

THE  
SPATULA PUBLISHING  
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INK LIBRARY

FORMULARY

RECIPES AND DIRECTIONS  
FOR MAKING ALL KINDS  
OF INKS FOR ALL KINDS  
OF PURPOSES

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BY

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## PREFACE

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**T**HE compiler of this book has been collecting formulas for the last thirty-five years for the purpose of publishing them to the world in book form. He presents herein the only complete list of ink formulas for every practical purpose ever published. In fact practically all known recipes for inks can be found in this volume.

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## THE ART OF MAKING INK.

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**M**UCH care and skill have been spent on ink. A learned scientist, struck by the annoyances caused by ink stains, invented a writing fluid which was quite colorless, and which consequently would not mark the whitest of linen or stain the brightest of carpets. Only when the ink was put on specially-prepared paper did it turn black. For some reason, however, this invention did not pay.

Ordinary ink — the ink that we use every day — can be made in several ways. But usually it is produced from galls, salts of iron, a little gum, and the liquor obtained from logwood.

Galls, or gall-nuts, are commonly known as “oak-apples.” An insect makes a tiny hole in a tree, and in that hole lays an egg, which it covers with a peculiar liquor that causes a sort of tumor on the spot. This tumor, brown in color and about the size of a marble, we call an “oak-apple.” Its real name is gall-nut, and the insect which produces it is called a gall-fly, which by forming the galls makes a home for its young. The best of these nuts come from Turkey.

Logwood is obtained from a tree found in many parts of the West Indies. It is wood of a red color and so heavy that it sinks in water; and it is largely used in dyeing, and calico-printing to give a black or brown color.

In making ink, a quantity of galls are pounded into small pieces and mixed with chopped straw:

Nothing is obtained from the latter; it is added to prevent the galls forming into a sticky mass. The two materials are put into a vat, and warm water is thrown over them. As this soaks through the galls it brews them, as one may say. When all the water passes through holes at the bottom of the vat, it is drawn off by means of a tap and thrown on the galls again; and this process is repeated as many times as may be necessary to obtain the proper strength. When copperas and gum have been added to the liquor made in this way, the result is ink.

But if we used it at this stage it would not be black when we put it on paper, though it would turn to that color when it dried. For this reason it is usual to add some extract of logwood, which has the effect of making the ink clear and distinct as soon as it is used. This, however, is of course not really necessary. Afterwards the ink is bottled.

The composition of some inks, which are sold only in large bottles, is a secret of the makers. One of these must contain some strong ingredients, for it soon spoils steel pens and eats into the paper so that it cannot be scratched out. In some countries registrars of births, marriages and deaths are all obliged to use this ink for making entries in their books, which of course have to last for ages, and which are referred to whenever a

dispute may arise with regard to a birth, a marriage, or a death.

Copying inks, which are so called because, with the aid of a sheet of damp paper and a hand-press, a copy of any document written with them can easily be obtained, are ordinary inks with the addition of a little sugar or glycerine. Colored inks are made by dissolving colors in certain liquids. To mention one, the best red ink is produced by mixing carmine and quassia.

For several centuries an infusion of nut-galls treated with sulphate of iron composed the only known ink.

#### ABOUT WRITING INK.

Judging from our correspondence, this topic is one constantly recurring, and apparently never exhausted. Only a tyro expects a receipt for making a perfect ink; if perfection exists anywhere, it is certainly not to be in writing fluids, for every experienced druggist knows too well the imperfection of the best of them. But a simple process to make a good ink is all that is required by a reasonable person, and this we find described in the Chemist and Druggist, together with a practical discussion interesting to druggists, who usually like to know why a certain manipulation succeeds while another is a failure. Our contemporary says:

“Opinion is divided as to the writing inks of the ancients. Some think that they were a mechanical mixture of pigments resembling the Indian ink of more modern times; others think that they were a veritable chemical compound, and others still that they were a mixture of these two elements in proper combination. In any case, opinion is not divided regarding the superiority of the old over that of more recent time, both as regards brilliancy and permanency. All modern inks are essentially gallo-tannates of iron, though varying somewhat both in their mode of preparation and in the proportion and variety of the different ingredients entering into their composition. There are exceptions to this statement, as, for example, the cheap and simple ink discovered by the German chemist, Runge, prepared from infusion of logwood and chromate of potash. An ink prepared from these ingredients is not affected by acids or water, is black, forms no deposit, and is not acted on, nor does it act on the pen in using. Unfortunately, after it has been prepared for a time, it gelatinizes, in which condition it is totally unfit for use, nor have means yet been devised to prevent this change or to restore it once it has taken place. Consequently, it is not known commercially, and the same may be said of every other preparation not having at least a trace of gallo-tannate of iron as a basis. Our remarks will, therefore, have reference entirely to such inks, and they may be conveniently divided into three parts, viz.: (1) the *ingredients*, with reference more directly to the relative proportions in which they should be present; (2) the *preparation*, bearing on the changes which take place in the different ingredients; and (3) the *preservation* of the ink, bearing more immediately on the changes which take place from exposure, age, etc.

*The Ingredients.*—These are infusion of galls, sulphate of iron and gum, the last entering into all inks (with the exception of the blue-black ink, afterwards

to be referred to) for the purpose of holding the gallotannate precipitate in suspension, and also giving the ink a body and gloss on drying. If too much gum be added the ink will lie on the paper without penetrating its surface, and will in consequence be easily removed. Moreover, certain other inconveniences will arise, such as the clotting of the ink in the inkstand on the least exposure, and the coating of the pen with the gummy matter, which prevents the ink flowing. The gum then should, in every case, be kept under rather than over, and most authorities give the proportion, as will immediately be shown, as part for part with the amount of iron taken. The apportioning of the iron and gall infusion is a more important matter, as on this depends both the intensity and durability of the ink. If the gall infusion be in excess, the ink, though black at first, will quickly change to more or less of a dirty brown; while, if the iron be in excess, it is equally objectionable in the other direction. Out of many recipes given in Watt's Dictionary, some of which are referred to as being too rich, and others as being too pale, three are selected as giving good commercial inks, and in these the proportions are respectively as follows:

Galls	Iron	Gum	Water
12.5	2.4	2.4	100
6.6	2.2	1.9	100
6.2	3.1	3.1	100

We have not tried any of these, but from experiments with other recipes we would imagine the first had about the proper proportion of galls, but a deficiency of iron, while the other two were both deficient in galls, and number three had an excess of iron for the proportion of galls used. This will probably be more forcibly brought out if we cite the recipes given by various other authorities. Ure, for example, gives the following proportions, with the remark that "the ink made by the recipe is much more rich and powerful than many of the inks commonly sold," and to "bring it to this standard a half more of water may safely be added":

Galls	Iron	Gum	Water
10	4.2	4.2	100

and Gray gives the following proportions:

Galls	Iron	Gum	Water
10	3.3	3.3	100

Another authority (Lewis), who has investigated the subject thoroughly, gives the relative proportion of galls to iron as 3 to 1, and the most favorable results have been always obtained in our own experiments in the proportions of 3 to slightly in excess of 1. Brande, on the other hand, gives the proportions 5.0 of galls, 3.3 of iron, 3.3 of gum, to 100 water, but allowance must probably be here made for the mode in which the ink is directed to be made. The galls are directed to be boiled in the water, the iron and the gum added, and the whole kept for two months, with occasional agitation before straining for use. To understand properly the effect of these directions on the ultimate product, it is necessary to dwell for a little on the second part of the preparation.

Galls contain both tannic and gallic acids in variable proportions, stated by different authors to be from 26

per cent of the former with a trace of the latter up to 40 per cent of the one, and 3.5 per cent of the other. The noticeable features here are, first, the somewhat extreme variations in which the tannin is present, and which suggests the use of the best galls, so as to get as uniform a proportion in the ink as possible; and, second, the extremely small percentage of gallic acid, and which suggests various particulars in the preparation of the infusion, so as to increase the amount and bring it into proper ratio with the tannin. Both tannic and gallic acids yield precipitates with ferrous and ferric salts, the former white and the latter black; but as the gallic precipitate is much more intense with the ferric salt than the tannic, means are taken to convert some of the tannic into gallic acid in the preparation of the infusion. To accomplish this the infusion may be boiled for a considerable time, or it may be exposed for some weeks either in preparation or after it has been prepared to the action of the atmosphere.

It is here we venture to suggest that much of the want of uniformity so often complained of in inks is produced, and consequently a little attention to details will be both expedient and profitable. Even a little variation in the process, such as a more or less lengthened exposure to atmospheric influence, or an increase or diminution of the temperature at which the exposure takes place, will affect the composition of the infusion, and disturb the relation which the ingredients bear to each other. In practice we have found that a fortnight in summer, when the temperature ranges between 70° and 80°, is sufficiently long for the infusion to stand, but in the winter, when the temperature is considerably reduced, from three weeks to a month is necessary. This, we should state, however, is for the blue-black ink, which we purpose recommending, and in the preparation of which even more care is necessary than in the case of the ordinary inks. To make the blue-black ink, let 10 parts galls be taken and infused, as directed above, in 80 parts water. Strain, and add 3½ parts pure crystallized sulphate of iron, previously dissolved in 20 parts more of water. Lastly, add 4 parts sulphate of indigo, mix thoroughly, and bottle for use. This naturally brings us to the third part—viz., the preservation of the ink. And while our remarks here will refer more immediately to the preservation of the ink of the foregoing formula, many of them also will apply to all inks of the gallo-tannate series. All inks of this series darken on exposure to the atmosphere, owing to the oxidation of the iron. In the case of the ordinary inks, it is preferred that the peroxidation of the iron should be partially accomplished before using to give color, and, to a certain extent also, body to the ink. If the oxidation be carried too far, however, the precipitate will acquire greater density than in the case of the ferrous salt, and even in the presence of the gum will quickly deposit and leave the ink both watery in color and weak in strength. If, on the other hand, more gum be added to keep the precipitate in suspension, or if the bottle be shaken to diffuse the precipitate through the liquid, the ink in either case, on using, will simply lie on the surface of the paper, and may be erased without diffi-



culty. To prevent the iron in the blue-black ink from oxidizing, the addition of an acid is generally recommended, as this retards the conversion of the ferrous into ferric salt, and consequently keeps the ink in a thinner and paler state. Where the ink requires to be kept for a time,  $\frac{1}{8}$  part sulphuric acid, or, better still, 1 part oxalic, may be advantageously added; but, as all acids act injuriously on the pen, and, moreover, as an ink containing a free acid acts also on the salts contained, more or less, in all papers, their use where they can possibly be avoided is to be deprecated. The sulphate of indigo of commerce has, besides, invariably an acid reaction sufficient, if not to prevent oxidation, at least sufficient to make the ink bite the paper, and more than this is injurious. Nothing will prevent oxidation like care in making, and afterwards bottling securely. And herein consists the advantage of every chemist making and retailing his own ink. He can make it in quantities to suit his convenience and consumption, and he, therefore, can regulate the age, which, in other words, means the oxidation of the ink. Moreover, all the processes and all the appliances he is perfectly familiar with and has at his command, while the actual cost of the material itself is so infinitesimal that he may successfully compete — at least, in the limited sphere of his own circle — with the larger manufacturer, who, supplying wholesale and keeping up a somewhat expensive plant, is not so far removed as would at first appear from the level of his competition."

#### REACTIONS OF INKS.

Prof. C. A. Doremus in a lecture before the American Chemical Society on the chemical examination of writing fluids described their behavior on heating, or on applying reagents. Of the sympathetic inks, the color of which is developed by heat, those containing a cobalt salt become blue, while a nickel salt turns green, and onion juice brown. Lead acetate in ink is blackened by hydrogen sulphide, a copper salt gives a brown with potassium ferrocyanide, and a mercuric salt reacts with very dilute potassium iodide solution, forming a red precipitate. Potassium ferrocyanide yields a blue coloration with ferric chloride, tannin a violet black with the same reagent, pyrocatechin turns green with iron salts, and dimethaniline becomes violet in the presence of chromic acid.

Among other constituents of ink, eosine produces an orange-yellow color with hydrochloric acid, while corallin turns yellowish with the acid, and red with alkaline beta-naphthol. Amine turns yellow with hydrochloric acid (original color with beta-naphthol), safranine blue, chrysaniline yellow (purplish-red with beta-naphthol), carmine has its intensity reduced, and fuchsine is bleached (red with beta-naphthol.) Logwood ink darkens to purple with sodium nitrite, is bleached by hydrochloric acid, and its color is restored by beta-naphthol. Brazil wood turns darker red with the nitrate, is not affected by the acid, but becomes reddish-purple with beta-naphthol.

#### TESTING THE INK OF WRITINGS.

In a paper read before the Manchester Literary and Philosophical Society, William Thomson, F. R. S. E.,

speaking of the importance of testing the inks of manuscripts in legal cases. said: "It frequently happens that circumstantial evidence of a very simple character, which is often overlooked, might occasionally have the effect of conclusively proving the innocence or guilt of an accused person, or of pointing in some definite direction towards tracing the culprit. In civil legal cases the same class of evidence may prove equally useful.

"If, for instance, a person be murdered on the highway, and any weapon or instrument found with which the deed had been committed, it is needless to say that such implement would be carefully examined for name, mark, or number, or in fact any peculiarity by which it may be traced to its former owner. Again, recent footprints in the snow or in soft clay often present sufficient individuality about them to make them useful in the detection of crime, and these means are usually employed. Seldom, however, is it supposed that a common substance such as the ink used in writing a letter or document has any special individuality about it. All ordinary inks are black or nearly so, yet it is conceivable that the name and address of the writer of an anonymous letter may, under a given combination of circumstances, be contained within the black fluid with which the letter was written. If, then, a murderer has left his trace behind him in the shape of paper and ink, it seems to me not improbable that, by a judicious use of the latter, some important information may be obtained respecting him which may ultimately lead to his capture.

"Some years ago the information obtainable by the examination of the ink on papers or documents would probably have been comparatively insignificant, owing to the fact that the number of different kinds of ink in the market at that time would be small, and the modes of preparation of the ink simple, and the materials used not specially subject to variation. At the present day, however, a large number of different articles, many of which are subject to variation, are employed in the manufacture of ink, and a large number of different inks are in general use; and from these reasons the testimony capable of being obtained by the chemical examination of the ink on letters or documents at the present time may, in some cases, prove to be of the greatest importance.

"The reagents which I have found to act best in the testing of the ink on papers are nine, viz.:

1. Dilute sulphuric acid.
2. Strong hydrochloric acid.
3. Slightly diluted nitric acid.
4. Sulphurous acid solution.
5. Caustic soda solution.
6. Cold saturated solution of oxalic acid.
7. Solution of bleaching powder.
8. Solution of protochloride of tin.
9. Solution of perchloride of tin.

"The method which I have adopted in applying these reagents is to moisten one or more strokes or letters of the writing with each reagent, and then to absorb by blotting paper the excess of fluid a few seconds afterwards.

“By thus treating the ink on different envelopes lately sent to me I find they give very diverse results; with sulphuric acid, for instance, the black colors of the different inks are changed, in some to bright crimson, in others to deep red, whilst some become blue, green, violet, and gray of different shades, and some remain practically unaltered; and when, as sometimes happens, the same or nearly the same colors are produced in two different inks by one reagent, the colors produced by another are very different, thus showing clearly that the letters were not written by the same inks.

“The same kind of ink, sold by the same maker, but made at different times, also varies more or less in its behavior with the reagents, as shown by the comparisons of three samples of Lyon's ink, sold in small penny bottles, which were bought at different places.

“Differences between inks which give nearly the same reactions may sometimes be observed by noticing the lengths of time which the reagents require to bring about the ultimate changes, and by the shades of color through which the ink passes after applying each reagent. Changes also continue to go on gradually for days and weeks after the reagents have been applied. The colors and shades of the same color can be much more distinctly seen by the aid of a good pocket lens.

“It is evident that if two persons use ink, made by the same maker, at the same time, the reactions would be precisely similiar; but it is easy to understand that, after such ink has been in use for some time, owing to the different habits of the users, each may acquire a distinct individuality. One, for instance, may have been more exposed to the air or to the direct sunlight than the other, and some of the coloring matters present may thus have been more or less altered or destroyed. One person may have a habit of leaving his steel pen in the fluid, so that some of the iron may be dissolved, thus altering the character of the ink, whilst the other may not do so or may employ a quill in writing. Again, some persons may allow their inks to dry up to a certain extent, and then add to them any fluid which may be at hand, such as tea, coffee, wine, beer, water, etc., each of which would alter the character of the writing fluid, whilst others may use mixtures of two or more different inks, in different and characteristic proportions. One can therefore understand that many persons may have in their ink bottles fluids which are so peculiar in chemical composition that they may have as much individuality about them, when treated with reagents, as the faces of their owners. I have tested the same ink on different kinds of paper, and the resulting shades of color produced were identical in each case.

“To make use of this mode of investigation it would be necessary to get the ink or inks used by a suspected person, or preferably some writing made by him at or about the same time as any letter or document in question, and test the two side by side with each other. The resulting shades of colors may agree precisely, and may thus tell strongly against the suspected person, or they may differ very much and so point towards exonerating him.

"A case lately occurred in which the expert, M. Chabot, was called, and gave evidence to the effect that the handwriting in a certain libellous letter was that of the person who was indicted as the writer of it. As a witness for the defence another person came forward and swore that he was the writer of the letter in question, and on that evidence the case was dismissed. One can, however, under some circumstances, understand that a suspicion of such a witness having perjured himself may be justifiable, and such a suspicion may possibly be removed from an innocent person by his producing for chemical examination a paper written about the same time and with the same ink as that said to have been used in writing the letter in question.

"I have arranged on two sheets of paper the writings on envelopes of fifty different persons lately sent to me. One sheet contains twenty-four, written in Manchester and the suburbs, and the other contains twenty-six, from London and the provinces; and from a minute inspection of these it will be observed that most of them are very different from each other, whilst no two give exactly similar shades of color with all the different reagents."

#### MAKING INK PERMANENT.

WRITING INK. — Adding a solution of yellow prussiate of potash, to any ordinary black ink, renders it incapable of being removed or altered. Oxalic and other acids convert it into Prussian blue.

#### TO FRESHEN OLD WRITING.

To make old writing legible, in a pint of boiling water put six bruised gall nuts, and let it stand for three days. Wash the writing with the mixture to restore the color, and if not strong enough, add more galls.

#### PRESERVATION OF INKS.

Most inks, but especially those containing gums or sugar, are liable to decomposition, due either to a fungus growth on their surface, or to their growing slimy, or to the production of lactic acid, which destroys the coloring matter. The latter two causes are due to the growth of bacteria in the milk. Copperas and alum have both been used as preservatives, and are quite effective in retarding or preventing fungus and bacterial growths, but inks to which these have been added are apt to lose their color on standing. Carbolic acid in quantities of 0.1% or less is effective, but its disagreeable odor prevents extensive use. It has been found that 0.1 — 0.2 gms. of salicylic acid added to a litre of any ink (2 to 4 grs. to a quart) will preserve the same indefinitely, while being free from the objections above mentioned.

#### GLOSS INK.

If you want to make a gloss ink in a hurry you may add one-half ounce of Fluid Waterglass to three ounces of any colored ink and shake well.

Ink dries quickly upon any paper dampened with water mixed with glycerine. Placards composed of large letters dry in from fifteen to twenty minutes with paper thus moistened, while several hours are required where only water is used.

GLOSSY INK.

A gloss may be imparted to almost any ink by the addition of a suitable amount of gum arabic, sugar or glycerine. Just the amount necessary to produce the desired result you can easily determine by a few experiments. An excess of gum is liable to produce an ink which will smear if the writing becomes damp.

## INK FORMULAS.

PERFUMED INK.

The following formula has been suggested for a perfume to be added to ordinary writing ink :

Oil of rose geranium .....	30 mins.
Oil of citronella.....	10 mins.
Oil of bergamot.....	20 mins.
Oil of cloves.....	5 mins.
Oil of cassia.....	4 mins.
Oil of wintergreen .....	2 mins.
Oil of lavender .....	20 mins.
Strong alcohol.....	1 oz.

Dissolve the oils in the alcohol, add to the ink and shake well.

TO RESTORE FADED WRITING.

Writing which was done with an ink containing a metallic salt, and has faded, may often be restored by moistening with solution of ammonium sulphide ; or, brush over the faded writing with an aqueous solution of pyrogalic acid (1 in 10), let remain for a few moments, wash off the excess and dry by gentle heat. This process will not restore faded writing of aniline ink.

TO KEEP INK FROM RUNNING.

The addition to the ink of glycerin or gum acacia, preferably the latter, in the proportion of 1 part of gum to 160 parts of ink will be found useful. Molasses or honey with a little gum, or a mixture of equal parts of glycerin and gum are also used as adhesive agents in the manufacture of copying inks.

TO FIX INK.

A simple method of rendering paper so retentive of ink that the latter cannot be removed without leaving plain marks has been adopted in France for checks. The main feature of the method is the passing the paper through a very weak solution of tannic acid in distilled water.

BLACK INK.

Aleppo galls, bruised.....	12 parts
Water.....	48 parts

Boil together, in a copper vessel, for 1 hour, adding hot water from time to time to make up for evaporation (the added water should be boiling, or nearly so, so as not to check the ebullition). Strain off and set the colate aside, then add 32 parts of water to the residual galls, and boil for 30 minutes, strain off and add the liquid to the first colate. Again boil the nuts, with 20 parts of water, for a half hour, strain and assemble the

liquids, and while still hot add 4 parts of iron sulphate, in coarse powder, and  $3\frac{1}{2}$  parts of gum arabic, also in coarse powder, stir until dissolved. Let stand over night, then strain through a hair sieve and bottle for use. If left to stand a few months before offering for sale, it will be all the better for it.

## REED'S WRITING INK.

Galls bruised..... 1 lb.  
Sulphate of iron..... 3 ozs. 64 grs.  
Gum..... 3 ozs. 64 grs.  
Water ..... 3 qts.

The galls are to be boiled with three pints of water, till a quart of decoction remains; it is then poured off, the remainder of the water added, and ebullition continued until again only a quart is left. The two menstrua are then mixed, and the other ingredients dissolved in them. The whole is allowed to stand for twenty-four hours, when the fluid ink is poured off and retained for use.

## BLACK INK.

Powdered gall nuts..... 16 parts  
Gum arabic..... 8 parts  
Cloves in powder..... 1 part  
Sulphate of iron..... 10 parts

Place in earthen or glass vessel and add 100 parts of rain water, and let it stand for eight to fourteen days, with frequent agitations. At the expiration of the time mentioned, decant for use. It is improved by the addition of from 2 to 6 parts of Campeachy wood. One great advantage of this ink is that it can be thinned with water at any time without injury, and that it can be converted into a copying ink by the addition of 4 parts of glucose.

## BLACK INK.

Aleppo galls, bruised..... 8 ozs.  
Ferrous sulphate..... 1 oz.  
Gum acacia..... 1 oz.  
Water ..... 33 ozs.

Heat the galls and the gum in 30 ounces of water on a water bath for two hours, replacing water lost by evaporation; then add the ferrous sulphate dissolved in 3 ounces of water. Bottle without straining, cork loosely and set aside for two weeks to ripen. Pour off as wanted.

## BLACK INK.

Galls bruised..... 2 lbs.  
Sulphate of iron..... 5 lbs.  
Gum arabic..... 4 lbs.  
Water ..... 12 gals.  
Creosote..... 2 drs.

The sulphate of iron and gum are dissolved in as little the water as possible, while the galls are boiled for some hours in an earthen pot. The decoction is strained through muslin, and all mixed together.

## BLACK INK.

Powdered nutgalls.....  $1\frac{1}{2}$  oz.  
Sulphate of iron.....  $\frac{1}{2}$  oz.  
Acacia..... 1 dr.  
Water (soft)..... 1 qt.

Macerate for a week or more with frequent shaking and decant or strain. Inks of this kind are very per-

manent, but are pale when first written with. The addition of a little indigo solution will give a deeper color.

BLACK INK.

Galls .....	58 parts
Dextrin .....	40 parts
Ferrous sulphate.....	40 parts
Soft water.....	300 parts

GOOD INK.

Gall-nuts, bruised.....	350 parts
Water .....	3500 parts
Sulphate of iron .....	115 parts
Crystallized oxalic acid .....	25 parts

Digest for two days the gall-nuts in the water, and the fluid strained. In this dissolve the sulphate of iron and the oxalic acid; then add 225 parts of solution of indigo, and finally dissolve 100 parts of sugar, a like quantity of gum Senegal and 10 drops of creosote in the fluid.

KARMARSCH'S BLACK INK.

Gall-nuts, pulverized.....	18 parts
Gum arabic .....	7 parts
Sulphate iron.....	7 parts
Water .....	150 parts

BOOTH'S EXCELLENT BLACK INK.

Aleppo gall-nuts, pulverized.....	6 parts
Sulphate of iron.....	2 parts
Gum arabic .....	1¼ parts
Water .....	90 parts

Boil the gall-nuts three times, and after each boiling add sufficient water to replace the loss by evaporation. Then strain the decoction and add to it the sulphate of iron and gum previously dissolved in the required quantity of water. The mixture is allowed to stand quietly for a few weeks, the supernatant liquid is then poured off, and a few drops of creosote added to prevent moulding.

BLACK INK.

Galls, powdered.....	50 parts
Hot water.....	800 parts
Sulphate of iron, green.....	25 parts
Gum arabic .....	25 parts

Digest the galls in the water for twenty-four hours, strain and add the sulphate of iron and gum arabic; when dissolved add the following solution and mix well:

Sal ammoniac.....	8 parts
Gum.....	2 parts
Oil lavender.....	1 part
Boiling water.....	16 parts

BRANDE'S BLACK WRITING INK.

Aleppo galls, bruised.....	6 ozs.
Water .....	6 pts.
Sulphate of iron .....	4 ozs.
Gum arabic.....	4 ozs.

Boil together. Put the whole in a bottle and keep it in a warm place shaking it occasionally. In two months pour it off into glass bottles; and add to each pint a grain of corrosive sublimate, or 3 or 4 drops of creosote.

## VAN MOO'S GOOD BLACK INK.

1 Nut-galls, ground.....	150	parts
Sulphate of iron.....	85	parts
Cold water.....	4000	parts
Gum arabic.....	48	parts

Digest the nut-galls and iron in the water for twenty-four to forty-eight hours; then strain through a cloth and dissolve in the filtrate the gum arabic.

2 Gall-nuts, ground.....	150	parts
Sulphate of iron.....	50	parts
Gum arabic.....	16½	parts

Pour 650 parts of rain water over these ingredients, let them stand for twenty-four hours in a place not too warm, stir frequently, and finally filter through a cloth.

3 Boil for one-fourth hour 100 parts of gall-nuts converted into a coarse powder and 30 parts of sulphate of iron in 4000 parts of ordinary wine or fruit vinegar, and when cold filter off the fluid.

## EXCHEQUER INK.

Galls, bruised.....	40	lbs.
Gum.....	10	lbs.
Green sulphate of iron.....	9	lbs.
Water.....	45	gals.

Macerate for three weeks employing frequent agitation. This ink will endure for centuries.

## DR. URE'S INK.

Galls, bruised.....	12	lbs.
Gum Senegal.....	5	lbs.
Green sulphate of iron.....	5	lbs.
Water.....	12	gals.

Boil the galls in a copper with 9 gallons of water for three hours, adding fresh water to replace what is lost by evaporation. Let the decoction settle and draw off the clean liquor; add to it a strained solution of the gum; dissolve also the sulphate of iron separately and mix the whole. Instead of boiling the galls, they may be macerated in a portion of hot water for twelve hours, then put into a percolator and the rest of the water passed through it.

## SCHMIDT'S INK FOR STEEL PENS.

1 Calcined sulphate of iron.....	1	oz.
Gall-nuts.....	1½	oz.
Vegetable gum.....	½	oz.
Distilled water.....	1	pt.

2 Boil down 2 pounds of pulverized gall-nuts with 3 quarts of water to one-half its bulk, and compound this with 7 ounces of sulphate of iron previously dissolved in hot water. The whole is then boiled for a few minutes and filtered through linen. A part of the decoction is poured over ½ ounce of Chinese ink, rubbed very fine, and to this is added ½ ounce of solution of iron to chloride of manganese of 60° Blaune. The Chinese ink which will swell up in about twenty-four hours, is then rubbed very fine upon a stone, the clear fluid of the decoction of gall-nuts is poured off from the sediment and mixed with the Chinese ink. A few drops of oil of cloves dissolved in acetic acid are then added, the mixture thoroughly shaken in a closed bottle and is then allowed to stand for a few days and the ink is finally poured off from the sediment into another bottle.



AN OLD INK FORMULA.

While examining a large number of old manuscripts of an old scribe some twenty-five years ago, said a well known New York librarian recently to a Washington Star reporter, I was struck with the clearness and legibility of the writing, owing, in great measure, to the permanent quality of the ink, which had not faded in the least, although many of the manuscripts were nearly two hundred years old. It was remarked, too, that the writer must have been celebrated in his day for his calligraphy, for I met with a letter or two from his correspondents in which there was a request for the recipe of the ink he used. I found his recipe, which I copied, and from one of them, dated in 1658, I have during the last eighteen years, made all the ink I have used. The recipe reads as follows:

- Rain water..... 1 gal.
- Galls, bruised..... 1 lb.
- Green copperas..... ½ lb.
- Gum arabic..... 10 ozs., 5 drs., 1 scruple

Not requiring so large a quantity at a time, I reduced the proportions to one-eighth and the recipe stands thus:

- Rain water..... 1 pt.
- Galls, bruised..... 1½ ozs.
- Green copperas..... 6 drs.
- Gum arabic..... 10 drs.

The galls must be coarsely powdered and put into a bottle with the other ingredients and water added. The bottle, when securely stoppered, should be placed in the light (sun if possible), and its contents occasionally stirred until the gum and copperas are dissolved, after which it is enough to shake the bottle daily, and in the course of a month or six weeks the ink will be fit to use. I have ventured to add 10 drops of carbolic acid to the contents of the bottle, as it effectually prevents the formation and growth of mould without any detriment to the quality of the ink so far as I know.

HAENLE'S INK WHICH DOES NOT CORRODE.

- Gall-nuts, powdered..... 220 parts
  - Gum..... 125 parts
  - Sulphuric acid..... 125 parts
  - Distilled water..... 4000 parts
  - Chloride of mercury..... a few grs.
- Boil a while and then strain.

BLACK INK.

- Gall-nuts, broken..... 1 lb.
  - Sulphate of iron..... ½ lb.
  - Gum acacia..... ¾ lb.
  - Sugar candy..... ¾ lb.
  - Water..... 3 qts.
- Agitate once a day for about three weeks.

BLACK INK.

- Nut-galls, powdered..... 7½ ozs.
- Sulphate of iron..... 2½ ozs.
- Alcohol, 82°..... 1 pt.
- Water..... 3 pts.
- Gum arabic..... 2½ ozs.

Digest for twenty-four hours at a gentle heat the nut-galls in the alcohol. In another vessel add the other ingredients with the water. These two liquids

passed through a flannel strainer, are then to be mixed and allowed to settle for eight days and again strained.

## BLACK INK.

Aleppo nutgall, bruised . . . . .	40 grs.
Suakim ink-gum . . . . .	20 grs.
Glacial acetic acid, 50 p.c. . . . .	20 grs.
Ferrous oxide . . . . .	2 grs.
Water . . . . .	960 grs.

Extract the nutgall with part of the water either by percolation or decoction and add the perfectly clear infusion to the solution, also clear, of the iron, acetic acid, gum, and the rest of the water. This fluid soon becomes fit for use and gradually grows quite black. According to the quality of the nutgall the ferrous sulphate may have to be slightly diminished or increased in amount, so as to prevent precipitation.

## WRITING FLUID.

Bruised galls . . . . .	3 lbs.
Gum . . . . .	1 lb.
Copperas . . . . .	1 lb.
Vinegar . . . . .	1 lb.
Water . . . . .	2 gals.

Macerate with frequent shaking for fourteen days. Product three gallons.

## BLACK INK (Treasury Ink).

Gum Senegal . . . . .	1 lb.
Iron sulphate, C. P. . . . .	1 $\frac{3}{8}$ lbs.
True Aleppo galls, thoroughly bruised . . . . .	4 lbs.
Nigrosin . . . . .	2 ozs.
Water . . . . .	5 gals.

Boil with 3 gallons of water and strain. Boil again with 2 gallons and strain; mix and add the sulphate of iron and finally the nigrosine.

These are very serviceable formulas, but the products will likely thicken up a little if exposed to the atmosphere on account of oxidation. Expose as little as possible beyond the time required for daily use. The addition of 20 grains of salicylic acid to each quart of ink will prevent molding.

## WRITING FLUID.

Nut galls . . . . .	$\frac{3}{4}$ lb.
Sulphindigotic acid . . . . .	$\frac{1}{2}$ lb.
Sulphate of iron . . . . .	$\frac{1}{2}$ lb.
Cloves . . . . .	2 drs.
Gum arabic . . . . .	$\frac{1}{4}$ lb.
Water . . . . .	1 gal.

Stark, who has devoted a great deal of time and labor to experimenting with ink, prefers for his own use the above. Macerate the nut galls and cloves in the water for a few weeks. Strain and add the other ingredients.

## BLACK INK.

Boil 10 parts of best powdered galls with 80 parts of water, until there are left 40 parts of decoction. Then dissolve 1 part of prime indigo in 4 parts of fuming (Nordhansen) sulphuric acid, mix the solution with 4 parts of water, and add to it 2 parts of clean and small iron filings, which will be almost completely dissolved by the acid liquor with the escape of hydrogen gas. Then add to the latter mixture 2 parts or a sufficient

quantity of chalk, so that the excess of acid is neutralized, and allow the calcium sulphate and the excess of calcium carbonate to settle. Pour off the clean solution and mix it with the decoction of galls. Finally add  $2\frac{1}{2}$  parts of gum arabic dissolved in 5 parts of water.

BLACK INK.

Aleppo gall nuts ..... 16 parts  
 Sulphate of iron..... 16 parts  
 Gum Senegal. .... 5 parts  
 Alum ..... 1 part  
 Vinegar ..... 216 parts

Digest for 8 days; then add to the whole 36 parts more of vinegar and 200 of water

GEISLER'S BLACK INK.

Gall nuts, ground..... 1 lb.  
 Sulphate of iron.....  $\frac{3}{4}$  lb.  
 Gum arabic .....  $3\frac{1}{2}$  ozs.

Pour over these ingredients, 1 quart vinegar and  $1\frac{3}{4}$  gallons of water. Let the mixture stand from eight to fourteen days, stirring it frequently, and then pour off the ink.

BLACK INK.

Powdered galls..... 42 ozs.  
 Powdered gum Senegal..... 15 ozs.  
 Distilled or rain water..... 18 qts.  
 Ferrous Sulphate, C.P. .... 18 ozs.  
 Ammonia Water..... 3 fl. drs.  
 Alcohol ..... 24 fl. oz.

Mix these ingredients in an open vessel, stirring frequently until the ink attains the desired blackness. This formula is said to yield a deep black, neutral ink, which does not corrode steel pens.

BANK OF ENGLAND BLACK INK.

Gum arabic (granular).....  $2\frac{1}{2}$  ozs.  
 Glycerin ..... 2 ozs.  
 Sulphate of iron (chemically pure).. 6 ozs.  
 True Aleppo galls (thoroughly  
 bruised) ..... 15 ozs.  
 Pure water..... 1 gal.

Put the galls into a clean bottle and add the glycerin and one gallon of water; macerate for 10 days frequently agitating. Then add the gum arabic, dissolved in water. Next add the sulphate of iron, dissolved in hot water. Let stand for a fortnight, shaking occasionally.

This makes a very fine ink, which, although a little pale at first, intensifies, on drying, into a bright black. It is a durable and a good commercial ink.

PARLIAMENT BLACK INK.

Gum arabic (granular) .....  $1\frac{1}{8}$  lbs.  
 Glycerin ..... 6 ozs.  
 Sulphate of iron .....  $1\frac{3}{8}$  lbs.  
 Sulphate of copper .....  $\frac{1}{2}$  lb.  
 True Aleppo galls .....  $3\frac{3}{8}$  lbs.  
 Water (soft)..... 4 gals.

Bruise the galls very fine and boil with  $2\frac{1}{2}$  gallons of water for  $\frac{1}{4}$  hour; strain and boil the galls for half an hour with  $1\frac{3}{4}$  gallons of water. Strain and mix with the first liquid. Then add the gum arabic dissolved in water; then the glycerin, and lastly the sul-

phates of iron and copper. Rub or strain through the fine bolting cloth.

## COUNTING HOUSE INK.

True Aleppo galls .....	4 $\frac{7}{8}$ lbs.
Sulphate of iron .....	1 $\frac{1}{2}$ lbs.
Sulphate of copper .....	$\frac{1}{2}$ lb.
Gum. mesquite .....	1 $\frac{1}{8}$ lbs.
Glycerin .....	7 ozs.
Acid sulphate of indigo.....	2 ozs.
or .....	q.s.
Water (pure and soft).....	5 gals.

Proceed to make the ink as in the formula for parliament black ink and finally add the acid sulphate of indigo, dissolved in hot water.

## LIPOWITZ'S PROCESS OF PREPARING BLACK INK.

Pulverize 6 $\frac{1}{2}$  pounds of the best black gall nuts, pour as much water over them as they will absorb, and place them upon a perforated bottom in a barrel provided with several layers of cut straw. A sufficient quantity of soft water is now gradually poured over the moistened gall nuts to give 6 gallons of a clear decoction of a dark brown color. A corresponding quantity of dissolved sulphate of iron is brought at the same time to the boiling point in a suitable earthen vessel, and oxidized with nitric acid during the boiling. The oxidized solution of iron is then precipitated with crystallized carbonate of soda dissolved in the necessary quantity of water. The precipitate is placed in a linen bag, washed out, and pressed with a gradually increasing pressure until it is of such a consistency that the cake, after the press-cloth has been removed, will cling together and not moisten blotting-paper. Three pounds of this pressed ferric oxide is then stirred together with 4 $\frac{1}{2}$  pounds of good crude wood spirit, and added, with constant stirring, to the 6 gallons of decoction of gall nuts. The mixture is allowed to stand for a few days, being frequently stirred, and then 2 $\frac{3}{4}$  pounds of gum Senegal is added, and the mixture stirred until the gum is dissolved.

## WRITING FLUID.

Nut-galls.....	11 parts
Sulphate of iron.....	2 parts
Solution of indigo .....	$\frac{1}{4}$ part
Water .....	33 parts

The quantities in the above receipt being proportionally larger, allow of the omission of the gum, while the solution of indigo imparts a deeper, brilliant black.

## BLUE BLACK WRITING FLUID.

Powdered galls.....	8 parts
Solut. iron acetate.....	3 parts
Acacia .....	2 parts
Wood vinegar.....	2 parts
Indigo carmine.....	1 part
Water .....	20 parts

Prepare the solution of iron acetate by pouring a sufficient quantity of wood vinegar upon scrap iron contained in a cask, and allow it to act upon the iron for at least a week. Macerate the powdered galls for a week, with the water mixed with the wood vinegar. Before mixing the strained liquid obtained from the galls with the iron solution, it is necessary to ascertain

whether the quantity of acetic acid present is sufficient to keep the ferrous acetate in solution. For this purpose 10 volumes of the liquid gall extract are mixed with one volume of the iron solution. If a clear liquid results, and of a dark green color in thin layers, the liquid contains enough acid; but if a black, opaque liquid results, the acid is deficient. In the latter case more wood vinegar must be gradually and cautiously added from a measured volume, until the liquid is clear, and dark green; and the requisite amount of acid, determined by this experiment, must be added to the extract of galls. The acacia is next dissolved in the latter, the iron solution then added, and finally the indigo carmine, or as much thereof as may be required to produce the desired tint.

#### BLUE BLACK WRITING FLUID.

Aleppo galls.....	56 parts
Cloves.....	14 parts
Water.....	480 parts
Powd. ferrous sulphate, C. P.....	18 parts
Sulphuric acid, C. P.....	1 part
Indigo sulphate.....	3 parts

Macerate the galls and cloves in the water for a fortnight, then express and strain through linen. Add the iron, dissolve, and add the acid and indigo. Shake or stir the mixture well, then set it aside for a week, and filter.

