having a background of printed elements, certain of the background elements of said area being printed in bleachable, water-soluble and lower alcohol and lower ketone insoluble ink wherein said lower alcohol and said lower ketone contains not more than 8 carbon atoms per mole-

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cule and certain other background elements of said area printed in non-bleachable, water-insoluble and the aforesaid lower alcohol and the aforesaid lower ketone soluble ink so that certain printed elements are bleachable and water-soluble and said certain other printed elements are soluble in the aforesaid lower alcohol and in the aforesaid lower ketone.

2. A printed document sensitive to attempted alteration comprising an area adapted to be written upon in ink and having a background of printed elements, certain of the background elements of said area being printed in a water-soluble and lower alcohol and lower ketone insoluble ink wherein said lower alcohol and said lower ketone contains not more than 8 carbon atoms per molecule and certain other background elements in water-insoluble and the aforesaid lower alcohol and the aforesaid lower ketone soluble ink so that certain printed elements are water-soluble and said certain other printed elements are soluble in the aforesaid lower alcohol and the aforesaid lower ketone.

3. A printed document sensitive to attempted alteration comprising an area adapted to be written upon in ink and having a background of printed elements, certain of the background elements in one of two complementary portions of said area being printed in a water-soluble, lower alcohol and lower ketone insoluble ink wherein said lower alcohol and said lower ketone contains not more than 8 carbon atoms per molecule and background elements in the other portion printed in water-insoluble and the aforesaid lower alcohol and the aforesaid lower ketone soluble ink of substantially matching color so that certain printed elements in said one portion are water-soluble and the aforesaid lower alcohol and the aforesaid lower ketone insoluble and certain printed elements in the other portion are soluble in the aforesaid lower alcohol and in the aforesaid lower ketone and water-insoluble.

4. A printed document sensitive to attempted alteration comprising an area adapted to be written upon in ink and having a background of printed elements, certain of the background elements being printed in a bleachable, water-soluble and lower alcohol and lower ketone insoluble ink wherein said lower alcohol and said lower ketone contains not more than 8 carbon atoms per molecule, certain other printed elements being printed in a water-insoluble, non-bleachable and the aforesaid lower alcohol and the aforesaid lower ketone soluble ink and still certain other printed elements being printed in a water-soluble, bleachable and the aforesaid lower alcohol and the aforesaid lower ketone soluble ink.

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