

H. W. F. LORENZ.
SENSITIVE SAFETY LITHOPRINT AND PROCESS.
APPLICATION FILED DEC. 21, 1909.

967,794.

Patented Aug. 16, 1910.

FIG. 1.

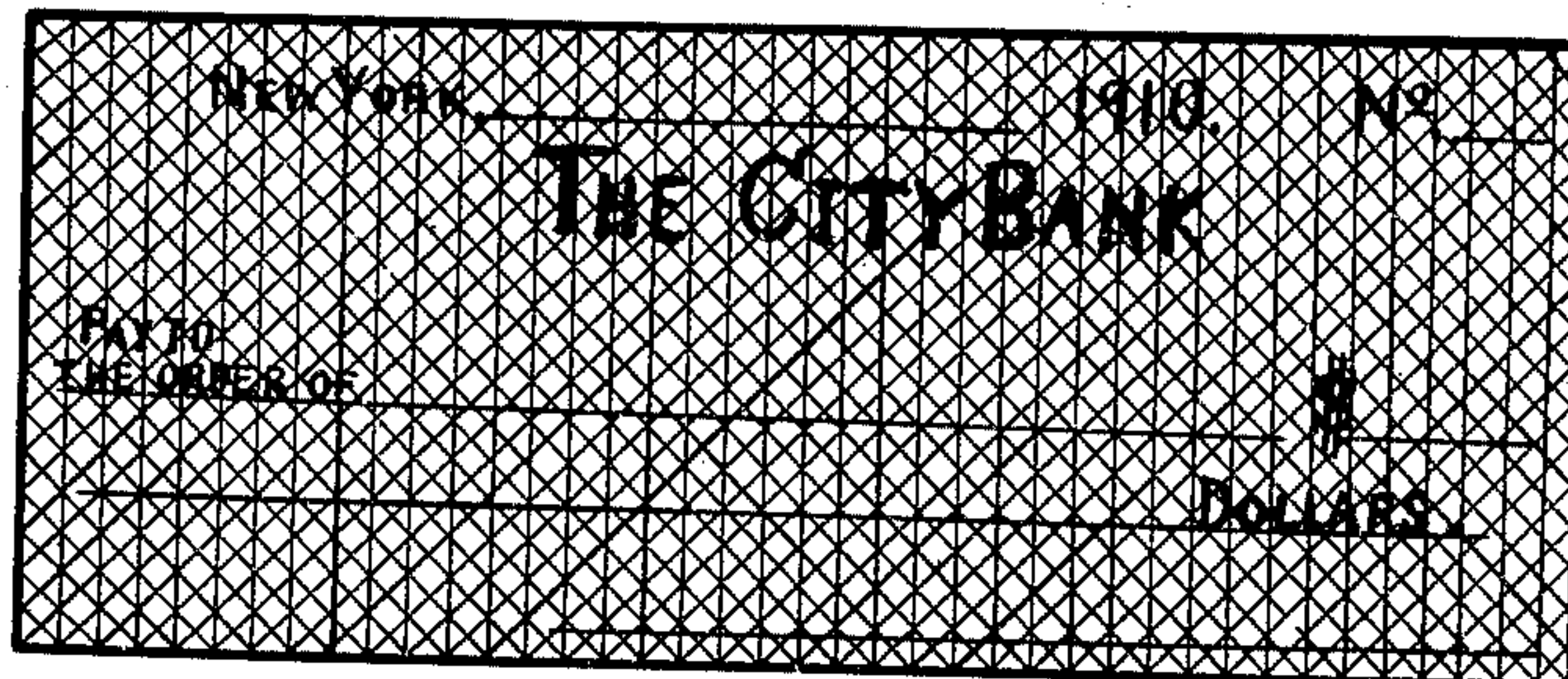


FIG. 2.