#### BLUE BLACK INK.

Bruised galls.....	3 lbs.
Sulphate of iron.....	1 lb.
Gum arabic.....	1 lb.
Vinegar.....	1 pt.
Water, sufficient to make.....	3 gals.
Indigo carmine, sufficient to give a blue tint.	

Macerate with frequent shaking for fourteen days and then decant. Inks of this type are also frequently called "writing fluids." The "fluid" is very pale until exposed to the air, and the indigo answers the double purpose of rendering it more visible in writing and of making the ink more resistant against bleaching agents. By omitting the indigo you have the black ink.

#### BLUE BLACK WRITING FLUID.

Dietrich's method of preparing a blue-black ink is as follows:

Chinese galls in coarse powder.....	6½ ozs.
Powdered French chalk.....	6 drs.
Rain or distilled water.....	2 pts.

Damp the powdered galls and place in a warm room (78 to 80 degrees F.), sprinkling water over the mass from day to day, until in from eight to ten days or longer it becomes mouldy. Then heat the mass for an hour on a water bath with 16 ounces of water, strain, and press with the hands. Repeat the infusion with another 16 ounces of water and again with 8 ounces. Add the French chalk to the strained liquors, agitate occasionally during twenty-four hours, then filter, washing the filtrate with water to 40 ounces. This is the basis for the ink. To make a blue black proceed as follows:

Decoction of galls (as above).....	2 pts.
Solution of ferric chloride (10%).....	3½ ozs.

Mix, allow to stand for a fortnight in a closed bottle, and filter. Then add to the filtrate:

Phenol blue, FFF .....	1	dr.
Carbolic acid.....	20	grs.
Distilled water .....	16	ozs.

Dissolve by the aid of heat. Allow the ink to stand for a week longer in a dark, cool place, and decant from any sediment which may have formed.

#### BLUE BLACK INK.

Galls, ground.....	15	ozs.
Ferrous sulphate.....	5	ozs.
Iron filing.....	4	ozs.
Water .....	12	pts.
Indigo .....	½	oz.
Sulphuric acid.....	3	ozs.

Mix the indigo in powder with the sulphuric acid, allow to stand for two days, then dilute with 15 ounces of water, and the iron filings added to neutralize the solution. Place the galls in the water and let stand for a few weeks, but reserve some of the 12 pints of the water to dissolve the ferrous sulphate. Strain the gall decoction and add all together.

#### BLUE BLACK WRITING FLUID.

Nut-galls, bruised.....	4½	ozs.
Cloves, bruised .....	1	dr.
Water, cold.....	40	ozs.
Iron sulphate .....	1½	oz.
Sulphuric acid.....	35	drops
Indigo paste (neutral or nearly so).	1	oz.

Put the galls and cloves in a 50-ounce bottle. Pour upon them the cold water and digest with daily stirring for two weeks. Then filter through paper into another 50-ounce bottle. Get out also the refuse of the galls and wring out of it the remaining liquor through a strong linen or cotton cloth into the filter in order that as little as possible be lost. Now put in the liquid the sulphate of iron, dissolve completely and filter through paper. Add the sulphur and agitate briskly. Lastly add the indigo paste and thoroughly mix by shaking. Pass the whole through paper. Filter out of one bottle into the other till the operation has been completed. On a large scale this ink may be made by percolation. No gum or sugar is required except when intended for copying; then 5½ ounces galls should be used and 3 drams sugar. By omitting the acid and indigo paste and substituting therefor 40 grains of methylene blue to the 2 pints of liquid the formula may be used for the preparation of an aniline blue black ink.

#### BLUE BLACK WRITING FLUID.

Japan galls.....	180	parts
Dextrin.....	120	parts
Ferrous sulphate.....	85	parts
Indigo carmine.....	90	parts
Water .....	2500	parts

#### PERSIAN INK.

A very lasting and fine ink is the so-called Persian ink, which is a sort of compromise between Indian or Chinese ink and the iron inks of the western world. It is as follows:

Lamp black.....	1	part
Iron sulphate.....	1	part
Gall nuts.....	2	parts
Gum arabic, carefully purified.....	4	parts

Reduce the substances to the finest powder, mix intimately and then on a tile or stone, work up, adding water, at first in small amount at a time, until the mass is homogenous, when it may be added more freely. The amount of water added is according to the use to which the ink is to be put.

ALIZARIN INK.

Nut-galls, ground.....	45 parts
Madder, ground.....	5 parts
Water .....	1200 parts
Indigo carmine.....	1 part
Ferrous sulphate .....	10 parts
Ferric acetate .....	4 parts

Allow to digest for a day the nut-galls and madder with the water, then strain and add the other ingredients. Allow to deposit for eight days.

OFFICE ALIZARIN INK.

Nut-galls.....	100 parts
Ferrous sulphate .....	60 parts
Gum arabic .....	10 parts
Vinegar.....	1000 parts
Indigo carmine solution.....	200 parts

This beautiful green and very fluid ink is prepared by pouring the vinegar over the nut-galls, after a few days decanting off the tannin solution, dissolving the finely pulverized ferrous sulphate and gum arabic by boiling them in a portion of the fluid, mixing both fluids, and finally adding the indigo carmine. Should the latter not be sufficient add a larger quantity. It is best not to weigh the indigo carmine, but keep a solution of it on hand and add 1 pint of it to 100 quarts of ink, stir vigorously and make a test. If the writing shows a beautiful blue green color immediately after the ink flows from the pen a sufficient quantity of indigo carmine has been added. The finished ink is at once filled in bottles, and when shaken should represent a clear, dark green fluid running down rapidly on the sides of the bottle. It is recommended to use, instead of ordinary vinegar, crude wood vinegar, which in consequence of its mode of preparation from wood tar contains a very small quantity of carbolic acid.

HAGER'S ALIZARIN INK.

Bring into a very capacious dish containing 12 parts of fuming sulphuric acid, 2 parts of indigo, in small portions; after twenty-four hours dilute the solution with 16 parts of water, and dissolve in the fluid 6 parts of iron filings free from rust. To this fluid add the decoction of 24 parts of Chinese nut-galls, with 300 to 400 parts of water, 6 parts of gum arabic, and 3 of sugar and a small quantity of carbolic acid.

BLUE BLACK WRITING FLUID.

Galls, bruised .....	18	ozs.
Cloves, bruised .....	½	oz.
Water.....	10	pts.
Iron sulphate.....	6	ozs.
Sulphuric acid.....	2	drs.
Indigo paste.....	1	oz.

Digest the galls and cloves in the water for two weeks. Press and filter. Add the iron and acid, shaking well until solution is effected; then add indigo

paste and filter if necessary. The ink must be kept in well corked bottles and should be made in vessels of glass or stoneware.

BLUE BLACK WRITING FLUID.

Galls, bruised.....	1 lb.
Water, boiling.....	1 gal.
Iron sulphate.....	5½ ozs.
Gum arabic.....	3 ozs.
Carbolic acid.....	10 drops
Prussian blue, strong solution.	

Macerate the galls for twenty-four hours, strain the infusion, and add the other ingredients.

PERMANENT WRITING FLUID.

To a fine ink made of Aleppo galls, add a strong solution of acidulated ferrocyanide of iron (Prussian blue). This renders the ink practically acid proof. The ink thus made is greenish black, but dries to a deep and unchangeable black.

SOLUTION OF FERROCYANIDE OF IRON.

Ferrocyanide of iron.....	3 ozs.
Hydrochloric acid.....	6 ozs.
Water.....	26 ozs.

Mix the Prussian blue with the hydrochloric acid and when effervescence has entirely ceased, add the water and bottle for use.

BLACK INK.

- 1 Macerate four days contused nut-galls.....24 ozs.  
in water..... 6 gals.
- 2 Dissolve extract logwood.....12 ozs.  
in water..... 6 gals.
- 3 Dried sulphate of iron.....22 ozs.  
in water..... 5 pts.
- 4 Sulphate of copper..... 1 oz.  
in water..... ½ pt.
- 5 Corrosive sublimate..... ½ dr.  
in water..... ½ gal.
- 6 Gum arabic.....17½ ozs.  
in water..... 9 pts.

Strain, respectively filter each solution separately, and mix in the above order.

WRITING FLUID (BLUISH BLACK CHANGING TO BLACK).

Crushed nut-galls.....	12 ozs.
Boiling water.....	1 gal.
Sulphate of indigo.....	6 ozs.
Carbolic acid.....	30 grs.
Gum arabic.....	4 ozs.
Iron filings or clean scraps of iron (wire, nails or any iron).....	4 ozs.

Pour two quarts of boiling water on the nut-galls and allow to stand twenty-four hours, pour off the liquid and reserve; pour the remaining two quarts of boiling water on the drugs and allow to stand twenty-four hours. Pour this off and add to reserved portion. Put the drugs in a percolator and pour boiling water upon them until 2 pints of liquid have passed; mix this with the portions before reserved and strain. In this liquid dissolve the gum arabic by occasional agitation. When the gum is dissolved add to it the iron



filings or scraps, and lastly the sulphate of indigo, and allow to stand in an open-mouth vessel for two weeks, stirring occasionally, then pour off the clear liquid and bottle. If more color is desired add 60 grains green aniline to a gallon. This gives it a beautiful greenish blue color which is much liked.

BLUE BLACK WRITING FLUID.

- Apello nut-galls, coarsely ground . . . . . 1 lb.
- Sulphate of iron . . . . . 5 ozs.
- Gum arabic . . . . . 4 ozs.
- Boric acid . . . . . ½ oz.
- Extract of indigo . . . . . 1 oz.
- Picric acid . . . . . 1 dr.
- Water, sufficient to make . . . . . 1 gal.

Macerate the nut-galls in 1 gallon of water for twelve hours, then boil in a kettle for one hour and pour off the decoction, add half a gallon of fresh water to the drugs, and boil again for half an hour and pour off the liquid, press the residue and mix the product with the previous decoction. This will make about 1 gallon of the liquid; to this, while still warm, add the remaining ingredients and dissolve; add water if necessary to make 1 gallon, and after standing twelve hours, or more, strain through a coarse muslin strainer. This is a good writing fluid, similar to those most popular in the market.

BLUE BLACK INK.

- Galls . . . . . 10 ozs.
- Water . . . . . 40 ozs.
- Indigo . . . . . 2 ozs.
- Acid, sulphuric . . . . . 8 ozs.
- Chalk . . . . . 3 ozs.
- Iron filings . . . . . 4 ozs.

Boil the galls in the water for two hours, then macerate for two days; strain, and add water enough to make 40 ounces. Digest the indigo and acid sulphuric for twenty-four hours, make up to 30 ounces with water, add the chalk and iron filings. Digest for another twenty-four hours; then decant, and mix with the gall solution, and add enough water to make 4 pints.

WRITING FLUID.

Dissolve sulphindylate of potassa or ammonia in hot water, and when cold decant the clear. It is an intense blue and dries nearly black; is perfectly incorrosive, and very permanent and easy flowing.

STEPHEN'S WRITING FLUID.

To prepare this ink, exhaust 40 parts by weight of nut galls with 112 parts of water; to the filtrate, add 7 parts of ferrous sulphate, and a quarter of a part oxalic acid. Add to the ink indigo carmine till it assumes a deep greenish blue color. Or, take 15 parts of bruised galls, boil for about an hour in 200 parts of water, strain and then add to the liquor, 5 parts ferrous sulphate, 4 parts fine iron turnings or filings, and a solution of half a pint of powdered indigo in 3 parts of sulphuric acid. This ink writes green, but turns black after a few hours. It flows very freely from the pen.

INDESTRUCTIBLE INK.

- Graphite (impalp. powder) . . . . . 10 parts
- Gum Copal . . . . . 10 parts

Iron Sulphate..... 1 part  
 Tincture Nutgall..... 1 part  
 Indigo Sulphate ..... 4 parts

Mix the materials and boil them in sufficient water to make a fluid of the desired consistence. After boiling for a few minutes let stand awhile for the coarser particles to settle; then decant the bottle.

## DR. LEWIS' WRITING INK.

Powdered sulphate of iron..... 1 oz.  
 Ground logwood ..... 1 oz.  
 Bruised galls..... 3 ozs.  
 Gum arabic..... 1 oz.  
 White wine or acetic acid..... 1 qt.

The copperas and gum arabic are dissolved in as little of the vinegar as possible, while the rest is boiled for some hours with the logwood and galls in an earthenware pot. The decoction is strained through muslin, and mixed with the solution of iron.

## BLACK INK.

Bruised galls..... 24 ozs.  
 Rasped logwood ..... 8 ozs.  
 Iron sulphate..... 12 ozs.  
 Powdered acacia..... 6 ozs.  
 Cresote ..... 30 drops  
 Soft water ..... 3 gals.

Boil the galls and logwood in the water until reduced to 2 gallons; then add the other ingredients and set aside for fourteen days, stirring frequently, when it will be ready for use.

## BLACK SCHOOL INK.

Japanese nut galls ..... 15 lbs.  
 Water ..... 80 qts.  
 Dextrin ..... 6 lbs.  
 Ferrous sulphate ..... 5 lbs.  
 Wood vinegar..... 1 lb.

Mix with logwood extract, 14 pounds; dextrin, 12; water, 100 quarts.

## BLACK INK.

Galls ..... 3 ozs.  
 Sulphate of iron..... 1 oz.  
 Logwood ..... ½ oz.  
 Gum ..... ½ oz.  
 Ale..... 1 qt.

Let it stand in a loosely corked bottle in a warm place for a week or more, shaking it daily.

## ENGLISH LOGWOOD INK.

Nut galls ..... 100 parts  
 Logwood ..... 120 parts  
 Ferrous sulphate..... 35 parts  
 Gum arabic..... 100 parts  
 Vinegar ..... 400 parts  
 Water..... 500 parts

Let stand for two weeks. Strain.

## RIBANCOURT'S INK.

Galls ..... 1 lb.  
 Logwood ..... ½ lb.  
 Gum ..... 6 ozs.  
 Sulphate of iron..... ½ lb.  
 Sulphate of copper..... 2 ozs.  
 Sugar ..... 2 ozs.  
 Water ..... 12 lbs. or 5 qts.

BLACK INK.

Galls .....	100 parts
Logwood .....	30 parts
Dextrin.....	40 parts
Alum.....	12 parts
Ferrous sulphate.....	45 parts
Soft water.....	1000 parts

BLACK INK.

Bruised Aleppo galls .....	12	ozs.
Logwood .....	2	ozs.
Sulphate of iron.....	4	ozs.
Alum .....	1½	drs.
Carbolic acid.....	1	dr.
Common salt.....	2	dr.
Gum arabic.....	3	ozs.

Water a sufficiency. Macerate the galls and logwood in ½ gallon of water for two days. Strain, and repeat. In the mixed liquors, dissolve the sulphate of iron, alum, and gum arabic, and add the carbolic acid and common salt.

JAPAN INK.

Aleppo nut gall, bruised.....	8	ozs. av.
Logwood .....	4	ozs. av.
Ferrous sulphate.....	4	ozs. av.
Copper sulphate .....	½	oz. av.
Acacia .....	3	ozs. av.
Sugar .....	1	oz. av.
Rock candy .....	½	oz. av.
Water .....	6	qts.

Put the galls and logwood in 6 quarts of water. Boil slowly until the water is reduced in volume one-half. Strain through cotton flannel, and add the other ingredients. Keeping the solution warm, stir until all the ingredients added are dissolved. It should then be placed in a deep glass vessel and allowed to settle. The ink may be removed from the settlings by pouring off carefully or using a siphon. The gloss of the ink may be increased or diminished by increasing or diminishing the amount of gum used in the recipe. If carbolic acid be added until its odor is just perceptible it will prevent molding. Oil of cloves added will also effect the same results, and it gives the ink a less offensive odor. This forms a glossy jet black ink such as is used by professional writers.

BLACK INK FOR WRITING AND COPYING.

Logwood chips .....	1	oz.
Nut-galls, in coarse powder.....	¾	lb.
Copperas, pure .....	3	ozs.
Acetate of copper (verdigris) .....	½	oz.
Sugar.....	3	ozs.
Gum arabic .....	4	ozs.
Soft water.....	1	gal.

If not to be used as a copying ink no sugar need be used and only 2 or 3 ounces of the gum arabic to hold colors suspended in the ink else they settle. Boil the logwood chips in the water for an hour or two; when cool strain, making up for evaporation with more hot water. Bruise the best blue galls coarsely and put over the fire again till it boils, adding the other articles

and set away until it acquires the desired blackness ; strain and bottle for use. If properly made it is a black ink at once and all the time, does not fade, and is therefore suitable for all records.

## PREROGATIVE COURT INK.

Galls.....	16 ozs.
Gum .....	6 ozs.
Alum .....	2 ozs.
Sulphate of iron .....	7 ozs.
Kino .....	3 ozs.
Logwood, powdered .....	4 ozs.
Water .....	8 lbs.

## BLACK INK.

Extract logwood.....	4 ozs.
Sulphate of copper.....	1 oz.
Nut-galls .....	15 ozs.
Sulphate of iron .....	6 ozs.
Gum arabic .....	6 ozs.
Cloves .....	2 ozs.
Rain water.....	3½ qts.
Vinegar .....	4 ozs.
Pyroligneous acid.....	8 ozs.

A little carbolic acid may be added. This, with the pyroligneous acid, will prevent the ink from mildewing. The cloves alone do not answer this purpose, but they give the liquid an agreeable odor.

## GOOD MERCANTILE INK.

Aleppo galls.....	1 lb.
Logwood chips .....	½ lb.

Put in 1 gallon of boiling soft water. Bruise the galls and simmer all together for three or four hours. Strain whilst hot. To this add

Pure sulphate of iron .....	10 ozs.
Gum arabic .....	5 ozs.
Glycerine .....	1 oz.
Bruised cloves.....	1½ oz.

Stir frequently, and at the end of fourteen days, strain. This ink improves with age. Use an enamelled vessel.

## LOGWOOD INKS.

Can, it is said, be deprived of their tendency to thicken, by the addition of oil of cloves or carbolic acid.

## BLACK INK.

Sodium carbonate .....	30 parts
Warm water .....	1300 parts
Extract of logwood .....	30 parts

Dissolve, and add then a solution of 5 parts potassium bichromate in 100 parts of water.

## BLACK INK.

Extract logwood.....	15 parts
Carbonate of sodium, crystallized..	4 parts
Neutral chromate potassium .....	1 part
Water .....	1000 parts

Dissolve the extract in 900 parts of water, allow it deposit, decant, heat to boiling, and add the carbonate of sodium; lastly, dissolve the chromate of potassium in the remainder of the water, and add to the logwood solution drop by drop with constant stirring.

BLACK INK.

Extract of logwood . . . . . 4 drs.  
 Chromate of potassa . . . . . 15 grs.  
 Water . . . . . 2 pts.

Dissolve the extract in cold water, strain, and add the chromate, previously dissolved.

CHEAP WRITING INK.

Logwood, in fine chips . . . . . 5 lbs.  
 Water . . . . . 10 gals.  
 Chromate of potassa . . . . . 400 grs.  
 Carbohc or salicylic acid . . . . . 200 grs.

Boil the logwood in the water, and gently simmer the liquid down to 5 gallons; strain and add the chromate and the acid, previously rubbed with a small quantity of water.

PHARMACEUTICAL INK.

Dissolve 15 parts of sodium bicarbonate in sufficient water, and in the solution rub up 30 parts of alizarin paste. When solution is effected, add 50 parts of extract of logwood, previously dissolved in sufficient water, and add sufficient distilled water to make 2,000 parts. To this solution add 15 parts of iron filings and sufficient oil of clove or carbohc acid (say 15 parts of the latter) to act as a preservative against mould, and let stand for 8 days. The ink is then ready for use or for bottling. The writing, at first pale, rapidly becomes an intense black, and does not readily yield to the ordinary bleaching agents.

DEEP BLACK WRITING INK.

Prepare beforehand a solution of extract of logwood, by heating in a water bath 1 part of the best French extract in 50 parts of water. Set this solution aside for a week, at the end of which time carefully decant the clear fluid. To 200 parts of this stock solution add 500 parts of water and place in a water bath, bringing the heat up to about 90° C. Add 2 parts potassium dichromate, 50 parts chrome alum, and 10 parts of oxalic acid, the whole dissolved in 150 parts of water. This solution must be added little by little, very slowly and carefully with frequent stirring. Continue the heat for a half hour, keeping the temperature as near 90° C. as possible. At the expiration of this time add sufficient water to make the whole 1,000 parts, and 1% of carbohc acid. Set aside for two or three days, then decant the clear liquid and fill into bottles.

ALIZARIN INK.

Alizarin paste . . . . . 225 grs.  
 Sodium carbonate . . . . . 105 grs.  
 Extract of logwood . . . . . 375 grs.  
 Carbohc acid . . . . . 1¼ dr.  
 Water . . . . . 32 fl. oz.

Dissolve the alizarin paste in a little water, in which the sodium carbonate has been previously dissolved. To this add the extract of logwood dissolved in the remainder of the water. Filter, transfer to a large bottle, drop in some iron filings, and expose to sunlight for a week with occasional agitation. Lastly decant and add the carbohc acid, which is intended to preserve the ink.

## CHEMICAL INK.

Extract of logwood .....	10 drs.
Alum .....	4 drs.
Potass. oxalate .....	6 drs.
Potass bisulph .....	1 dr.
Potass. bichrom .....	30 grs.
Salicylic acid .....	10 grs.

Mix the coarse powders. Sufficient to make 2 quarts of good ink by the addition of lukewarm water.

## THE AMERICAN COMMERCIAL INK.

Extract of logwood .....	2 ozs.
Soft water .....	1 gal.
Bichromate of potash .....	24 grs.
Prussiate of potash .....	12 grs.

Boil slightly in an iron vessel fifteen minutes the extract of logwood with the gallon of water. Dissolve in a little hot water bichromate and prussiate of potash, and stir into the liquid a few minutes while over the fire; take off, and when settled, strain twice through common muslin or sheeting cloth.

## BLACK INK (Common School Ink.)

Extract of logwood .....	3 ozs.
Bichromate of potassium .....	3 drs.
Carbolic acid .....	30 grs.
Water .....	1 gal.

Boil the extract with the bichromate of potassium in one quart of water until the extract is dissolved. Continue the boiling for twenty minutes, and add enough water to make one gallon, when cool add the carbolic acid and set away for a few days to settle. When the sediment has all subsided, pour carefully off, and bottle.

This is a very bright black ink.

## LOGWOOD INK.

Logwood ink may be prepared from the following solution.

Logwood extract solution	
Logwood extract, best .....	4½ ozs.
Distilled water .....	20 ozs.

Dissolve the extract in the water on a water bath. Set the solution aside for 8 days, and decant the clear liquid.

## BLACK INK.

Extract logwood .....	30 parts
Water .....	250 parts
Sodium carbonate (cryst.) .....	8 parts
Glycerin .....	30 parts
Potassium chromate .....	1 part
Acacia, powdered .....	8 parts

Dissolve the logwood extract in the water, and add the sodium carbonate and glycerin; then incorporate the potassium chromate and acacia, previously dissolved in a little water. This ink does not attack pens nor turn mouldy, and is very black.

## CHROME INK.

Extract of logwood .....	½ oz.
Gum .....	¼ oz.
Water .....	1 pt.

Dissolve also in 12 ounces of water, ½ ounce of yellow chromate of potash (or ¼ ounce each of bichro-

mate and bicarbonate of potash;) and mix the two solutions. The ink is ready for immediate use.

BLACK INK.

Concentrated solution of extract  
of logwood in alcohol.....1 pt.  
Violet aniline, sufficient, or..... ½ dr.  
Solution of chlorate of iron .....1 oz.

Mix.

Take off the above mixture ..... 2 ozs.  
Water .....14 ozs.  
Gum arabic ..... ½ dr.

Said not to make a lasting ink. The logwood extract will gelatinize.

BLACK INK.

Logwood extract solution.....20 ozs. av.  
Potassium, bichromate .....90 grs.  
Chrome alum ..... 5 ozs. av.  
Oxalic acid ..... 1 oz. av.  
Carbolic acid ..... 1 dr.  
Distilled water.....sufficient.

Mix the extract solution with 50 ounces of water, heat on a water bath to 90 degs. C., add the potassium bichromate, chrome alum, and oxalic acid (previously dissolved) in 15 ounces; continue the temperature of 90 degs. C. for one-half hour, then add enough water to make the mixture weigh 100 av. ozs., and the carbolic acid; set aside for 2 or 3 days, and decant the clear liquid.

This ink is black in color, and the writing is of the same tint. It is very cheap, and hence is adapted to school purposes.

GOOD BLACK INK.

Logwood extract.....120 gms.  
Sulphate of iron ..... 90 gms.  
Alum..... 60 gms.  
Gum arabic..... 60 gms.

Pulverize the ingredients and place them in an earthen pot, pour one litre wine vinegar over them, and cover the pot with an earthen cover. Stir several times a day, whether the temperature be cold or warm and eight days afterwards dilute with the corresponding quantity of rain water.

BLACK SCHOOL INK.

Extract of logwood .....3 ozs.  
Bichromate of potassium.....3 drs.  
Muriatic acid .....6 drs.  
Water .....1 gal.

Boil the extract with the bichromate of potassium in 1 quart of water until dissolved, add the acid to the balance of the water and mix. It is a reddish black, and is a very good ink in every respect.

BLACK INK.

Extract of logwood ..... ½ oz.  
Lime water.....25 ozs.  
Hydrochloric acid ..... 5 drs.  
Bichromate of potassium.....45 grs.  
Carbolic acid.....45 grs.  
Gum arabic..... 1 oz.  
Distilled water..... 2½ pts.

Reduce the extract to coarse powder and in a quart basin mix it gradually with the lime water. Heat on

a water bath until solution is effected, then add the acids and continue to beat for half an hour. Set aside to cool, and decant the clear liquor into a 7-pound earthenware jar. Add to it gradually, and with constant stirring, the bichromate of potassium dissolved in 10 ounces of water, next the gum, also dissolved in water, and make up to the required volume. Set this ink aside for several weeks before using. By using 4 drams of hydrochloric acid and 2 drams of bichromate a violet ink is obtained. As it is the above ink writes red, and the writing becomes a beautiful black color. Sometimes, owing to the variable nature of logwood extract and weak lime water, the ink is dreadfully thin and weak looking; for the latter reason we have found it to be, on the whole more satisfactory to use, instead of lime water, a scruple of fresh slaked lime shaken up with 25 ounces of tap water.

## BLACK INK.

Extract logwood.....	2	ozs.
Water, hot .....	1	gal.
Bichromate potash.....	2	drs.
Yellow prussiate potash.....	½	dr.
Water.....	6	ozs.
Mucilage of gum arabic.....	1 ½	ozs.

Dissolve the extract in 1 gallon of hot water and separately, the bichromate of potassa in 4 ounces, and the prussiate of potash in 2 ounces of water, combine the solutions, add the mucilage and 2 drams of powdered cloves. The ink will be ready for use an hour after being mixed.

## JAPAN INK.

Extract of logwood .....	3	ozs.
Bichromate of potassium.....	3	drs.
Borax .....	3	ozs.
Shellac.....	6	drs.
Aqua ammonia .....	1 ½	ozs.
Water .....	1	gal.

Mix the logwood and bichromate of potassium and dissolve by boiling in 1 quart of water for thirty minutes. Mix the shellac and borax and dissolve by boiling in 2 quarts of water. While both of the solutions are hot mix them and add the balance of the water and aqua ammonia. Set aside for some days and pour off the liquid from the sediment, and bottle. This makes a glossy jet black ink. It does not flow as readily as some other ink, but is used for drawing and other purposes, when a very fine jet black ink is desired. It works very nicely with the ruling pen.

## WRITING INK.

English extract logwood .....	1 ¼	oz.
Lime water.....	15	ozs.
Carbolic acid.....	½	dr.
Hydrochloric acid .....	3	drs.
Glycerine .....	¼	oz.
Bichromate of potash.....	½	oz.
Distilled water to make up .....	30	ozs.

Dissolve the extract of logwood in half a pint of water by aid of heat, in a water bath, whilst hot, add hydrochloric acid, then the carbolic acid and glycerine mixed. Dissolve bichromate of potash in the lime water and add to foregoing making up to 30 ounces



with water. Set aside for a few days and decant clear solution.

In this receipt English Extract of Logwood *must* be used.

JOHN'S BLACK INK.

Boil down to  $\frac{1}{2}$  its volume 25 parts of ground logwood and 150 parts of bablah with 15,000 parts of water. Strain the decoction through linen and then add  $12\frac{1}{2}$  parts each of pulverized gum arabic and pulverized sugar, and  $37\frac{1}{2}$  parts of finely pulverized sulphate of iron. Moulding is prevented by adding a very small quantity of a solution of chloride of mercury in water.

SUPERIOR LOGWOOD EXTRACT INK.

Extract of logwood.....10 drs.  
 Aluminum sulphate.....  $\frac{1}{2}$  oz.  
 Potassium oxalate ..... 6 drs.  
 Potassium bisulphate..... 1 dr.  
 Potassium bichromate .....  $\frac{1}{2}$  dr.  
 Salicylic acid.....10 grs.

Mix the coarse powders sufficient to make 2 quarts of good ink by the addition of luke-warm water.

RUNGE'S BLACK WRITING FLUID.

Boil logwood 22 pounds in enough water to yield 14 gallons of decoction. To 1000 parts of this decoction, when cold, add 1 part of chromate of potash. The mixture is to be well stirred. The proportions are to be carefully observed, and the yellow chromate, not the bichromate employed. (This ink is said to possess some great advantages to adhere strongly to paper, so that it can neither be washed off by water nor even altered by weak acids; to form no deposit; and not to be in the least acted upon by steel pens.) Steel pens should be washed in an alkaline solution before being used with this ink. On exposure to the air, rapid decomposition of this fluid sometimes takes place. This may be prevented by adding a little carbonate of soda to the fluid.

BLACK INK.

Concentrated extract of logwood.... 2 ozs.  
 Digest with water .....20 ozs.  
 Concentrated sulphuric acid.....  $1\frac{1}{2}$  dr.

For two days, stirring or shaking often. Let it stand half a day and decant. Add little by little:

Carbonate of soda  $7\frac{1}{2}$  drs., and then a solution of yellow chromate potassia, 10 grs., in water, 30 oz. Shake often. After several hours add:

Simple syrup..... 5 drs.  
 Gum arabic..... 1 oz.  
 Water ..... 2 ozs.  
 Water of ammonia..... 3 drs.

After six hours add

Nutgalls ..... 1 dr.  
 Tartaric acid.....40 grs.  
 Liquor ferrichloride ..... 1 dr.  
 Sugar.....  $1\frac{1}{2}$  dr.  
 Water ..... 2 ozs.

Then an emulsion of

Oil of cloves ..... 5 drops  
 Carbolic acid..... 5 drops  
 Gum arabic..... 1 dr.

Sugar ..... ½ dr.  
Water ..... 2 dr.

## INKS FOR SCHOOL USE.

## No. 1.

Extract of Campeche wood, powd... 60 parts  
Hot lime water ..... 900 parts  
Hydrochloric acid, commercial ..... 15 parts  
Solution (2.5%) pot. bichromate ..... 100 parts  
Dextrin, commercial. .... 10 parts  
Creosote, q.s., or 20 drops to the quart.

## No. 2.

Extract Campeche wood ..... 120 parts  
Hot water ..... 1200 parts  
Sol. of pot. bichromate (14:160) ... 160 parts  
Sol. of iron sulphate com. (24:400). 400 parts  
Acid hydrochloric, commercial .... 56 parts  
Water sufficient to make ..... 2800 parts

## BLUE BLACK INK.

Extract of logwood ..... 3½ drs.  
Potash alum ..... 20 grs.  
Indigo carmine ..... 30 grs.  
Iron sulphate ..... 6 grs.  
Copper sulphate ..... 4 grs.  
Potash bichromate ..... 4 grs.  
Gum arabic ..... 3 grs.  
Distilled water ..... 2½ oz.

Dissolve the extract of logwood in 1 ounce of distilled water; then dissolve the other ingredients in the remainder. Mix let stand to settle, and decant.

The above formula is recommended as furnishing an ink that flows readily from the pen and changes rapidly from a blue to a deep black.

## COMMON BLACK INK.

Logwood chips ..... 1 lb.  
Water ..... 1½ gal.  
Bichromate of potash ..... ½ oz.  
Prussia of potash ..... ¼ oz.  
Prussiate of iron (Prussian blue) ..... ½ oz.

Boil logwood chips in the water until reduced to 2 quarts; pour off and repeat the boiling again as before; mix the two waters; 1 gallon in all, then add the other ingredients, boil again about five minutes, and strain. Bottle for use.

You will find none of the gumminess about this ink that is found in that made from the extract of logwood.

## BLACK INK.

Lactate of iron ..... 15 grs.  
Gum arabic, powdered ..... 75 grs.  
Sugar, powdered ..... ½ dr.  
Gallic acid ..... 9 grs.  
Hot water ..... 3 ozs.

I have tried this with poor results.—J.H.O.

## BLACK INK.

Galls ..... 1 lb.  
logwood chips ..... 4 ozs.  
Water ..... 6 qts.

Boil 1 hour, strain 5 quarts, add of sulphate of iron (calcined to whiteness) 4 ounces, brown sugar 3 ounces, gum 6 ounces, acetate of copper ¼ ounce. Agitate twice a day for a fortnight, then decant the clear, bottle, cork up for use. Writes a full black.

WRITING FLUID.

- Bruised galls ..... 1 lb.
- Logwood ..... ½ lb.
- Gum ..... 6 ozs.
- Blue vitriol ..... 1 oz.
- Sugar ..... 1 oz.

Boil the galls and logwood in 20 pints of water down to 10 pints, strain, dissolve the other ingredients and bottle.

ANTI-CORROSIVE INK.

- Aleppo galls ..... 10 lbs.
- Logwood ..... 5 lbs.
- Pomegranate peel ..... 2½ lbs.
- Cloves ..... 2½ ozs.
- Water ..... 8 gals.

Let the whole boil gently for an hour or two, then cover the copper and leave it for twelve or fourteen hours, stirring it now and then. Strain off the decoction and add 2 gallons more water to the ingredients; simmer gently for an hour, and strain. Mix the liquors and let them settle; draw off the clear liquid from the dregs; dissolve in a portion of it 2½ pounds of gum arabic and ½ pound of sugar candy; and in another portion 2½ pounds of green sulphate of iron. Strain both solutions and mix the whole together; then add 1 ounce of calcined borax, and ¼ ounce of creosote dissolved in ¼ pint of spirit of wine.

ASIATIC BLACK INK.

- Logwood shavings ..... 2 lbs.
- Nut galls, powdered ..... 2 lbs.
- Green vitriol ..... 1 lb.
- Gum ..... ½ lb.
- Pomegranate bark ..... ¼ lb.
- Water ..... 1 gal.

Infuse fourteen days with frequent agitation.

BLACK INK.

- Bruised galls ..... 24 ozs.
- Rasped logwood ..... 8 ozs.
- Iron sulphate ..... 12 ozs.
- Powdered acacia ..... 6 ozs.
- Creosote ..... 30 drops
- Soft water ..... 3 gals.

Boil the galls and logwood in the water until reduced to 2 gallons; then add the other ingredients and set aside for fourteen days, stirring frequently, when it will be ready for use.

BLACK INK.

- Nut galls ..... 4½ ozs.
- Logwood ..... 4 drs.
- Sulphate iron ..... 4 drs.
- Pyroligneous acid ..... 4 drs.
- Gum arabic ..... 1 to 2 ozs.
- Water ..... 1 pt.

Dissolve the gum arabic in the ink prepared in the usual manner.

A GOOD SCHOOL AND OFFICE INK.

- Gall apples, coarsely powdered .... 100 gm.
- Salicylic acid ..... 1 gm.
- Water ..... 1000 ccm.

Mix and set aside for several days, agitating vigorously occasionally. At the expiration of six or eight

days add 50 gms. iron sulphate in powder. Shake well together and set aside for an equal length of time, shaking in the same manner, and giving the fullest access to the atmosphere. After six or eight days standing (the longer the better), filter off and add to the filtrate 7 gms. aniline blue water (water soluble) previously dissolved in a little gum water. If the ink flows too freely, add a little gum arabic mucilage.

The proportions used by different ink makers vary very much. Watts gives the following recipes :

PARTS BY WEIGHT						
Galls.....	225	187	133	125	66	62
Copperas.....	75	73	55	24	22	31
Gum arabic.....	25	73	55	24	19	31
Water.....	1000	1000	1000	1000	1000	1000
	According to Lewis		According to Ribeau Court		According to Robinson	
	PARTS		PARTS		PARTS	
Gall nuts.....	100		85		100	
Logwood.....	25		30		30	
Sulphate of iron.....	30		30		30	
Sulphate of copper.....	30		10		60	
Gum arabic.....	30		30			
Sugar.....			10			
Water.....	2000		2000		2000	

The following recipes for logwood inks have been collected by Watts.

PARTS BY WEIGHT					
Galls.....	50	174	50	60	42
Logwood.....	—	—	100	20	21
Copperas.....	32	87	16	20	21
Sulphate of copper.....	—	—	—	—	5
Gum.....	9	43	47	20	16
Sugar.....	—	—	23	1000	—
Vinegar.....	125	135	—	—	—
Water.....	1000	1000	1000	1000	1000

Sulphate of copper deepens the color of the precipitate, but renders it more likely to settle down. Sugar renders the ink more fluid, and permits the addition of a larger proportion of gum. It likewise renders the ink adhesive when dry, so that a copy of the writing may be taken off by laying a damp sheet of unsized paper upon it, and passing lightly over it a flat iron moderately heated, or by applying a little pressure in the cold ink of this quality is called copying ink.

NUTGALL INFUSION.

Chinese nutgall..... 7 ozs. av.

Talcum, purified..... ¾ oz. av.

Water, distilled..... sufficient

Reduce the nutgalls to coarse powder, moisten (not wet) the powder, and set the latter aside at a temperature of 20 to 25 degs. C., until it is thickly covered with mould. In order to hasten this moulding the drug should be moistened daily with water, so that it will always have about the same proportion of moisture. At the end of from 8 to 10 days, fermentation will have advanced sufficiently to admit of extraction of the drug. To the latter should be added 14 ounces of water, and the mixture heated for an hour on the water bath. Then express, treat the residue in the same manner with the same amount of water, and then again with 7 ounces of water. Mix the three liquids

obtained, add the talcum, shake well, set aside for 24 hours, filter, and add enough water, if necessary, through the filter to make the filtrate measure 32 ounces. The infusion will keep for several days.

NUTGALL INK BODY.

No. 1.

Nutgall infusion..... 30 ozs.  
Sulphuric acid, concentrated ..... 40 drops  
Ferrous sulphate, pure ..... 100 grs.  
Distilled water.....sufficient.

Mix the infusion and acid ; heat for 15 minutes on a water bath, dissolve the iron salt in the mixture, transfer the latter to a bottle, cork well, set aside for 2 weeks, filter and add through the filter enough water to make the filtrate measure 32 ounces.

NUTGALL INK BODY.

No. 2.

Nutgall infusion.....32 ozs.  
Solution of chloride of iron, U.S.P.. 2¼ ozs.  
Distilled water..... 6 drs.

Allow this mixture to stand for 2 weeks in a closed vessel, and then filter.

TANNIN INK BODY.

Tannin solution.....15 ozs.  
Ferrous sulphate, pure..... 1¾ oz. av.  
Distilled water ..... sufficient.

Heat the tannin solution to about 70 or 80 degs. C., also dissolve the iron salt in 9 ounces of hot water ; mix the hot solutions by pouring iron solution gradually into the tannin solution, set the mixture aside for 3 weeks, filter and add enough water through the filter to make the filtrate measure 25 ounces.

The tannin solution for the above is as follows :

Tannic acid.....3 ozs. av.  
Muriatic acid, commercial .....4 drs.  
Distilled water.....sufficient.

Mix the two acids and 3 ounces of water in a flask, and heat on a water bath to a temperature of 80 to 90 degs. C., for 3 hours, adding from time to time, hot water until 27 ounces are added.

This solution should not be kept longer than 7 days.

TANNIN INK BODY.

Tannic acid.....3½ ozs. av.  
Solution of iron chloride, U.S.P....4 ozs.  
Muriatic acid, commercial.....2¼ drs.  
Water .....sufficient.