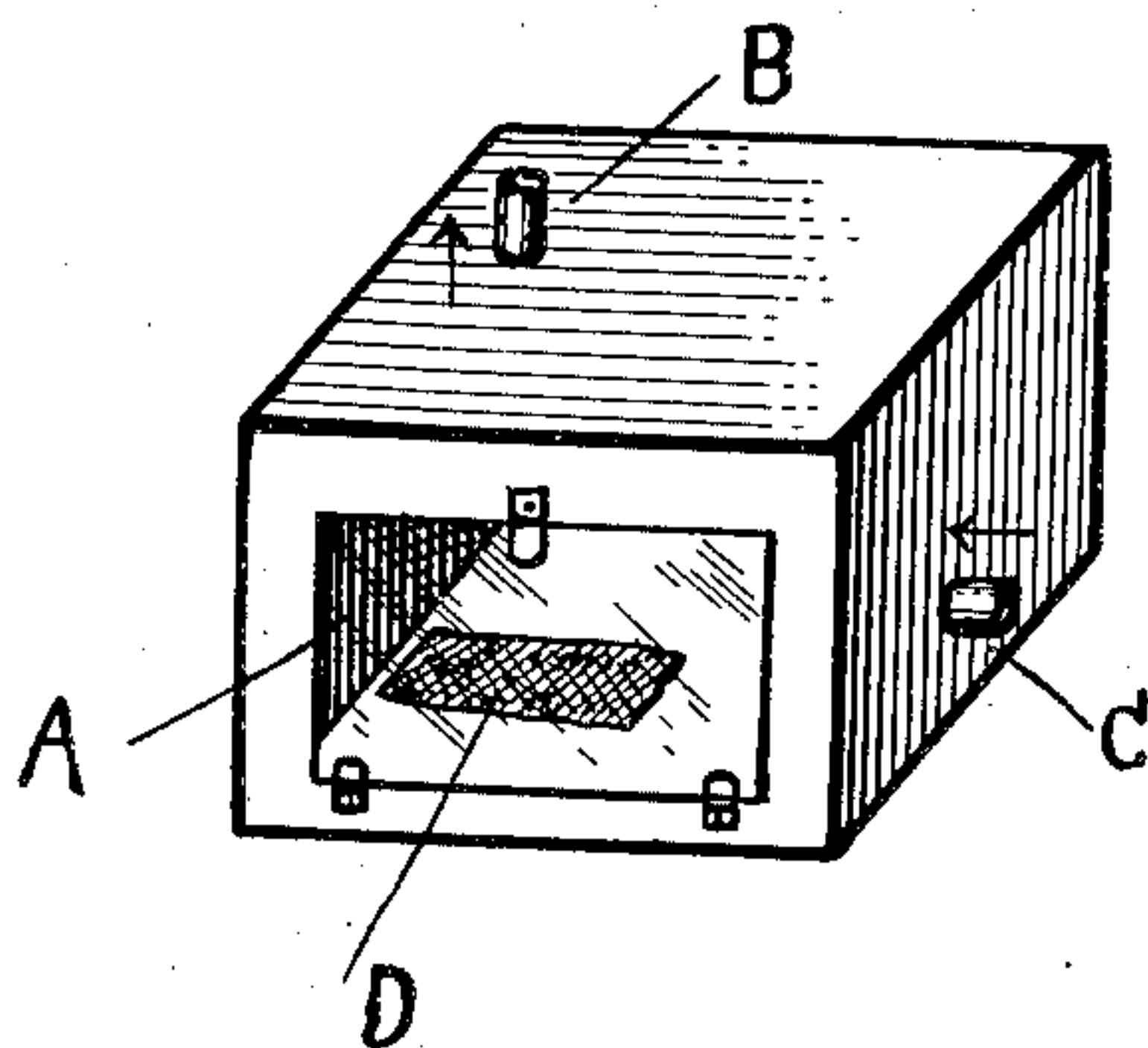
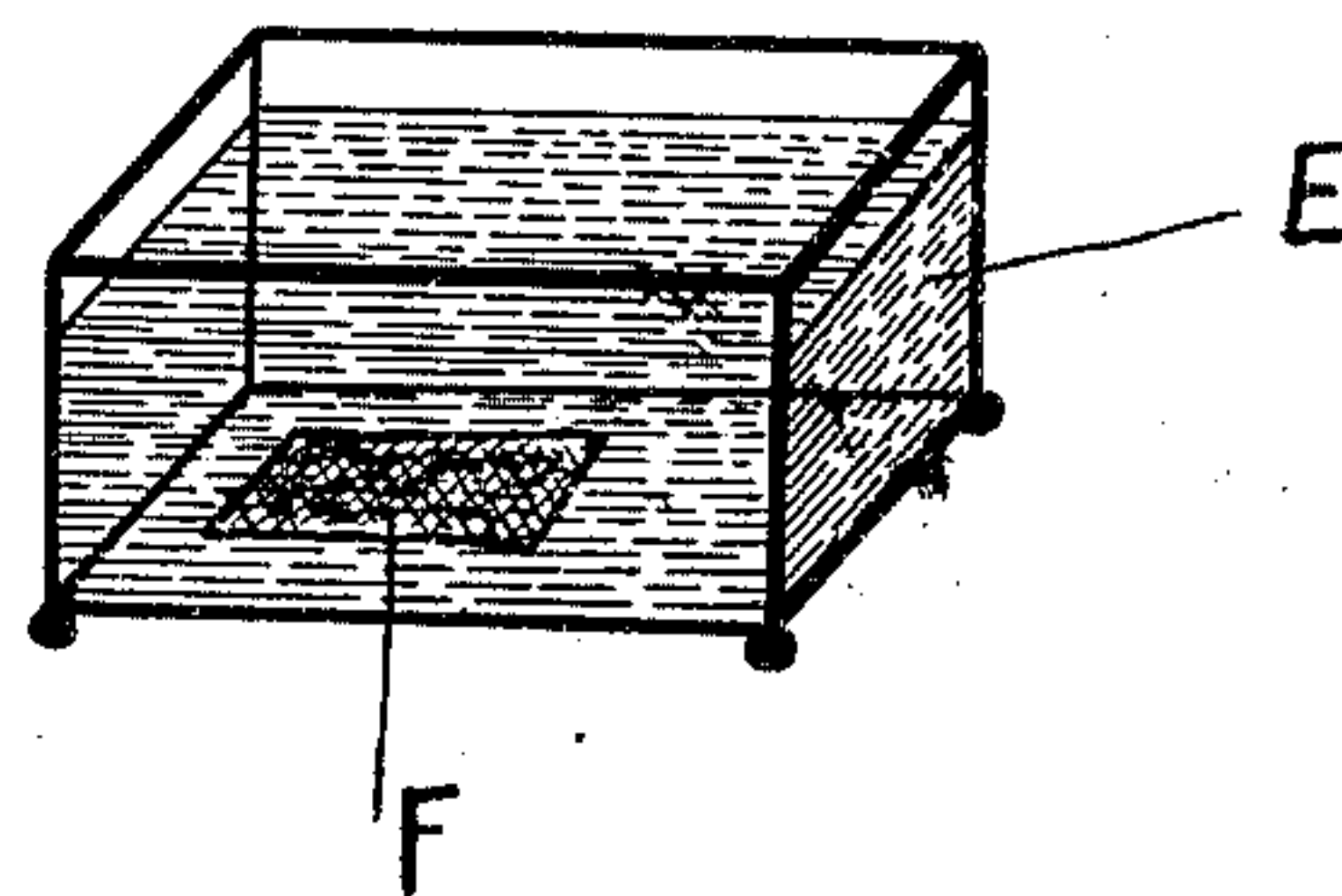