Mix the two acids, the solution and 7 ounces of water in a flask on a water bath, at a temperature of 80 to 90 degs. C., for a period of 10 hours. Then add 20 ounces of hot water; continue the heat for another hour, transfer to a bottle, cork well, set aside in a cool place for 2 weeks, filter and add through the filter enough water to make the filtrate measure 32 ounces.

ALIZARIN COPYING INK.

Indigotin.....95 grs.  
Aniline green, D .....57 grs.  
Sugar ..... 1¼ oz. av.  
Distilled water..... 3 ozs.

Nutgall ink body 1.....32 ozs.  
 Carbohc acid .....20 drops

Dissolve the dyes and sugar in the water by the aid of heat, add the remaining ingredients, transfer the mixture to a bottle; tie over the latter a piece of paper, set aside in a cool place for a week, and decant the clear liquid from the precipitate.

## ALIZARIN COPYING INK.

Indigotin .....70 grs.  
 Aniline green, D.....42 grs.  
 Glucose ..... 1¼ oz. av.  
 Distilled water..... 2 ozs.  
 Tannin ink body 1.....25 ozs.  
 Carbohc acid .....15 drops.

Dissolve the dyes and glucose in the water by the aid of heat, add the remaining ingredients, transfer to a bottle; tie over the latter a piece of paper, set aside in a cool place for one week, and decant the clear liquid from the trifling precipitate.

## ALIZARIN INK.

Aniline green, D..... 76 grs.  
 Indigotin.....128 grs.  
 Water ..... 28 ozs.  
 Nutgall ink body, 2 ..... 38 ozs.  
 Carbohc acid..... ½ dr.

Dissolve the two dyes in the water by the aid of heat, add the other ingredients, transfer the mixture to a bottle, tie over the mouth of the latter a piece of paper, set aside for one week in a cool place, and decant the clear liquid.

## ALIZARIN INK.

Indigotin .....80 grs.  
 Aniline green, D.....48 grs.  
 Tannin ink body, 2 .....16 ozs.  
 Distilled water .....25 ozs.  
 Carbohc acid.....20 drops.  
 Sugar.....40 grs.

Dissolve the dyes in the water by the aid of heat, add the other ingredients, transfer to a bottle, tie over the latter a piece of paper, set aside for one week in a cool place, and decant the clear liquid.

## BLACK COPYING INK.

Phenol black (coal tar dye)....190 grs.  
 Sugar ..... 1¼ oz. av.  
 Distilled water ..... 3 ozs.  
 Nutgall ink body, 2..... 32 ozs.  
 Carbohc acid..... 20 drops.

Prepare like Alizarin Copying Ink, No. 1.

## BLACK COPYING INK.

Phenol black B, (coal tar dye)...140 grs.  
 Glucose ..... 1¼ oz. av.  
 Distilled water..... 2 ozs.  
 Tannin ink body, 1..... 25 ozs.  
 Carbohc acid ..... 15 drops.

Prepare like Alizarin Copying Ink, No. 2.

## BLACK INK.

Phenol black (coal tar dye).....320 grs.  
 Water ..... 28 ozs.  
 Nutgall ink body 2..... 38 ozs.

Carbolic acid..... ½ dr.  
 Prepare like Alizarin Ink, No. 2.

BLACK INK.

Phenol black, B ..... 160 grs.  
 Tannin ink body, 2..... 16 ozs.  
 Distilled water ..... 25 ozs.  
 Carbolic acid..... 20 drops  
 Sugar..... 40 grs.  
 Prepare like Alizarin Copying Ink, No. 2.

BLUE COPYING INK.

Phenol blue, 3 F. (coal tar dye)... 48 grs.  
 Sugar ..... 1¼ oz. av.  
 Distilled water..... 3 ozs.  
 Nutgall ink body, 1..... 32 ozs.  
 Carbolic acid..... 20 drops  
 Prepare like Alizarin Copying Ink, No. 1.

BLUE COPYING INK.

Phenol blue, 3 F..... 42 grs.  
 Glucose ..... 1¼ oz. av.  
 Distilled water..... 2 ozs.  
 Tannin ink body, 1..... 25 ozs.  
 Carbolic acid..... 15 drops  
 Prepare like Alizarin Copying Ink, No. 2.

BLUE INK.

Phenol blue, 3 F..... 96 grs.  
 Water ..... 28 ozs.  
 Nut gall ink body, 2 ..... 38 ozs.  
 Carbolic acid..... ½ dr.  
 Prepare like Alizarin Ink, No. 1.

BLUE INK.

Phenol blue, 3 F. .... 60 grs.  
 Tannin ink body, 2 ..... 16 ozs.  
 Distilled water ..... 25 ozs.  
 Carbolic acid..... 20 drops.  
 Sugar..... 40 grs.  
 Prepare like Alizarin Ink, No. 2.

BLUE-GREEN COPYING INK.

Phenol blue, 3 F..... 38 grs.  
 Aniline green, D. .... 95 grs.  
 Sugar ..... 1¼ ozs. av.  
 Distilled water..... 3 ozs.  
 Nut gall ink body, 1..... 32 ozs.  
 Carbolic acid..... 20 drops  
 Prepare like Alizarin Copying Ink, No. 1.

BLUE-GREEN COPYING INK.

Phenol blue, 3 F..... 28 grs.  
 Aniline green, D..... 70 grs.  
 Glucose ..... 1¼ oz. av.  
 Distilled water..... 2 ozs.  
 Tannin ink body, 1..... 25 ozs.  
 Carbolic acid..... 15 drops  
 Prepare like Alizarin Copying Ink, No. 2.

BLUE-GREEN INK.

Phenol blue, 3 F. (coal tar dye)..... 48 grs.  
 Aniline green, D. .... 60 grs.  
 Water ..... 28 ozs.  
 Nut gall ink body, 2 ..... 38 ozs.  
 Carbolic acid..... ½ dr.  
 Prepare like Alizarin Ink, No. 2.

## BLUE-GREEN INK.

Phenol blue, 3 F. .... 30 grs.  
 Aniline green, D. .... 50 grs.  
 Tannin ink body, 2 ..... 16 ozs.  
 Distilled water ..... 25 ozs.  
 Carbolic acid ..... 20 drops  
 Sugar ..... 40 grs.  
 Prepare like Alizarin Copying Ink, No. 2.

## GREEN COPYING INK.

Aniline green, D. .... 114 grs.  
 Sugar ..... 1¼ oz. av.  
 Distilled water ..... 3 ozs.  
 Nut gall ink body, 1 ..... 32 ozs.  
 Carbolic acid ..... 20 drops  
 Prepare like Alizarin Copying Ink, No. 1.

## GREEN COPYING INK.

Glucose ..... 1¼ oz. av.  
 Aniline, green, D. .... 70 grs.  
 Distilled water ..... 2 ozs.  
 Tannin ink body, 1 ..... 25 ozs.  
 Carbolic acid ..... 15 drops  
 Prepare like Alizarin Copying Ink, No. 2.

## GREEN INK.

Aniline green, D. .... 192 grs.  
 Water ..... 28 ozs.  
 Nut gall body, 2 ..... 38 ozs.  
 Carbolic acid ..... ½ dr.  
 Prepare like Alizarin Ink, No. 1.

## GREEN INK.

Aniline green, D. .... 100 grs.  
 Tannin ink body, 2 ..... 16 ozs.  
 Distilled water ..... 25 ozs.  
 Carbolic acid ..... 20 drops  
 Sugar ..... 40 grs.  
 Prepare like Alizarin ink, No. 2.

## RED COPYING INK.

Ponceau, R. R. (coal tar dye) ... 152 grs.  
 Sugar ..... 1¼ oz. av.  
 Distilled water ..... 3 ozs.  
 Nut gall ink body, 1 ..... 32 ozs.  
 Carbolic acid ..... 20 drops.  
 Prepare like Alizarin copying ink, No. 1.

## RED COPYING INK.

Glucose ..... 1¼ oz. av.  
 Ponceau, R. R. .... 112 grs.  
 Distilled water ..... 2 ozs.  
 Tannin ink body, 1 ..... 25 ozs.  
 Carbolic acid ..... 15 drops.  
 Prepare like Alizarin copying ink, No. 2.

## RED INK.

Ponceau, R. R. .... 192 grs.  
 Water ..... 28 ozs.  
 Nut gall ink body, 2 ..... 38 ozs.  
 Carbolic acid ..... ½ dr.  
 Prepare like Alizarin ink, No. 1.

## RED INK.

Ponceau, R. R. .... 100 grs.  
 Tannin ink body 2 ..... 16 ozs.  
 Distilled water ..... 25 ozs.



Carbolic acid..... 20 grs.  
 Sugar ..... 40 grs.  
 Prepare like alizarin ink No. 2.

VIOLET COPYING INK.

Phenol blue, 3 F. (coal tar dye)... 38 grs.  
 Ponceau R. R. (coal tar dye)..... 57 grs.  
 Sugar ..... 1¼ oz. av.  
 Distilled water..... 3 ozs.  
 Nut gall ink body 1..... 32 ozs.  
 Carbolic acid..... 20 drops  
 Prepare like alizarin ink No. 1.

VIOLET COPYING INK.

Phenol blue, 3 F..... 28 grs.  
 Ponceau R. R..... 42 grs.  
 Glucose ..... 1¼ oz. av.  
 Distilled water..... 2 ozs.  
 Tannin ink body 1..... 25 ozs.  
 Carbolic acid..... 15 drops  
 Prepare like alizarin copying ink No. 2.

VIOLET INK.

Phenol blue, 3 F. (coal tar dye)..... 48 grs.  
 Ponceau R. R. (coal tar dye)..... 64 grs.  
 Water ..... 28 ozs.  
 Nut gall body 2..... 38 ozs.  
 Carbolic acid..... ½ dr.  
 Prepare like alizarin ink No. 1.

VIOLET INK.

Phenol blue, 3 F..... 30 grs.  
 Ponceau R. R..... 40 grs.  
 Tannin ink body 2..... 16 ozs.  
 Distilled water..... 25 ozs.  
 Carbolic acid ..... 20 drops  
 Sugar ..... 40 grs.  
 Prepare like alizarin ink No. 2.

(Inks from Dietrich's Manual.)

NUT GALL INKS.

a Nut gall, ground..... 200.0 gms.  
 Water ..... 1000.0 gms.  
 White bole..... 5.0 gms.

Macerate the nut gall in 750 grams of cold water for twenty-four hours, strain and wash the residue with 350 grams of warm water; heat the mixed filtrates with the white bole to the boiling point, and strain through flannel; lastly add sufficient water to make it weigh 1000 grams.

b Nut gall, ground..... 200.0 gms.  
 Liqui citrini, ground..... 100.0 gms.  
 Water ..... 1000.0 gms.  
 White bole..... 5.0 gms.

Prepare as for body liquid (a).

SODIUM INDIGO SULPHATE SOLUTION.

Sulphuric acid, fuming..... 150.0 gms.  
 Indigo, powdered..... 20.0 gms.  
 Sodium carb. cryst..... 205.0 gms.  
 Water ..... 430.0 gms.

Add the indigo gradually to the acid contained in a capacious vessel surrounded with water to keep down the temperature, and allow to stand eight days, after which gradually add a solution of the sodium carbonate in the water, after the reaction has ceased warm

the solution to expel all carbonic acid gas, and finally add sufficient water to make it weigh 800 grams.

SOLUTION ACETATE OF IRON (PYROLIGNEOUS).

Proligneous acid ..... 100.0 gms.  
Iron filings..... 10.0 gms.

Add the acid to the iron, and when the reaction has ceased filter the solution, which should have a specific gravity 1.115.

ALIZARIN INKS.—COPY INK.

Ferrous sulphate cryst..... 50.0 gms.  
Body liquid No. 2 ..... 750.0 gms.  
Water ..... 100.0 gms.  
Solution sul. of indigo and sodium. 150.0 gms.  
Solution acetate of iron, pyro..... 25.0 gms.  
Ammonium chloride..... 20.0 gms.  
Sodium sulphate cryst..... 20.0 gms.  
Sugar..... 20.0 gms.

Dissolve the sulphate of iron in the body liquid and add the other ingredients in the order named. Allow it to stand fourteen days and decant.

WRITING FLUID.

Ferrous sulph. cryst..... 30.0 gms.  
Body liquid No. 2 ..... 500.0 gms.  
Solution indigo and sodium..... 100.0 gms.  
Water ..... 200.0 gms.  
Solution acetate iron pyro..... 15.0 gms.  
Ammonium chloride..... 10.0 gms.  
Sodium sulphate cryst..... 20.0 gms.  
Sugar ..... 10.0 gms.

Dissolve the sulphate of iron in the body liquid without heat, and add the other ingredients in the order named.

BLUE GALL INK.

Body liquid No. 1 ..... 500.0 gms.  
Ferrous sulphate cryst..... 30.0 gms.  
Sugar ..... 20.0 gms.  
Hydrochloric acid..... 2.0 gms.  
Blue aniline..... 2.0 gms.  
Water ..... 500.0 gms.

To the body liquid add the other ingredients previously dissolved in the water. Allow it to stand fourteen days and decant the clear liquid.

DARK BLUE GALL INK.

Body liquid No. 1 ..... 600.0 gms.  
Ferrous sulphate cryst..... 30.0 gms.  
Sugar ..... 20.0 gms.  
Hydrochloric acid..... 2.0 gms.  
Blue aniline..... 5.0 gms.  
Water ..... 400.0 gms.

To the body liquid add the other ingredients previously dissolved in the water. Allow to stand fourteen days and decant the clear liquid.

BLUE SCHOOL INK.

Body liquid No. 1 ..... 400.0 gms.  
Ferrous sulph. cryst..... 20.0 gms.  
Sugar ..... 20.0 gms.  
Hydrochloric acid..... 1.5 gms.  
Blue aniline..... 1.5 gms.  
Water ..... 600.0 gms.

To the body liquid add the other ingredients previ-

ously dissolved in the water. Allow it to stand fourteen days and decant from the sediment.

DUNCAN CLOCKHART & CO.'S, OF EDINBURGH,  
CELEBRATED BLUISH BLACK INK.

Is prepared by cold maceration according to the following receipt: 4½ ounces bruised Aleppo gall nuts, not gnawed by insects, 1 dram of pulverized cloves, 40 ounces of cold water, 1½ ounces purified sulphate of iron, 35 grains of purified sulphuric acid, and ¼ ounce of sulphindgoti acid in the form of a thin paste, and either entirely neutral or nearly so. The gall nuts are placed together with the cloves into a flask capable of holding about 4 gallons water is poured over them and they are allowed to digest, being frequently shaken. The fluid is then filtered into another flask of the same size. The iron is now added, and when entirely dissolved, the acid is poured into the mixture and the whole quickly shaken; finally, the indigo is added and mixed with the compound by shaking, and the whole filtered. For copying ink 5½ of gall nuts are used.

INK THAT WILL STAND WATER.

- Borax . . . . . 1 dr.
- Gum shellac . . . . . 1 dr.
- Lampblack, sufficient, or about . . . . . 2 drs.
- Water . . . . . 12 drs.

Let the water and shellac stand over a gentle heat until the shellac is dissolved, then add the lampblack and mix well.

SHELLAC INK OR COALHUPE'S WRITING FLUID.

To 18 ounces of water add 1 ounce of powdered borax and 2 ounces of bruised shellac, and boil them in a covered vessel, stirring them occasionally till dissolved. Filter when cold, through coarse filtering paper; add 1 ounce of mucilage, boil for a few minutes, adding sufficient finely powdered indigo and lampblack to color it. Leave the mixture for two or three hours for the coarser particles to subside; pour it off from the dregs, and bottle it for use.

GLOSS OR ENAMEL INK.

- Gum shellac . . . . . ½ oz.
- Borax, powdered . . . . . ¾ oz.
- Nigrosine . . . . . ¼ oz.
- Tannic acid . . . . . 8 gms.
- Picric acid . . . . . 3 gms.
- Ammonia water . . . . . 6 drs.
- Water . . . . . ¾ pt.

Mix the shellac, borax and water and heat till the shellac is dissolved, then strain through flannel while hot and add the other ingredients and shake well. If gloss ink is wanted in a hurry, it can also be made by adding ½ ounce of fluid water glass to 3 ounces of any colored ink and shaking well.

BANKER'S INDELIBLE INK.

- Water . . . . . 200 parts
- Borax . . . . . 1½ part
- Shellac . . . . . 3 parts

Boil in a porcelain dish till dissolved, let it stand in a cool place three to four hours, and filter. Complete 150 parts of liquid. Add

- Aniline blue . . . . . 4 parts
- and digest

Gallic acid ..... 5 parts  
 Picric acid ..... 2 parts  
 Borax ..... ½ part  
 Ammonia water ..... 20 parts  
 Water ..... 50 parts  
 Put in a porcelain dish, and after solution, add  
 Caustic potassa ..... 1 part

Dissolve in

Water ..... 50 parts

Boil for several minutes, or until the mixture turns from a yellow to a brown color; let it stand in a warm place for one hour, stirring once in a while. Mix with the first solution, shake often, and decant.

#### NON-ERASIBLE INK.

Is prepared by mixing 20 grams caustic potassa, 10 grams leather scrape, cut fine, and 5 grams of sulphur in an iron kettle on a sand bath, covering with water, evaporating to dryness, and continuing the heat, with continual stirring, until the mixture again becomes pasty. This mass is then dissolved in water, strained, preserved in well stoppered bottles. The product resists all chemical agents.

#### INERADICABLE INK.

1.75 grams of anilin black are ground up with 60 drops of hydrochloric acid and 42 grams alcohol, and the liquid is diluted with a hot solution of 25 grams of gum arabic in 170 grams of water. If the anilin black solution is diluted with a solution 25 grams of shellac in 70 grams of alcohol, instead of the gum water, the result is an ink suitable for writing on wood, brass or leather.

#### INK THAT WILL NOT FREEZE.

Aniline black ..... 1 dr.

Rub with a mixture of

Concentrated hydrochloric acid ..... 1 dr.

Alcohol ..... 10 ozs.

The deep blue solution obtained is diluted with a hot solution of

Concentrated glycerine ..... 1½ dr.

In water ..... 4 ozs.

This ink does not attack steel pens, is unaffected by concentrated mineral acids or strong alkalies, and will not freeze at a temperature of 22° or 24° below zero.

#### ACID AND WATERPROOF INK.

This is made by dissolving in a litre of distilled or boiling water, 50 grams of anilin black (naphthol black) with 50 grams of alum, and adding a small quantity of gum arabic.

#### INDELIBLE WRITING INK.

The following ink is suitable for druggists, since it withstands the action of acids and alkalies better than any hitherto proposed.

Ferrocyanide of potassium ..... 3 parts

Concentrated ammonia water ..... 2 parts

Tartaric acid ..... 2 parts

Water ..... 240 parts

Dissolve and filter; then add

Iron and ammonium citrate ..... 160 parts

Water ammonia ..... 40 parts

Aniline blue ..... 8 parts

Gum arabic, powdered ..... 70 parts

This gives a blue ink. By adding to the above  
 Pyrogallic acid.....20 parts  
 a black ink results.

INDESTRUCTIBLE INK FOR DEEDS, ETC.

Dissolve 25 grains of powder gum copal in 200 grains of lavender oil by the aid of a gentle heat; then add 2½ grains of lampblack and half a grain of powdered indigo.

BLACK INK.

Ferri sulphatis.....℥viii  
 Sodii sulphit.....℥iv  
 Aquæ destillat.....℥xx  
 Acidi pyrogallici.....℥x  
 Mucilaginis acaciæ.....℥gs

Age improves the ink. Dissolve the first two in half the water, then mix with sodii sulph. dissolved in the remainder.

A NEW INK.

Tannic acid.....1 oz.  
 Pyrogallic acid.....½ dr.  
 Lactate of iron.....1 oz.  
 Sulphate of iron.....1 oz.  
 Pyoktannin.....½ dr.  
 Tartaric acid.....1 oz.  
 Warm water.....6 pts.

Shake well to dissolve. Set aside for a few days, shaking occasionally. Strain through cotton wool, and add 1½ ounces of fresh mucilage. This ink writes a deep black, and gives good copies, it is said.

GALLOTANNATE OF IRON AND INK.

The gallotannate of iron from which ink is made is generally prepared extemporaneously in solution, from tannic acid and ferrous sulphate and ferric chloride. Indigo sulphate is a synonym by which the substance more properly called "sulphindigotic acid" is known.

Tannic acid.....1 oz.  
 Pyrogallic acid.....½ oz.  
 Iron lactate.....1 oz.  
 Iron sulphate.....1 oz.  
 Tartaric acid.....1 oz.  
 Warm water.....6 pts.

Shake well to dissolve. Set aside for a few days, shaking occasionally; then strain through cotton, and add 1½ ounces of fresh mucilage. Sufficient sulphindigotic acid may be added to improve the appearance of the ink.

FINE BLACK WRITING FLUID.

a Nigrosin.....20 g.  
 Carbolic acid.....0.5 g.  
 Water, boiling.....500 g.  
 b Tannin.....40 g.  
 Ferrous sulphate.....25 g.  
 Sugar.....15 g.  
 Aniline blue.....5 g.  
 Boric acid.....2 g.  
 Water.....900 g.

Mix the filtered solutions a and b and set aside for several weeks before using.

## WRITING FLUID.

Tannic acid	40.0 grams.
Ferrous sulphate cryst.	30.0 grams.
Sodium chloride, sulphate of each	20.0 grams.
Sugar	20.0 grams.
Potassium bisulph.	6.0 grams.
Benzoic acid	2.0 grams.
Indigotin	2.5 grams.
Picric acid	2.5 grams.
Water, warm	1000.0 grams.

Dissolve the ingredient in the water in the order named.

## BLACK INK.

Tannic acid	7 ozs.
Gallic acid	8 ozs.
Ferrous sulphate	16 ozs.
Aniline blue	1 oz.
Water	20 pts.

Dissolve acids in half the water, and the iron salt in 5 pints of water to which a few drops of sulphuric acid has been added. Mix the solutions. Triturate the aniline with 4 ounces of alcohol and 8 drops of oil of cloves. Add 5 pints of water and the mixed tannin and iron solution. Shake well, set aside for three weeks and decant.

## ALIZIRIN INK.

Indigotin	6 parts
Pure water	388 parts
Sugar	20 parts
Solution of tersulphate of iron (U.S.)	62 parts
Ink body (see below)	600 parts

Dissolve the indigotin by one day's maceration in water. Then add sugar and tersulphate of iron, and lastly the *ink body*, which is prepared as follows: Macerate 200 parts of coarse powdered Chinese galls for 24 hours with 750 parts of distilled water, strain and express. Upon the residue pour 350 parts of boiling water and express for one hour. Triturate 50 parts of white bole with the mixed strained liquids, heat once to boiling, remove the scum and filter through flannel bags. Wash the latter with water until the weight of the filtrate is 1,000 parts.

In place of the ink body a solution of 60 parts of tannic acid in 540 parts of water may be used.

## BLUE DOCUMENT INK (Blue Nutgall Ink).

Solution tersulphate of iron (U. S.)	44 parts
Sulphate of sodium (cryst.)	20 parts
Sugar	20 parts
Ink body	500 parts
Aniline blue (water-soluble)	4 parts
Pure water	q.s.

Dissolve the sulphate of sodium in 242 parts of water, add the solution of tersulphate of iron and the sugar, when the latter is dissolved, add the ink body. Lastly add the aniline blue dissolved in 200 parts of water. In place of the ink body a solution of 50 parts of tannic acid in 450 parts of water may be added. Let the ink stand 8 days then pour off the clear liquid. This ink writes with a fine blue color, dries rapidly upon paper, and after a few days becomes bluish-

black. For ordinary use the ink may be diluted with an equal volume of water which has been boiled and then allowed to become cold. For every 100 parts of product, 3 more parts of sugar are added.

For the Ink Body use the one that is used in the Alizirin Ink formula.

WRITING FLUID. (Bluish Black, changing to Black.)

Tannin.....	160	grs.
Indigo compound.....	320	grs.
Sulphate of iron.....	1	oz.
Gum arabic.....	½	oz.
Carbolic acid.....	5	grs.
Water.....	1	pt.
Whiting or chalk.....	¼	oz.

Mix the tannin with part of the water and dissolve, add to this the sulphate of iron and gum arabic. Mix the balance of the water with the indigo compound and add the whiting, a little at a time. When precipitate has settled, pour off the liquid, and add to the other solution, then add the carbolic acid. Set away to settle.

BLUE-BLACK INK.

Tannin.....	1	oz.
Sulphate of iron.....	6½	drs.
Sulphuric acid.....	20	mins.
Methyl blue.....	1	scruple
Spirit.....	½	oz.
Water.....	25	ozs.

Dissolve the tannin in half of the water and the sulphate of iron and acid in the rest. Dissolve the methyl blue in the spirit, and add to the iron solution; then add the tannin solution.

BLUE-BLACK INK.

Gallic acid.....	2	ozs.
Iron sulphate.....	3½	ozs.
Aniline blue.....	1	dr.
Water.....	10	pts.

Heat the gallic acid in 5 pints of water. Dissolve the iron sulphate in a quart of water and add to it the gallic solution, stirring well, and then add the aniline dissolved in the remaining water.

BLUE-BLACK INK.

Tannic acid.....	200	grs.
Gallic acid.....	50	grs.
Protosulphate of iron.....	1	oz.
Indigo carmine (neutral).....	320	grs.
Powdered cloves.....	5	grs.
Water.....	1	pt.

Dissolve the tannic and gallic acids in water. To this solution add the iron salt, and filter through cotton. Then add the indigo carmine, and lastly the cloves. One good copy can be obtained from this ink.

BLUE-BLACK INK.

Tannic acid.....	160	grs.
Gallic acid.....	40	grs.
Ferrous sulphate.....	352	grs.
Indigo-carmine.....	256	grs.
(or in its place indigo paste about.....)	200	grs.)
Beechwood creosote.....	5	drops
Distilled water.....	16	ozs.

If preferred, mucilage of acacia may be added, in the proportion of about 1 grain per fluid ounce, but it is not essential. Dissolve the acids in part of the water, and do the same with the iron and the remainder of the water; mix, shake well, and add the indigo-carmine; when dissolved, add the cresote and mucilage; shake well, filter through cotton and after 48 hours through paper.

**BLUE-BLACK INK.**

Tannic acid .....	80 grs.
Gallic acid .....	14 grs.
Salicylic acid.....	1 gr.
Ferrous sulphate.....	102 grs.
Indigotin.....	90 grs.
Water .....	1 pt.

Would be best to use 10 ounces of water in place of 1 pint.

**THE BEST TANNIN AND IRON INK.**

We scarcely are in a position to say what is the best ink for all purposes, since an ink which may be the best for one class of writing may be inferior for other purposes. The best ink for records of all descriptions is presumably the following, since it was adopted only after long and scientific experimentation, by the Royal Danish Chancelry.

Tannic acid, pure .....	284 parts
Gallic acid.....	77 parts
Iron sulphate.....	300 parts
Gum Arabic .....	100 parts
Phenol .....	10 parts
Water .....	10,000 parts

The test prescribed for this ink is a very severe one.

A writing or drawing is made with the ink on rag-paper and this letter is exposed for ninety days of the summer months, to the direct action of the sunlight. The writing is then washed with water, dried and again washed with alcohol. If the writing runs, or fades in any degree, the ink is condemned. Further than this, the ink, after being filtered, must stand for fourteen days in an open vessel without either becoming mouldy or throwing down a precipitate. So we think that the above formula comes very nearly to a perfect writing fluid. It is easily converted into a drops of glycerin to the liter.

copying fluid by the addition of loaf sugar, and a few

**BLACK INK.**

The following is the black ink of the German chancelry.

Tannin .....	60 parts
Liquor chloride of iron .....	25 parts
Aniline deep black (E).....	20 parts
Sulphuric acid, dilute.....	1 part
Water .....	5400 parts

Add gum arabic, in thick solution, little by little, testing the ink frequently, until a satisfactory gloss appears.

**PERMANENT BLACK INK.**

“Writing inks to be used for records and important documents in Denmark, according to the Chemist and Druggist, are required by the government to come up



to the following requirements: The first, an iron and nutgall ink, must contain not less than 4 per 1,000 of iron, and it must stand exposure in an open vessel for fourteen days without throwing down any sediment or becoming mouldy; it must resist light, air, water, alcohol. The test for stability is made by exposing the filtered ink to light and air, in a medicine glass the top of which is closed with a cap of paper or other device, to exclude dust. Another portion is exposed in a similar manner without a cap. The latter tests mould-resisting power. An ink of this description may be made as follows.

- Tannin ..... 6 drs.
- Gallic acid ..... 2 drs.
- Ferrous sulphate ..... 1 oz.
- Acacia ..... 4 drs.
- Carbolic acid ..... 20 min.
- Hydrochloric acid ..... 2 fl. dr.
- Water, enough to make ..... 35 fl. oz.

The ink is to be tested thus: Writing or drawing is made with it on rag paper, and the document is exposed for three summer months to direct sunlight. It is then washed with water and alcohol and dried; the marks must remain dark and legible. The editor of the Montreal Pharmaceutical Journal says of this ink that it can be readily made by any one, he has used it for some time and finds it very good. It has the excellent property of the writing darkening with time. Only gallotannic inks can be trusted for permanency."

WRITING FLUID (Greenish Blue changing to Black.)

- Tannin ..... 120 grs.
- Gallic acid ..... 160 grs.
- Sulphate of indigo ..... 320 grs.
- Sulphate of iron ..... 1 oz.
- Gum arabic ..... ½ oz.
- Carbolic acid ..... 5 grs.
- Water ..... 1 pt.
- Whiting or chalk ..... ¼ oz.

Mix the tannin and gallic acids with part of the water and dissolve by gentle heat, add the gum arabic and iron and dissolve. To the balance of the water add the sulphate of indigo and the whiting a little at a time. When the precipitate has settled, pour off and mix the solutions, add the carbolic acid and set aside to settle.

If desired of a green shade, add 10 grains green aniline to each pint.

BLACK INK.

- Tannic acid ..... 20 grs.
- Gallic acid ..... 10 to 20 grs.
- Water ..... 2 ozs.
- Copperas crystals ..... 15 grs.
- Monsel's salt ..... 15 grs.
- Mucilage ..... 2½ drs.
- Oil cloves ..... 2 drops

Dissolve the tannic and gallic acids in the 2 ounces of water, and dissolve the copperas and Monsel's salt in 2 quarts of water. Mix the two solutions and add the mucilage and oil of cloves.

BLACK INK.

- Tannin ..... 100 gms.
- Water ..... 100 gms.

Solution ferric chloride (10 per cent.) 200 gms.  
 Crude hydrochloric acid (spr.gr. 1.16) 10 gms.  
 Heat at 80 to 90°C. during 10 hours. Mix in a flask.  
 Then dilute with 700 gm. water and heat an hour  
 longer, replacing the evaporated water from time to  
 time. Let it settle two weeks, filter and bring the  
 weight up to 1,000 gm.

## EXTEMPORANEOUS BLACK INK.

Tannin acid.....312 grs.  
 Powdered acacia ..... 1½ drs.  
 Pyrogallic acid (Schering's)..... 16 grs.  
 White sugar..... 1 dr.  
 Sulphate of iron (best) ..... 2½ drs.  
 Distilled water..... 1 pt.  
 Creosote (Morson's from wood tar) 2 drops

The quantity of acacia can be diminished if a freer  
 flowing ink is desired.

The creosote should be shaken into the ink, *not* dis-  
 solved in alcohol, as is sometimes advised.

## EXTEMPORANEOUS BLACK INK.

Tannic acid.....10 grs.  
 Gallic acid .....10 grs.  
 Ferr. sulphate cryst.,.....15 grs.  
 Ferr. subsulphate, sice Monsel's salt 15 grs.  
 Mucilage..... 2½ drs.  
 Oil cloves..... 2 drops

Dissolve the tannic and gallic acids in 2 ounces of  
 water, and dissolve the ferr. sulph. and ferr. subsulph.  
 in 2 ounces of water. Mix the two solutions, and add  
 the mucilage and oil of cloves.

## WRITING FLUID (green changing to black).

Gallic acid .....160 grs.  
 Solution muriate of iron..... ½ oz.  
 Sulphate of indigo .....160 grs.  
 Gum arabic..... ½ oz.  
 Water..... 1 pt.  
 Whiting or chalk ..... ¼ oz.

Dissolve the gallic acid in part of the water by heat  
 and add the gum arabic. To the balance of the water  
 add the solution of iron and sulphate of indigo and  
 the whiting. Allow to stand until precipitate has  
 settled, pour off and mix the solutions.

## BLUE BLACK INK.

A. Dissolve 1 pound of tannin in sufficient distilled  
 or rain water to make a gallon.

B. Dissolve 14 ounces of sulphate of iron and 5  
 drams of pure sulphuric acid in sufficient water to  
 make half a gallon.

C. Dissolve 6 drams of methyl-blue in 8 ounces of  
 spirit and make up to half a gallon with water. Mix  
 these solutions and rinse out the bottles with enough  
 water to make the bulk of the mixture 2½ gallons.  
 This formula produces a beautiful ink very quickly,  
 but on keeping it deposits, and is apt to become a  
 trifle slimy. This result is due to the gradual change  
 of the tannin through the influence of the sulphuric  
 acid and oxidation. This disadvantage is obviated in  
 the next formula :

Tannin..... 3 ozs.  
 Water ..... 3 ozs.

Solution of ferric chloride (10%) . . . . . 7 ozs.  
 Hydrochloric acid . . . . . 2 ½ drs.

Heat in a large glass flask or bottle on a water-bath for five or six hours, then add hot water to 2 pints. Continue to heat for an hour longer, then set the ink aside for a fortnight in a cool place and filter. To the filtrate add a mixture of

Phenol blue FFF . . . . . 2 drs.  
 Carbohc acid . . . . . 40 grs.  
 Sugar . . . . . 3 ½ drs.  
 Water . . . . . 3 pts.

Dissolve by the aid of heat. Allow the ink to stand for a week in a cool, dark place before decanting. In the last the conversion of the tannin into gallic acid is effected by heating with the hydrochloric acid, and thus the ink becomes less prone to change than when made in the cold, and without the preliminary hydrolysis.

BLACK INK.

Tannin . . . . . 1 oz.  
 Water . . . . . 10 ozs.  
 Solution of perchloride of iron (10%) ½ oz.  
 Pure sulphuric acid . . . . . 6 drops  
 Water . . . . . 7 ozs.  
 Aniline deep black E . . . . . 2 ½ drs.

Dissolve the tannin in the first water, and the aniline deep black E in the second. To the latter add the iron solution and the acid, then mix the solutions.

MASSACHUSETTS STANDARD RECORD INK.

Tannic acid, pure dry . . . . . 23.4 parts  
 Gallic acid . . . . . 7.7 parts  
 Ferrous sulphate . . . . . 30.0 parts  
 Acacia . . . . . 10.0 parts  
 Diluted hydrochloric acid . . . . . 25.0 parts  
 Carbohc acid . . . . . 1.0 part

Water sufficient to make up the mixture at a temperature of 60° F. to the volume of 1,000 parts by weight of water.

WRITING FLUID (green changing to black).

Tannin . . . . . 160 grs.  
 Sulphate of iron . . . . . 1 oz.  
 Gum arabic . . . . . ½ oz.  
 Green aniline crystals . . . . . 30 grs.  
 Water . . . . . 1 pt.

Dissolve the tannin in part of the water and add to the solution the sulphate of iron. Dissolve the gum arabic in the balance of the water and then the green aniline in the solution. Mix the two solutions. This is said to make a fine ink and is easy made.

BLUE BLACK COMMERCIAL WRITING AND COPYING FLUID.

Tannic acid . . . . . 1 oz.  
 Gallic acid . . . . . 1 ½ oz.  
 Sulphate of iron, green . . . . . 3 ½ ozs.  
 Sulphate of indigo (paste) . . . . . 6 ozs.  
 Aniline blue . . . . . 1 dr.  
 Water . . . . . 1 gal.

Dissolve gallic acid and tannic acid in half a gallon of water by heating moderately, dissolve iron in a quart of hot water, then having dissolved the aniline and indigo in the quart of hot water, add to the ink

solution with constant stirring until all are dissolved, set aside to cool, and it is ready for use.

#### COPYING INKS.

For an ink that may be used for copying letters without moistening and without a press.

Ordinary ink .....	100 parts
Glycerine .....	60 parts
Honey .....	20 parts
Rock candy .....	20 parts
Alcohol .....	10 parts
Molasses .....	50 parts

#### COPYING INKS.

The quality required of a copying ink is that it shall afford one or more copies of the written matter by applying dry or damped paper to its surface, and subjecting it to more or less pressure. The best kinds of copying ink are usually prepared by adding a little alum to an extract of logwood of 10° B., 1,075 sp. gr., or to a decoction of the same, and then, to improve its copying power, some sugar and glycerine or table salt are added. Such inks have a violet tint, are purple when first written, and gradually darken on the paper. The copies taken from them are at first very pale, and only slowly darken.

#### RENDER RULING INKS COPYABLE.

Add sugar or glycerine.

#### FOR COPYING INK.

One ounce of moist sugar, added to every pint of common ink, will make an excellent copying ink.

#### COPYING INK.

A concentrated solution of logwood is treated, first, with 1% of alum, and then with the same proportion of lime water until a permanent precipitate is formed. A few drops of a weak solution of chloride of calcium are added, until a bluish black color is obtained, then hydrochloric acid is added drop by drop until the liquid turns red. A little gum and about 1% glycerine are then added, and the ink is ready for use.

#### COPYING INK.

A good copying ink may be made from common violet writing ink by addition of 6 parts of glycerine to 8 parts of the ink. Using only 5 parts of glycerine to 8 parts of the ink, the ink will copy well fifteen minutes after it has been used. With fine white copying paper it will copy well without the use of a press.

#### COPYING INK.

The following is recommended as a copying ink which may be used without press or water. Mix well three pints of jet black writing ink and 1 pint of glycerine. This, if used on glazed paper, will not dry for hours and will yield one or two fair neat copies, by simple pressure of the hand, in any good letter copy book. To prevent "setting off" the superfluous ink after copying should be removed by blotting paper. The writing should not be excessively fine nor strokes uneven or heavy.

Scriptol is a (*Pharm Post*) solid paste made by adding dextrine to a nutgall ink containing nigrosin. A mixture of 1 part of scriptol to 20 or 25 parts of water is said to produce an excellent ink which will copy even after having been dried for some time.

BLACK COPYING INK.

The black copying ink of the Bank of England is made by putting 425 parts of powdered Aleppo galls in a clean bottle or jar, pouring over the powder 4500 parts of water and 56 parts of glycerin, and letting the whole macerate for ten days at ordinary temperature, with frequent shaking. Dissolve 70 parts of gum arabic in sufficient water, and add to the liquid thus obtained. Dissolve 170 parts chemically pure sulphate of iron in sufficient hot water, and add the solution to the foregoing. Let stand for fourteen days, with an occasional shaking, and finally strain off the liquid. The addition of a little white sugar or glucose converts the liquid into a copying ink. The foregoing is probably the best black ink made. The process may, however, be very much simplified and cheapened and still make an elegant black ink.

- Powdered gallnuts ..... 16 parts
- Gum arabic in powder ..... 8 parts
- Cloves, in powder ..... 1 part
- Sulphate of iron ..... 10 parts

Put the ingredients in a glass vessel and add 100 parts of rain water. Let stand from ten to fourteen days, agitating the vessel several times each day. Finally decant for use. The addition of 5 or 6 parts of Campeachy wood very much improves this ink without materially increasing the cost. The addition of 4 parts of glucose converts it at once into a first-class black copying ink. One advantage that this ink possesses over others is that it can be thinned with water at any time without injury.

BLACK COPYING INK.

- Rain water ..... 2 gals.
- Gum arabic ..... ¼ lb.
- Brown sugar ..... ¼ lb.
- Clean copperas ..... ¼ lb.
- Powdered nutgalls ..... ¾ lb.

Bruise all and mix, shaking occasionally for 10 days, and strain. If needed sooner, let it steep in an iron kettle until the strength is obtained.

COPYING INK.

- Galls ..... 120 parts
- Iron sulphate ..... 30 parts
- Water ..... 1000 parts
- Gum arabic ..... 20 parts
- Glucose ..... 10 parts
- Carbolic acid ..... 1 part

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#### BLACK COPYING INK.