FIG. 3.



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SENSITIVE SAFETY-LITHOPRINT AND PROCESS.

967,794.

Specification of Letters Patent.

Patented Aug. 16, 1910.

Application filed December 21, 1909. Serial No. 534,388.

To all whom it may concern:

Be it known that I, HENRY W. F. LORENZ, a citizen of the United States, and a resident of the city of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and Improved Sensitive Safety-Lithoprint and Process, of which the following is a clear, full, and exact description.

This invention relates to the manufacture of sensitive safety lithoprints such as are intended to be used for checks, letters of credit, bank notes, postage and revenue and trade stamps, bonds, stock certificates and the like security papers (it being often desirable to print a part or the whole of such security papers lithographically).

So called sensitive lithoprints have in the past been made by using as the vehicle in the ink slow drying oils in place of the ordinarily employed drying oils. The result has been unsatisfactory. The oils envelop the sensitive color particles and prevent them, even in the most favorable cases, from being sensitive to any but bleaching solutions; eventually, when the oils have dried, all sensitiveness is lost. However, owing to the peculiarity of the litho printing process requiring an oily or greasy ink repellent to water, an oily or greasy vehicle for the litho ink cannot be dispensed with. But true sensitive safety litho prints must be free from greasy substances.

The object of my invention is a sensitive safety litho print devoid of oil or grease,—so as to be truly sensitive to the chemical reagents ordinarily employed in removing writing ink—and having the sensitive coloring matter fixed firmly upon the paper surface.

In carrying out my invention I, ordinarily, may divide my process into four steps, viz.: (1) preparation of the special ink, (2) printing therewith from the ordinary litho stone, or from zinc, aluminium, etc., (3) steaming said print, and (4) removal of the vehicle from the ink on the print (grease or oil varnish), and drying the print.

Reference is to be had to the accompanying drawings which form a part of this specification.

Figure 1 represents a check which is formed according to my invention, being printed with my special litho-ink.

Fig. 2 shows a simple form of closed receptacle, or steaming box, into which steam

enters at (C) and passes out at (B). (A) represents a removable glass door through which is seen the check (D) being subjected to steam vapor.

Fig. 3 shows a simple form of dish containing a suitable solvent (E) in which is immersed the check (F). This latter treatment is for removing the vehicle from the ink on the print (grease or varnish). Subsequently the print is returned, for drying (removing the solvent) to the steaming box as shown in Fig. 1, or dried in the air.

Whenever varnish is mentioned in this specification applicant has in mind a litho varnish, preferably one possessing non-drying properties, or very slow drying ones, for instance, such as can be made by "blowing" non- or slow-drying vegetable oils.

Examples of slow drying oils are cotton seed oil, rape seed oil; very slow drying or non-drying oils, castor oil, olive oil.

In preparing the special litho ink, I incorporate the chemically sensitive coloring matter in a solution of a coagulable substance such as, for instance, albumen, casein, gelatin or similar working substances, coagulate these, by heat or chemically, and then thoroughly grind the resultant mass in an ink mill with a large percentage of a non-drying oily or greasy varnish.

In place of the coagulable substances I may employ gelatinous bodies such as gelatin, agar agar, gum tragacanth, tragacanth and the like, incorporating the sensitive coloring matters with these, permitting the same to gelatinize by cooling, or otherwise, and then grinding the resultant mass, as described, with varnish.

The ink thus prepared is printed with in the ordinary way, from a stone or from zinc or aluminium, the resultant print is preferably steamed (which steaming process should be carried out as soon as possible after the print has been made) and, finally, the print is washed with, or immersed in, a suitable solvent for the oily ink vehicle and dried to free it from said solvent. The finished print, freed from all oil or grease, will be found to be extremely sensitive to chemical reagents.

Suitable solvents are, petroleum ether or gasoline, ordinary ether, benzene, carbon tetrachlorid, carbon bisulfid, etc.

A few examples will illustrate different modifications of my process.

The varnish employed must not be driable

when the print is subjected to steam vapor, otherwise the dried part of the vehicle could be extracted from the print only with difficulty, if at all.

- 5 Another point to be noted is that the gelatinized, or coagulated mass containing the coloring matter must not contain too much moisture, nor must the same form too large a part of the litho ink. If this is the case, 10 the ink will not take properly on the stone, or metal. I have found that the best working ratio of gelatinous or coagulated mass, containing the coloring matter sensitive to chemical reagents, to the varnish is from 15 1:4 to 1:6.

The coloring matters may be soluble or insoluble sensitive colors, or sensitive lakes of such colors. I, ordinarily, prefer to use the insoluble sensitive lakes.

- 20 (1) Dissolve 4 parts of gelatin in 6 parts of water. Add 2 parts of cotton red 4 B. A small quantity of glycerin may be added. Let the mass dry uniformly until the moisture content equals about 32 per cent. 25 Now take about one part of the above mixture and add four parts of varnish. Grind thoroughly in an ink mill and print with the resultant ink. Steam the print and immediately immerse it in petroleum ether. 30 Let the print dry. Reactions of the litho print: solutions of oxalic acid, gray-black; alkalies, redder; bleaching powder, bleached.