Rain water .....	2 gals.
Gum arabic .....	$\frac{1}{4}$ lb.
Brown sugar .....	$\frac{1}{4}$ lb.
Clean copperas .....	$\frac{1}{4}$ lb.
Powdered nutgalls .....	$\frac{1}{4}$ lb.

Bruise all and mix, shaking occasionally for 10 days, and strain. If needed sooner, let it steep in an iron kettle until the strength is obtained.

#### COPYING INK.

Galls .....	120 parts
Iron sulphate .....	30 parts
Water .....	1,000 parts
Gum arabic .....	20 parts
Glucose .....	10 parts
Carbolic acid .....	1 part

#### COPYING INK.

Galls .....	100 parts
Iron sulphate .....	33 parts
Vinegar .....	250 parts
Logwood .....	66 parts
Gum arabic .....	25 parts
Sugar .....	35 parts
Glycerin .....	2 parts
Water .....	750 parts

Solution of indigo is frequently added to inks of the above class for the double purpose of giving a more decided color and increased resistance to tampering with chemicals.

#### BLACK COPYING INK.

Aleppo galls .....	$5\frac{1}{2}$ oz. av.
Cloves .....	60 grs.
Distilled water .....	40 ozs.
Ferrous sulphate, pure .....	720 grs.
Sulphuric acid, pure .....	35 drops
Neutral sulphate of indigo .....	120 grs.

The galls and cloves coarsely ground, may be exhausted by percolation until 40 ounces are obtained, or they may be macerated with sufficient water. In either case it is intended to produce 40 ounces of the fluid, and allowance must be made for the water absorbed by

marc. To this, when filtered, add the iron, and when dissolved filter again, then add the acid and, after mixing thoroughly the indigo paste, after which it may be again filtered.

This produces a blue-black fluid, not apt to mould. To insure a superior product, careful attention must be paid to manipulation, details and to the quality of its ingredients. The galls must be free from insect perforation, and the iron, selected crystals free of effervescence or ferric salt, and the indigo neutral, or nearly so. If the article sold as "indigo paste" is not at hand, it may be prepared by carefully adding to the ordinary sulphate of indigo a solution of potassic or sodic carbonate until effervescence ceases.

BLACK COPYING INK.

Nutgalls, bruised ..... 2 lbs.  
 Water..... 1 gal.  
 Copperas ..... 10 ozs.  
 Gum arabic, powd.,..... 8 ozs.  
 Sol. potassium permanganate, few drops.

Boil the nutgalls in the water for an hour, adding water to make up for that lost by evaporation, strain and again boil the galls with 1 gallon of water and strain. Mix the liquors and add immediately the copperas, gum arabic, agitate until solution of these latter is effected, add the solution of potassium permanganate strain through a piece of hair cloth, and after permitting to settle, bottle. The addition of a little extract of logwood will render the ink blacker when first written with. Half an ounce of sugar to the gallon will render it a good copying ink.

COPYING INK.

A copying ink without gum or sugar is said to be made by boiling together 7 parts extract of gall-apple, 4 parts liquor of chloride of iron, and adding 2 parts of aniline black.

BLACK COPYING INK.

Nutgalls, ground..... 33 parts  
 Extract logwood..... 33 parts  
 Tormentil root, bruised..... 33 parts  
 Water..... 500 parts  
 Sulphate iron..... 180 parts  
 Alum..... 33 parts  
 Water..... 250 parts  
 Indigo carmine..... 1 dr.  
 Gum arabic..... 1 oz.  
 White sugar..... 2½ ozs.

Boil the nutgalls, extract of logwood and tormentil root in the 500 parts of water, and strain. Next dissolve the sulphate of iron and alum in the 250 parts of water; add this solution to the above fluid, and dissolve in it by boiling the indigo carmine, gum arabic and white sugar.

BEAN'S FRENCH COPYING INK.

Beer, by weight..... 1650 parts  
 Gallnuts ..... 95 parts  
 Gum arabic ..... 30 parts  
 Calcined sulphate iron ..... 40 parts  
 Tormentil root ..... 20 parts  
 Lampblack ..... 10 parts

Rock candy .....	10 parts
White sugar .....	60 parts
Honey .....	5 parts

## BLACK COPYING INK.

Nutgalls .....	6 ozs.
Alum .....	½ oz.
Brazil wood .....	½ oz.
Sugar .....	½ oz.
Sour beer .....	1 gal.

Infuse this mixture for twenty-four hours in a glazed earthenware vessel, frequently stirring it; raise to boiling temperature, and boil down to two-thirds of its original volume. Strain and add 1½ ounces powdered sulphate of iron. Let it stand some days in the sun, and afterward bottle.

## EXCELLENT BLACK COPYING INK.

Gallnuts, ground .....	9 ozs.
Logwood, ground .....	4¾ ozs.
Water .....	1¾ gal.
Sulphate of iron .....	4¾ ozs.
Sulphate of copper .....	3 ozs.
Gum arabic .....	3½ ozs.
Rock candy .....	1 oz.

Boil the nutgalls and logwood in the 1¾ gallon of water until ¾ gallon of fluid remain, and filter through a cloth. Then dissolve the other ingredients in 1¾ quart of water; add the solution to the above decoction, stir it thoroughly, let it stand for twenty-four hours, and filter the ink from the sediment through a felt bag.

## BLACK COPYING INK.

Logwood, rasped .....	4¾ ozs.
Water .....	3 gals.
Gallnuts, best, ground .....	1 lb.
Sulphate of iron .....	4¾ ozs.
Sulphate of copper .....	½ oz.
White sugar .....	3½ ozs.
Gum arabic .....	3½ ozs.

Boil for two hours the logwood in the 3 gallons of water, replenishing from time to time the evaporated water. To this liquid, while still warm, add the other ingredients. It is best to place the mixture in an earthenware pot of a capacity of 7 gallons, and allow it to stand in this for fourteen days, stirring it at least twice a day; the ink is finally filtered through a coarse woolen cloth.

## COPYING INK.

Extract gall apple .....	7 parts
Liquor chloride iron .....	4 parts
Aniline black .....	2 parts

Boil the extract gall apple and liquor chloride iron and then add the aniline black.

## COPYING INK.

Extract logwood .....	100 parts
Potassium chromate .....	1 part
Glycerine .....	10 parts
Iron sulphate .....	4 parts
Indigo carmine .....	8 parts
Water .....	500 parts



COPYING INK.

Extract logwood .....	35 parts
Vinegar .....	1000 parts
Dissolve and add	
Iron sulphate .....	20 parts
Acacia .....	16 parts
Alum .....	10 parts
Sugar .....	32 parts
Glycerine .....	2 parts

BLACK COPYING INK.

Extract of logwood .....	1 oz.
Vinegar .....	1 qt.
Water .....	1 qt.
Sulphate of iron .....	$\frac{3}{4}$ oz.
Alum .....	$\frac{1}{2}$ oz.
Gum arabic .....	$\frac{1}{2}$ oz.
Sugar .....	1 oz.

Boil the extract of logwood with the vinegar and water, and add the other ingredients.

BIRMINGHAM COPYING INK.

Solution of logwood extract .....	2600 parts
Dextrin .....	120 parts
Alum .....	132 parts
Verdigris .....	1 part
Oxalic acid .....	8 parts
Glycerin from .....	30 to 80 parts

BLUE BLACK COPYING INK.

Extract logwood, best quality .....	$7\frac{3}{4}$ lbs.
Crystallized sulphate of iron .....	$8\frac{1}{2}$ ozs.
Crystallized sulphate of copper .....	$8\frac{1}{2}$ ozs.
White sugar .....	1 lb.
Water (free from lime) .....	25 pts.
Yellow chromate of potash .....	1 lb.
Indigo, finely powdered .....	$1\frac{1}{4}$ ozs.
Distilled water .....	5 qts.
Sulphuric acid, by weight .....	25 ozs.
Fluid basic sulphate of iron .....	60 ozs.
Fluid measure glycerine .....	50 ozs.

METHOD OF PREPARATION.

Boil the 25 pints of water, and while boiling dissolve therein the extract of logwood, sulphates of iron and copper, and filter or strain off this fluid and call it No. 1.

Dissolve the yellow chromate of potash in as little water as possible, and stand this solution aside, calling it No. 2.

In an earthenware vessel put the indigo, and pour on it the sulphur (sulphuric acid), and when intumescence has ceased and the indigo has completely dissolved, add the 5 quarts of distilled water (cold) and set aside, calling it No. 3.

To prepare the liquid basic sulphate of iron, pour crystals of ferrous sulphate into a bottle with twice their weight of water and a quarter their weight of nitric acid, cork, and when the crystals have dissolved, gradually add a few more at a time, until the liquid will not dissolve any more, then pour off the supernatant liquid for use. This is the liquid that gives the blue black tone to the ink.

Add the solution (No. 2) of yellow chromate to the

extract of logwood solution (No. 1), then add the glycerine and finally put in the indigo solution, stir well and correct the redness of the mixture by adding the liquid basic sulphate of iron. The result will be a plum color, but on exposing it to the air in open vessels for a week or two, it will eventually exhibit a damson blue black hue. Do not put more than the quantity given of liquid sulphate of iron, or the compound will turn brown.

To prepare a cheaper product, before straining the logwood solution (No. 1), dilute it with about twice its weight of water and boil for about fifteen minutes.

By omitting the sugar and glycerine you have a good writing ink.

#### STARK'S PATENT COPYING INK.

Extract logwood.....	250 parts
Sulphate iron.....	17 parts
Sulphate copper.....	17 parts
Sugar.....	50 parts
Boiling water.....	1000 parts

Dissolve in the boiling water, strain the solution and add a solution of 16 parts of neutral chromate of potash, 100 of glycerine and finally 200 of sulphuric acid, obtained by dissolving 2.5 parts of indigo in 50 of fuming sulphuric acid, and diluting with 200 of water.

#### COPYING INK.

For the preparation of a good writing or copying ink, a solution of proper strength is freshly prepared from logwood chips, by repeated cooking with rain water and diluting the mixed filtrates until they have, when cool, the specific gravity of 1.028. Then dissolve 10 grammes of potassium bichromate in 1 litre of water, add to this solution 100 grammes crystallized sulphate of aluminium, 200 grammes of glycerine, 100 grammes of rock candy, and heat for one-half hour to boiling. The second solution, when cold, is to be added to 10 litres of the solution of logwood, and to the mixture is to be added 100 grammes of 50 per cent acetic acid. The thoroughly shaken mixture is allowed to stand at rest for one week to become clear. This ink flows brown red from the pen, after a time becoming violet black, and copies well.

#### COPYING INK.

Extract of logwood.....	200 parts
Sulphate of iron.....	8 parts
Chromate of potassium.....	2 parts
Indigo carmine.....	16 parts
Gum arabic.....	2 parts
Glycerine.....	20 parts
Salicylic acid.....	0.3 part
Vinegar.....	100 parts
Distilled water.....	900 parts

Dissolve the extract of logwood completely in a portion of the water by heating at a temperature of about 200° F. Then add the rest of the water and the vinegar, in which the other ingredients have been mixed in the order given above and dissolved. Mix thoroughly, and set aside for a few days to settle.

RED COPYING INK.

Logwood, extra solution..... 24 ozs. av.  
 Sulphuric acid, concentrated ..... 40 drops  
 Aluminum sulphate.....700 grs.  
 Oxalic acid.....700 grs.  
 Potassium carbonate .....700 grs.  
 Potassium bichromate ..... 52 grs.  
 Carbolic acid..... 20 drops  
 Distilled water, sufficient.

Heat the extract solution with the acid on a water bath for 15 minutes. In the meantime dissolve the aluminium salt in the water at a moderate heat; add the potassium carbonate, stir until there is no further evolution of carbonic acid gas, then add the oxalic acid, stir until all the precipitate is dissolved and there is no further evolution of gas, and now add the potassium bichromate and dissolve. Incorporate the latter solution with the extract mixture by pouring the former slowly into the latter, continue the heat for 15 minutes more, add enough water to make the liquid weigh 40 av. ounces. and finally, add the acid.

This ink is of a handsome red color; it writes red, and the writing speedily darkens. It is one of the best of copying inks.

RED COPYING INK.

Extract logwood, French extra fine..100 parts  
 Oxalate of ammonium..... 30 parts  
 Sulphate of aluminum..... 30 parts  
 Oxalic acid ..... 8 parts  
 Bichromate of potassium ..... 1 part  
 Salicylic acid ..... 1 part  
 Pure water ..... q.s.

Reduce the first four ingredients to a coarse powder and heat the mixture with 800 parts of water to boiling in a copper vessel. Then add a solution of bichromate of potassium in 156 parts of hot water; next add the salicylic acid, and set the whole aside for 14 days. Pour off the clear liquid and put it in  $\frac{1}{4}$  or 1-pound bottles. In thin layers this ink has a fine red tint and writes with a violet-red color, which copies dark violet, and also assumes the last mentioned shade when drying. It is one of the best copying inks in existence. Writing done by it can be copied many weeks afterward. May add a little sugar or gum arabic.

RED COPYING INK.

Fuchsine.....  $\frac{1}{2}$  oz.  
 Water .....30 ozs.  
 Glycerin .....  $\frac{1}{2}$  oz.

Dissolve the fuchsine in the water; then add the glycerine.

RED COPYING INK.

Aniline red (or, better erytheosin) .. 2 parts  
 Water .....1200 parts  
 Sugar ..... 5 parts

SCARLET COPYING INK.

Cardinal R. R. dye .....60 grs.  
 Mucilage of acacia ..... 1 oz.  
 Glycerin ..... 1 fl. oz.  
 Water ..... 6 fl. oz.

## GENERAL FORMULA FOR THE MANUFACTURE OF ANILINE INKS. (Copying Ink.)

Starch.....	4	drs.
Chromate lead .....	6	drs.
Sal ammoniac.....	6	drs.
Aniline salt.....	6	drs.
Chlorate soda .....	½	dr.
Water, q.s.		

Still another is as follows:

Aniline dye.....	1	part
Glycerine.....	2½	parts
Gum arabic.....	5	parts
Alcohol.....	75	parts

Methyl blue and water blue make fine blue inks, and nigrosine and be obtained as deep black are various shades of blue, black and violet black. Eosine yields a satisfactory carmine ink and rosaniline a beautiful red menthyl violet and Hoffman's violet yield violet and purple inks.

## ANILINE COPYING INK.

Nigrosin .....	1	dr.
Hot water.....	1	dr.
Glycerin .....	1	oz.
Glucose .....	1½	drs.

Rub all these together and dilute with as much water as will give the ink the necessary character, say about 10 ounces.

COPYING INK (To be used without a press.)

Best nigrosine.....	6	grs.
Glycerine .....	1	dr.
Alcohol .....	2	drs.
Water, sufficient to complete .....	1	oz.

Triturate the nigrosine with the glycerine and successively add the alcohol and the water. The ink should be used as follows: The writing should be touched lightly with a blotter to be left to dry for a short time, before taking the impression. This is done by simply pressing the copying paper with the fingers on the writing, and after a little practice it is said any one can take a copy successfully. The letter to be copied, being "pulled taunt," the paper is spread over it and rubbed briskly with the fingers. We have seen moderately good copies obtained in the way just now described, but we confess the process never worked quite satisfactorily in our hands. The copy was always much inferior to that produced with a press.

## BLACK COPYING INK.

Nigrosine.....	½	oz.
Gum arabic.....	½	oz.
White sugar.....	1	oz.
Carbolic acid.....	5	grs.
Water .....	1	pt.

By using blue aniline you can have a blue ink and other colors by using different colors of aniline.

## BLACK INK COPYING.

Aniline black.....	190	grs.
Sugar.....	1¼	oz.
Distilled water .....	3	ozs.
Nutgall ink body .....	32	ozs.
Carbolic acid.....	20	drops.

Dissolve the sugar in the water and the aniline black in this. Add the nutgall ink body, filter and set aside in the sunlight for about a week, shaking frequently in the interval. Lastly decant and add the carbolic acid.

INK FOR COPYING (with Unmoistened Paper.)

Aniline coloring matter..... 30 parts  
 Alum ..... 15 parts  
 Glycerin ..... 1000 parts  
 Water ..... 2000 parts

Mix and dissolve. Letters or documents written with this ink need only to be placed in the copy book, and the latter closed, to get an excellent copy. When no copy is needed, the blotting pad will take up sufficient of the ink to prevent blurring.

INK (which will copy without moistening the paper.)

Aniline black, w.s..... 30 parts  
 Aniline blue, w. s. .... 2 parts  
 Ammonia alum, powdered ..... 16 parts  
 Glycerin ..... 1000 parts  
 Water, sufficient to make..... 3000 parts

Mix and dissolve.

All that is necessary is to place the writing in the copy book, close, and run down the press, an excellent copy being the result.

COPYING INK (to be used without moisture.)

Ordinary writing ink..... 20 parts  
 Glycerin ..... 12 parts  
 Honey..... 4 parts  
 Sugar candy..... 4 parts  
 Alcohol..... 2 parts  
 Molasses ..... 1 part

BLUE COPYING INK.

Prussian blue ..... 1 oz.  
 Oxalic acid ..... ½ oz.  
 Hot water..... 11 oz.  
 Glycerin ..... 3½ ozs.

Dissolve the oxalic acid in the hot water, add the Prussian blue, finely powdered, then the glycerin.

Soluble Prussian blue..... 1 oz.  
 Hot water..... 12 ozs.  
 Glycerin ..... 3 ozs.

For the dry method.

INK FOR COPYING WITHOUT PRESSURE.

Extract logwood ..... 1 oz.  
 Sodium carbonate, crystals ..... 1 dr.  
 Neutral potassium chromate ..... 15 grs.  
 Gum acacia..... 2 drs.  
 Glycerin ..... 1 oz.  
 Distilled water..... q. s.

Place the extract in coarse powder in a porcelain capsule with the sodium carbonate, add 8 fluidounces distilled water and heat until the extract is all dissolved and the solution acquires a deep red color. Remove from the heat and add the glycerin, and then the chromate and the acacia, each previously separately dissolved in a little water.

## A GOOD CHEAP WRITING INK.

A good and cheap ink, similar to that made by Mathieu Plessy, can be made according to the following formula, which I have tested for years, and improved :

Ext. Campeachywood .....	10.0 gms.
Lime water .....	80.0 gms.
Carbolic acid.....	0.3 gms.
Hydrochloric acid .....	2.5 gms.
Distilled water.....	60.0 gms.
Gum arabic.....	3.0 gms.
Potassium bichromate.....	0.3 gms.
Sufficient distilled water to make 180 gms.	

In making this ink, porcelain or enamelled iron vessels are used, according to the quantity to be made. At first the logwood extract is dissolved in the lime water on a steam bath, with frequent stirring, then the carbolic acid and hydrochloric acid are added (the reddish color now changes to a brownish yellow,) and heated for one-half hour on the steam bath. It is then set aside to settle. After cooling, the liquid is strained or filtered, and the gum arabic and potassium bichromate, each dissolved separately in the requisite quantity of water, are added, with sufficient water to make a total of 180 gms. The ink thus obtained has a fine red color and writes red, which however soon changes to black. It does not attack steel pens. If dried up in open vessels, water may be added, and it is again fit for use. In case the ink strikes through paper, a larger quantity of gum arabic may be used. An addition of sugar, dextrin, etc., to this ink was found to be inadmissible.

## COPYING INK.

Extract logwood.....	½ lb.
Alum .....	2 ozs.
Copper sulphate.....	4 drs.
Sulphate iron .....	4 drs.
Sugar .....	1 oz.
Water .....	4 pts.
Chromate potash, neutral solution....	4 drs.
Potash.....	4 ozs.
Chemic blue solution .....	2 ozs.
glycerine .....	2 ozs.

Boil the extract logwood, alum, sulphate of copper, sulphate of iron, sugar in the four pints of water, filter the decoction through flannel. Add the other ingredients. The chemic blue is the solution of indigo in sulphuric acid, or sulphindigotic acid.

## COPYING INK.

Extract of logwood.....	200 parts
Indigo carmine.....	20 parts
Alum .....	25 parts
Sulphate of iron.....	4 parts
Sulphate of copper.....	3 parts
Glucose.....	16 parts
Gum arabic.....	2 parts
Chromate of potassium.....	2 parts
Salicylic acid.....	0.3 parts
Water .....	1000 parts

BROWN INK.

Boil one-half ounce of catechu with 8 ounces of water until dissolved, and strain. Dissolve 60 grs. of bichromate of potash in one and one-half ounce of water, and add it gradually to the solution of catechu until the desired shade is obtained. It requires no gum.

BROWN ANILINE INK.

Brown aniline, soluble ..... 2 drs.  
 Gum arabic ..... 2 drs.  
 Carbohc acid..... 3 grs.  
 Water ..... 1 pt.

GREEN COPYING INK.

Extract logwood ..... 50.0 grs.  
 Potassium chromate, yellow ..... 2.0 grs.  
 Oxalic acid..... 3.0 grs.  
 Ammonium oxalate..... 20.0 grs.  
 Aluminium sulphate..... 40.0 grs.  
 Glycerin..... 10.0 grs.  
 Pyroligneous acid..... 50.0 grs.  
 Aniline blue ..... 3.0 grs.  
 Water..... 900.0 grs.

Dissolve the first two ingredients in 600 grams of water, allow the solution to stand twenty-four hours, then add all to the remaining ingredients, save the aniline previously dissolved in the remaining water. After standing twenty-four hours bring the mixture to the boiling point in a bright copper vessel, let stand fourteen days, decant the clear liquid, and lastly add the aniline dissolved in a small quantity of water.

RED COPYING INK.

Eosine..... 120 grs.  
 Water ..... 12 ozs.  
 Glycerin ..... 4 ozs.

Dissolve the eosine in the water, and add the glycerin. For the dry method.

RED COPYING INK.

Eosine..... 120 grs.  
 White sugar ..... 1 oz.  
 Water ..... 1 pt.

CARMINE RED COPYING INK.

Glycerin ..... 3 ozs.  
 Carmine ink ..... 1 oz.

RED COPYING INK WHICH TURNS BLACK.

Extract logwood ..... 100 grs.  
 Hot water..... 2 ozs.  
 Gum arabic ..... 50 grs.,  
 Alum ..... 50 grs.  
 Concentrated sulphuric acid..... 10 mins.  
 Acetate of copper ..... 5 grs.

Dissolve the extract of logwood in the hot water; to the solution add the gum and the alum, and when they are dissolved with the help of a gentle heat, add the concentrated sulphuric acid. Mix well and after a few days add the acetate of copper dissolved in water.

RED COPYING INK.

Extract of logwood..... 50.0 gms.  
 Yellow potassium chromate..... 2.0 gms.  
 Oxalic acid ..... 3.0 gms.  
 Ammonium oxalate ..... 20.0 gms.  
 Aluminium sulphate..... 50.0 gms.

Pyroligneous acid..... 50.0 gms.  
Water .....900.0 gms.

Dissolve the extract in 700 grams of the water; add the yellow potassium chromate and let stand twenty-four hours; then add the other ingredients previously dissolved in the water. After standing twenty-four hours heat to boiling in a copper vessel; let stand fourteen days, then decant from the sediment.

RED COPYING INK ("Imperial Ink," "Isatin Ink," "Crown Ink," "Coral Ink," etc.)

Extract logwood ..... 50 parts  
Water, distilled .....750 parts  
Chromate potassium..... 2 parts  
Oxalic acid, solution..... 3 parts  
Ammonium oxalate..... 20 parts  
Aluminum sulphate..... 40 parts  
Water, distilled ..... 20 parts  
Wood vinegar..... 50 parts

Dissolve the extract of logwood in a mortar with the 750 parts of distilled water without the aid of heat; add the chromate of potassium and set aside. After 24 hours add the oxalic acid solution, oxalate of ammonium and sulphate of aluminum in the 20 parts of distilled water, and again set aside for 24 hours. Now raise it at once to boiling in a bright copper kettle and add the wood vinegar, and after cooling fill into bottles that must be corked. After a fortnight, decant. This ink is red in thin layers, writes red, gives excellent copies in brownish color, and turns blackish-brown upon the paper.

BLUE INK.

Soluble Prussian blue (Laundry blue)  $\frac{1}{2}$  oz.  
Dextrin.....2 drs.  
Hot water.....1 pt.

BLUE COPYING INK.

Soluble Prussian blue..... 3 ozs.  
Rain water.....30 ozs.  
Gum arabic, powdered..... 1 oz.

Dissolve the blue in the water, and add the gum arabic.

BLUE COPYING INK.

Cotton blue, aniline.....12 ozs.  
Glucose ..... 2 ozs.  
Glycerin .....  $\frac{1}{2}$  oz.  
Water, hot ..... 2 qts.

To the solution of the dye in the hot water add the other substances and strain through a piece of silk. If too thick when cold, dilute to the proper consistency with water. In preparing this ink it is absolutely necessary that the water should be kept hot while dissolving the tinctorial matter. Solution is best effected by trituration, which should be continued until all the dye has been taken up by the water. The straining must be performed hot, otherwise the filtering cloth becomes clogged.

BLUE ANILINE INK.

Blue aniline, soluble in water.....45 grs.  
Gum arabic ..... 2 drs.  
Carbolic acid..... 3 grs.  
Water, enough to make 1 pint.



BLUE COPYING INK.

Blue aniline ..... 1 dr.  
 Gum arabic ..... ½ oz.  
 White sugar ..... 1 oz.  
 Carbohc acid ..... 5 grs.  
 Water ..... 1 pt.

BLUE COPYING INK.

Resorcin blue, M ..... 100 grs.  
 Sugar ..... 100 grs.  
 Oxalic acid ..... 20 grs.  
 Distilled water ..... 20 ozs.

Dissolve the dye in some of the cold water by the aid of heat, add the other ingredients, and stir about until dissolved.

VIOLET COPYING INK.

Violet aniline ..... 2 drs.  
 Alcohol ..... 1 oz.  
 Water ..... 11 ozs.  
 Glycerin ..... 4 ozs.

Mix the alcohol with the aniline and dissolve, add the water, then the glycerine.

VIOLET COPYING INK.

Methyl violet ..... 15.0 grs.  
 Sulphuric acid, dilute ..... 6.0 grs.  
 Sugar ..... 30.0 grs.  
 Water ..... 1000.0

Dissolve the sugar and acid in the water, in this solution dissolve the methyl violet.

VIOLET COPYING INK.

Violet aniline ..... 2 drs.  
 White sugar ..... 1 oz.  
 Gum arabic ..... ½ oz.  
 Carbohc acid ..... 5 grs.  
 Alcohol ..... 1 oz.  
 Water ..... 1 pt.

Dissolve the aniline in the alcohol, dissolve the sugar and gum arabic in the water and mix the solutions.

VIOLET COPYING INK.

Methyl violet, 3 B, ..... 200 grs.  
 Sugar ..... 100 grs.  
 Oxalic acid ..... 20 grs.  
 Distilled water ..... 20 ozs.

Dissolve the dye by the aid of heat in the water, add the other ingredients and again dissolve.

LONDON PASTE.

The National Formulary gives this under the head of "Soda Cum Calce" (soda with lime):

Soda .....  
 Lime, each ..... equal parts

Reduce them to powder in a clean iron mortar, previously warmed, and mix them intimately. Keep the powder, in small, well-stopped vials.

TO MARK WHITE ON RUBBER SHOES.

Notwithstanding long search we have failed to find any definite information. We think some neutral white ink which would not attack the rubber would prove suitable, and would suggest a trial with one of the following:

No. 1. Triturate together 1 part honey and 2 parts ammonia alum. Dry thoroughly and calcine in a

shallow dish over the fire to whiteness. Cool, wash, and rub up with enough gum water to use.

No. 2. Fine French zinc white or white lead rubbed up with gum water to the proper consistency.

No. 3. Mix pure flaky precipitated barium sulphate or flake white with water containing enough gum arabic to prevent settling of the substances.

GLYCERIN VIOLET COPYING INK.

Logwood extract.....	50 parts
Alum .....	35 parts
Oxalic acid .....	6 parts
Water .....	1500 parts

Dissolve in the cold, and add:

Glycerin.....	10 parts
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Allow to settle for 24 hours, heat to boiling and add while the solution is still hot:

Pyroligneous acid .....	60 parts
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Allow to settle again, and bottle.

VIOLET BLUE COPYING INK.

Extract of logwood.....	30.0 gms.
Oxalic acid.....	5.0 gms.
Ammonium oxalate.....	40.0 gms.
Aluminium sulphate.....	30.0 gms.
Glycerin .....	10.0 gms.
Potassium bichromate.....	10.0 gms.
Water .....	900.0 gms.
Pyroligneous acid.....	50.0 gms.

Dissolve the first five ingredients in 800 grams of the water, and allow the solution to stand twenty-four hours; then add the bichromate of potassium, previously dissolved in the remainder of the water. Allow the mixture to stand twenty-four hours; heat it to the boiling point in a copper vessel, and lastly add the pyroligneous acid, when, after standing fourteen days, decant the ink from the sediment.

VIOLET COPYING INK.

Extract of logwood.....	80 parts
Oxalic acid .....	1 part
Alum, in fine powder .....	6 parts
Glycerin .....	2 parts
Potassium bichromate.....	1 part
Wood vinegar.....	10 parts
Rain, or distilled water.....	180 parts

Mix the glycerin and water, and in 160 parts of the mixture dissolve the first three ingredients, and in the remaining fluid dissolve the bichromate. Let the solutions stand twenty-four hours, then mix them. After letting the mixture stand another day, put it into a copper kettle and bring to a boil. While boiling, add the wood vinegar, let the boiling continue for one minute, then remove the fire and let cool down slowly. Let stand until all sediment is thrown down, then decant carefully and fill into bottles. This ink flows freely, is said not to mould, and attacks steel pens but slowly.

VIOLET COPYING INK.

Extract of campeche wood.....	40 parts
Oxalic acid .....	5 parts
Aluminum sulphate.....	30 parts
Wood, vinegar.....	50 parts
Water, distilled .....	800 parts

Dissolve the extract, oxalic acid and the aluminum sulphate in the cold, and set aside for 24 hours to settle. Decant the clear liquid into a copper capsule and heat in the water-bath to the point of ebullition, then add the wood vinegar. Remove from fire, pour into bottles and set aside for 15 days to settle, then carefully decant. This ink gives a deep violet script and copies in violet blue.

VIOLET COPYING.

- Methyl-violet..... ½ oz.
- Water .....16 ozs.
- Glycerine ..... ½ oz.

Dissolve the violet in the water and add the glycerine. A few drops of creosote should be added to make the ink keep.

VIOLET BLACK COPYING INK.

- Extract of logwood .....3 ozs.
- Bichromate of potassium.....3 drs.
- Alum .....2 ozs.
- Lime water.....1 pt.
- Aqua ammonia.....8 ozs.
- Commercial muriatic acid, by weight...1 lb.
- Iron filings or scraps of old iron or nails.1 lb.
- Gum arabic .....3 ozs.
- Water .....1 gal.

Boil the extract of logwood and bichromate of potassium in one quart of water until dissolved, add the alum previously dissolved in one quart of hot water, then add the lime water and then the aqua ammonia; stir up thoroughly, and gradually add the muriatic acid with constant stirring. To this mixture add the balance of the water in which the gum arabic has previously been dissolved, and pour the mixture upon the scraps of iron in an open vessel or crock. Allow to stand for several days, stirring up occasionally, until the acid no longer acts upon the iron, then pour off carefully and bottle.

This ink is very fine, when written with it is a deep violet or maroon color, which changes in a short time to a perfect jet black. It flows as readily as a writing fluid and is as permanently black. It never spoils or gelatinizes, and cannot be erased by chemicals. It is a very valuable ink for business papers, and is the only ink made from logwood that can be recommended.

VIOLET COPYING INK.

This is an excellent copying ink, dark violet at first and becoming darker with age.

- Extract of logwood..... 80 parts
- Oxalic acid ..... 1 part
- Alum, in fine powder..... 6 parts
- Glycerin ..... 2 parts
- Potassium dichromate..... 1 part
- Wood vinegar..... 10 parts
- Rain or distilled water.....180 parts

Mix the glycerin and water and in 160 parts of the mixture dissolve the first three ingredients. In the remaining liquid dissolve the dichromate. Let the solution stand for twenty-four hours and then mix them. After letting the mixture stand for another day pour into a copper kettle and bring to a boil. While boil-

ing add the wood vinegar. Let the boiling continue for one minute, then remove from the fire and let cool down slowly. Allow the ink to stand until all sediment is thrown down, then rack off and fill into suitable bottles. It is said not to mould, and to attack steel pens but slowly.

#### ATRAMIN INK.

The following processes are said to yield durable and very cheap black ink. Dissolve 20 quarts of atramin in one-half liter of luke-warm water. For large quantities, mix 3 kilos atramin into a paste, with 500 grams hydrochloric acid and a little water. After a few hours mix well with 1500 grams of glycerin, 1500 grams of a syrup of burnt sugar, and 50 liters of hot water. Stir occasionally for a day, allow to stand 24 hours, and decant the clear supernated liquid.

For office ink the quantity of water is increased to 75 or 80 liters. For school ink the washings from the residue obtained with about 5 liters of hot water are added to the office ink.

#### NEW ALAZARIN INK.

Hemelon powder ..... 4 ozs.  
Alum powder..... 1 oz.  
Water ..... 1 gal.

Boil 15 minutes, strain, and add 10 drops nitric acid. Writes pale and rapidly darkens.

#### DRICHROIC INK.

Hemelon powder ..... 4 ozs.  
Bichromate of potash..... 2 drs.  
Carbolic acid crystals..... 1 dr.  
Hydrochloric acid..... 1 oz.  
Lime water..... 1 gal.

Heat hemelon in the lime water (which must be fresh made) dissolve bichromate, and add the carbolic acid, take off the fire and add the hydrochloric acid, stirring with a glass rod; set aside for 24 hours and bottle.

#### INK FROM DOMESTIC SOURCES.

No. 1. Take one measure (or one handful for each half-pint of ink intended to be made) of maple bark, and as much of pine leaves, both fresh, and previously separated. Put them into an iron vessel, and add two measures of water; measure the depth of the water, and mark the height of surface on a pointed stick thrust to the bottom; then add six more measures of water (making eight in all); boil very slowly (or simmer), until three-fourths of the fluid has evaporated, which may be known by its surface reaching that mark on the measuring stick; then remove the vessel from the fire; and add, for every half-pint of remaining fluid, one teaspoonful of green sulphate of iron, as much sugar and a tablespoonful of vinegar; stir and let stand from twelve to twenty-four hours; then strain the fluid (ink) from the solid refuse through a coarse cloth, and bottle for use.

No. 2. First, make a strong infusion of the inner bark of red oak, by steeping in water, twenty-four hours, a handful of chopped bark for each half-pint of water (or, otherwise, make a decoction by boiling an hour and evaporating in the same quantity by water);

decant the fluid, and add about a teaspoonful of green sulphate of iron for every half-pint of fluid, and keep for the use next to be directed.

Take of ripe elder berries four measures in a wash-basin; wash them well in the hands; put the mixture of pulp and fluid juice into an iron vessel; measure the depth of the whole mass, as directed for No. 1; then add one measure of the before-prepared infusion of red-oak bark and boil very slow until evaporation has reduced the quantity of fluid to what it was at first, of the mashed elder-berries alone; remove the pot from the fire, put in a teaspoonful of green sulphate of iron for every half-pint of ink to be made, and let the mixture stand for twelve or twenty-four hours; then strain through a coarse cloth, using strong pressure.

No. 3. Fill an iron pot half full of white oak bark, (coarse or fine), one-fourth full of red oak bark, and one-fourth full of maple bark; fill the pot with water, and boil slowly, and for a long time; a teaspoonful of green sulphate of iron for every half-pint of ink to be made will produce the requisite tint; then strain; and bottle for use.

HOME MADE INK.

Strained elderberry juice.....10 ozs.  
 Persulphate of iron..... 1 scruple  
 Bichromate of potassa ..... 1 scruple  
 Carbolic acid, melted..... 10 drops

Said to flow readily from the pen, and is ready for use as soon as made. When first written with, it is of a bright purple but darkens on drying. It will not stand acids or chlorine compounds.

GLUTEN INK.

Dissolve wheat gluten, free from starch, in weak acetic acid of the strength of common vinegar, mix 10 grains of lamp black and 2 grains of indigo with 4 ounces of the solution and a drop of oil of cloves.

INK.

Elderberries are bruised and kept in an earthen vessel for three days, then pressed, and the juice filtered. The juice has an intensely dark color, and requires about two hundred parts of water to one of juice to reduce it to the shade of deep red wine.

Filtered juice.....12½ qts.  
 Sulphate iron ..... 1 oz.  
 Pyroligneous acid (crude)..... 1 oz.

The ink that results has, when first used, a violet color, but when dry is an indigo blue-black. In some respects it is superior to that prepared from galls. In writing it flows easily from the pen without gumming and the letters formed by it do not spread over the paper and run into one another; and finally it does not thicken so soon as common ink. These are no small advantages, and ought to recommend it for general use.

KINDT'S INDESTRUCTIBLE INK FOR DOCUMENTS.

Mix 1 part of honey, 14 of water, 2 of sulphuric acid, and enough indigo dissolved in fuming sulphuric acid, that the fluid seems to be sufficiently colored to furnish

eligible writing on paper. The writing executed with this ink, which of course, must not be done with a steel pen, becomes perfectly black by heating the paper. To prevent the writing from being destroyed by free acids, it is, after the paper has been heated, moistened with spirit of sal-ammonia, or the document is placed in a box and then subjected to vapors of carbonate of ammonia. It is claimed that this ink answers all demands.

#### ANILINE INKS—INTERESTING EXPERIMENTS.

“The beauty and variety of aniline dyes has, for a long time induced manufacturers to use them for the making of inks. Formerly, red inks were prepared from cochineal and ammonia, and blue inks from Prussian blue and oxalic acid; but an exceedingly cheap red ink may be made by simply dissolving a little gum in a very diluted solution of aniline red. This ink may be immediately used, and the solution must not be too strong, or the complementary color (green) will appear. Violet and blue inks, with and without a greenish tint, are now much used. The so-called *bleu soluble* is readily available for making them. It is prepared like red ink, and the same is the case with the “patent violet.” Aniline dyes may also be employed for the preparation of sympathetic inks, which formerly were very much in vogue. Letters written with aniline red will disappear when exposed to the vapors of ammonia, in which case we obtain the colorless rosaniline, which is scarcely or not at all visible. After some time, especially if warmed a little, the letters appear again in their original beauty. Nicholson's blue yields a still more beautiful sympathetic ink. To produce it the blue is dissolved in a solution of borax, to which a little gum is added. When used, this ink is scarcely perceptible, but when exposed to the vapor of muriatic or acetic acid, the characters appear in dark blue; but they disappear if exposed to the vapors of ammonia.

“The following is an interesting experiment, and may be of interest to popular lecturers on chemistry: White flowers, made of paper, and white silk ribbons may be variously colored, without any one recognizing how it is done. It is a well known fact that if an aniline dye, in the state of a very fine powder, is spread over a sheet of paper, and the loose dust removed, there remain imperceptible particles, which, however, are sufficient, if dissolved, to intensely color the whole sheet. To this end it is only necessary to moisten the paper with strong alcohol, or with a solution of alcohol and acetic acid. This experiment may be carried out by making roses or other flowers from paper. White roses, if covered with fuchsin in the form of dust, when immersed in spirits of wine or other proper solvent, are immediately changed to beautiful red roses. Silken ribbons may be treated in a similar manner. By dropping a few grains of aniline dyes into wine glasses and adding a solvent, variously colored liquors may be obtained by means that few persons are able to detect. A white liquid may be colored red, and decolorized by adding ammonia. In fact, many interesting experiments can be performed with these dyes.”

**Aniline and Other Inks.**

BLACK INK.

Nigrosin powder ..... 1 oz.  
 Pulverized alum..... ¼ oz.  
 Warm water enough to dissolve powder and to give  
 a good body.

BLACK INK.

Methyl violet..... 3 grs.  
 Bengal green..... 5 grs.  
 Bismark brown..... 4 grs.  
 Water ..... 3 to 4 ozs.  
 (according to strength wanted.)

If other kinds of violet and green be used, the relative proportions will probably have to be changed, but not much, I think. Violet and green in the above proportions gives a very good blue ink.

BLACK SCHOOL INK.

Methyl violet..... 6 grs.  
 Bengal green..... 10 grs.  
 Bismark brown..... 4 grs.  
 Acacia ..... 60 grs.  
 Water..... 8 fl. ozs.

BLACK INK. (Indelible Ink for Paper.)

The indelibility of the ink made from the subjoined formula depends on the fact that when potassium bichromate and gelatin come together, particularly in the form of a thin film, in the presence of daylight, the film becomes insoluble in hot or cold water. The formula reads:

Gelatin..... 2 grs.  
 Potassium bichromate ..... 2 grs.  
 Nigrosine ..... 10 grs.  
 Water ..... 1 fl. oz.

Dissolve the gelatin and nigrosine in most of the water, and the potassium bichromate in the remainder. Mix the two solutions in an amber-colored bottle. If it is found that the ink "gums" in the pen, the quantity of gelatin and bichromate may be somewhat reduced. But the ink, when properly made, and dry, cannot be entirely removed from paper by hot or cold water, acids or alkalis.

BLACK ANILINE INK.

Phenol-black..... 2¼ av. ozs.  
 Sugar ..... 2½ av. ozs.  
 Carbolic acid..... 1 fl. dr.  
 Sulfuric acid pure..... 25 m.  
 Water, distilled..... 96 fl. oz.

Mix the aniline dye with 6 fluidounces of cold water, allow to stand for 2 hours, then add the rest of the water, in the boiling condition, and then the other ingredients. Stir until dissolved.

This ink writes a handsome blue-black and is especially recommended for school purposes. It may be cheapened by reducing the amount of aniline to 1¼ ounce.

FINE BLACK ANILINE INK.

Negrosine ..... ¾ oz.  
 Dextrin..... ½ oz.  
 Corrosive sublimate..... 2 grs.  
 Water ..... 2 pts.

Dissolve the negrosin in a pint of hot water. Dissolve the dextrin and corrosive sublimate in the remaining pint of water and mix the solution. By using a less quantity of negrosine a very good ink may be made, but not so black.

## BLACK INK.

Aniline-black.....	1 oz.
Pyrogallic acid.....	½ oz.
Ferrous sulphate.....	2 ozs.
Water.....	1 gal.

Dissolve the aniline-black and ferrous sulphate in most of the water, and the pyrogallic acid in the remainder. Mix the solutions.

## BLACK ANILINE-OFFICE INK.

Nigrosine.....	30.0 gms.
Pyroligneous acid.....	920.0 gms.

Dissolve the nigrosin in the water and add the pyroligneous acid. For a copying ink add 30.0 grams sugar.

## ACID AND WATERPROOF INK.

This is made by dissolving in a liter of distilled or boiling water, 50 grams of anilin-black ("naphthol-black") with 50 grams of alum, and adding a small quantity of gum arabic.

## BLACK ANILINE INK.

Phenol-black B.....	2¼ oz. av.
Sugar.....	2¼ oz. av.
Carbolic acid.....	1 dr.
Sulphuric acid, pure.....	25 drops

Mix the aniline dye with 6 ounces of cold water, allow to stand for 2 hours, then add the rest of the water, in the boiling condition, and then the other ingredients. Stir until dissolved. This ink writes a handsome blue-black and is especially recommended for school purposes. It may be cheapened by reducing the amount of aniline to 1¼ ounce.

## CHEAP BLACK INK.

Aniline-black B.....	2 ozs.
Acetic acid.....	2 ozs.
Gum arabic.....	2 ozs.
Water.....	1 gal.

Put the aniline-black in a jar and pour the acetic acid, diluted with 8 ounces water upon it. Separately dissolve the gum in a few ounces of water, add to the rest of the water, which pour into the jar, shaking well to dissolve.

## BLACK ANILINE INK.

The following formula for preparing anilin black ink which combines chemically with fibers and does not fade.

(a) Crystallized copper chloride.....	4
Sodium chloride.....	5
Ammonium chloride.....	3
Distilled water.....	30
(b) Anilin hydrochlorate.....	40
Gum arabic.....	15
Water.....	95

The two solutions must be kept apart and in the dark. When required for use, equal bulks are mixed to-



gether. If one solution only be preferred, then before mixing with solution (a), 100 hydrochlorate acid is added to solution (b), and the whole boiled for some time. Though intended to dye filter papers so, as to contrast with white or colored fibers in the filtrate, the ink may be used for other articles, such as linen. Filter-papers are to be soaked in the ink for two days, dried, steamed for from 10 to 15 minutes, washed in soap-suds, and finally in distilled water.

LABEL INK.

An ink for labeling containers in Pharmaceutica and Chemical laboratories, and which is unaffected by moisture, acids, and alkalies, is obtained by dissolving 20 grammes of brown shellac in 400 grammes of an aqueous solution of borax (40 : 400) by the aid of heat, filtering while hot, and adding :

Nigrosin.....	10.0 gms.
Tannic acid.....	0.3 gms.
Picric acid.....	0.1 gms.
Ammonia.....	15.0 gms.
Water.....	7.0 gms.

The ink is deep black and flows freely from the pen.

BLUE-BLACK INK.

Nigrosin Powder.....	½ oz.
Soluble Blue.....	4 ozs.
Hard water, enough for shade desired, or	
Nigrosin.....	½ dr.
Soluble blue.....	½ oz.
Water.....	24 ozs.

BLUE ANILINE INK.

Dissolve water-soluble aniline blue in water and dilute the solution so that writing executed with it shows, when dry, a pure blue color without metallic luster; then add sufficient gum arabic solution to give the ink the required degree of fluidity. By an addition of glycerin the ink may be made suitable for copying.

For other colors use any of the water-soluble anilines.

BLUE INK.

Resorcin Blue M.....	48 grs.
Sugar.....	192 grs.
Oxalic Acid.....	10 grs.
Distilled Water.....	19¼ fl. ozs.

Mix the dye with 1 fluid ounce of cold water, set aside for two hours, then add the remainder of the water, in the hot state, and the other ingredients, and stir until dissolved. Any other water-soluble blue may be used — phenyl blue, methylene blue, etc. Think it will take about three drams of Resorcin blue in place of 48 grains.

MAROON ANILINE INK.

Blue aniline (water blue).....	20 grs.
Eosine aniline.....	30 grs.
Water.....	1 pt.

BLUE INK.

Pure Prussian blue, in fine powder...	180 grs.
Oxalic acid.....	90 grs.
Dextrin.....	2 drs.
Hot water.....	1 pt.

Mix the blue and acid together and add half of the water. Dissolve the gum in the balance of the water and add.

## BLUE INK.

Prussian blue ..... 3 parts  
Oxalic acid ..... 1 part  
Water ..... 30 parts  
When dissolved add one part of gum arabic.

## BLUE INKS.

The particular shade of the ink depends entirely upon the kind of pigment and the quantity used in a given preparation. In practice it is a good plan to make a rather concentrated solution of the dye and then dilute to the shade required. By experimenting in this way you are pretty sure to hit upon just what you want.

## INDIGO BLUE INK.

Indigo-carmin ..... 10 parts  
Gum arabic ..... 5 parts  
Water ..... 50 to 100 parts

Dissolve the gum arabic in the water, then the indigo-carmin, and dilute the solution with sufficient water to produce an ink of the desired shade.

## RESORCIN BLUE INK.

Resorcin blue, M ..... 1 dr.  
Water, distilled ..... 6 drs.  
Water, hot distilled ..... 24 ozs.  
Oxalic acid ..... 10 grs.  
Sugar ..... ½ oz.

Dissolve the resorcin blue in the 6 drams of water, and agitate occasionally for two hours, then add the 24 ounces of and the other articles. Shake.

This ink may be perfumed by rubbing up a drop of oil of rose or other odoriferous substance with the sugar before dissolving it in the hot water.

## BLUE WRITING INK.

Dissolve basic or soluble Prussian blue in water and add a little mucilage of acacia.

## INDIGO BLUE INK.

Indigo carmine ..... 10 parts  
Gum arabic ..... 5 parts  
Water ..... 50 to 100 parts

Dissolve the gum arabic in the water, then the indigo-carmin, and dilute the solution with sufficient water to produce an ink of the desired shade.

## NORMANDY'S BLUE INK.

Chinese blue (ferrocyanide of iron) is ground in water with binoxalate of potash and gum arabic, in the following proportions:— 7 ounces of water to 3 drams of Chinese blue. 1 dram of binoxalate of potash, and 1 dram of gum arabic.

## BLUE INK.

Ferro cyanide of potassium ..... 1 dr.  
Concentrated water of ammonia ..... 1 dr.  
Tartaric acid ..... 84 grs.  
Water ..... 4 ozs.

The liquids are to be taken by measure. Mix and filter to separate the bitartrate of potassium. Then add:

Ammonia citrate of iron.....80 grs.  
 Concentrated water of ammonia.....20 mins.  
 Aniline blue.....4 grs.  
 Gum arabic .....35 grs.

BLACK INK.

Add to the above 10 grains of gallic acid or better the same quantity of pyrogallic acid. It makes a perfectly clear mixture.

BLUE INK.

Digest 2 ounces of the cuttings of tin plate with 4 ounces of nitrous acid, and add the solution to a gallon of water in which 2 ounces of prussiate of potash have been dissolved. This requires frequent shaking to keep the precipitate (which is Prussian blue) suspended.

READE'S BLUE INK.

Prepare a solution of iodide of iron, from iodine, iron and water; add to the solution half as much iodine as first used. Pour this solution into a semi-saturated solution of ferro-prussiate of potash, containing nearly as much of the salt as the whole weight of iodine. Collect the precipitate, wash it, and finally dissolve it in water, to form the blue ink. The solution from which the precipitate is separated, evaporated to dryness, and the residue fused, redissolved, and crystallized, yields pure iodide of potassium.

BLUE INK.

1. Solution of chloride of iron....80 mins.  
 Water..... ½ pt.
2. Ferro cyanide of potassium..... ½ oz.  
 Water..... ½ pt.

Pour 2 into 1., transfer to a filter and wash till the water runs through with a bluish color. Now transfer to a jar containing one pint and a half of water. The following improvement has been proposed.

Dissolve protosulphate of iron, ten parts in water, oxidize with a sufficient quantity of nitric acid, and add a diluted solution of ferrocyanide of potassium, ten parts. Wash with cold water until the precipitate can easily be separated from the filter with a spatula. Now rub in a mortar with two parts of oxalic acid, and after one hour, add four hundred parts water. This blue ink must not be kept in the sun or in strong daylight, else it fades; nor must it be mixed with gum arabic.

BLUE INK.

Logwood, best.....5 ozs. av.  
 Alum .....120 grs.  
 Acacia.....120 grs.  
 Sugar.....60 grs.  
 Water .....40 ozs.  
 Boil for an hour, let stand 2 or 3 days, and strain.

GOLD WRITING INK.

Gold leaves .....24  
 Bronze gold..... ½ oz.  
 Spirits wine.....30 drops.  
 Honey .....30 grs.  
 Gum arabic .....4 drs.  
 Rain water.....4 ozs.  
 Rub the gold with the honey and gum, and having mixed it with the water, add the spirit.

## GOLD INK.

This may be prepared by mixing equal parts of potassium iodide and lead acetate, placing the mixture upon a paper filter and pouring on it 20 times the quantity of boiling water. As the filtrate cools, the lead iodide separates in golden scales; these scales are collected on a fresh filter, washed slightly with a little cold water, removed to a mortar and rubbed up to ink consistency with mucilage of acacia. The ink must be shaken before using.

## GOLD INK.

Reduce gold foil to powder by triturating in a mortar with honey or syrup; dilute with water, decant the liquid, wash the gold several times with water; dry and mix with mucilage of acacia to form proper consistency.

## GOLD INK.

Chrome yellow.....30 grs.  
Mucilage.....1 oz.  
Pale gold bronze..... $\frac{1}{4}$  oz.  
Spirit of wine.....30 drops

Rub down the chrome yellow with the mucilage in an earthen mortar until smooth, then add the gold bronze and spirit of wine and make up the quantity to 2 ounces with rose water.

## GREEN INK.

Dissolve 3 drs. of bichromate of potash in 1 oz. of water; add to the hot solution  $\frac{1}{2}$  oz. of alcohol, and decompose the mixture by a little strong sulphuric acid till it assumes a brown color. Evaporate the liquid to half, let it cool, dilute a sufficient quantity of water, and filter; add to the filtered liquid 4 drs. of alcohol, decompose with a few drops of sulphuric acid, and let it rest. After some time it assumes a fine green color. A little gum may be added. There is danger of the paper and steel pens suffering from an excess of sulphuric acid.

## GREEN INK.

Prussian blue..... $3\frac{1}{2}$  drs.  
Gamboge, powdered,.....3 drs.  
Mucilage.....2 ozs.  
Water..... $\frac{1}{2}$  pint

Rub the first 3 articles well together, and add the water.

## STEIN'S GREEN INK.

Carmine indigo.....1 oz.  
Gum arabic..... $1\frac{1}{2}$  oz.  
Water.....26 ozs.  
Picric acid.....2 drs.  
Boiling water.....6 ozs.

## GREEN INK.

A solution of recently precipitated hydrated oxide of chromium in liquor of ammonia, diluted with a sufficient quantity of water. This produces a beautiful dark green liquid, perfectly anti-corrosive.

## GREEN INK.

Acetate copper.....2 parts  
Carbonate potash.....1 part  
Water.....8 parts

Boil till half is evaporated, and filter.

GREEN CHROME INK.

Potassium bichromate..... 10 parts  
 Hydrochloric acid..... 10 parts  
 Alcohol..... 10 parts  
 Gum arabic..... 10 parts  
 Water ..... 30 parts

The finely powdered bichromate contained in a capacious porcelain or stone vessel is covered with the hydrochloric acid. After standing an hour, the alcohol is very gradually and in small quantities added. The liquid must be constantly stirred with a glass-rod, and after each addition of alcohol, the effervescence must be allowed to subside before adding more. To the green liquid thus produced, powdered sodium carbonate is added, as long as effervescence takes place. As soon as a permanent green precipitate begins to form, the addition of soda is interrupted, the vessel covered and set aside for a week, the contents then transferred to a filter, to separate the solid salt formed, and the filtrate diluted with sufficient water to give it the proper shade of color. Finally the gum arabic is dissolved in the liquid. This ink penetrates the paper very energetically, and is almost indestructible.

GREEN INK.

A solution of recently precipitated hydrated oxide of chromium in liquor of ammonia diluted with a sufficient quantity of water. This produces a beautiful dark green liquid, perfectly anti-corrosive.

GREEN ANILINE INK.

Green aniline in crystals ..... 1 dr.  
 Gum arabic ..... 2 drs.  
 Carbohc acid..... 3 grs.  
 Water ..... 1 pt.

A less or greater quantity of aniline will change the shade if desired.

KLAPROTH'S GREEN INK.

Crystal. copper acetate (verdigris) .. 4 parts  
 Cream of tartar..... 2 parts  
 Water. .... 16 parts

Boil the two salts in a glass or clean copper vessel with the water, until the solution has acquired an intense green color. Then filter, add 1 part of mucilage and bottle.

GREEN INK.

Picric acid ..... 1 dr.  
 Water ..... 1 pt.  
 Sulphate indigo..... q. s.

Dissolve the picric acid in the water and add enough of the sulphate of indigo to produce the shade of green desired.

GREEN INK.

Methyl green, bluish (water soluble) 96 grs.  
 Sugar..... 192 grs.  
 Distilled water ..... 19½ ozs.

Mix the dye with 1 ounce of cold water, set aside for 2 hours, then add the remainder of the water, in the hot condition, and the sugar, and stir about until dissolved.

GREEN INK.

Iodine green..... 1 part  
 Hot water ..... 100 to 110 parts

This ink writes a brilliant bluish-green; if it is desired to give it a slight yellowish-green tint, a little picric acid is to be added.

## ORANGE INK.

Aniline orange ..... 144 grs.  
 Sugar ..... 288 grs.  
 Distilled water ..... 20 ozs.

Mix the dye with 1 ounce of water, set aside for 2 hours; then add the sugar and the remainder of the water, in the hot condition, and stir until dissolved.

## PURPLE INK.

A good purple ink may be made by dissolving a little carmine in dilute water of ammonia.

## PURPLE INK.

Anilin purple ..... 4 drs.  
 Alcohol ..... 4 ozs.  
 Gum, mesquite (or arabic) ..... 1½ ozs.  
 Water ..... 54 ozs.

Dissolve the anilin purple in the alcohol; add the water, evaporate the alcohol, and add the gum dissolved in 10 ounces of water.

The same proportions will answer for any of the anilin colors. It generally takes about three drams of any of the anilines for each pint of ink.

## PURPLE ANILINE INK.

Blue aniline (water blue) ..... 30 grs.  
 Eosine aniline ..... 10 grs.  
 Water ..... 1 pint.

By varying the proportion of the colors different shades of purple may be obtained.

## PURPLE INK.

Campeachy wood ..... 12 lbs.  
 Boiling water ..... 12 gals.  
 Verdigris or acetate of copper ..... 1 lb.  
 Alum ..... 14 lbs.

Digest the first two ingredients together, and strain the liquor upon the finely divided salt of copper, then immediately add the alum. For every 17 gallons of this liquid add 4 pounds of gum arabic or gumsenegal.

Let these remain for three or four days, and a beautiful purple will be produced.

## PURPLE INK.

Logwood extract ..... 15 parts  
 Crystallized verdigris ..... 10 parts  
 Alum ..... 50 parts  
 Gum arabic ..... 30 parts  
 Water ..... 800 parts

Dissolve the logwood extract by itself in water and to the solution add the boiling solutions of the verdigris and alum and of the gum arabic. If the color of the fluid should be too much inclined toward blue, add drop by drop strong vinegar or a quantity of dark red (carmine) ink.

## PURPLE CARTHAMIN.

Safflower carmine (carthamin) ..... 7 ozs.  
 Gum arabic ..... 26 ozs.  
 Cream of tartar ..... 1 ozs.  
 Sugar ..... 2½ ozs.  
 Water ..... 6 qts.  
 Carbolic acid ..... 2½ drs.

PURPLE INK.

A writer says with a solution of perchloride of iron and gallic acid, I get a purple ink.

PURPLE INK.

Add a little muriate (chloride) of tin to a strong decoction of logwood. A little gum may be added.

RED INK.

- Cochineal powdered ..... 225 grs.
  - Gum arabic, powd ..... 225 grs.
  - Tartrate potassium ..... 1 oz.
  - Boiling water ..... 7½ ozs.
- Macerate, filter, and add to the filtrate
- Burnt alum ..... 135 grs.
  - Oil cloves ..... 4 drops

RED COCHINEAL INK.

- Cochineal, in coarse powder ..... 5 parts
- Potassium carbonate ..... 10 parts
- Water ..... 110 parts
- Tartaric acid ..... 30 parts
- Ammonia alum ..... 2 parts
- Alcohol ..... 5 parts
- Gum arabic ..... 5 parts

Dissolve the potassium carbonate in 100 parts of the water and to the solution add the cochineal and macerate for two days. To the liquid add the tartaric acid, and as soon as the violent reaction has subsided, add the alum, and heat the mixture until the residual carbonic acid is driven off. Add the alcohol and filter. Dissolve the gum arabic in the residual water, and with the solution wash the filter.

RED INK.

To 4 ounces of Brazil wood in fine chips, add 1 ounce of salt of tartar, 1 ounce of powdered alum, and 1 quart of distilled or rain water. Boil it down to 1 pint, and add, of refined sugar and gum arabic, of each 1 ounce. When cool, filter through tibulous paper.

RED RULING INK.

- Best malt vinegar ..... 1 gal.
- Ground Brazil wood ..... 16 ozs.
- Alum ..... 12 ozs.
- Saturated solution of tannic acid ..... 1 pt.

Heat the vinegar in an earthen-ware vessl until just simmering, then put in the Brazil wood and continue the simmering for 30 minutes, then add the alum, and when that has dissolved strain it, and to the fluid portion add the tannic acid solution. This prevents the color spreading in the fibre of the paper.

RED INK.

- Pernambuco wood ..... 4½ oz. av.
- Alum ..... 480 grs.
- Acacia ..... 480 grs.
- Tin muriate (crystals) ..... 60 grs.
- Diluted acetic acid ..... 16 ozs.

Mix the wood, water and acid, boil together until 24 ounces remain, add the alum; evaporate to 16 ounces, strain, add the acacia, dissolve, and then add the tin crystals.

## BRAZIL WOOD INK — RED.

Brazil wood.....	2	ozs.
Muriate of tin.....	½	dr.
Gum arabic.....	1	dr.
Water.....	32	ozs.

Boil down to one-half and strain.

## RED INK.

Brazil wood.....	2	ozs.
Sol. protochloride of tin.....	2	drs.
Mucilage of acacia.....	2	drs.
Water.....	1	qt.

Boil the whole together until the bulk is reduced to half; then strain.

## RED INK.

Brazil wood, ground.....	4	ozs.
Diluted acetic acid.....	1	pt.
Alum.....	½	oz.

Boil them slowly in a covered tinned copper or enameled saucepan for one hour, add one ounce of gum.

## RED INK.

Rubramin.....	7½	parts
Oxalic acid.....	2½	parts
Water, cold.....	40	parts

Add to the solution some hot water, said to make a fine ink.

## STEPHENS' RED INK.

Add to a quantity of common carbonate of potassium, sodium, or ammonium, twice its weight of crude argol in powder. When the effervescence has ceased, decant or filter the solution from the insoluble matter, and add by measure half of its quantity of oxalate of aluminium prepared by dissolving damp newly-precipitated alumina in as small a quantity as possible of a concentrated solution of oxalic acid. The mixture thus prepared is next colored, when cold, with bruised or powdered cochineal, and after standing for forty-eight hours is strained, when it is fit for use.

## RED CARMINE INK.

Carmine.....	240	grs.
Water of ammonia.....	3	ozs.
Glycerin.....	3	ozs.
Water, q. s.....	8	ozs.

Rub the carmin into a fine powder in a wedgewood mortar; make a paste with and dissolve in the water of ammonia, and then add with constant trituration, the glycerin. Transfer to a porcelain capsule, and heat upon a water bath until the liquid is entirely destitute of ammoniacal odor, cool and add the water. The entire removal of the ammonia gas requires the constant stirring of the liquid with a glass rod, and rather lengthy heating. This should be diluted with water.

## RED CARMINE INK.

Carmine.....	228	grs.
Ammonia water.....	8	ozs.
Distilled water.....	8	ozs.
Gum arabic.....	¾	oz. av.



BOETTGER'S IMPROVED CARMINE INK.

"The solution of the carmine alumina in caustic ammonia has the defect that the coloring matter of the cochineal, owing to the alkaline nature of the ammonia, forms by-and-by a basic combination, which in contact with steel pens shows no longer an intense red, but a blackish color. In order to obviate this defect, the following mode of preparing the red ink is recommendable, viz.: Mix intimately by rubbing in a porcelain mortar one gramme of pure carmine with fifteen fifteen grammes of a solution of acetate of ammonia and the same quantity of distilled water, and let the mixture rest for some time. The alumina combined with the carmine will be partially absorbed by the acetic acid of the ammonia salt, and separated as a precipitate, while the pure coloring matter of the cochineal will remain in solution in the half-saturated ammonia. Finally filter, and add a few drops of pure, white sugar syrup, (but by no means a solution of gum Arabic) for preventing too great fluidity. Thus prepared, a superior ink will be obtained, which retains its brilliant red color for any length of time."

RED INK.

An excellent red ink is obtained by grinding carmine with a solution of potassium silicate in a porcelain mortar. The ink, which should be preserved in a well closed bottle, provided with an oiled stopper, is said to dry very rapidly and have a brilliant appearance.

RED CARMINE INK.

Carmine ..... 192 grs.  
 Ammonium carbonate ..... 192 grs.  
 Water of ammonia ..... 4 ozs.  
 Mucilage of acacia ..... 3 ozs.  
 Distilled water ..... 13 ozs.

Mix the carmine and ammonium carbonate, dissolve in the ammonia water, and add the remaining ingredients.

RICH CARMINE INK.

Pure carmine, No. 40 ..... 2 drs.  
 Aqua ammonia ..... 5 drs.  
 Water ..... 3½ ozs.  
 Mucilage gum arabic ..... 3 drs.

Dissolve the carmine in the aqua ammonia and water, filter or strain and add the mucilage. A splendid ruling and ledger ink.

RED INK.

Red ink which is not affected by powerful chemical agents. Carmine is triturated in a porcelain mortar, with a little solution of soluble glass; afterwards more of the solution is added, until the desired shade and fluidity has been attained. The ink when used dries rapidly, with a gloss, and when not in use should be protected from contact with the atmosphere by closing the vial with an oiled cork.

RED CARMINE INK.

Carmine ..... ½ oz. av.  
 Ammonia water ..... 1 oz.  
 Dextrin ..... 120 grs.  
 Water ..... 16 ozs.

Triturate the carmine, add to the ammonia and water, dissolve by agitation; add the dextrin, and again dissolve.

## CARMINE INK.

Carmine No. 40.....  $\frac{1}{4}$  oz.  
 Aqua ammonia..... 1 oz.  
 Dextrin.....  $\frac{1}{4}$  oz.  
 Water, enough to make..... 1 pt.

Rub the carmine to a fine powder and add the aqua ammonia, triturate to dissolve and add part of the water. Dissolve the dextrin in the balance of the water and add. A few drops of some perfume added is of much advantage as it covers the odor and prevents moulding.

## CARMINE INK FOR DRAUGHTSMEN.

Triturate 1 gm. of pure carmine with 15 gms. of solution of acetate of ammonia, and an equal quantity of distilled water in a porcelain mortar, and allow the whole to stand for some time. In this way, a portion of the alumina, which is combined with the carmine dye, is taken up by the acetic acid of the ammonia salt, and separates as a precipitate, while the pure pigment of the cochineal remains dissolved in the half saturated ammonia. It is now filtered and a few drops of pure white sugar syrup are added to thicken it, since the ink still contains some acetic acid which would coagulate the bassorin, one of the constituents of the gum.

## RED INK.

Carmine, No. 40..... 30 grs.  
 Ammonia water..... 1 dr.  
 Acacia..... 6 grs.  
 Water, q. s. to..... 1 oz.

Dissolve the carmine in the ammonia, and add the other ingredients. The depth of tint may be varied by the use of more or less water.

## CARMINE INK.

Aqua Ammonia..... 1 dr.  
 Carmine No. 40.....  $\frac{1}{2}$  dr.  
 Water..... 7 drs.  
 Mucilage of Gum Acacia.....  $\frac{1}{2}$  dr.

Mix in a mortar.

## RED INK.

Ammonia..... 1 dr.  
 Gum arabic..... 4 grs.  
 Carmine, No. 40..... 6 grs.  
 Carmine, No. 6 or 8..... 5 grs.  
 Soft water, to make..... 1 oz.

## RED INK.

Red carmine..... 6 parts  
 Liquid water glass..... 75 parts  
 Rain water..... 675 parts

Rub the carmine with the liquid water glass. Add the water. Let it stand a few days, and pour off the fluid.

## RED INK.

Drop lake.....  $\frac{1}{2}$  dr.  
 Gum arabic, powd..... 18 grs.  
 Ammonia water..... 3 ozs.

This makes one of the finest of carmine inks.

RED INK.

A cheap red ink is made by dissolving 2 parts of aniline red (or, better, erythrosin) in 1200 parts of water and adding 5 parts of sugar. A finer (the finest next to pure carmine) red ink is obtained by dissolving 7½ parts of rubramin and 2½ parts of oxalic acid, in 40 parts of cold distilled water, and adding to the solution hot distilled water.

RED ANILINE INK.

Red anilin..... 2 drs.  
 Alcohol ..... 1 oz.  
 Gum arabic..... 3 drs.  
 Water ..... 15 ozs.

Put the aniline in a bottle with the alcohol and dissolve by agitation. Dissolve the gum arabic in the water and add.

EOSIN RED INK.

Eosin B..... 1 dr.  
 Solution of perchloride of mercury.. ½ oz.  
 Mucilage of acacia..... 2 drs.  
 Oil of lavender..... 1 drop  
 Rectified spirit..... 2 drs.  
 Distilled water to..... 4 ozs.

Dissolve the eosin in the solution and 2 ozs., of water, add the mucilage and mix, then the oil dissolve in the spirit, and finally make up.

EOSIN INK.

To make a good, quick-drying red ink from eosin, take —

Eosin (best, water-soluble)..... 120 grs.  
 Alcohol..... 2 fl. ozs.  
 Mucilage ..... 1 fl. oz.  
 Water, enough to make..... 16 fl. ozs.

Dissolve the eosin in about 12 fluidounces of water, a small portion of this being poured, hot upon the eosin contained in a bottle. Next add the alcohol, and shake; finally, and the mucilage and enough water to make 1 pint.

RED INK.

Eosin..... 1½ drs.  
 Water, soft..... 1 pt.  
 Carbolic acid..... 5 drops

RED INK.

Erythrosin..... 1 part  
 Water..... 99 parts

Thicken with gum arabic and add a little boric acid or other preservative.

RED INK.

Eosin ..... 144 grs.  
 Sugar ..... 288 grs.  
 Distilled water..... 20 fl. oz.

Mix the dye with 1 fl. oz., of cold water, set aside for two hours, add the remainder of the water, hot, and the sugar, and stir until dissolved.

RED INK.

Saffranin ..... 25 parts  
 Glycerine, warm..... 500 parts  
 Alcohol..... 500 parts  
 Acetic acid ..... 500 parts  
 Water ..... 9000 parts  
 Gum arabic a little.

Dissolve the saffranin in the glycerin, then stir in carefully the alcohol and acetic acid, then add the water and gum arabic. The parts are in weight.

**RED INK.**

Fuchsine .....	2 parts
Gum arabic.....	5 parts
Alcohol.....	10 parts
Water .....	100 parts

Pour the alcohol, 90 per cent., over the finely rubbed fuchsine and effect complete solution by gently heating. Dissolve the gum arabic by itself in the water, strain the solution, and heat to boiling. Into the boiling solution pour the fuchsine solution in a thin jet, stirring constantly.

**VIOLET BLACK INK.**

Hematin .....	4 drs.
Slaked lime .....	12 grs.
Distilled water.....	15 ozs.

Heat gently to dissolve. Allow to cool and deposit; decant and add:

Carbolic acid.....	5 grs.
Hydrochloric acid.....	40 drops
Distilled water.....	1 oz.

Mix, allow to settle for half an hour, and decant again, and add gradually, and with constant stirring.

Chromate of potassium.....	8 grs.
Distilled water .....	2 ozs.

Finally add an ounce of fresh mucilage and make up to 1 pint with distilled water. This is a true violet black ink.

**VIOLET-BLACK WRITING INK.**

You can impart a violet shade to ordinary gall and iron ink by adding to it a small proportion of the anilin color known as methyl-violet. Other tints may be obtained by using other anilin colors, choosing of course, such as are soluble in water. Whether these additions will affect the permanence of the ink we are unable to say.

**FRENCH VIOLET WRITING AND COPYING INK.**

Hemelon powder.....	4 ozs.
Chrome alum .....	2 ozs.
Hydrochloric acid.....	$\frac{1}{2}$ oz.
Nitric acid.....	$\frac{1}{4}$ oz.
Water .....	1 gal.

Heat hemelon and chrome alum for 20 minutes, add hydrochloric acid, set aside for 12 hours, then add nitric acid.

**VIOLET INK.**

Logwood.....	40 gms.
Oxalic acid.....	5 gms.
Alum .....	30 gms.
Glycerin .....	10 gms.
Water.....	800 cc.
Potassium bichromate.....	5 gms.

Macerate the first four ingredients in the water for 24 hours. Then add the potassium bichromate dissolved in 100 cc. water, shake well and let it stand 24 hours to settle. Then boil the clear solution in a copper vessel and after cooling add 50 gms. wine vinegar. The ink should be kept in glass vessels.

VIOLET INK.

Ordinary aniline violet soluble in water, with a little alcohol and glycerine, makes an excellent ink.

VIOLET INK.

- Cudbear ..... 1 oz.
- Pearlash ..... 1½ oz.
- Mucilage ..... 2 ozs.
- Soft water to make.... 1 pt.

Pour the water hot on the cudbear and pearlash, allow the mixture to stand for twelve hours, then strain, and add the mucilage; 1 ounce of rectified spirit may also be added.

FINE VIOLET INK.

- Violet aniline..... 120 grs.
- Alcohol ..... ½ oz.
- Hot water..... 2 pt.

Put the aniline in a bottle with the alcohol and add the hot water in which the dextrin has been dissolved. Different shades of violet, ranging from reddish to blue, may be obtained and various shades of ink may be made.

VIOLET INK.

- Aniline violet powder..... 1 parts
- Methylated spirit..... 2 parts
- Glycerin ..... 4 parts
- Soft water ..... 10 parts

By weight, mix the liquids and dissolve the powder therein, agitate frequently until amalgamated.

VIOLET ANILINE INK.

- Violet aniline..... 1 dr.
- Alcohol..... ½ oz.
- Gum arabic..... 3 drs.
- Water..... 15 ozs.

Put the aniline in a bottle with the alcohol, and agitate lightly until dissolved. Dissolve the gum arabic in the water and add.

VIOLET INK.

- Methyl violet, 3 B..... 96 grs.
- Sugar..... 96 grs.
- Oxalic acid..... 20 grs.
- Distilled water ..... 19½ ozs.

Mix the dye with 1 ounce of cold water, set aside for 2 hours, then add the remainder of the water, in the hot condition, and the other ingredients, and stir about until dissolved.

YELLOW INK.

- Gamboge, pulverized ..... 1 oz.
  - Hot water..... 5 ozs.
- Dissolve and when cold add:
- Alcohol ..... ½ oz.

YELLOW INK.

- Picric acid..... 1 dr.
- Water ..... 1 pt.

YELLOW INK.

- Fine orpiment ..... 1 part
  - Thick gum water..... 4 parts
- Well rubbed up.

YELLOW INK.

A little alum added to saffron in soft hot water makes a beautiful yellow ink.

## YELLOW INK.

Gamboge.....	5 gms.
Alum .....	1 gm.
Gum arabic .....	4 gms.
Acetic acid, 30 per cent .....	4 gms.
Oil of cloves .....	5 drops
Distilled water .....	86 gms.

**Parlor Inks.**

## VIOLET.

Methyl violet . . . . .	10.0 gms.
Sugar .....	10.0 gms.
Sulphuric acid, dilute .....	5.0 gms.
Water.....	1000.0 gms.
Essence patchouly .....	10 0 gms.

Mix the acid and water and dissolve the other ingredients in the mixture.

## BLUE.

Blue anilin.....	15 0 gms.
Sugar .....	15.0 gms.
Sulphuric acid, dilute.....	6 0 gms.
Essence patchouly.....	10.0 gms.
Water .....	1000.0 gms.

Prepare as the foregoing ink.

## VANADIUM INK.

Pyrogallic acid.....	1 part
Gum arabic powdered.....	3 parts
Neutral vanadate of ammonia.....	3 parts

Triturated in a porcelain mortar with a suitable quantity of cold rain water. In a short time an excellent ink is formed, that flows freely and has a deep-black color.

## VANADIUM INK.

Tannic acid .....	480 grs.
Ammonia vanadate.....	19 grs.
Water .....	11 ozs.

Dissolve the acid in 10 ounces of water and the vanadate in 1 ounce of water and mix the solutions.

## CATECHU INK.

Catechu .....	10 parts
Ferrous sulphate .....	10 parts
Gum arabic .....	2 parts
Water .....	100 parts

Dissolve the catechu in boiling water, allow the solution to clarify by standing, and then mix it with the ferrous sulphate.

## CHESTNUT INK.

Green shells .....	200 parts
Ferrous sulphate .....	2 parts
Alum .....	1 part
Water .....	1000 parts

Boil the shells with the water for a few hours, strain the decoction and mix it with the ferrous sulphate and alum solution. Very cheap and good ink may, in the same manner, be prepared from the bark of the young branches of the horse chestnut.

## INK POWDER.

Gall nuts, powdered .....	10 ozs.
Green copperas.....	3 ozs.
Alum, powdered.....	2 ozs.
Gum arabic, powdered.....	2 ozs.

Put a little of this mixture into white wine, and it will be fit for immediate use.

INK POWDER.

Powdered galls ..... 2 lbs.  
 Green vitriol ..... 1 lb.  
 Gum ..... 8 ozs.

In 2 ounce packets, each for 1 pint of ink.

INK POWDER.

Powdered galls ..... 4 ozs.  
 Powdered sulphate ..... 1 oz.  
 Powdered gum arabic ..... 1 oz.  
 Powdered white sugar ..... ½ oz.  
 Powdered cloves ..... 1 dr.

To these proportions add of water one quart, and macerate for an hour or two. Note the quantity of sulphate of iron is small, because it has been dried and has thus lost the weight of water evaporated.

WRITING FLUID POWDER.

Nut galls, ground ..... 100.0 gms.  
 Ferrous sulphate ..... 25.0 gms.  
 Sodium chloride ..... 2.50 gms.  
 Sugar ..... 2.50 gms.  
 Potassium bisulphate ..... 6.0 gms.  
 Benzoic acid ..... 2.0 gms.  
 Indigo carmine ..... 2.0 gms.

The quantity is sufficient to make two pints of ink.

INK POWDER.

Nutgalls, powdered ..... 4 ozs.  
 Ccpperas ..... 3 ozs.  
 Gum arabic ..... ½ oz.  
 Logwood ..... 1 oz.

This is sufficient for 1 quart of water.

INK POWDER.

Nutgalls ..... 4 ozs.  
 Extract of logwood ..... 4 ozs.  
 Copperas ..... 1 oz.  
 Sujphate of copper ..... 1 dr.  
 Gum arabic ..... ¼ oz.

All to be pulverized and evenly mixed.

About one ounce of the mixture will be required to each pint of boiling water used. It should stand a couple of weeks before using, or it may be steeped a few hours if needed sooner.

BLACK INK POWDER.

Oxidized tannin ..... 50 gms.  
 Ferrous sulphate, anhydrous ..... 40 gms.  
 Sugar ..... 20 gms.  
 Phenol blue 3F ..... 3 gms.  
 Salicylic acid ..... 1 gm.

The ingredients in coarse powder, are mixed and filled into well-closed vials.

Directions for use: Place the powder in an earthen jar pour on 1¼ liter of boiling water, let simmer for 20 minutes, then allow to cool. After 24 hours transfer to a bottle, cover loosely with paper, then set aside in a cellar for 3 or 4 weeks. Finally decant the clear ink carefully and divide into small bottles.

Oxidized Tannin is made as follows: In a retort place 100 grams of tannin and 150 grams of water, apply heat, and after solution add 30 grams of finely powdered potassium disulphate and 10 grams of crude

hydrochloric acid, sp. gr. 1.16. Heat on a water-bath at 80-90 degrees C. for 10 hours. Then transfer the contents to an evaporating dish and carefully evaporate to dryness. Weight of residue 130 grains.

INK POWDER.

Extract of logwood . . . . .	1	oz.
Potassium bichromate . . . . .	48	grs.
Sodium carbonate . . . . .	3½	drs.
Gum arabic . . . . .	2	drs.
Indigo carmine . . . . .	15	grs.

For 1 quart of ink.

BLACK ANILINE INK POWDER.

Phenol black B . . . . .	20	grs.
Sugar . . . . .	20	grs.
Potassium disulphate . . . . .	1	gr.

This powder is preserved in parchment paper.

The powder is dissolved in 1 liter of boiling water.

RED POWDERS.

Fuchsine . . . . .	20	parts
Gum arabic . . . . .	50	parts

Powders to produce almost any shade of ink may be made by triturating together water soluble anilines and a little gum or dextrine to give the desired body.

BLACK INK POWDER.

(Plain.)

Tannin . . . . .	1	oz.
Iron sulphate, dried . . . . .	3½	drs.
Gum acacia . . . . .	75	grs.
Sugar . . . . .	40	grs.
Aniline water blue, B . . . . .	40	grs.

The above is added to 30 ounces of water and the mixture gently boiled for from fifteen to twenty minutes. When cold strain.

BLACK INK POWDER.