- (2) Dissolve 4 parts of gelatin in 6 parts of water. Add 2 parts of cotton red 35 4 B lake ($C_{36}H_{26}N_6O_6S_2Ba$). Now add enough formaldehyde to coagulate the mass. Permit the latter to dry uniformly until the moisture content equals about 31 per cent. Now take one part of the mixture and add 40 five parts varnish. Proceed as above mentioned. Reactions of litho print, same as preceding.

- (3) Digest thoroughly 4 parts of egg albumen with 6 parts of water. Add 2 45 parts of cosmos red (Badische). Coagulate the mass by heating on a water bath. Let the coagulum dry uniformly until the moisture in the same equals 33 per cent. Now take one part of the coagulum and add 50 parts of varnish. Grind thoroughly in an ink mill and print with the resultant ink. Steam the print and immerse it in ordinary ether. Let the ether taken up by the paper evaporate. Reactions of the litho print: 55 solutions of oxalic acid, blue; alkalies, redder; bleaching powder, bleached.

- (4) Digest on a water bath 1 part of agar agar with 10 parts of water. Heat 60 for some time until a uniform mixture is obtained, replacing the water that evaporates by adding more water from time to time. Let cool and permit the mass to gelatinize. To prepare the litho ink proceed as follows: take of the agar agar jelly 10 65 parts and heat on a water bath until the

mass melts. Now add 2.5 parts of Congo red lake ($C_{32}H_{22}N_6O_6S_2Ba$) containing about 10 per cent. of moisture, mixing thoroughly. Let the mass cool to gelatinize; then partially dry the same until the moisture content equals about 38 per cent. Now 70 take a part of the above, semi-dried, mixture and add five parts of varnish. Grind thoroughly in an ink mill and print with the resultant ink lithographically. Steam 75 the print (steaming is not always necessary) and dissolve out the varnish of the print with a solvent. Reactions: solutions of oxalic acid, blue; alkalies, red, soluble; bleaching powder, bleached. 80

(5) Treat 5 parts of gum tragacanth with 40 parts of water. Digest on a water bath for at least 48 hours. 10 parts of Congo red are now added. Permit the mass to dry until the moisture present equals about 25 85 per cent. Take one part of the same and add four parts of varnish. Grind thoroughly in an ink mill and print with the resulting ink. Steam the print made with this ink, and dissolve out the vehicle as 90 above described. Finally, the print can be washed with water, the gelatinous gum being thus removed; the color being fixed on the paper.

Instead of proceeding as above described, 95 I may also carry out my invention of making a chemically sensitive litho print as follows: (It will be noted that in all cases I print with an ink containing an oily or greasy vehicle and then get rid of this 100 vehicle in the finished print.) I may mix the chemically sensitive coloring matter (or coloring matter previously incorporated with a gelatinous or coagulable substance) with a volatile oily vehicle, print therewith 105 and subject the resultant print to heat, or steam vapor. Or, I may employ a semi-volatile vehicle in which the non-volatile part of the vehicle must be removed with a solvent, as above described. 110

Examples are here appended:—

Ink with volatile vehicle.—Take as the vehicle, for instance, 7 parts cedar wood oil and dissolve in it 5 parts of camphor. With this vehicle mix thoroughly 2 parts of 115 Congo red lake. Print with this ink and subject the print to heat, or steam vapor.

Ink with semi-volatile vehicle.—Take as the vehicle, for instance, 7 parts cedar wood oil and dissolve in it 5 parts of camphor and 120 1 part of varnish, or Venetian turpentine, then add 2 parts of Congo red. Print with this ink, subject the print to steam vapor, and extract the residual part of the vehicle with a solvent. 125

It is evident that in the litho inks mentioned in this specification inert bases, such as blanc fixe, sublimed lead, etc., may be present.

The inks can also be used typographically, 130

but more direct processes for making sensitive typographical prints are available. Washing out the gelatinous substance from finished print is not strictly necessary.

5 I claim:

1. The process of making a sensitive safety litho print on paper for checks, letters of credit, bank notes, postage and revenue and trade stamps, bonds, stock certificates and the like security papers, which consists in incorporating a chemically sensitive coloring matter in a solution of a coagulable substance, coagulating said substance, thoroughly grinding the coagulated mass in an excess of an oily vehicle such as varnish, printing lithographically on paper with the resultant ink, steaming the print, and eliminating the oily vehicle from the print by treatment with a solvent for the vehicle.