(Copying)

Tannin . . . . .	9	drs.
Iron sulphate, dried . . . . .	4	drs.
Gum acacia . . . . .	4	drs.
Sugar . . . . .	75	grs.
Aniline water blue, B . . . . .	75	grs.

Prepare like black ink powder, plain.

INK POWDER.

Tannic acid . . . . .	50	parts
Tersulphate of iron, dry . . . . .	20	parts
Sulphate of sodium, dry . . . . .	10	parts
Sugar . . . . .	20	parts
Aniline, blue (water soluble) . . . . .	4	parts

Reduce to a coarse powder and keep it in a tin box. When using it, pour the contents of the box into an earthen jar, add one quart of pure hot water, and stir until dissolved. When cold the ink is transferred to bottles. This ink writes with a bluish color and turns black rapidly. The dry tersulphate is best prepared by evaporating 25 parts of liquor ferri tersulphatis, U. S. P., on a water bath, to a syrupy condition, then adding the dry sulphate of sodium, and transferring the mass in thin layers, upon plates of glass which are to be placed in a drying closet, until the mass is dry, when it may be reduced to a powder.



INK POWDER.

Tannic acid .....	7	ozs.
Sulphate iron.....	1	lb.
Gum arabic .....	1 ½	lb.
Sugar .....	¼	lb.

Powder as finely as possible; rub all together, adding a few drops of clove oil.

ALIZARIN INK POWDER.

Acid tannic .....	450	parts
Iron sulphate .....	350	parts
Sodium chloride .....	250	parts
Potassium bisulphate.....	75	parts
Indigo carmine, dry.....	5.0	parts
Acid picric.....	4	parts

Mix the sulphate of iron (reduced to a coarse powder) and chloride of sodium, and dry them in an iron pan over a naked fire, constantly stirring. Lastly reduce the mass to a fine powder. Rub the bisulphate of potassium to a fine powder in a mortar, and mix this intimately with the picric acid. Then mix the mass with that first prepared, and lastly incorporate the other ingredients. Picric acid is poisonous, and under certain conditions explosive. It should be manipulated as directed above. The resulting product is a green powder which when dissolved in 15 parts of water, yields a superior ink, which turns jet black.

INK POWDER.

These are prepared for quickly made inks by the addition of hot water. They are usually put up in packages sufficient to make a pint of ink, which requires from a teaspoonful to a tablespoonful of the powder. The following are the colors usually desired.

BLACK.

Negrosine in crystals.....	1	part
Dextrin.....	3	parts

BLUE, (Water Blue)

Aniline .....	1	part
Dextrin.....	5	parts

This may also be made with soluble Prussian Blue, 1 part, dextrin, 2 parts.

GREEN

Green aniline .....	1	part
Dextrin.....	4	parts

RED

Eosine aniline .....	1	part
Dextrin.....	1	part

INK FOR TRAVELERS.

Saturate white blotting paper with a strong solution of one of the aniline dyes, black, navy blue, scarlet or violet; a little gum should be put in the solutions. While still wet press three or four sheets together to form a pad; then dry. A small square cut off and put in a little water makes ink in a few minutes. A good plan is to use a punch, say one used for cutting gun wads, which makes a clean, round wafer. Put them up in boxes, give them any suitable name, and they will find ready sale, especially among public school children, travelers, and people who "board" where facilities for writing are scanty.

## INK PAPER.

Aniline, any color . . . . . 1 oz.  
 Hot water . . . . . ½ pt.  
 Alcohol . . . . . 2 ozs.

Put the aniline and alcohol in a pint bottle and shake several times, then add the water and shake till the aniline is dissolved. Pour out into a shallow vessel and soak pieces of white blotting paper in the ink solution till they become saturated. Hang them up to dry then cut into pieces 2½ by 5½ inches, and put five pieces in an envelope. To make the ink put one piece into a bottle with ½ pint of water and shake several times, when the ink is ready for use.

## ANILIN INK PAPER.

Thick filtering paper is soaked in a very concentrated solution of an aniline color, and allowed to dry; it may then be soaked again to make it absorb more color. With a little attention it will not be difficult to prepare the paper so as to have a known quantity of coloring matter in a square of a given size. Paper prepared as above is very convenient to have when travelling; when one wishes to write it is only necessary to tear off a small piece of the paper and let it soak in a little water.

## INK EXTRACT.

Extract of logwood . . . . . 5 parts  
 Yellow chromate of potash . . . . . 1 part

Half an ounce of this extract is sufficient to make a quart of ink.

## LOGWOOD INK POWDER.

Logwood extract . . . . . 500 parts  
 Chromate of potassium . . . . . 1 part

Pour sufficient water upon the logwood extract in a pot that the whole on heating is converted into a thick fluid, and then add the chromate of potassium dissolved in a small quantity of water. Then, with constant stirring, evaporate the mass to dryness, then dry it thoroughly, pulverize it, and place it, while still warm, into boxes.

## PURPLE INK POWDER.

Logwood, rasped . . . Label No. 1  
 Verdigris . . . . . 1½ oz., one 1 lb.  
 Alum . . . . . 2½ ozs. Label No. 2  
 Gum arabic . . . . . 4 ozs. Label No. 3

For use, infuse No. 1 in 1 gallon of water, and after twenty-four hours strain the infusion into a vessel containing No. 2; add No. 3 and agitate at intervals until solution takes place. Allow the whole to remain three or four days before use.

## ANILINE INK EXTRACT.

Deep black E . . . . . 1 oz.  
 Sugar, in coarse powder . . . . . 1 oz.  
 Potassium bisulphate . . . . . 1 dr.

For a gallon of ink.

## INK EXTRACTS.

	Plain	Copying
Tannin . . . . .	1 oz.	9 drs.
Dried sulph. of iron . . .	3½ drs.	4 drs.
Gum arabic . . . . .	75 grs.	2 drs.
Sugar . . . . .	40 grs.	75 grs.
Aniline water-blue I B . .	40 grs.	75 grs.

The above quantities are intended for a wine-bottleful of rain water. The powder is to be added to the water and the mixture gently boiled for from 15 to 20 minutes, and when cold the ink should be bottled and set aside for four weeks before using. Other colors may take the place of the aniline blue as in the preceding formulas.

DOCUMENT INK EXTRACT.

Tannic acid . . . . . 50 parts  
 Tersulphate of iron, dry . . . . . 20 parts  
 Sulphate of sodium, dry . . . . . 10 parts  
 Sugar . . . . . 20 parts  
 Aniline blue, water soluble . . . . . 4 parts

Reduce them to a coarse powder and keep it in a tin box. When using it pour the contents of the box into an earthen jar, add one quart of hot water and stir until dissolved. When cold the ink is transferred to bottles. This ink writes with a bluish color and turns black rapidly. The dry tersulphate is best prepared by evaporating 25 parts liquor ferri tersulphates, U. S. P., on a water bath to a syrupy condition, then adding the dry sulphate of sodium, and transferring the mass in thin layers, upon plate of glass, which can be placed in a drying closet until the mass is dry, when it may be reduced to a powder.

INK CAKE.

Extract 42 parts of Aleppo gall nuts and 3 of madder with sufficient water; then filter the fluid and dissolve in it  $5\frac{1}{2}$  parts of sulphate of iron and compound it with 2 parts of solution of methyl acetate of iron and  $1\frac{1}{2}$  of solution of indigo. Evaporate this mixture to dryness at a moderate heat and form into cakes of desired size. One part of this ink dissolved in 6 of hot water gives an excellent writing and copying ink, while a beautiful ordinary writing ink is obtained by dissolving 1 part in 10 to 15 of water.

INK POWDER IN CAPSULES.

The basis of the powders is generally an aniline color. For carmine, 40 parts of eosine, 3 of lunar caustic, and 7 of gelatine. For green, 44 parts of aniline green, 4 of gelatine, and 2 of lunar caustic. For purple, 40 parts of aniline violet, 4 of gelatine, and 2 of lunar caustic. The substances are separately converted into fine powder, mixed, and the mixture placed in the capsules. Each capsule contains about 15 grains of powder. It is dissolved in a corresponding quantity of pure water, requiring about one hour for solution.

INK IN PASTE FORM.

Tannic acid . . . . . 1 oz.  
 Tartaric acid . . . . . 10 grs.  
 Acacia . . . . . 1 dr.  
 Phenol black B . . . . . 30 grs.  
 Ferrous sulphate . . . . . 1 oz.  
 Glycerine . . . . . 1 dr.  
 Salicylic acid . . . . . 10 grs.  
 Water . . . . . sufficient.

Thoroughly mix the solids, all in fine powder, and add the glycerine and sufficient water to make a paste, of which a small quantity is to be dissolved in water when required for use.

## COPY INK POWDER.

Extract of logwood.....	50.0 gms.
Ammonium oxalate.....	20.0 gms.
Ammonium sulphate.....	40.0 gms.
Oxalic acid.....	3.0 gms.
Salicylic acid.....	2.0
Potassium chromate, yellow....	2.0 gms.

Reduce each to a coarse powder and mix them. The above is sufficient to make 2 pints of copying or 4 pints of writing ink by the addition of warm water.

## COPYING BLACK INK POWDER.

Tannin.....	9 drs.
Iron sulphate, dried.....	4 drs.
Gum acacia.....	4 drs.
Sugar.....	.75 grs.
Aniline water blue B.....	.75 grs.

The above is added to 30 ounces of water and the mixture gently boiled for from fifteen to twenty minutes. When cold strain.

## INK POWDER OR TABLETS.

Extract of logwood.....	100 parts
Bichromate of potash.....	1 part
Carmine indigo, or indigo blue	$\frac{1}{10}$ part

All by weight. Pulverize and mix intimately. Can be made in tablets or powder. The above yields an ink of first blue but soon becoming black.

## BLUE INK POWDER.

Pure Prussian blue.....	6 parts
Oxalic acid.....	1 part

For use, rub the powder to a smooth paste with a little warm water, and then dilute with enough to render it fluid and of the proper depth of color.

## CHESTNUT INK TABLETS.

Ext. of horse chestnut shells....	100 parts
Ferrous sulphate.....	10 parts
Alum.....	2 parts
Gum arabic.....	5 parts
Indigo carmine.....	5 parts

The extract is prepared by boiling the green shells of horse chestnuts or the young branches, and evaporating the decoction until it has acquired a doughy consistency.

## INK TABLETS.

Galls.....	84 parts
Madder.....	6 parts

Percolate with hot water until exhausted and add to the solution.

Ferrous sulphate.....	11 parts
Ferrous acetate.....	4 parts
Indigo carmine.....	1 part

Evaporate to dryness and make the residue into suitable tablets by the aid of gum arabic.

## INK TABLETS.

Extract of logwood.....	500 parts
Alum.....	10 parts
Gum arabic.....	10 parts
Natural chromate of potassium..	1 part

Dissolve the salts in 500 parts of water, add the extract of logwood and gum arabic, and concentrate the

mixture to the consistence of an extract. Then pour the mass out, either into moulds or in a flat bottomed dish, and cut it in pieces of suitable size, which may be inclosed in boxes or other receptacles.

INK TABLETS.

Extract of logwood.....100 parts  
 Gum arabic..... 10 parts  
 Indigo-carmine..... 5 parts  
 Neutral chromate of potassium 1 part  
 Glycerin ..... 10 parts  
 Water, sufficient quantity.

Proceed as in the above formula.

INK TABLETS.

Nut-galls..... 2 ozs.  
 Sulphate of iron..... 5 drs.  
 Sulphate of copper .....15 grs.  
 Alum ..... 1 dr.  
 Sugar candy .....90 grs.  
 Gum arabic..... 2½ drs.  
 Cream of tartar.....15 grs.

Make into a stiff paste with water. Mould and dry.

INK POWDERS AND TABLETT.

The basis of ink powders is usually an aniline color.

CARMINE INK.

Eosine.....40 parts  
 Lunar caustic ..... 3 parts  
 Gelatin ..... 7 parts

GREEN INK.

Aniline green .....44 parts  
 Lunar caustic..... 2 parts  
 Gelatin ..... 4 parts

PURPLE INK.

Aniline violet .....40 parts  
 Lunar caustic ..... 2 parts  
 Gelatin ..... 4 parts

The substances of the three formulas above are separately converted into fine powder, mixed, and the mixture placed in capsules, each capsule being dissolved in the desired quantity of water to make the ink. The powder requires about an hour in which to dissolve. Other aniline colors may be substituted.

RED INK POWDERS IN CAPSULES.

Eosine.....40 parts  
 Lunar caustic ..... 3 parts  
 Gelatin ..... 4 parts

The substances are separated and converted into fine powder, and mixed, and the mixture placed in the capsules. Each capsule contains about 15 grains of powder. It is dissolved in a corresponding quantity of pure water, requiring about one hour for solution.

RED INK POWDER.

Carmine.....20 grs.  
 Gum arabic..... 18 grs.

Label the carmine No. 1. Label the gum arabic No. 2. These are to be put up in separate packages. For use, dissolve No. 1 in 3 ounces of ammonia water, add No. 2 and agitate at intervals until complete solution has been effected.

## CHINA INK.

The materials with which this beautiful black ink is made are the following: (1) Sesamum oil, colza oil, expressed from the large poisonous seeds of what Dr. Brettschneider calls the *Dryandra Cordata* or *Elocococca Verrucosa*, called by the Chinese "Wu Tung," a tree extensively cultivated in the Yangtze Valley, and also well known in Japan; (2) varnish; (3) pork fat. The lampblack made by the combustion of these substances is classed according to the materials and the grade of fineness, and also according to the time taken over the process of combustion. The paste made of that lampblack has some glue added, and is beaten on wooden anvils with steel hammers. Two good hammerers can prepare in a day 80 pieces, each weighing half a pound. A certain quantity of musk (of the musk deer) or of Baroos camphor for scenting it, and gold leaves are added, the latter, the quantity of which varies from 20 to 160 to the pound, being to give a metallic lustre. The materials thus prepared are moulded in moulds of carved wood, dried (which takes about twenty days in fine weather) and adorned with the Chinese characters in gilding. About 30 or 32 averaged sized sticks go to the pound.—Brit. Am. Col. Drug.

## INDIAN INK MANUFACTURE.

The materials with which the beautiful black ink is made are sesamum or colza oil, or the oil expressed from the poisonous seeds of a tree extensively cultivated in the Yang-tsze valley, and also well known in Japan. To this, varnish and pork fat are added. The lampblack made by the combustion of these substances is classed according to the materials and the grade of fineness, and also according to the time taken over the process of combustion. The paste made of this lampblack has some glue added, and is beaten on wooden anvils with steel hammers. Two good hammerers can prepare in a day eighty pieces, each weighing half a pound. A certain quantity of the musk of the musk deer or of Baroos camphor, for scenting, and gold leaves, varying from 20 to 160 to the pound, are added to give a metallic lustre. The materials thus prepared are moulded into moulds of carved wood, dried, which takes about twenty days in fine weather, and adorned with Chinese characters in gilding. About 30 or 32 averaged sized sticks of ink go to the pound. The price varies from 2s. or less per pound to as much as £7, there being over a dozen different grades. Nearly all writing is done by the natives throughout China, Japan, Korea, Tongsking and Anam with this China ink, rubbed down on a stone ink slab and applied with a paint brush of sable, fox, or rabbit hair, set in a bamboo holder, and, when not in use, carefully covered with a protecting brass cap.

## INDIA INK.

Liquid India ink is made by rubbing down the stick India Ink with water until the proper shade and consistency.

## INDIAN INK.

Real lamp-black, produced by combustion of linseed oil, ground with gum and infusion of galls. It is pre-

pared both in a liquid and solid form, the latter being dried in the sun.

## INDIA INK.

Purify fine lampblack by washing with caustic soda, dry and make into a thick paste with a weak solution of gelatin, containing a few drops of essence of musk and about half as much ambergris. Mould and dry. Instead of gelatin, the following solution may be used: Seed lac, 1 ounce, borax,  $\frac{1}{4}$  ounce, water, 1 pint. Boil until solution is effected and made up with water to  $\frac{3}{4}$  pint.

## INDIA INK.

For making a deep-black India ink which will also give neutral tints in its half shades, rub thoroughly together 8 parts of lampblack, 64 parts water, and 4 parts finely powdered indigo. Boil the mixture until most of the water has evaporated, then add 5 parts gum arabic, 2 parts glue and 1 part extract chicory. Boil the mixture again until it has thickened to a paste, then shape into moulds which have been rubbed with olive or almond oil.

## INDIA INK.

Piffard states (Chem. News) that a pigment apparently identical with India ink can be obtained by the action of sulphuric acid on camphor. When an excess of camphor is placed in contact for twenty-four hours with strong sulphuric acid a reddish gelatinous mass results, which, when heated, gives off fumes of sulphurous acid and turns intensely black. There remains an excess of both acid and camphor which are driven off by heat, and the residue constitutes the pigment. It appears to be dissolved, not merely suspended, by water, and remains an indefinite time without precipitation.

## AN IMPROVED INDIA INK.

Most of the black Indian ink met with in commerce possesses this disadvantage, that it blots when a damp brush is passed over it; or, as draughtsmen say, "it does not stand." The addition of alum does but little good; but G. Reisenbichler states that bichromate of potash accomplishes the object by rendering insoluble the glue which the ink contains, and thus making the ink permanent. Such ink Reisenbichler calls "Harttusch" or "hard Indian ink." The bichromate of potash is not colorless; on the contrary, it possesses a deep yellow (almost red) color, but it does not at all injure the shade of the ink, as 1 per cent of it in a fine powder, intimately mixed with the ink, which has already been mixed with glue and dried again, is sufficient. The salt must always be mixed with the ink in a dry state; otherwise the ink might lose its frailty in water. A drawing which has been made with the ink or by artificial light, must be exposed to sunlight for a few minutes, which renders the bichromated glue insoluble in water. Draughtsmen who cannot provide themselves with such ink make use of a dilute solution of bichromate of potash in rubbing up the ink. There is no danger of the yellow salt penetrating the paper, if the ink is thick enough.

## INDIA INK.

"A correspondence asks for a recipe by which he can cause India ink to remain liquid, keep from spoil-

ing, and be waterproof, in a word, a recipe for waterproof drawing ink. A. We know of no means by which, if any material be added to India ink, it can be made waterproof, but would suggest that the drawing itself be covered with a thin coating of the following: Dissolve 30 to 40 parts of dammar in 180 parts of acetone, and then mix 40 parts of this solution with 30 parts of thickly fluid collodion."

"Can you tell me a simple, inexpensive way of preparing India ink so that it will keep in a liquid state, without becoming mouldy or losing any of its qualities? A. The addition of a few drops of oil of cloves, oil of almonds, or carbolic acid will prevent its becoming mouldy, and it may thus be kept a long time; there is no good way of keeping it permanently liquid."

"To make very black drawings with India ink, a correspondent suggests that the pigment be cracked into small pieces and soaked in dilute ammonia water, when with an occasional shaking it will dissolve in two days; but if the ammonia is too strong, it will turn the ink brown."

To add to China ink to make it flow easily and without interruptions on tracing cloth, it has been found that if genuine Indian ink be rubbed with good black ink until it will flow easily from a pen, excellent results will ensue.

#### TO RENDER INDIA INK WATERPROOF.

As the ink is prepared with a certain proportion of gelatine, the addition of a little bichromate of potassa, followed by exposure to sunlight, has been recommended for rendering the ink so insoluble in water that it will not run or spread when water-colors are used for shading the sides of the lines.

#### SILVER INK.

Gum arabic.....1 part  
Water, distilled .....4 parts  
Silicate soda, in solution.....1 part  
Triturate with the best silver bronze powder sufficient to give the solution the required brilliancy.

#### SILVER INK.

Oxide zinc.....30 grs.  
Mucilage.....1 oz.  
Spirit of wine.....40 drops.  
Silver bronze.....3 drs.

Rub together until perfectly smooth, then add the spirit of wine and silver bronze and make up the quantity to 2 ounces with water.

#### WHITE INK.

White ink is made by suspending some insoluble substance in a liquid and applying with a brush or pen. In this way zinc oxide (Chinese white) may be ground very fine on a slab with a little mucilage of tragacanth, then thinned to the required consistency to flow from a pen. The mixture requires shaking from time to time to keep the pigment from separating. The ink may be preserved by adding a little oil of cloves, carbolic acid, or other antiseptic to prevent decomposition. All so-called white inks for colored papers, about which you particularly inquire, are made from acids or alkalies which will discharge the color.



The following preparation is used for writing on slate colored, blue or red paper.

Slaked lime..... 4 drs.  
 Tragacanth, in powder..... 16 grs.  
 Glycerin, a sufficiency  
 Distilled water ..... 4 ozs.

The lime is rubbed with the tragacanth and enough glycerin to make a stiff paste; rub for about 15 minutes, and then add the water, and bottle.

The following is an ink for a blue paper:

Hydrochloric acid..... 1 fl. dr.  
 Mucilage ..... 30 mins.  
 Water ..... 7 fl. drs.

WHITE INK FOR USE ON COLORED OR BLACK PAPER.

Rub up with thin mucilage of gum arabic, either zinc white, calcined ammonia alum, flake white or any similar impalpable powder. When you have the whole well incorporated, dilute with very weak mucilage or water, until you get a fluid that flows easily from the pen. The addition of a little ultramarine improves the color, which is otherwise inclined to be yellowish.

WHITE INK.

White ink consists usually of finely levigated zinc carbonate suspended in mucilage of acacia, though other mixtures are used, notably a solution of either oxalic or hydrochloric acid in water. The latter affect the coloring material in the paper, where an ultramarine or deep blue paper is to be marked. The simplest form of white ink for use with any variety of dark colored paper is that which provides for the use of a white pigment like zinc carbonate, or a mixture of the latter and white precipitate as given below. The formula:

Zinc white..... 2 drs.  
 White precipitate..... 5 grs.  
 Mucilage of acacia..... 1 dr.  
 Water..... 6 drs.

Triturate the zinc white and the precipitate with 2 drams of water until perfectly smooth, then add the mucilage and the rest of the water. The ink requires shaking from time to time to prevent the pigments from settling to a solid mass at the bottom.

WHITE INK.

To prepare white ink, a mucilage of gum acacia is prepared, and with this is mixed zinc white in sufficient quantity. In order to make the ink smooth, after mixing the zinc white, the whole is well rubbed with a palette knife or glass muller upon a slab of glass. A few drops of carbolic acid are added as a preservative.

WHITE INK.

For writing on blue paper a solution of oxalic acid may be used. For writing on dark colored paper the following may answer your purpose. Rub together until perfectly smooth 30 grains of zinc oxide and 1 ounce of mucilage. Then add 30 minims of alcohol and 3 drams of silver bronze, and make up the quantity with water to 2 ounces.

WHITE INK.

White ink may be made by mixing 1 part of Chinese white with 3 or 4 parts of waterglass. The air must

be carefully excluded from the vials. A different preparation is the following:

WHITE INK FOR PHOTOGRAPHS.

Potassium iodide..... 10 parts  
Iodine..... 1 part  
Water..... 30 parts  
Gum arabic..... 1 part

Dissolve the iodide in the water and the iodine in the solution thus made. Add the gum and dissolve. The iodine acts as a reducer of the silver in the picture, leaving a white mark wherever the "ink" touches.

WHITE INK.

Triturate together 1 part of honey and 2 parts of dry ammonia alum. Dry thoroughly and calcine in a shallow dish over the fire to whiteness. Cool, wash and rub up with enough of gum water to use.

WHITE INK.

Mix pure, freshly precipitated barium sulphate or flake white with water containing enough gum arabic to prevent the immediate settling of the substance. Starch or magnesium carbonate may be used in a similar way. They must be reduced to impalpable powder.

WHITE STAMPING INK.

Rosin..... 2 drs.  
Benzine..... 4 ozs.  
Zinc white..... ½ oz., or sufficient

Dissolve the rosin in the benzine, triturate the zinc white in a portion of the liquid, to a smooth paste, and mix all together. It must be shaken often during using.

WHITE INK ON BLUE PAPER.

A solution of oxalic acid is generally employed for writing on blue paper. Write with a gold or quill pen. The writing is said to be ineffaceable. The solution of oxalic acid should be labeled "poison." For dark-colored paper an ink made with Chinese white rubbed up with mucilage of acacia may be employed.

INK FOR STYLOGRAPHIC PEN.

Extract of logwood..... 3 ozs.  
Sulphate of iron..... 6 ozs.  
Gum acacia..... 5 ozs.  
Water..... 80 ozs.  
Potassium bichromate..... 4 drs.  
Nigrosine..... 1 oz.

Boil together the first four ingredients until dissolved; while hot add the other articles. Strain through muslin.

INK FOR STYLOGRAPHIC PENS.

Twenty grains of brown shellac are dissolved in a warm solution of 30 grains of borax in 300 to 400 grains of water and filtered hot; to the filtrate is added a solution containing 7.5 to 10 grains of water. Soluble nigrosine, 0.3 grains tannin, 0.1 grain picric, 15 grains ammonia water, and 7 grains water.

INK FOR STYLOGRAPHIC PENS.

Indigo carmine..... 1 dr.  
Gum acacia, powdered..... 2½ drs.  
Tannic acid..... 320 grs.

Pyrogallic acid.....	10	grs.
Ferrous sulphate.....	220	grs.
Carbolic acid.....	1	dr.
Syrup.....	1½	drs.
Distilled water.....	20	fl. ozs.

REMEDY FOR LEAKY STYLOGRAPHIC PENS.

The stylographic pen is a great convenience, but no inventor seems to have succeeded thus far in making a joint which will prevent soiling the fingers with ink. A remedy for this leakage which has been tried, and thus far seems to be complete, is to rub the joint on which the fingers rest with the thin edge of a piece of wax. Hold the pen over a candle, lamp, or the flame of a match, till the wax melts, when it will lute the joint so that no ink can escape through it.

INK FOR AUTOMATIC SHADING PENS.

Almost any aniline ink can be used with the automatic shading pen by adding to it a small quantity of mucilage. A good black ink for the purpose may be made from this formula:

Powdered nutgalls.....	18	parts
Ferrous sulphate.....	8	parts
Gum arabic.....	7	parts
Water.....	145	parts

Boil the nutgalls in 130 parts of the water; dissolve in the remainder of the water the ferrous sulphate and gum arabic, and slowly add this solution to the former.

AUTOMATIC SHADING PEN INK.

Asphaltum varnish thinned by the addition of benzine gives a handsome dark brown ink, which of course withstands moisture better than writing ink. Very pretty variations in the effects may be produced by sprinkling bronze powders of different colors on the writing while moist, when the powders will adhere to the heavy lines, the excess being brushed off when the writing is thoroughly dry.

AUTOMATIC SHADING PEN INK.

Aniline, color to suit fancy.....	20	grs.
Alcohol.....	2	drs.
Copal varnish.....	12	drs.
Turpentine.....	2	drs.

Powder the aniline very fine and rub with the alcohol; slowly work in the turpentine and varnish; of course, the shading pen should be cleaned after using each time.

SHADING PEN INK.

Use soluble blue or ultramarine for the blue, and vermilion or English red for the other color. Grind the colors up with a weak mucilage of gum arabic until smooth. Add a little glycerin to prevent cracking after the pigment dries. If the ink flows too freely, add a little gum arabic in powder, and if it is too stiff, a little water.

INKS FOR AUTOMATIC SHADING PEN.

Almost any ink which flows well from the pen can be used. The easiest inks made are the aniline inks and it is only necessary to dissolve the desired color in water, add mucilage of acacia or syrup or mixtures of them, and occasionally a small amount of glycerine works well. When larger amounts of glycerine are

used the ink can be copied, and when still large amounts are employed, the ink serves for use on rubber stamping pads.

## INK FOR SHADING PEN.

The essential feature in the ink for use with a shading pen is simply the addition of a sufficient quantity of acacia or other mucilaginous substance to impart a proper degree of consistency to the ink. A mixture of two parts of mucilage of acacia with eight of ink gives about the required consistency.

## No. 1.

Water-soluble nigrosine . . . . . 1 part  
Water . . . . . 9 parts  
Mucilage acacia . . . . . 1 part

## No. 2.

Paris violet . . . . . 2 parts  
Water . . . . . 6 parts  
Mucilage acacia . . . . . 2 parts

## No. 3.

Methyl violet . . . . . 1 part  
Distilled water . . . . . 7 parts  
Mucilage acacia . . . . . 2 parts

## No. 4.

Bordeau red . . . . . 3 parts  
Alcohol . . . . . 2 parts  
Water . . . . . 20 parts  
Mucilage acacia . . . . . 2 parts

## No. 5.

Rosaniline acetate . . . . . 2 parts  
Alcohol . . . . . 1 part  
Water . . . . . 10 parts  
Mucilage acacia . . . . . 2 parts

## GRAPH INK.

Aniline violet . . . . . 1½ dr.  
Methylated spirit of wine . . . . . 1 dr.  
Mucilage of gum arabic . . . . . 1 dr.  
Boiling water . . . . . 1 oz.

## SLOE-BLACK GRAPH INK.

Induline R . . . . . 1½ dr.  
Glycerin . . . . . 15 drops  
Alcohol (60 per cent) . . . . . 1 dr.  
Water . . . . . 12 drs

## FIRE-PROOF INK.

It appears that the effort to manufacture a fire-proof paper and ink for either writing or printing purposes has recently met with success in Germany. Paper possessing fire-proof qualities was made with chemically-treated asbestos fibre and ground or finely divided wood fibre. Ninety-five parts of asbestos was used with five parts of the wood fibre, and by aid of glue, water and borax were made into a pulp, which yielded a fine, smooth paper, which could be used for writing purposes. It had the unusual quality of sustaining the influence of a white heat without injury. Fire-proof printing and writing inks were made by combining platinum chloride, oil of lavender and lamp-black and varnish. These ingredients produced a printing ink, and when a writing fluid was wanted, Chinese or India ink and gum arabic were added to the mixture. Ten parts of the dry platinum chloride, twenty-five parts of the oil of lavender and thirty of

varnish are reported by a local writer to yield a good printing ink of this valuable kind when mixed with a small quantity of lampblack and varnish. When the paper printed with this compound is ignited the platinum salt is reduced to a metallic state and becomes a coating of a brownish-black color. A free-flowing ink for writing on the fire-proof paper with an ordinary metallic pen may be obtained by using five parts of the dry chloride of platinum with 15 parts of oil of lavender, 15 parts of Chinese ink, and one part of gum-arabic, adding thereto 64 parts of water. When the paper is ignited after being written upon with this ink, the platinum ingredient causes the writing to appear transparent, and, as a consequence, it is claimed that such writing as has become black or illegible will become readily legible again during the process of heating the paper. Colors for painting may also be made fire-proof by mixing commercial metallic colors with the chloride of platinum and painters' varnish, adding an ordinary aquarelle pigment to strengthen the "covering power" of the color. These fire-proof paints or colors can be used in the same manner as the common water colors.

GAMBLER'S INK.

Take a small quantity of dark-blue or scarlet aniline put it into a 2 dram vial and dissolve in glycerin over a lamp; then add about 10 grains of carbolic acid crystals, and ether enough to fill the vial. Keep well corked, and when required for use heat over a lamp and apply it to the card with a common steel pen.

LUMINOUS INK.

The directions for this preparation, tracings with which will phosphoresce in the dark, are to dissolve by means of a gentle heat (water bath) 1 part of phosphorous in 8 parts of cinnamon oil keeping the vial well corked to exclude air.

SYMPATHETIC INKS.

Sympathetic, or invisible inks are colorless solutions used in writing secret correspondence. The writing cannot be seen till the "developer," is applied. The writing is developed by heat, by light, or by chemical reagents.

INKS THAT APPEAR THROUGH HEAT.

- 1.— Dil. sulphuric acid ..... 50 parts  
Powdered sugar ..... 1 part  
Dissolve and use with a quill pen.
- 2.— Cobalt chloride ..... 5 parts  
Distilled water ..... 45 parts  
Glycerine ..... 1 part

The invisible writing turns blue on gently warming the paper.

3.— Write with a concentrated solution of potassa. The writing will appear when the paper is submitted to strong heat.

4.— Write with a solution of hydrochlorate of ammonia, in the proportion of 15 parts to 100. The writing will appear when the paper is heated by holding it over a stove or by passing a hot smoothing iron over it.

5.— A weak solution of nitrate of copper gives an invisible writing, which becomes red through heat.

6.— A very dilute solution of perchloride of copper gives invisible characters, which become yellow through heat.

7.— A slightly alcoholic solution of bromide of copper gives perfectly invisible characters, which are made apparent by a gentle heat, and which disappear again through cold.

8.— Write upon rose-colored paper with a solution of chloride of cobalt. The invisible writing will become blue through heat, and will disappear on cooling.

9.— Write with lemon, onion, leek, cabbage, or artichoke juice. Characters written with these juices become very visible when the paper is heated.

10.— Put in a vial  $\frac{1}{2}$  ounce distilled water, 1 dram potassium bromide and 1 dram pure copper sulphate. The solution is nearly colorless, but becomes brown when heated.

11.— Nitrate of nickel and chloride of nickel in weak solution form an invisible ink which becomes green by heating when the salt contains traces of cobalt, which usually is the case; when pure, it becomes yellow.

12.— A weak solution of nitrate becomes black by heat.

#### INKS THAT APPEAR THROUGH LIGHT.

13.— Chloride of gold serves for forming characters that appear only as long as the paper is exposed to daylight, say for an hour at least.

14.— Write with a solution made by dissolving 1 part nitrate of silver in 1,000 parts distilled water. When submitted to daylight, the writing appears of a slate color or tawny brown.

#### INKS APPEARING THROUGH REAGENTS.

15.— If writing be done with a solution of acetate of lead in distilled water, the characters will appear in black upon passing a solution of an alkaline sulphide over the paper.

16.— Characters written with a very weak solution of chloride of gold will become dark brown upon passing a solution of perchloride of tin over them.

17.— Characters written with a solution of gallic acid in water will become black through a solution of sulphate of iron, and brown through the alkaloids.

18.— Upon writing with a very clear solution of starch on paper that contains but little sizing, and submitting the dry characters to the vapor of iodine, the writing becomes blue, and disappears under the action of a solution hyposulphite of soda in the proportion of 1 to 1,000.

19.— Characters written with a 10 per cent solution of protoxide of mercury become black when the paper is moistened with liquid ammonia, orange-red with a solution of same, and gray through heat.

20.— Characters written with a weak solution of the soluble chloride of platinum or iridium become black when the paper is submitted to mercurial vapor. This ink may be used for marking linen. It is indelible.

21.— To make the writing or the drawing appear which has been made upon paper with the ink, it is sufficient to dip it into water. On drying, the traces

disappear again, and reappear by each succeeding immersion. The ink is made by intimately mixing linseed oil, 1 part; water of ammonia, 20 parts; water 100 parts. The mixture must be agitated each time before the pen is dipped into it, as a little of the oil may separate and float on top, which would of course leave an oily stain upon the paper.

22.— Write with a solution of ferrocyanide of potassium; develop by pressing over the dry invisible characters a piece of blotting paper moistened with a solution of copper sulphate or of copperas.

23.— Write with pure dilute tincture of iron; develop with a blotter moistened with strong tea.

24.— Sulphate of copper in very dilute solution will produce an invisible writing, which will turn light blue by vapors of ammonia.

25.— Soluble compounds of antimony will become red by sulphide of hydrogen vapor.

26.— Soluble compounds of arsenic and of peroxide of tin will become yellow by the same vapor.

27.— An acid solution of chloride of iron is diluted till the writing is invisible when dry. This writing has the remarkable property of becoming red by sulphocyanide vapors (arising from the action of sulphuric acid on sulphocyanide of potassium in a long-necked flask), and it disappears by ammonia, and may alternately be made to appear and disappear by these two vapors.

INVISIBLE INK.

Chloride nickel ..... 10 grs.  
 Chloride cobalt..... 10 grs.  
 Distilled water ..... 1 oz.

The writing becomes green on heating.

INVISIBLE INK.

Hyposulphate soda ..... 10 grs.  
 Water ..... 1 oz.

When the writing is dry, rub the paper with a paper folder or the blade of a clean knife to remove all trace of dry salt. Exposed to the heat of a bright coal fire it develops a black writing. It is necessary to use a perfectly clean pen.

INVISIBLE INK.

A weak mixture of acetate and nitrate of cobalt develops a rose tint on warming.

INVISIBLE INK.

Solution of chloride or nitro-muriate of cobalt; turns green when heated, and disappears again on cooling. If the salt is pure, the marks turn blue.

INVISIBLE INK.

Solution of acetate of lead; turns brownish-black when exposed to the fumes of sulphuretted hydrogen.

INVISIBLE INK.

It is said that a permanent sympathetic ink may be made by dissolving gum camphor in whiskey or dilute alcohol. The writing must be done very rapidly, the first letters of a word disappearing before the last are written. The writing may be brought out at any time by dipping the paper in water, and becomes again invisible on drying.

## INVISIBLE INK FOR POSTAL CARDS.

Oxide of cobalt.....  $\frac{1}{2}$  oz.  
 Muriatic acid, sufficient to dissolve it;  
 Water..... 4 ozs.  
 Mucilage of gum acacia..... 1 dr.

Characters written on paper with this solution are invisible, but on the application of heat they instantly appear in blue. On cooling they become invisible again.

## INVISIBLE INK.

Provide yourself with Ferri Sulph. labeled "For Blue Ink," Cupri Sulph. labeled "For Brown Ink," and Yellow Prussiate of Potash, labeled "The Developer." They may also bear the numbers 1, 2 and 3 respectively. Make separate solutions 1, 2 and 3, and preserve in bottles for use. With a clean quill pen write with solution 1 or 2 and allow to dry. The writing will remain invisible. Dip a feather or small brush into No. 3, and brush over the writing, which will then distinctly appear, blue if 1 was used, or brown if 2 was employed.

Those inks whose color is developed by the application of heat are as a rule to be preferred over others, inasmuch as the writing again disappears on cooling.

## INVISIBLE INK.

Sulphuric acid..... 1 part  
 Water ..... 50 parts

This ink after drying naturally is invisible, but when strongly heated it develops the writing in deep black characters. Unlike most of this class the color does not disappear on cooling.

## INVISIBLE INK.

Copper sulphate and ammonium chloride in solution in equal parts are said to develop a yellow color when strongly heated.

## INVISIBLE INK.

Onion juice is said to produce the same color when warmed. This was one of the earliest known.

## INVISIBLE INK.

A very weak solution of chloride of cobalt is invisible when written on pink paper, but when warmed thoroughly develops green or blue. This change, however, is liable to take place in very dry atmosphere without the application of heat.

## INVISIBLE INK.

Copper chloride in solution can be used as an ink. On the application of heat it develops yellow.

## INVISIBLE AND INDELIBLE INK.

F. Moller, Hamburg, claims an ink made by dissolving 100 parts of alum in water, and adding to the boiling alum solution 100 parts of white garlic juice, and again boiling. Writing made with this ink becomes visible upon heating, and cannot be effaced by wet.

## INVISIBLE INK.

Cobalt chloride..... 1 dr.  
 Acacia mucilage..... 1 dr.  
 Distilled water ..... 1 oz.

Dissolve. The writing becomes blue when the paper is heated, and disappears again on cooling.



SYMPATHETIC INK—BLUE.

Writing with copperas turns blue if wetted with a solution of prussiate of potash.

SYMPATHETIC INK—BLUE.

Nitrate of cobalt turns blue on being wetted with a weak solution of oxalic acid.

SYMPATHETIC INK—BLUE.

Rice water or a solution of boiled starch turns blue in a solution of iodine in weak spirit.

SYMPATHETIC INK.

The following inks are developed by exposure to the action of reagents:

1. Upon writing with a very clear solution of starch on paper that contains but little sizing, and submitting the dry characters to the vapor of iodine (or passing over them a weak solution of potassium iodide) the writing becomes blue, and disappears under the action of a solution of hyposulphite of soda (1-1000).
2. Characters written with a weak solution of the soluble chloride of platinum or iridium become black when the paper is submitted to mercurial vapors. This ink may be used for marking linen, as it is said to be indelible.
3. Sulphate of copper in very dilute solution will produce an invisible writing, which will turn light blue by vapors of ammonia.
4. Soluble compounds of antimony will become red by hydrogen sulphide vapor.
5. Soluble compounds of arsenic and of peroxide of tin will become yellow by the same vapor.
6. An acid solution of iron chloride is diluted until the writing is invisible when dry. This writing has the remarkable property of becoming red by sulphocyanide vapors (arising from the action of sulphuric acid on potassium sulphocyanide in a long-necked flask), and it disappears by ammonia, and may alternately be made to appear and disappear by these two vapors.
7. Write with a solution of paraffin in benzol. When the solvent has evaporated, the paraffin is invisible, but becomes visible on being dusted with lampblack or powdered graphite, or smoking over a candle flame.

SYMPATHETIC INK.

According to the Ph. Ztg., the cobalt solutions heretofore used may be replaced by a solution of gum arabic in diluted sulphuric acid. The writing produced by this fluid is invisible, but becomes black on warming, in consequence of the carbonization caused by the sulphuric acid.

SYMPATHETIC INK.

Lead acetate . . . . .	10 parts
Uranium acetate . . . . .	1 part
Bismuth citrate . . . . .	10 parts
Distilled water . . . . .	1,000 parts
Ammonia, sugar, or acacia, of each	a sufficient quantity.

Dissolve the salts in the water and carefully add ammonia until a clear solution is obtained. Then add a small quantity of sugar or acacia. Characters written with this solution are invisible, but become visible

when exposed to the vapor of sulphuretted hydrogen, fading again after a few minutes. They reappear, however, when the writing is moistened with a very dilute solution of nitric acid.

## SYMPATHETIC INK.

According to Bruylant (Chem. Centralb.) if paper after being thoroughly dried is written on with water, and the writing, when dry, exposed to the vapors of iodine, the letters will appear violet-blue on a yellow or brownish ground. On wetting the sheet, they will turn to a dark purple, the rest of the paper being light blue.

## VANISHING INK.

Dextrin.....	95 parts
Iodine .....	5 parts
Sulphuric ether.....	10 parts
Alcohol.....	5 parts
Water .....	10 parts

Mix the alcohol and ether, and dissolve the iodine in the mixture, and the dextrin at once stirred in. Dry the mixture in a cool, dark place. When required for use, dissolve in water enough of the substance to make the required amount of ink.

## DISAPPEARING OR EVANESCENT INK.

Iodine .....	1 part
Potassium iodide.....	1 part
Mucilage of acacia.....	24 parts
Water .....	100 parts

Dissolve the iodide in half the water, then add and dissolve the iodine. Add the rest of the water and the mucilage and mix by agitation. This ink can be used only on glazed white paper alone, but the following may be used on any paper.

Arrowroot .....	2 parts
Tincture of iodine.....	5 parts
Water enough to make.....	500 parts

Mix the arrowroot and water and boil together, let cool and when cold add and stir in the tincture.

## A NEW SYMPATHETIC INK.

The well known reaction of phenol-phthalein with alkalies makes this substance desirable as a basis for sympathetic ink. It is best used in form of a weak solution prepared with dilute alcohol. The writing on paper can scarcely be seen, but when the paper is moistened with a solution of alkali, such as carbonate of soda, it appears at once with an intensely red color. No particular precautions are required in moistening the paper to prevent blurring of the letters, as the alcoholic solution penetrates into the paper and does not remain on the surface.

To make an ink, black at the time of writing, but which shall disappear after a short time, boil nutgalls in aqua vitæ, put Roman vitriol and sal ammoniac to it, and when cold dissolve a little gum in it. Writing done with this ink will vanish in twenty-four hours.

## INVISIBLE INK FOR POSTAL CARDS.

A drawing or writing on white paper with chloride of platinum is invisible. But if such drawing is held over a plate containing mercury, the lines traced come out in dark tints, in a very pleasing effect in consequence of the soft tone produced.

NEW INVISIBLE INK.

C. Widemann communicates a new method of making an invisible ink to Die Natur. To make the writing or the drawing appear which has been made upon paper with the ink, it is sufficient to dip it into water. On drying, the traces disappear again, and reappear by each succeeding immersion.

The ink is made by intimately mixing—

Linseed Oil ..... 1 part  
 Water of ammonia ..... 20 parts  
 Water ..... 100 parts

The mixture must be agitated each time before the pen is dipped into it, as a little of the oil may separate and float on top, which would, of course, leave an oily stain upon the paper.

INDELIBLE INK.

These inks are used mostly for marking linen or other articles of clothing. These inks must be all protected from light by wrapping the bottles with yellow paper.

BLACK INDELIBLE INK.

Negrosine ..... 30 grs.  
 Nitrate of silver ..... 120 grs.  
 Aqua ammonia, sufficient  
 Dextrin ..... 120 grs.  
 Distilled water ..... 4 ozs.

Dissolve the silver nitrate in part of the water; dissolve the nigrosin in the balance. Mix the solution and add 30 drops aqua ammonia. Allow to stand 1 hour and if any precipitate has formed, add enough aqua ammonia to dissolve it. Then add the dextrin and dissolve.

WOODHOUSE'S INDELIBLE INK.

Nitrate of silver ..... 1 oz.  
 Infusion of nutgalls ..... 2 drs.  
 Acacia ..... 2 drs.  
 Water ..... 8 ozs.

Dissolve the nitrate of silver in 4 ozs. of water. In the remainder of the water dissolve the acacia and add the infusion. Then mix the two liquids.

The infusion of nutgalls is made by pouring 1 oz. of boiling water upon 30 grains of powdered nutgalls.

INDELIBLE INK.

Nitrate of silver ..... 2 drs.  
 Water ..... 6 drs.  
 Mucilage ..... 1 dr.  
 Ammonia, sufficient.

Dissolve the nitrate of silver in the water, add enough ammonia to just redissolve the precipitate formed at first; and lastly, the mucilage. Sometimes it is found convenient to color the liquid with a little syrup of buckthorn, to facilitate the writing.

INDELIBLE INK.

Silver nitrate ..... 11 grs.  
 Water of ammonia ..... 30 grs.  
 Gum arabic ..... 20 grs.  
 Rain water ..... 85 grs.  
 Sodium carbonate ..... 22 grs.

Dissolve the silver nitrate in the water of ammonia, and the gum arabic in the rain water. Add the sodium

carbonate to the mucilage and when it is dissolved, mix the two solutions. Place the bottle containing the mixture in a water bath, and apply heat until the mixture turns black. When it is cold it is ready for use with a clean pen or quill.

## INDELIBLE INK.

Silver nitrate.....100 grs.  
 Distilled water ..... 1 oz.  
 Gum arabic ..... 2 drs.  
 Indigo ..... 1 scruple

Writing done with this ink is made more permanent by first treating the fabric to be marked with a solution of sodium bicarbonate in water, and drying.

## INDELIBLE INK.

The following is the formula used in German marine and naval service for marking the linen of the men and is said to be more satisfactory than any other of which trial has been made:

Silver nitrate..... 5 parts  
 Aqua ammonia.....10 parts  
 Soda commercial..... 7 parts  
 Mucilage of acacia .....15 parts  
 Boiling water ..... 5 parts

Dissolve in separate vessels, the silver nitrate in the ammonia water, and the soda in the boiling water, and mix the solutions. Finally add the mucilage, and place the mixture in full sunlight, until it turns black.

## INDELIBLE INK.

Nitrate of silver.....50 grs.  
 Tartaric acid.....40 grs.  
 Carmine, No. 40..... 5 grs.  
 Solution ammonia ..... ½ oz.  
 Mucilage of gum arabic..... ½ oz.

Dissolve the nitrate of silver in the ammonia, and add the tartaric acid; then rub the carmine with the solution. Lastly, add the mucilage. This ink is red when first written with; on the application of heat it soon changes into black.

## INDELIBLE INK.

Nitrate of silver..... 1 oz.  
 Carbonate of sodium ..... 1 ½ oz.  
 Tartaric acid.....60 grs.  
 Aqua ammonia..... 6 ozs.  
 Refined sugar..... 6 drs.  
 Powdered gum arabic.....10 drs.  
 Distilled water, a sufficient quantity.

Dissolve the nitrate and the carbonate separately in sufficient water, mix the solutions, collect and wash the precipitate and rub it while still moist with the acid until effervescence ceases. Then dissolve the precipitate and the sugar and gum in the ammonia, adding enough water to make 8 ozs.

## INDELIBLE INK.

Carb. soda..... 7 ozs.  
 Pulv. acacia..... 7 ozs.  
 Nit. silver cryst..... 4 ozs.  
 Aqua ammonia, strong..... 7 ozs.  
 Aqua .....28 ozs.

Dissolve the carb. soda in the water and the pulv. acacia in the resulting menstruum. Dissolve the nit-

rate silver in the strong aqua ammonia and mix the two solutions. Put the solution thus obtained in a porcelain lined pot and by the aid of heat bring to the boiling point when it assumes a rich black color. It should not be allowed to boil after reaching the boiling point. Keep well corked in a dark bottle. Best indelible laundry ink in use.

INDELIBLE MARKING INK.

Crystallised nitrate of silver . . . . . 1 oz.  
 Carbonate soda crystals . . . . . 1½ oz.  
 Tartaric acid . . . . . 160 grs.  
 Liquid ammonia . . . . . 2 oz. or q.s.  
 Aniline black . . . . . 80 grs.  
 Glycerin . . . . . 5 drs.  
 Distilled water . . . . . 8 oz.

Dissolve the nitrate of silver and carbonate of soda separately in 3 ounces of distilled water. Mix the solution, collect and wash precipitate well with distilled water; now introduce precipitate (moist) into a wedge-wood mortar and add to it the tartaric acid dissolved in 1 ounce of distilled water, stir until effervescence ceases then introduce liquid ammonia enough to dissolve precipitate. Having dissolved aniline black in 1 ounce boiling water, add it to above, then add glycerin and distilled water enough to make the product 8 fluid ounces.

INDELIBLE INK.

Nitrate of silver . . . . . 1 oz.  
 Carbonated sodium . . . . . 1½ oz.  
 Tartaric acid . . . . . 160 grs.  
 Aqua ammonia . . . . . 6 ozs.  
 Refined sugar . . . . . 6 drs.  
 Gum arabic, powdered . . . . . 10 drs.  
 Distilled water, a sufficient quantity.

Dissolve the nitrate and the carbonate separately in sufficient water, mix the solutions, collect and wash the precipitate and rub it while still moist with the acid until effervescence ceases. Then dissolve the precipitate and the sugar and gum in the ammonia, adding enough water to make 8 ounces.

BLACK INDELIBLE INK.

Nitrate of silver . . . . . 25 grs.  
 Gum arabic . . . . . 15 grs.  
 Aqua ammonia . . . . . 60 grs.  
 Soot, purified . . . . . 2 grs.

Dissolve the first two ingredients in the ammonia, and ultimately mix the remainder. Apply with a quill, and when dry pass a heated iron over it.

BLUE INDELIBLE INK.

Blue aniline . . . . . 15 grs.  
 Nitrate of silver . . . . . 120 grs.  
 Aqua ammonia, sufficient  
 Dextrin . . . . . 120 grs.  
 Distilled water . . . . . 4 ozs.

Dissolve the nitrate of silver in part of the water, the blue aniline in the balance. Mix the solutions and add 30 drops aqua ammonia; then add the dextrin and dissolve. For violet use violet aniline.

BLUE MARKING INK FOR WHITE GOODS.

Crystallized nitrate of silver . . . . . 1 dr.  
 Water of ammonia . . . . . 3 drs.

Crystallized carbonate of soda . . . . . 1 dr.  
 Powdered gum arabic . . . . . 1½ drs.  
 Sulphate of copper . . . . . 30 grs.  
 Distilled water . . . . . 4 drs.

Dissolve the silver salt in the ammonia; dissolve the carbonate of soda, gum arabic, and sulphate of copper in the distilled water, and mix the two solutions together.

#### CRIMSON INDELIBLE INK.

Make two solutions, one of 3 parts of silver nitrate, and one of 4.5 parts of sodium carbonate, in crystals, each in sufficient water to completely dissolve the same. Mix the solutions, collect the precipitate on a filter and wash with plenty of water. Put the washed precipitate, still moist, in a wedgewood mortar, add 1 part of tartaric acid, and rub together until effervescence ceases. Now, for every ounce of the silver nitrate used in making the silver tartrate, take 6 grains of carmine in powder and dissolve them in 6 ounces of ammonia water of 0.882, s.g., and to the solution add the silver tartrate, and then add 6 drams of sugar, 10 drams of powdered gum arabic, dissolved in sufficient water to bring the whole solution up to 8 ounces.

#### INDELIBLE BLUE INK.

Dissolve five parts of oxide of molybdenum in the smallest necessary quantity of muriatic acid; also dissolve two parts of extract of liquorice, and six of gum arabic, in two hundred parts of water. Mix the solutions, and write with them on the linen to be marked. After writing moisten with a solution of chloride of tin in water. This is an ink not only indelible in ordinary washing, but in acids and alkalies. It cannot possibly be removed except by destroying the article written upon. In fact, it is an utterly indelible blue dye, while the black so-called indelible inks may be removed by cyanide of potassium.

#### NORMANDY'S INDELIBLE INK.

Frankford lamp-black 24 pounds to be ground with mucilage, made by adding 24 pounds of gum to 60 gallons of water and the mixture filtered through a coarse flannel; 4 pounds of oxalic acid are then added, with as much decoction of cochineal and sulphate of indigo as will yield the shade of color desired.

#### INDELIBLE INK.

Lampblack . . . . . 1 part  
 Syrup potassium silicate . . . . . 12 parts  
 Ammonia water . . . . . 1 part  
 Distilled water . . . . . 38 parts

#### MARKING INK.

Shellac . . . . . 2 av. ozs.  
 Gum arabic . . . . . 1 av. oz.  
 Borax . . . . . 1 av. oz.  
 Water . . . . . 20 fl. ozs.  
 Lampblack, sufficient.

Dissolve the gum arabic in two fluid ounces of water, and to the remainder of the water add the borax and apply heat; when dissolved add the shellac and boil until it is in solution or nearly so, then filter. Now triturate sufficient of the lampblack with the gum solution, and when well mixed add gradually with trituration the shellac solution.

ANILINE MARKING INK.

Anilin oil,  
Hydrochlor acid, of each a sufficiency.

Saturate the aniline oil with the hydrochloric acid and add one-sixth its volume of water; then mix with equal volumes of the following solution:

Potassium chlorate..... 1 part  
Sulphate of copper..... 1 part  
Water .....16 parts

SILVER-FREE INDELIBLE INK.

Copper chloride..... 1 part  
Distilled water..... 3 parts  
Liquor potassæ, q.s.

Dissolve the copper salt in the water, and to the solution add the liquor potassæ until a precipitate is no longer thrown down. Let stand until the precipitate settles, then decant or syphon off the supernatant fluid. Now add ammonia water a little at a time until the precipitate is dissolved. In order to give the consistency necessary to make it flow properly from the pen add 5 or 6 parts of dextrin, or more if necessary. Use a glass or quill pen and after the writing gets dry, pass a hot iron over it. Should the ink get thick from evaporation of the liquid add a little ammonia from time to time.

PLATINUM MARKING INK.

Platinic chloride..... 1 part  
Water .....10 parts  
Mucilage, sufficient.

The portion of the fabric to be marked must previously be treated with a little solution of stannous chloride and gum arabic. After writing, the fabric is gently heated, when the marks will assume a black or blackish color.

OSMIUM MARKING INK.

On writing upon a fabric with a dilute solution of osmic acid in water, 1 part in 50, the marks will soon assume an intense dark-blue color, and will be found to be very permanent. The fabric must be previously sized and ironed. The osmic acid solution must be quite dilute, because stronger solutions are apt to destroy the fabric itself. It must be remembered that osmic acid is very poisonous, and consequently careful handling is required.

INDELIBLE LAUNDRY INK.

Dragon's blood..... 10 gm.  
Silver nitrate..... 10 gm.  
Water, distilled, small quantity.  
Dextrin ..... 10 gm.

Rub well together the first three articles, and add the dextrin, and sufficient glycerin to make the mass about the consistency of good printer's ink.

Before applying the rubber stamp, apply a few drops of oil of sweet almonds to the face thereof, and rub it off with a rag. The best manner of inking the stamp is to rub the color into a bit of velvet, and apply the stamp to it, instead of to the ink direct.

A GOOD BLACK LAUNDRY INK.

Copper sulphate..... 35 parts  
Silver nitrate..... 15 parts  
Ammonia water..... 50 parts

Potassium tartrate.....	10 parts
Caustic soda.....	10 parts
Dextrin.....	10 parts
Sugar.....	5 parts
Lampblack.....	1 part
Distilled water.....	80 parts

Dissolve the copper sulphate in the ammonia water, and add the silver nitrate in powder. Warm the water, and add the soda, dextrin, and, when dissolved, stir in the lampblack. Mix the two solutions with persistent stirring. The inks may be used with either a pen or hand stamp:

## INDELIBLE INK.

To an aqueous solution of chloride of copper add a solution of hydrate of potassium, collect the precipitate, wash it and dissolve in a small quantity of ammonia, to which add six per cent of dextrin.

## CHEAP INDELIBLE INK.

Braconnet recommends the following: Twenty parts of potassa are dissolved in boiling water, ten parts of fine cut leather chips and five parts of flowers of sulphur are added, and the whole heated in an iron kettle until it is evaporated to dryness. Then the heat is continued until the mass becomes soft, care being taken that it does not ignite. The pot is now removed from the fire (allowed to cool) water is added, the solution strained, and preserved in bottles. The ink flows easily from the pen.

## INDELIBLE INK.

To us the most satisfactory formula for a silver ink is that of Professor Redwood:

Silver nitrate.....	1	av. oz.
Sodium carbonate, crystallized..	1 ½	av. oz.
Tartaric acid.....	160	grs.
Strong water of ammonia.....	2	fl. ozs.
Mucilage of acacia.....	3	fl. ozs.
Simple syrup.....	1	fl. oz.
Water, sufficient.		

Dissolve the silver and soda salts separately, each in a pint of boiling water and mix; allow the precipitate to settle, decant the clear fluid, and collect the precipitate on a filter and wash with ten fluid ounces of water, and when drained, transfer to a mortar, add the tartaric acid, and when effervescence has ceased add the water of ammonia. Stir to dissolve, add the syrup and mucilage and enough water to make up ten fluid ounces of the finished product. To impart a red color to the ink use half a dram of carmine which is previously dissolved in the ammonia; if a blue shade is desired put sixty grains of sulphate of coffee in the same menstruum.

## INDELIBLE INK.

Silver nitrate.....	11 parts
Sodium carbonate.....	22 parts
Gum arabic, in powder.....	20 parts
Venice turpentine.....	10 parts
Glycerin.....	85 parts
Ammonia water, stronger.....	20 parts

Triturate the gum-arabic, sodium carbonate and glycerin together. In a separate flask dissolve the silver



nitrate in the ammonia water and mix the solution with the triturate. Put into the water-bath and heat to boiling, and while boiling add the turpentine little by little with constant stirring. When cool put into suitable vessels. After stamping with this ink expose the article to full sunlight, or pass a hot smoothing iron over it.

**BLACK INDELIBLE INK FOR USE WITH A STAMP.**

Nitrate of silver..... 5 parts  
 Ammonia water..... 10 parts  
 Gum arabic..... 5 parts  
 Sodium carbonate, crystal ..... 7 parts  
 Water ..... 12 parts

Dissolve the silver nitrate in the ammonia, and the gum arabic and sodium carbonate in the water. Mix the solutions and heat until the mixture becomes quite black.

**INDELIBLE STAMP INK FOR LAUNDRY PURPOSES.**

Silver nitrate..... 60 parts  
 Gum arabic..... 60 parts  
 Sodium carbonate..... 72 parts  
 Water ..... 144 parts  
 Ammonia water..... 144 parts

Dissolve the silver nitrate in the ammonia water. In another vessel dissolve the soda and gum arabic in the water. Mix the solutions in a porcelain capsule, and warm in a water-bath until the mixture becomes quite black, being very careful not to apply too much heat.

**MARKING INK.**

One and one-tenth pints of nitrate of silver; 2.3 pints spirit of ammonia; 2.2 pints soda; 5 pints gum arabic; 0.2 pints sapgreen; 2 or 3 pints distilled water. After marking, apply a hot flat-iron until the tracing is perfectly black.

**MARKING INK.**

1. Dissolve one part of nitrate of silver in six parts of distilled water, and add six parts of gum arabic. 2. Dissolve one part of hypophosphite of soda in sixteen parts of distilled water, and add two parts of gum arabic. This is an excellent preparation. To use it, the part of the linen to be marked must be thoroughly moistened with solution No. 2, and be allowed to dry; this done, write what is desired with solution No. 1. To bring out the characters in black, a hot iron should be held upon the spot, or it may be held near a fire. The effect is due to the highly reductive action of the hypophosphite.

**INDELIBLE MARKING INK.**

Silver nitrate..... 3¼ ozs.  
 Sodium bicarbonate ..... 4½ ozs.  
 Solution of ammonia (s. g. 900) ..... 3½ ozs.  
 Tartaric acid..... 9 drs.  
 Archil ..... 1 oz.  
 Soluble sap green..... 1 oz.  
 Powdered acacia..... 2½ ozs.  
 Sugar..... 1½ oz.  
 Water..... q. s.

Dissolve the silver and soda salts separately in two pints of boiling water and mix the solutions. Allow the precipitate to subside, decant the fluid and collect

the precipitate on a filter and wash well; transfer it to a mortar, add the tartaric acid and mix. When effervescence has ceased add the ammonia solution and transfer to a vessel containing the sugar. Now dissolve the sap green and the archil in four ounces of water by the aid of heat, add the acacia and stir until dissolved and then strain. Add the ammoniacal solution to this and make up to 20 ounces with water.

To obtain this ink in form for the pad add 5 ounces of glycerine and water to make 20 ounces.

## NEW INDELIBLE INK.

Copper sulphate.....20 parts  
 Anilin hydrochlorate .....30 parts  
 Dextrin.....10 parts  
 Glycerin ..... 5 parts  
 Water, sufficient.

Rub up the copper salt and the anilin separately, to impalpable powder. Mix and rub up with the dextrin and glycerin, and finally add enough water to make a paste or liquid that will flow from a pen or pencil.

## INDELIBLE INK FOR LAUNDRY.

Toluidin..... 10 parts  
 Aniline oil ..... 240 parts  
 Dissolve and add:  
 Hydrochloric acid.....480 parts  
 Mucilage ..... 480 parts

The mordant consists of:

Potassium hydrate ..... 2 parts  
 Copper sulphate..... 4 parts  
 Ammonium chloride..... 2 parts  
 Water ..... 144 parts  
 Mucilage .....48 parts

## INDELIBLE INK.

Aniline black..... 1 dr.  
 Strong hydrochloric acid.....60 drops  
 Alcohol..... 6 drs.

Dissolve, and add a hot solution of  $1\frac{1}{2}$  drams gum arabic in 3 ounces of water.

## INK FOR MARKING CLOTHING WITH HAND-STAMP.

Wood vinegar.....10 parts  
 Alcohol.....10 parts  
 Glycerin.....70 parts  
 Water, distilled.....10 parts  
 Aniline blue (methyl violet)..... 8 parts  
 Nigrosin ..... 4 parts

This is said to be indelible, does not "spread" on the fabric, and keeps well.

## LAUNDRY INK.

a.

Copper chloride, crystals..... 85 parts  
 Sodium chlorate ..... 106 parts  
 Ammonium hydrochlorate..... 53 parts  
 Distilled water .....600 parts

b.

Glycerin.....100 parts  
 Gum water (gum arabic 1, water 2) 200 parts  
 Anilin hydrochlorate .....200 parts  
 Distilled water.....300 parts

Mix and make a solution.

Mix the glycerin and gum water; dissolve the anilin in the water, and add to the mixture. To use, mix in a glass or porcelain vessel, 1 part of solution a with 4 parts of solution b. This should be done immediately before using, and only enough for the occasion should be prepared. The articles need no preparation, and while passing a hot iron over the writing facilitates drying, it is not absolutely necessary.

MARKING INK FOR LINEN.

The majority of marking inks contain as the prime ingredient nitrate of silver, and such inks give an excellent mark when fresh. By the action of the alkaline liquors in washing the impression after a time becomes yellowish, and finally leaves something like an iron stain upon the linen.

By the following method, it is said that a splendid red ink which gives an indelible impression upon linen can be manufactured at a small cost. Three solutions are first made as follows:—

1.  
Carbonate of soda ..... 12 gms.  
Gum arabic ..... 12 gms.  
Water ..... 45 gms.

2.  
Perchloride of tin ..... 4 gms.  
Distilled water ..... 64 gms.

3.  
Protochloride of tin ..... 4 gms.  
Distilled water ..... 64 gms.

To mark the linen, the part upon which it is wished to write is damped with solution (1) and dried. The second solution is then used to write or stamp the name and left to dry. Finally the mark is covered over with the third solution. The color (a purple red) soon shows up, and will be found to resist the strongest washing soda or soap liquors.

INDELIBLE MARKING INK.

Aniline black ..... 4 parts  
Alcohol ..... 16 parts  
Hydrochloric acid C. P. .... 2 parts  
Water ..... 90 parts  
Acacia ..... 6 parts

INDELIBLE INK FOR LAUNDRY.

Toluidin ..... 10 parts  
Aniline oil ..... 240 parts  
Dissolve and add:  
Hydrochloric acid ..... 480 parts  
Mucilage ..... 480 parts

The mordant consists of:

Potassium hydrate ..... 2 parts  
Copper sulphate ..... 4 parts  
Ammonium chloride ..... 2 parts  
Water ..... 144 parts  
Mucilage ..... 48 parts

INDELIBLE INK FOR LAUNDRY.

For an ink to be used with a hand-stamp, dilute 30 parts of coal tar with the same volume of benzin, and rub in thoroughly 3 parts of ivory black and 1 part of Prussian blue. The consistency may be varied by adding more or less benzin.

## BRACONNOT'S INDELIBLE INK.

Caustic potassa ..... 20 parts  
 Leather, cut small ..... 10 parts  
 Sulphur ..... 5 parts

In an iron pot heat, on a sand bath the above ingredients with sufficient water: evaporate the whole to dryness and heat, while stirring, until the dry mass again assumes a doughy consistence. Dissolve it in water; strain the liquid, and keep it well closed.

## INDELIBLE STAMPING INK.

Sulphate of manganese ..... 2 parts  
 Lampblack ..... 1 part  
 Sugar ..... 4 parts  
 Water, sufficient.

The manganese, lampblack and sugar are first rubbed together into a fine powder and enough water is added to form a thin paste. When this ink is used, it should be allowed to dry on the cloth and then be well rinsed in water.

## GOLD INDELIBLE INK.

Make two solutions, as follows:

1.

Chloride of gold and sodium ..... 1 part  
 Water ..... 10 parts  
 Gum ..... 2 parts

2.

Oxalic acid ..... 1 part  
 Water ..... 5 parts  
 Gum ..... 2 parts.

The cloth or stuff to be written on should be moistened with liquid No. 2. Let dry, and then write upon the prepared place with liquid No. 1, using preferably a quill pen. Pass a hot iron over the mark, pressing heavily.

## INDELIBLE MARKING INK.

Phosphate of manganese ..... 1 oz.  
 Muriatic acid ..... 2 ozs.  
 Anthracene ..... 4 drs.  
 Chromate of potassa ..... 2 drs.  
 Water ..... 2 drs.  
 Gum arabic, sufficient.

Dissolve the phosphate of manganese in the muriatic acid, to the solution add the anthracene and the bichromate, dissolved in the water, and, lastly, enough gum arabic to thicken the liquor. The ink, it is said, can be used with any pen, and is more stable than silver combinations, especially in the presence of the chlorinated compounds now so frequently employed in washing.

## INDELIBLE PENCILS FOR MARKING LINEN.

Kaolin ..... 8 parts  
 Mangan, dioxide (finely powd.) ..... 2 parts  
 Silver nitrate ..... 3 parts.

Mix, and knead intimately with:

Distilled water ..... 5 parts

Dry the mass and enclose in wood pencils.

## INDELIBLE PENCILS FOR MARKING LINEN.

Reduce nitrate of silver to an impalpable powder, add just enough lampblack to give it a black color, then make into a paste with a solution of gum arabic; form into thin sticks and dry.

INDELIBLE INK.

Add to strong sulphuric acid an excess of camphor, let stand for 24 hours; a reddish gelatinous mass results, which, when heated, gives off fumes of sulphurous acid, and turns intensely black. The superfluous weakened acid and camphor are driven off by heat, and the residue constitutes the pigment. It appears to be dissolved, not merely suspended by water, and remains an indefinite time without precipitation.

INDELIBLE INDIGO INK.

Into a flask put 10 parts of very finely powdered indigo, 25 parts of pure sulphate of iron (ferrous), and 15 parts of dry caustic soda dissolved in 120 parts of distilled water. Close the flask immediately air-tight with a stopper. Shake it occasionally until the blue color has disappeared, then allow to settle. The supernatant liquid contains indigo-white in solution, which by exposure to air is changed to insoluble blue indigo. Just before use, take 10 parts of the decanted liquid, mix it with 2 parts of mucilage, tint it with a little fuchsin or other aniline color (to make the writing visible) and write at once on the fabric. The blue color will come out under the influence of air and light.

INDELIBLE INK.

Bottle A.

Aniline ..... 1 dr.  
 Paratoluidine..... 10 grs.  
 Diluted hydrochloric acid ..... 2 drs.  
 Mucilage of acacia..... 2 drs.

Dissolve the paratoluidine in the aniline, add the acid and the mucilage and mix.

Bottle B.

Copper chloride..... 40 grs.  
 Sodium chloride..... 30 grs.  
 Ammonium chloride ..... 20 grs.  
 Potassium chloride..... 20 grs.  
 Distilled water ..... 5 drs.  
 Mucilage of acacia ..... 3 drs.

Boil the water and dissolve the salts in it, add the mucilage and mix.

The following directions for using the two-bottles solution together with a form of label suggested are taken from "Pharmaceutical Formulas."

For writing, equal parts of each solution should be mixed immediately before use. The ink is put in cases containing a bottle of each solution and a small earthenware dish in which the ink is mixed together with a quill nib, as a steel pen must not on any account be used. Cases containing two empty 2 dram square phials (lipped) and an earthenware dish, are sold by druggist's sundrymen. The box should be labelled as follows:

Directions for Use.— Shake the bottles and mix two or three drops from each one in the palette contained in the box, and stir with the quill nib, when the ink is ready for writing, which should on no account be done with a steel pen. The quill or a gold pen should be used. The writing must on no account be heated and should be allowed to remain, a day or two before washing. The first washing turns the writing jet black.

N. B. Keep the bottle well corked, and do not mix the contents, except in the manner described.

## ANILIN BLACK MARKING INK.

Make a solution of 4 parts of hydrochlorate of anilin, and 10 parts of gum arabic in 10 parts of glycerin and 40 parts of water; and another solution of 15 parts of chloride of copper, 10 parts of chloride of ammonium, 20 parts of chlorate of sodium (not the chloride) in 100 parts of water. Just before use, mix a sufficient quantity of the two solutions, using 1 part of the second for every 5 parts of the first named. The ink is applied to the unsized fabric, and the latter then exposed to steam for some time.

## RED INDELIBLE STAMP INK.

A red ink for laundry purposes, which is used with a rubber hand stamp is made as follows:

Cinnabar ..... 50 parts  
Iron sulphate ..... 50 parts

Mix and rub up to the finest powder. Add sufficient linseed oil to make the mass of the proper consistency and continue the rubbing until the materials are homogeneously incorporated. If so desired, enough oil may be added to make the ink thin enough to use with a quill pen.

## RED INDELIBLE INK.

I.

Sodium carbonate ..... 3 drs.  
Gum arabic ..... 3 drs.  
Water ..... 12 drs.

II.

Platinic chloride ..... 1 dr.  
Distilled water ..... 2 ozs.

III.

Stannous chloride ..... 1 dr.  
Distilled water ..... 4 drs.

Moisten the place to be written upon with No. 1 and rub a warm iron over it until dry; then write with No. 2, and, when dry, moisten, with No. 3. An intense and beautiful purple-red color is produced in this way.

A very rich purple color — the purple of Cassius — may be produced by substituting a solution of gold chloride for the platinic chloride in the above formula.

## INDELIBLE RED INK.

The following simpler and less expensive method of obtaining an indelible red mark on linen has been proposed by Wegler: Dilute egg albumin with an equal weight of water, rapidly stir with a glass rod until it foams, and then filter through linen. Mix the filtrate with a sufficient quantity of finely levigated vermilion, until a rather thick liquid is obtained. Write with a quill, or gold pen, and then touch the reverse side of the fabric with a hot iron, coagulating the albumin.

It is claimed that marks so made are affected by neither soaps, acids nor alkalies.

This ink, or rather paint, is said to keep moderately well in securely-stoppered bottles, but we should not rely on it as a "stock" article.

## INDELIBLE RED MARKING INK.

The following formula yields a red marking ink which is practically indelible:

Vermillion ..... 1 part  
 Ferrous sulphate..... 1 part  
 Linseed oil, q.s.

Reduce the vermilion and copperas to a very fine powder, then add enough linseed oil to form a suitable paste. It may be used with a quill pen or stencil brush.

INDELIBLE INK.

Potassium ferrocyanide..... 3 parts  
 Strong ammonia water ..... 2 parts  
 Acetic acid..... 2 parts  
 Water ..... 240 parts

Dissolve and add :

Ammonia citrate of iron..... 160 parts  
 Ammonia water..... 40 parts  
 Aniline blue..... 8 parts  
 Gum ..... 70 parts  
 Pyrogallic acid..... 20 parts

RED INDELIBLE INK.

Eosine..... 30 grs.  
 Nitrate of silver ..... 120 grs.  
 Aqua ammonia, q. s.  
 Dextrin ..... 120 grs.  
 Distilled water ... 4 ozs.

Dissolve the nitrate of silver in part of the water, the eosine in the balance. Mix the solutions and add enough ammonia to make the solution clear. Then add the dextrin and dissolve.

INK ERASER.

Cream tartar and Citric acid, each four parts.  
 Dissolve in water.

INK ERASER.

Oxalic acid and Tartaric acid, each four parts.  
 Mix well. When to be used, dissolve a little in water. It is poisonous.

INK ERASER.

Cold aqueous or acetic acid solution of calcium hypochlorite, bleaching powder, eau de Javelle.

INK ERASER.

Immerse blotting paper or any similar material in a hot concentrated solution of citric acid, roll it into a pencil and coat the larger portion of it with paper or lacquer. Moisten the eraser with water, and rub over the ink to be removed. Drop upon the ink spot a drop of water containing chloride of lime. The ink immediately disappears.

INK ERASER.

Alum, Amber, Sulphur, Saltpetre, each one part.  
 Mix.  
 This forms an excellent mixture for the removal of ink spots and writing on paper.

TWO BOTTLES INK ERASER.

No. 1.

Chlorinated lime ..... 1 dr.  
 Rain water..... 4 ozs.

Let stand 24 hours and decant.

No. 2.

Acetic acid, U. S. P. .... 1 dr.  
 Water ..... 1 oz.

Mix. Wet the writing with No. 2 and apply No. 1 with a toothpick or brush. Burnish paper when dry.

## ERASER INK PENCIL.

Immerse in hot concentrated solution of citric acid, clean white blotting paper. Cut into strips and roll into pencil shapes. Cover with paper label or lacquer. To use them moisten with tongue or water and rub over ink to be removed, then drop a little water containing chloride of lime and the ink will disappear.

## PAPER FOR REMOVING INK BLOTS.

A new blotting paper, by means of which either fresh or dried ink blots may be completely removed after moistening with water, is prepared as follows: Porous white paper is immersed in a solution of one part oxalic acid in four parts alcohol until it is completely saturated. The separate sheets are then hung on lines to dry. The paper is, of course, applicable only to inks having iron for a basis, while anilin inks cannot be removed with it.

Ink stains produced by it on the hands, etc., may be easily removed by washing in alcohol strongly acidified with acetic acid.

## WHITE STAMPING INK FOR EMBROIDERY.

Zinc white . . . . . 2 drs.  
Mucilage . . . . . 1 dr.  
Water . . . . . 6 drs.

Triturate the zinc white with a small quantity of water till quite smooth, then add the mucilage and the remainder of the water.

For a stamping liquid the following has been recommended: Dissolve 1 dram each of rosin and copal in 4 fluidounces of benzine and with a little of this liquid triturate  $\frac{1}{2}$  dram of some white pigment, zinc oxide, white lead, barytes, bismuth, nitrate, etc.

## TO WRITE ON ABSORBENT PAPER.

Dissolve one dram of alum in three ounces of spring water, and sponge the paper with it; when dry it will bear writing upon without blotting. You may also write on absorbent paper with common ink if a little powdered gum arabic may be added to it, or by rubbing on the paper a little finely powdered cuttlefish and smoothing it with an ivory folder; or the white of a fresh egg may be applied with a flat camel hair pencil, producing a size which dries in a few minutes. The above is useful for making notes on the margin of foreign books, many of which are printed on very absorbent paper.

Is there any ink which is black at the time of writing, and which will gradually disappear? If so, how made, and how may it be made to appear again? A. Boil nut galls in a *qua vitæ*; put some Roman vitriol and sal ammoniac to it, and when cold dissolve a little gum arabic, and it will, when written with, vanish in twenty-four hours. We do not think that it can be made to reappear.

## RED WRITING ON BLUE PRINTS.

Use ordinary carmine ink mixed with a saturated solution of carbonate of soda.

## INDELIBLE INK FOR STAMPS.

Boiled linseed oil varnish . . . . . 18 parts  
Ivory black, finest . . . . . 6 parts  
Perchloride, protoxide or peroxide of iron 5 parts



Grind up together. This ink, which is that devised by Dr. Reissing, of Munich, Bavaria, for use in the canceling of revenue and other government stamps, is said to be totally indelible. When made with ferric chloride it cannot be used with metallic stamps on account of the destructive action of the chloride upon type metal. To avoid this, Reissig recommends the preparation a protochloride dissolving the ferric chloride in absolute alcohol, and adding sufficient pulverized iron, the resultant ferrous chloride being rapidly dried and added to the ink.

TO RESTORE OBLITERATED WRITING ON  
PARCHMENT DEEDS.

Dip the parchment into a vessel of fresh-drawn spring water, and let it remain about a minute, then take it out, and press it between two sheets of blotting-paper, to prevent its crumpling. When it is nearly dry, examine it, and if the writing is not restored, repeat the operation two or three times. If the fading is only the effect of time, you will, by this means, restore the writing to its first time state; but if the ink has been removed by any chemical process, of course it cannot be restored.

STAMPING INKS.  
(For Rubber Stamps, etc.)

The anilin colors make the best stamping inks for rubber stamps.

BLACK STAMPING INK.

Nigrosine ..... 1 oz.  
Water ..... 1 oz.  
Glycerin ..... ½ oz.

Rub the nigrosine to a very fine powder and add the water. Rub them smooth and add the glycerin.

BLACK RUBBER STAMP INK.

Nigrosine..... 2 parts  
Methyl violet..... 4 parts  
Water ..... 5 parts  
Wood vinegar..... 5 parts  
Alcohol..... 5 parts  
Glycerin ..... 35 parts

BLACK INK FOR RUBBER STAMPS.

The following makes a black stamp ink that will equal the best printing ink in depth of color and brilliancy:

Tannin black..... 100 parts  
Water ..... 100 parts  
Glycerin ..... 200 parts

Dissolve by the aid of the sand bath and constant agitation until complete solution is effected. A syrup like liquid is thus formed, which may be used without further addition, and which keeps indefinitely without alteration.

BLACK INK FOR RUBBER STAMPS.

Nigrosin ..... 1 dr.  
Methylated spirit..... 1 dr.  
Acetic acid..... 10 drops  
Water ..... 5 drs.  
Glycerin ..... 2 drs.

## BLACK INK FOR RUBBER STAMPS.

Nigrosin .....	1 oz.
Glycerin .....	2 drs.
Tannin.....	4 drs.
Silica solution (water glass) q.s.	
Water to.....	8 ozs.

The tannin and soluble glass prevent the ink running in the fiber.

## BLACK INK FOR RUBBER STAMPS.

Glycerine.....	5 parts
Water .....	1 part
Gelatine .....	1 part
Nigrosin.....	6 parts

For other colors use any of the anilines, carmine and Prussian blue.