2. The process of making a sensitive litho print on paper for security papers, which consists in incorporating a chemically sensitive coloring matter in a solution of a gelatinous substance, gelatinizing said substance, thoroughly grinding the gelatinous mass in an excess of an oily vehicle such as varnish, printing lithographically on paper with the resultant ink, steaming the print, and eliminating the oily vehicle from the print by treatment with a solvent for said vehicle.

3. The process of making a sensitive litho safety print on paper for security papers, which consists in incorporating a chemically sensitive coloring matter in a coagulable substance, coagulating said substance, thoroughly grinding the coagulated mass in an oily vehicle such as varnish, printing therewith on paper, steaming the print, and eliminating the oily vehicle from the print by treatment with a solvent for said vehicle, and drying the print.

4. The process of making a sensitive safety litho print on paper for security papers, which consists in incorporating a chemically sensitive coloring matter in a gelatinous substance, coagulating said substance, thoroughly grinding the gelatinous mass in an oily vehicle such as varnish, printing therewith on paper, steaming the print, and eliminating the oily vehicle from the print by treatment with a solvent for said vehicle, and drying the print.

5. The process of making a sensitive safety litho print on paper for security papers, which consists in incorporating a chemically sensitive coloring matter in an aqueous medium, thoroughly emulsifying this with an oily medium, printing therewith and eliminating the oily medium from the print.

6. The process of making a sensitive safety litho print on paper for security papers, which consists in taking a chemically sensitive coloring matter and incorporating it in a volatile vehicle, printing therewith litho-

graphically on paper and steaming the print to drive off said volatile vehicle and fix the coloring matter on the paper.

7. The process of making a sensitive safety litho print on paper for security papers, which consists in taking a chemically sensitive coloring matter and incorporating it in a volatile vehicle, printing therewith on paper and heating said print to drive off the volatile vehicle.

8. The process of making a sensitive safety litho print on paper for security papers, which consists in taking a semi-volatile vehicle, mixing with it a chemically sensitive coloring matter, printing therewith, driving off the volatile part of the vehicle, and extracting the non-volatile part of the vehicle with a solvent, leaving the coloring matter fixed on the paper surface.

9. The process of making a sensitive safety print lithographically on paper for security papers, which consists in taking a water-soluble medium containing a chemically sensitive coloring matter and emulsifying it thoroughly with an oily medium, printing therewith and eliminating the oily medium from the print.

10. The process of making a sensitive safety litho print on paper for security papers, which consists in incorporating a chemically sensitive coloring matter in a gelatinous substance, gelatinizing said substance, thoroughly grinding the gelatinous mass in varnish, printing therewith on paper, and eliminating the oily vehicle from the print by treatment with a solvent for said vehicle, and drying the print.

11. As a new article of manufacture, a chemically sensitive safety litho print devoid of vehicle.

12. A chemically sensitive safety litho print from which the oily and greasy vehicle has been removed by evaporation.

13. A chemically sensitive safety litho print from which the oily and greasy vehicle has been removed by a solvent.

14. A chemically sensitive safety litho print having the chemically sensitive color, incorporated in a gelatinous mass, residually upon the paper.

15. A chemically sensitive safety litho print having the chemically sensitive color and gelatinous mass left residually upon the paper surface.

16. A chemically sensitive safety print on paper, made lithographically, having the sensitive color firmly attached to the paper surface.

17. The process of making a sensitive safety litho print on paper for security papers, which consists in incorporating a chemically sensitive coloring matter in an aqueous gelatinous medium, thoroughly mixing this with an oily medium, printing therewith and eliminating both aqueous

gelatinous medium and oily medium, leaving the coloring matter fixed upon the paper surface.

18. The process of making a sensitive
5 safety litho print on paper for security
papers, which consists in incorporating a
chemically sensitive coloring matter in an
aqueous gelatinous medium, thoroughly mix-
ing this with an oily medium, printing
10 therewith; steaming the print, and eliminat-

ing the oily medium and aqueous gelatinous
medium, leaving the coloring matter fixed
upon the paper surface.

In witness whereof I have subscribed my
name to this specification in the presence of 15
two subscribing witnesses.

HENRY W. F. LORENZ.

Witnesses:

CHARLES MILLER,
FRANK HACKETT.