## INK FOR RUBBER STAMPS.

Nigrosin.....	3 parts
Water .....	15 parts
Alcohol.....	15 parts
Glycerin .....	70 parts

Dissolve the nigrosin in the alcohol, add the glycerin previously mixed with the water, and rub well together.

Almost any anilin color may be substituted for nigrosin in the foregoing formula, and blue, green, red, purple and other inks obtained.

## RUBBER STAMP INK.

Methyl violet.....	10 parts
Nigrosin.....	20 parts
Glycerin .....	30 parts
Gum arabic.....	5 parts
Alcohol.....	60 parts

## BLACK RUBBER STAMP INK.

Black anilin (nigrosin) best quality ..	5 parts
Absolute alcohol .....	5 parts
Mucilage of acacia .....	5 parts
Distilled water .....	6 parts

Warm in a Florence flask until entirely dissolved. Let it stand 24 hours, and strain.

## RUBBER STAMP INK.

Methyl violet .....	3 parts
Bismark brown .....	4 parts
Bengal green.....	5 parts
Glycerin .....	10 parts
Alcohol.....	15 parts
Water .....	15 parts

## RUBBER STAMP INK.

## For Textile Fabrics.

Nigrosin.....	2 parts
Methyl violet .....	4 parts
Water .....	5 parts
Wood vinegar.....	5 parts
Alcohol.....	5 parts
Glycerin .....	35 parts

## BLACK INK FOR RUBBER STAMPS AND PENCILS.

Lampblack, finest .....	1 part
Prussian blue .....	2 parts
Gum arabic, powd.....	1 part
Glycerin, enough for a paste.	

**BLACK INK FOR RUBBER STAMPS AND PENCILS.**

Lampblack, finest ..... 10 parts  
 Gum arabic, powd. .... 4 parts  
 Glycerin ..... 4 parts  
 Water ..... 3 parts

Dissolve the gum arabic in the water, add the glycerin, then rub the lampblack with the mixture in a mortar.

Colored. Replace the lampblack in the above formula by the appropriate color; chrome-yellow for yellow; red lead or red ochre for red; green, ultramarine, or chrome-green for green; indigo or Prussian blue, or blue ultramarine for blue; umber for brown, etc.

**BLACK STAMPING INK.**

Drop black ..... 1 oz.  
 Water ..... 1 oz.  
 Glycerin ..... ½ oz.

**RUBBER STAMP INK.**

Anilin blue, water-soluble ..... 3 parts  
 Distilled water ..... 10 parts  
 Pyroligneous acid ..... 10 parts  
 Alcohol ..... 10 parts  
 Glycerin ..... 70 parts

Mix them intimately by trituration in a mortar. The blue should be well rubbed down with the water, and the glycerin gradually added. When solution is effected, the other ingredients are added.

Other colors are produced by substituting for the blue; methyl violet, fuchsin, methyl green, vesuvin (brown), or negrosin (blue black).

If a bright red ink is required, 3 parts of eosin BBN are used, but the pyroligneous acid must be omitted, as this would destroy the eosin.

**BLACK STAMPING INK.**

Prussian blue (in fine powder) ..... 1 oz.  
 Water ..... 1 oz.  
 Glycerin ..... ½ oz.

**BLUE STAMPING INK.**

Prussian blue ..... 1 oz.  
 Dextrin ..... 1 oz.

Rub to a perfectly smooth paste with a little water, and finally add sufficient water to bring it to the proper consistence.

**BLUE INK FOR RUBBER STAMPS.**

Prussian blue, 1 ounce, with water enough to make a perfectly smooth paste; then add 1 ounce of dextrine, incorporate it well, and finally add sufficient water to bring it to the proper consistence.

**DARK BLUE INK FOR RUBBER STAMP.**

Indigo, in fine powder ..... 10 parts  
 Gum arabic ..... 4 parts  
 Glycerin ..... 4 parts  
 Water ..... 3 parts

Dissolve the gum in the water, and mix the glycerin; then triturate with the indigo until a homogenous mass is obtained.

**BLUE INK FOR STAMPS AND PADS.**

Borax ..... 20 parts  
 Water ..... 300 parts

Dissolve with the aid of heat. In this solution at a boiling temperature dissolve :

Bleached shellac ..... 20 parts  
Gum arabic..... 20 parts  
Water ..... 50 parts

Dissolve with heat and mix in this solution ultramarine blue, best, 10 to 20 parts. Mix in the shellac solution and lastly add water to make 250 parts.

For black use lampblack.

#### INK FOR RUBBER STAMPS AND PENCILS.

Prussian blue ..... 6 parts  
Oxalic acid

Add a little water and make a smooth paste. Let it stand in a rather warm place over night, then rub it with more water, and with 1 part of gum arabic to a thin paste.

#### INK FOR RUBBER STAMPS.

Water blue, 1 B ..... 3 parts  
Dextrin..... 15 parts  
Distilled water..... 15 parts

Mix and dissolve in the water bath by the aid of heat. When dissolved, add 70 parts of refined glycerin.

For other colors use any of the aniline.

#### GENERAL FORMULA FOR RUBBER STAMP INKS.

Here is a general formula for any color stamping ink :

Acetic acid..... 1 oz.  
Water, distilled..... 5 ozs.  
Aniline..... 80 grs.  
Glycerine ..... ½ oz.  
Simple syrup..... ½ oz.

Mix and dissolve the first three ingredients, strain and add the last two ingredients.

#### GENERAL FORMULA FOR RUBBER STAMP INKS.

Aniline color..... 1½ oz.  
Water, boiling..... 6 ozs.  
Methylated spirit..... 6 ozs.  
Glycerin, to make..... 1 lb.

Mix in the order given. Half of the glycerin may be replaced by treacle. The spirit is necessary to insure rapid drying.

#### GENERAL FORMULA FOR RUBBER STAMP INKS.

Anilin color..... 16 parts  
Hot distilled water ..... 80 parts  
Glycerine ..... 8 parts  
Syrup ..... 3 parts

Dissolve the color in the water, add the syrup and then the glycerine.

#### INK FOR RUBBER STAMPS.

Dieterich gives the following formula in which any desired anilin color not chemically incompatible with the other ingredients may be used :

Distilled water..... 10 parts  
Pyroligneous acid ..... 10 parts  
Alcohol..... 10 parts  
Glycerin..... 70 parts.  
Anilin color sufficient, or..... 3 parts

Mix them intimately by trituration in a mortar. The anilin should be well rubbed down with the water, and the glycerin gradually added. When solution is ef-

fect the other ingredients are added. The following anilin colors may be used:

Methyl violet, fuchsin (red), methyl green, vesuvin (brown), or negrosin (blue black).

If a bright red ink is required, 3 parts of eosin BBN are used, but the pyroligneous acid must be omitted, as this would destroy the eosin.

RUBBER STAMP INK.

Aniline dye, black, scarlet or blue.... ½ oz.  
 Boiling distilled water..... 2½ ozs.  
 Glycerin ..... 3½ drs.  
 Treacle ..... 1¼ dr.

Dissolve the dye in the boiling water, then add the other ingredients, and when cold it is ready for use.

INK FOR STAMPING.

M. Haltzsch recommends the following as a good ink for hand stamping (rubber stamps, etc.): Sixteen parts of anilin in crystals, blue, red or violet, are dissolved in 80 parts of water, 7 parts of glycerine, and 3 parts of syrup of vinegar. It is passed through a fine gauze into a funnel placed in the neck of a bottle. After standing some time it is decanted.

OIL FREE INK FOR RUBBER STAMPS.

Make a mixture of 10 parts of distilled water, 10 parts of white vinegar, 10 parts alcohol, and 70 parts glycerine. For color use 8 parts of either anilin blue, methyl violet, or eosin, or 4 parts of nigrosin.

INK FOR RUBBER STAMP.

Aniline dye (any color)..... 1 dr.  
 Water ..... 5 drs.  
 Glycerine ..... 25 drops  
 Syrup ..... 10 drops

GLYCERINE STAMP-INK.

Aniline water-blue 1 B..... 3 drs.  
 Distilled water ..... 10 drs.  
 Acetic acid ..... 2 drs.  
 Alcohol ..... 1½ ozs.  
 Glycerine, enough to make..... 10 ozs.

Make a solution by rubbing in a mortar.

In the same way inks of the following colors may be prepared with the above compound menstruum, substituting, of course, the pigment named for the aniline water-blue in the formula given.

Blue: 1 B water-blue..... 3 drs.  
 Violet: Methyl-violet (3 B)..... 2 drs.  
 Red: Diamond fuchsin (I)..... 2 drs.  
 Green: Aniline green (D) ..... 4 drs.  
 Brown: Vesuvin (B)..... 5 drs.  
 Black: Deep black (E)..... 3 drs.

For bright red omit the acid from the solution, replacing it by water, and using 3 drams of eosin (BBN).

GLYCERINE INKS FOR STAMPS.

The water soluble anilins alone are used in these preparations. The vehicle is as follows:

Distilled water ..... 10 parts  
 Wood vinegar..... 10 parts  
 Alcohol..... 10 parts  
 Glycerin ..... 70 parts

To make any desired color of ink add the above aniline colors.

## INK FOR RUBBER STAMPS.

The following may be taken as a typical formula, in which any desired anilin color may be used :

Gelatin .....	5 parts
Anilin color .....	10 parts
Alcohol .....	5 parts
Glycerin .....	70 parts
Castile soap .....	5 parts
Salicylic acid .....	1 part

Dissolve the gelatin in the glycerin by the aid of a water bath, add the soap and the acid, and when thoroughly incorporated and nearly cold add the anilin color previously dissolved in the alcohol, and mix the whole.

## GREEN STAMPING INK.

Green aniline crystals .....	½ oz.
Water .....	½ oz.
Glycerin .....	1 oz.

## GREEN STAMPING INK.

Chrome green .....	1 oz.
Water .....	1 oz.
Glycerine .....	½ oz.

## PURPLE RUBBER STAMP INK.

Methyl violet .....	1 part
Water .....	7 parts
Glycerin .....	2 parts

## RED RUBBER STAMP INK.

Fuchsin .....	2 parts
Water, distilled .....	10 parts
Spirit .....	10 parts
Vinegar .....	70 parts
Glycerine .....	70 parts

## RED RUBBER STAMP INK.

Eosine .....	15 grs.
Glycerine .....	4 drs.
Water .....	4 drs.

## RED STAMPING INK.

Red aniline (Fuchsine) .....	1 oz.
Alcohol .....	1 oz.
Glycerin .....	1 oz.

Rub the aniline with the alcohol and add the glycerin.

## INK FOR RUBBER STAMPS (RED).

Diamond fuchsin I .....	2 drs.
Distilled water .....	10 drs.
Acetic acid .....	2 drs.
Rectified spirit .....	12 drs.
Glycerin to .....	10 ozs.

Rub together in a mortar till dissolved.

## INKS FOR RUBBER STAMPS.

Aniline red (fuchsin) .....	½ oz.
Dextrin .....	2½ ozs.
Water .....	2½ ozs.
Glycerin .....	14 fl. ozs.

Mix the dye and dextrin and dissolve in the water by the aid of heat and add the glycerin.

Various other anilin colors may be substituted for the red. The dextrin may be omitted and alcohol used to add in dissolving dyes not freely soluble in water.

INK FOR RUBBER STAMPS.

Aniline red (violet).....90 grs.  
 Boiling distilled water ..... 1 oz.  
 Glycerin .....30 grs.  
 Molasses.....15 grs.

RED INK FOR RUBBER STAMPS.

Carmin .....  $\frac{1}{4}$  oz.  
 Strong ammonia water.....2 ozs.  
 Glycerin .....1 dr.  
 Dextrine .....  $\frac{3}{4}$  oz.

RED STAMPING INK.

Carmine .....1 oz.  
 Aqua ammonia..... $1\frac{1}{2}$  oz.  
 Glycerin .....1 oz.

Rub the carmine to a fine powder and add the aqua ammonia, then the glycerin, and mix.

RED STAMPING INK.

Carmine .....  $\frac{1}{4}$  oz.  
 Strong ammonia water.....2 ozs.  
 Glycerine .....1 dr.  
 Dextrine .....  $\frac{3}{4}$  oz.

INK FOR RUBBER STAMPS AND PENCILS.

Carmine.

Carmine .....24 grs.  
 Aqua ammonia.....3 ozs.  
 Glycerin .....2 drs.  
 Gum arabic, powdered.....  $\frac{1}{2}$  oz.

Dissolve the carmine in the ammonia and glycerine and add the gum.

FOR RUBBER STAMPS.

Aniline (violet or crimson) .....1 part  
 Water .....4 parts  
 Methylic alcohol .....4 parts  
 Dissolve, then add:  
 Treacle.....1 part  
 Glycerin .....1 part

VIOLET INK FOR RUBBER STAMPS.

Aniline violet.....2 to 4 drs.  
 Alcohol .....15 ozs.  
 Glycerine .....15 ozs.

VIOLET STAMP INK.

Methyl violet 3B.....3 drs.  
 Distilled water .....10 drs.  
 Dilute acetic acid.....10 drs.  
 Rectified spirit .....  $1\frac{1}{2}$  oz.  
 Glycerin .....7 oz.

Triturate the violet in a mortar with the water, add the glycerin gradually then the acid and spirit.

VIOLET RUBBER STAMP INK.

Methyl violet.....  $1\frac{1}{2}$  drs.  
 Dextrin, yellow.....5 drs.  
 Water .....5 drs.  
 Glycerin .....28 drs.

Mix the dye and dextrin, dissolve by the aid of a water-bath in the water, add the glycerin, and replace the water lost by evaporation.

VIOLET AND BLUE RUBBER STAMP INK.

— Aniline violet or blue (2 RB to 3 B) ...1 oz.  
 Hot water.....7 ozs.

Allow to cool, and add :

Alcohol .....	1 oz.
Glycerin .....	2 ozs.
Ether .....	5 drops
Carbolic acid .....	1 drop

Other colors may be given the ink by using water soluble anilin colors of any desired shade.

#### INK FOR HAND STAMPS.

Dieterich in his "Pharmaceutische Manual" gives the following formulas for inks in which an insoluble coloring matter is suspended in an oily vehicle, and those made from oil-soluble anilins :

Inks in which the colors are suspended :

##### 1. Ultramarine Blue.

Ultramarine in impalpable powder .....	1 part
Olive oil .....	3 parts

##### 2. Dark Blue.

Ultramarine .....	1 part
Paris blue .....	2 parts
Olive oil .....	17 parts

##### 3. Green.

Verdigris, in fine powder .....	5 parts
Oleic acid .....	1 part
Olive oil .....	5 parts

Mix the verdigris and oleic acid, and let stand 15 to 20 minutes, then add oil.

##### 4. Red.

Vermillion .....	2 parts
Olive oil .....	3 parts

##### 5. Black.

Lamp black (gas black) .....	3 parts
Olive oil .....	17 parts

These inks should be labeled "shake before using."

#### Oil-Soluble Anilin Inks.

##### 6. Red.

Bordeaux red .....	15 parts
Anilin scarlet .....	15 parts
Crude oleic acid .....	50 parts
Castor oil .....	950 parts

##### 7. Blue.

Anilin blue .....	3 parts
Oleic acid .....	6 parts
Castor oil .....	94 parts

##### 8. Blue-Black.

Anilin black .....	5 parts
Oleic acid .....	6 parts
Castor oil .....	94 parts

##### 9. Green.

Anilin blue .....	25 parts
Anilin lemon yellow .....	15 parts
Oleic acid crude .....	50 parts
Castor oil .....	950 parts

##### 10. Violet.

Anilin violet .....	3 parts
Oleic acid .....	5 parts
Castor oil .....	95 parts

In preparing these inks rub the anilin (oil soluble) to perfect smoothness in oleic acid; then add the oil, little by little, with constant rubbing. After incorporation of the whole of the oil, heat the mixture, under constant stirring, to about 45° V. (167° F.)



INK FOR STAMP PADS.

As an excipient for inks for stamp-pads, either castor oil, alone, or, better, a mixture of castor oil and crude oleic acid, in various parts, answers admirably. The following will yield excellent results:

Black: Oil soluble nigrosin and crude oleic acid in equal parts. Add from 7 to 8 parts of castor oil.

Red: Oil soluble anilin red, 2 parts; crude oleic acid, 3 parts; castor oil, from 30 to 60 parts, according to the desired intensity of color.

There is a wide range of shades in both red and blue anilins — as, in fact, of other colors, as well, the selection of which is a matter of taste and experience. By using other oil soluble colors, other inks can easily be made.

INK FOR RUBBER STAMP PADS.

Inks suitable for typewriters serve equally well with slight modifications for stamping pads. Thus oil-soluble aniline colors, when dissolved in castor oil, answer for either purpose. A modification of a typewriter ink may be used, and is as follows:

- Castor oil.....4 parts.
- Creosote or carbolic acid .....1 part.
- Oil cassia .....1 part
- Oil soluble aniline color .....1 or 2 parts

As a rule, however, oily inks are unsuitable for rubber stamps, those prepared with glycerin being preferable.

INDELIBLE INK FOR RUBBER STAMPS.

Black.

- Boiled linseed oil varnish.....16 parts
  - Lampblack, finest .....6 parts
- Iron perchloride, diluted, 2 to 5 parts with  $\frac{1}{8}$  the quantity of boiled oil varnish. For color use 1 part gelatin glue, 2 parts anilin of desired color, 1 part absolute alcohol, 10 parts glycerin, 1 part Venetian soap,  $\frac{1}{2}$  part salicylic acid.

INDELIBLE INK FOR RUBBER STAMPS.

Good printing ink thinned with a little sweet oil or petroleum is said to work very well with rubber stamps. Some prefer lampblack rubbed into a fine paste of the proper thickness of glycerine.

INDELIBLE INK FOR RUBBER STAMPS.

- Venice turpentine..... $2\frac{1}{4}$  ozs.
- Soap, in thick paste..... $2\frac{1}{2}$  ozs.
- Olein .....1 oz.
- Carbon black ..... $1\frac{1}{4}$  oz.
- Paris blue..... $\frac{1}{4}$  oz.
- Oxalic acid..... $\frac{1}{8}$  oz.
- Water ..... $\frac{1}{4}$  oz.

Mix the Paris blue oxalic acid and water into a paste; mix the Venice turpentine and olein at a gentle heat, add the soap and carbon and allow to cool. Then add the blue paste, and mix and grind with a muller till perfectly smooth.

INDELIBLE INK FOR RUBBER STAMPS.

- Silver nitrate.....11 parts
- Sodium carbonate.....22 parts
- Gum arabic, powdered.....20 parts
- Venice turpentine .....10 parts

Glycerin .....85 parts  
 Ammonia water, stronger .....20 parts

Triturate the gum arabic, sodium carbonate and glycerine together. In a separate flask dissolve the silver nitrate in the ammonia water and mix the solution with the triturate. Put into the water-bath and heat to boiling, and while boiling add the turpentine little by little with constant stirring. When cool put into suitable vessels. After stamping with this ink expose the article to full sunlight or pass a hot smoothing iron over it.

#### INDELIBLE INK FOR RUBBER STAMPS.

Silver nitrate.....1 dram  
 Water .....2 drams  
 Water of ammonia (stronger) .....q. s.  
 Carmine .....q. s.  
 Glycerine .....2 drams

Dissolve the silver nitrate in the water and add water of ammonia until the precipitate first formed is just redissolved, then evaporate to four drams, add a drop of stronger water of ammonia and ammoniacal carmine and then the glycerine.

#### INDELIBLE STAMP INK.

The ink that is usually used for cancelling stamps is the ordinary aniline ink used on rubber stamps. A good ink can be made as follows:

Nigrosine.....3 drs.  
 Alcohol .....3 drs.  
 Glycerine .....2 ozs.

Dissolve the aniline in the alcohol and then add the glycerine and let stand for a while, then pour off the clear. This, when allowed to dry, is virtually indelible.

#### TO PRINT ON WOOD WITH RUBBER STAMP.

Use printer's ink, thinned down with turpentine.

#### RED INK FOR NUMBERING MACHINE.

Eosin BBN.....3 parts  
 Distilled water.....10 parts  
 Alcohol.....10 parts  
 Glycerin .....70 parts

For self-inking machines which are so arranged that the lower surface of the stamp is inked through a piece of cloth, the ink must be thinly fluid to permit it to penetrate the cloth with sufficient rapidity to allow of several impressions being taken in succession.

#### INK FOR TYPEWRITER RIBBONS.

"The requirements of typewriter ink are: When applied to the ribbon, it should dry sufficiently so as not to stain the paper which it touches, remain soft enough to print clearly wherever the ribbon is struck by the type, and contain enough coloring material to make the ribbon last a long time without re-inking. Two kinds of ribbon are supplied by the manufacturers: the "black record," the coloring matter of which consists of carbon and is permanent; and the "copying" which contains aniline colors, gives print which can be copied in an ordinary copying press, but is liable to fade in course of time.

Black Record Ink.—Take vaseline (petrolatum) of high boiling point, melt it on a water bath or slow fire, and incorporate by constant stirring as much lamp-

black (or powdered drop black) as it will take up without becoming granular. If the fat remains in excess, the print is liable to have a greasy outline; if the color is in excess, the print will not be clear. I am unable to give the proportions more definitely, as I have not made ink enough for manufacturing purposes, but no difficulty will be found in practice. Remove the mixture from the fire, and while it is cooling mix equal parts of petroleum benzine and rectified oil of turpentine, in which dissolve the fatty ink, introduced in small portions, by constant agitation. The volatile solvents should be in such quantity that the fluid ink is of the consistence of fresh oil paint. One secret of success lies in the proper application of the ink to the ribbon. Wind the ribbon on a piece of cardboard, spread on a table several layers of newspaper, then unwind the ribbon in such lengths as may be most convenient, and lay it flat on the paper. Apply the ink, after agitation, by means of a soft brush, and rub it well into the interstices of the ribbon with a stiff tooth-brush. Hardly any ink should remain visible on the surface.

For blue "record" ink, Prussian blue may be substituted for the lampblack."

**Ribbons Charged with Aniline Colors.**—Take about three ounces of water, dissolve in it about a quarter of an ounce of transparent glycerin soap in fine shavings, add one ounce of glycerin, heat the mixture to about 120° F., remove from the fire, add one-half oz. of the desired aniline color, with constant agitation. This ink can be painted on the ribbon with a soft brush and needs no tooth-brush to rub it in. Nor need the ribbon be taken from the machine in this instance, but the ink can be applied as the ribbon is wound from one spool to the other. If applied hot, it will dry quickly enough on the ribbon. All inks containing glycerin are more or less hygroscopic, and the ingredients may have to be varied somewhat in quantity, according to the season. For instance, in stove-heated rooms in winter, the air is generally so dry that less soap will be required, while in summer more soap may be needed to give the ink sufficient body.

For copying inks, aniline colors form the pigment; a mixture of about 3 parts of water, 1 part of glycerin,  $\frac{1}{4}$  part transparent soap and 6 parts of stronger alcohol are used to make up the body. The aniline is dissolved in the hot glycerin, the soap added to give the ink the body and counteract the hygroscopic tendency of the glycerin, and in the stronger alcohol the ink will readily dissolve, so that it can be applied in a finely divided state to the ribbon, where the evaporation of the alcohol will leave it in a thin film. After the ink is made and tried, if too soft, add a little more soap; if too hard, a little more glycerin; if too pale, a little more pigment. Users of the typewriter should so set a fresh ribbon as to start at the edge nearest the operator, allowing it to run back and forth with the same adjustment, until exhausted along that strip; then shift the ribbon forward with the width of one letter, running until exhausted, and so on. Finally, when the whole ribbon is exhausted, the color will have been

equally used up, and on re-inking, the work will appear even in color, while it will look patchy if some of the old ink has been left here and there, and fresh ink applied over it.

#### TYPEWRITER INK.

Take petrolatum of high boiling point, melt it on a water bath or slow fire, and incorporate by constant stirring as much lampblack or powdered dropblack as it will take up without becoming granular. If the fat remains in excess the print is liable to have a greasy outline; if the color is in excess the print will not be clear. Remove the mixture from the fire and while it is cooling mix equal parts of petroleum benzine and rectified oil of turpentine, in which dissolve the fatty ink, introduced in small portions by constant agitation. The volatile solvents should be in such quantity that the fluid ink is of the consistence of fresh oil paint. Apply the ink, after agitation, by means of a soft brush and rub it well into the interstices of the ribbon with a toothbrush. Hardly any ink should remain visible on the surface. For colored inks use Prussian blue, red lead, etc., and especially the aniline colors. For black, try the following:

Aniline black.....	½ oz.
Alcohol.....	15 fl. ozs.
Glycerin.....	15 fl. ozs.

Dissolve the aniline black in the alcohol and the glycerin. Ink as before.

#### TYPEWRITER COPYING INK.

Transparent soap.....	1 oz.
Glycerine.....	4 fl. ozs.
Water.....	12 fl. ozs.
Alcohol.....	23 fl. ozs.
Aniline dye.....	sufficient

Dissolve the soap in the water and glycerin, with the aid of heat; dissolve the aniline in the alcohol, and mix the two solutions. If the ink is too soft add more soap.

#### NON-DRYING TYPEWRITER INK.

A large proportion of typewriter inks are made with glycerin and water for a vehicle, and this is the cause of their drying in the ribbons after a length of time. In order to prevent this unpleasant result the vehicle must be of a fatty nature and the following is a formula of this type:

Coaltar dye (fat-soluble).....	2 ozs.
Carbolic acid.....	1 oz.
Oil cassia.....	1 oz.
Castor oil.....	2 ozs.

Warm together the first three ingredients, then incorporate the dye.

By using lampblack, mixing it with petrolatum and thinning with a mixture of equal parts of oil of turpentine and benzine, an indelible ink may be obtained.

#### TYPEWRITER INK.

Shuttleworth has made the observation that many of the salts of the aniline series are soluble in castor oil; methyl-violet is especially so, and advantage can be taken of this fact to prepare a typewriter ink of remarkable power, admitting of a large number of copies being taken from the same impression. The incor-

poration and solution of the aniline in the oil can be effected on the small scale by triturating the previously powdered pigment with the oil in a mortar, the operation being sometimes facilitated by the addition of a little alcohol. Various colored inks for stamping pads might be produced in the same way.

TYPEWRITERS INK.

Aniline, color  
 Water ..... 10 parts  
 Gum arabic ..... 10 parts  
 Glycerin ..... 10 parts

Dissolve the aniline in the water to such an extent that the required depth of color is obtained. In this dissolve the gum arabic by maceration and subsequent heating; finally add the glycerin.

TYPEWRITERS INK.

Aniline, color ..... 20 parts  
 Water, boiling ..... 80 parts  
 Glycerin ..... 10 parts  
 Syrup ..... 5 parts

Dissolve the aniline color in the water, then add the other ingredients. To this add 5 drops of bisulphide of carbon to each 100 grams of the preparation as a preservative agent.

TYPEWRITERS INK.

Anilin black ..... ½ oz.  
 Alcohol ..... 15 ozs.  
 Concentrated glycerin ..... 15 ozs.

Dissolve the anilin in the alcohol and add the glycerin.

Any anilin color desired may be used in the same way, but violet and black appear to be the most popular.

INK FOR TYPEWRITER AND HAND STAMP RIBBONS.

Castor oil ..... 2 parts  
 Creasote or carbolic acid ..... 1 part  
 Oil cinnamon ..... 1 part

Add to the above from 1 to 2 parts of any of the oil-soluble anilin colors. This ink answers equally well when used on pads or on ribbons. For India rubber stamps it should contain 4 (not 2) parts of castor oil.

TO RE-INK A TYPEWRITER RIBBON.

“Some time ago I tried the experiment of re-inking a ribbon, with such success that I never expect to buy one again. In two ounces or more of any ordinary writing fluid put a spoonful of thick gum arabic mucilage and a teaspoonful of brown sugar, warm the mixture, and immerse the ribbon long enough to become well saturated. When dry, spread the ribbon on a board and brush it well with glycerine. Should there be too much “color” in the ribbon, press it out, between papers, with a warm flatiron; or, if too dry, brush it again with glycerine. The secret of the ribbon giving out its color is in the glycerine, and if you have body enough in the color, there is no danger that it cannot be made to work well. Such a ribbon is not affected by the dryness or humidity of the atmosphere, and I esteem mine as much better than any obtained from the trade.

"It may be that I was fortunate in hitting upon just the right proportion of the different constituents, and possibly a second trial might not be so successful; but I think with a little care any one could do as well with the same or similar means. My object was to get body to the color, hence the mucilage and sugar. Then it was necessary that the ribbon should retain a certain degree of moisture, for the gum and sugar make it dry and harsh, so the glycerine coat was put on; but there was danger of smearing the paper with too much moisture, or a wrinkled surface, and the ironing obviated this."

TO MOISTEN AND REJUVENATE TYPE-  
WRITER RIBBONS.

Stretch them in a frame and apply several times to each side, with a brush, a solution of analine to match the color, to which a small proportion of glycerine has been added.

CHROMOGRAPH INKS.

These inks are to be used only with the chromograph or hectograph.

BLACK CHROMOGRAPH INK.

Nigrosine.....	1 oz.
Glycerin .....	1 oz.
Sugar.....	2 drs.
Water .....	6 ozs.

About 30 copies can be taken very well with this if carefully done.

BLUE CHROMOGRAPH INK.

Blue aniline.....	½ oz.
Alcohol.....	1 oz.
Glycerine .....	1 oz.
Sugar.....	2 drs.
Water .....	6 ozs.

For other colors use other aniline colors.

BLACK HECTOGRAPH INK.

Nigrosin.....	1 part
Water .....	14 parts
Glycerin .....	4 parts

BLACK HECTOGRAPH INK.

Anilin black, best .....	5 parts
Absolute alcohol .....	5 parts
Mucilage of gum arabic .....	5 parts
Distilled water .....	35 parts

Dissolve the anilin in the alcohol, add the other ingredients and warm together in a flask until solution is complete.

BLACK HECTOGRAPH INK.

Methyl violet .....	10 parts
Nigrosin.....	20 parts
Glycerin .....	30 parts
Gum arabic.....	5 parts
Alcohol .....	60 parts

BLUE HECTOGRAPH INK.

Resorcin blue M .....	10 parts
Dilute acetic acid .....	1 part
Water .....	85 parts
Glycerin .....	4 parts
Alcohol.....	10 parts

Dissolve by the aid of heat.

INDIGO-BLUE HECTOGRAPH INK.

- Brilliant green crystals ..... 3 parts
- Hoffman's violet, 4B..... 3 parts
- Glycerin ..... 1 part
- Water ..... 10 parts

Mix the two coloring matters in a mortar, and if in lumps reduce to a moderately fine powder. Transfer this to a tarred flask, add the glycerin and water, and heat the mixture on a water bath frequently agitating till the colors are dissolved. Then allow the flask to cool, replace it in the scale and restore the loss of water. Transfer the product to small vials.

Since a little of this ink lasts a long time it is best to keep it in small vials, otherwise the bulk would by gradual evaporation become too thick and the lost water could be replaced only by guess.

This is a superior ink for photographic purposes, yielding copies of a very fine brilliant indigo or "navy" blue.

HECTOGRAPH INK.

- Anilin blue..... 10 parts
- Picric acid..... 10 parts
- Alcohol (90 per cent.)..... 30 parts

GREEN HECTOGRAPH INK.

- Anilin blue, soluble in water, by weight 10 parts
- Picric acid..... 10 parts
- Alcohol (99 per cent.)..... 30 parts
- Glycerine ..... 10 parts
- Water ..... 30 parts

By decreasing or increasing the quantity of picric acid, various shades of yellow are obtained.

GREEN HECTOGRAPH INK.

- Anilin green, water soluble..... 15 parts
- Glycerin ..... 10 parts
- Water ..... 50 parts
- Alcohol ..... 10 parts

HECTOGRAPH BLUE INK.

- Anilin blue, soluble in water..... 10 parts
- Glycerin ..... 10 parts
- Water..... 50 to 100 parts

Heat in a suitable vessel with constant stirring. Solution takes place immediately and, according to the quantity of water used, an ink is obtained which permits the taking of a smaller or larger number of copies. On account of its fluidity, the finest pen-drawings may be executed with this ink, and copies of them taken by means of the hectograph.

HECTOGRAPH GREEN INK.

- Anilin green D..... 2 drs.
- Acetic acid..... 6 mins.
- Glycerin ..... 25 mins.
- Rectified spirit ..... 1 dr.
- Distilled water, enough to make.... 1½ oz.

To make mix the liquids, warm and dissolve the dye in the hot fluid.

HECTOGRAPH GREEN INK.

- Anilin green D ..... 100 grs.
- Acetic acid, glacial ..... 5 drops
- Glycerin ..... ½ dr.
- Alcohol ..... 1 dr.
- Distilled water ..... 7 drs.

Dissolve the dye in a mixture of the other ingredients by the aid of heat.

## HECTOGRAPH COPYING INK.

Purple anilin, 3B .....	1 oz.
Alcohol (188 per cent.) .....	1 oz.
Glycerin .....	1 oz.
Glucose .....	1 oz.
Water, hot .....	7 ozs.

Dissolve the anilin in the alcohol, add the glycerin, glucose and hot water.

## HECTOGRAPH PURPLE INK.

Methyl violet .....	1 part
Distilled water .....	7 parts
Glycerin .....	2 parts

Dissolve the methyl violet in the distilled water by the aid of a water bath, and add, when cool, the glycerin.

## HECTOGRAPH RED INK.

Eosin, ff 40 .....	180 grs.
Distilled water .....	6½ drs.
Glycerin .....	½ dr.

## HECTOGRAPH RED INK.

Rosanilin .....	100 grs.
Water .....	1 oz.
Alcohol .....	1 dr.

## HECTOGRAPH INK.

Rosanilin, acetate .....	2 parts
Alcohol .....	4 parts
Water .....	20 parts
Glycerin .....	1 part

## HECTOGRAPH VIOLET INK.

Methyl violet .....	10 parts
Dilute acetic acid .....	5 parts
Alcohol (90 per cent.) .....	10 parts
Water .....	10 parts
Glycerin .....	5 parts

## HECTOGRAPH VIOLET INK.

Violet anilin .....	40 grs.
Alcohol .....	2 drs.
Glycerin .....	1 dr.
Water .....	2 drs.

## HECTOGRAPH VIOLET INK.

Methyl violet, 3B .....	48 grs.
Alcohol .....	1 dr.
Distilled water .....	7½ drs.

## HECTOGRAPH INK.

Paris violet .....	1 part
Water .....	3 parts

## HECTOGRAPH INK.

Anilin red or violet .....	2 drs.
Alcohol .....	1 dr.
Acetic acid dilute .....	1 dr.
Water .....	7 drs.

Dissolve.

## RED HECTOGRAPH INK.

Rosanilin acetate .....	2 parts
Alcohol .....	1 part
Water .....	10 parts



RED HECTOGRAPH INK.

Bordeaux red ..... 3 parts  
 Alcohol..... 2 parts  
 Water ..... 20 parts  
 Glycerin ..... 1 part

HECTOGRAPH RED INK.

Rosanilin ..... 2 parts  
 Water ..... 10 parts  
 Alcohol..... 1 part

RED HECTOGRAPH INK.

Diamond fuchsine..... 10 parts  
 Alcohol..... 10 parts  
 Acetic acid ..... 2½ parts  
 Gum arabic..... 10 parts  
 Water ..... 70 parts

RED HECTOGRAPH INK.

Fuchsin..... 10 parts  
 Alcohol..... 10 parts  
 Glycerin ..... 10 parts  
 Water ..... 50 parts

VIOLET HECTOGRAPH INK.

Methyl-violet anilin..... 2 parts  
 Spirit..... 2 parts  
 Water ..... 6 parts

VIOLET HECTOGRAPH INK.

Methyl violet ..... 1 part  
 Water ..... 7 parts  
 Alcohol..... 1 part

HECTOGRAPH VIOLET INK.

Hoffmann's violet, BBB..... 120 grs.  
 Alcohol ..... 2or 3 ozs.  
 Glycerin ..... 4 drs.  
 Water..... 4 drs.

Dissolve the dye in the other ingredients and evaporate on a water bath to 1½ av. ounce.

VIOLET HECTOGRAPH INK.

Methyl violet ..... 15.0 gms.  
 Sulphuric acid, dilute..... 1.0 gms.  
 Water ..... 100.0 gms.

Dissolve the anilin in the water with heat, and add the acid.

VIOLET AND BLUE HECTOGRAPH INK.

Anilin violet or blue (2 RB to 3B)..... 1 oz.  
 Hot water ..... 7 fl. ozs.

Allow to cool, and add:

Alcohol ..... 1 fl. oz.  
 Glycerin..... 2 fl. dr.  
 Ether ..... 5 drops  
 Carbolic acid ..... 1 drop

Other colors may be given the ink by using water-soluble anilin colors of any desired shade.

AN IMPROVEMENT IN HECTOGRAPH MASS.

The hectograph mass as hitherto prepared and employed could not be used in thin layers, applied to paper, pasteboard, etc., and thus be made portable. By a recently patented process this difficulty is overcome. In this the mass is prepared in the usual manner, but is applied to paper, pasteboard, or cloth with either a brush, sponge, or mop, to any desired thick-

ness. The applied mass is then made homogenous, and of uniform thickness by drawing the material to which it is applied through a space between heated plates of metal, without allowing it to touch the plates on either side. The radiated heat softens and liquefies the hectograph material so that it readily becomes uniform and homogeneous.

## VIOLET HECTOGRAPH INK.

Methyl violet, 3B ..... 9 grs.  
Acetic acid..... 6 mins.  
Water ..... 2 ozs.

## VIOLET HECTOGRAPH INK.

Obtained by admixture of blue and red ink in suitable proportions or by the employment of anilin-violet.

## HECTOGRAPHIC PRINTS.

The distinctness and sharpness of hectographic prints may be very materially heightened by wetting the paper upon which the prints are to be made with alcohol and removing the excess of the alcohol by blotting paper.

## ABOUT USING THE HECTOGRAPH PAD.

The writing is allowed to dry without blotting. The pad having been moistened with clean water, the paper is placed on it, face inward, of course, and rubbed gently but firmly over every portion, care being taken to prevent it changing position. It is allowed to remain on the pad for from two to five minutes, and is then carefully removed. Copies are now taken by pressing dry paper on this surface and removing immediately. The operation should be carried out with as little interruption as possible.

After using the pad the ink should be removed from the surface immediately with a soft sponge and warm water, drying it well. It will then be ready for another operation. It may be used a great many times, if properly manipulated.

The writing to be copied by means of the hektograph is done on good paper with an anilin ink. The purple ink is most frequently used we think; it is said that more copies can be obtained from writing done with it than with other kinds:

## COPYING PAD, HECTOGRAPH.

Into a shallow pan with square bottom and of a convenient size is poured while still hot a mixture composed of:

Gelatin ..... 1 oz.  
Molasses..... 1 oz.  
Glycerin..... 9 ozs.

By weight melted together on a water bath. When cold and firm the surface is slightly moistened with a damp sponge and the original previously written with the ink is laid on this for a few minutes, being pressed smoothly, then carefully removed, starting with a corner. It is now ready for copying, and in the first copies taken the paper must be laid on gently to prevent blotting. When no more copies are to be taken, the ink can be removed with a sponge. Can be melted and worked over.

HECTOGRAPH.

Gelatin (gold label) ..... 4 ozs.  
 Water ..... 15 ozs.  
 Glycerin ..... 15 ozs.

HECTOGRAPH.

Glycerin ..... 5½ ozs.  
 Cox's gelatin..... 1 oz.  
 Sulphate barium..... 2 ozs.

Let the gelatin soak over night in enough water to dissolve. Then heat on a water bath, add the glycerin, and while hot the sulphate of barytes finely powdered and rubbed in a mortar with a part of the compound, and pour into a pan.

HECTOGRAPH.

Glue..... 100 parts  
 Glycerin ..... 500 parts  
 Baric sulphate, powdered..... 25 parts  
 Water ..... 375 parts

To remove the old copy from the pad, a little muriatic acid is added to the water, washing it gently with this liquid by means of a soft rag, afterward using blotting paper for removing superfluous moisture.

HECTOGRAPH.

Gelatin ..... 1 part  
 Glycerin ..... 4 parts  
 Water ..... 2 parts

Add the water to the gelatin and allow to soak until it is absorbed; then add the glycerin, and apply a gentle heat until a clear solution results. A few drops of creosote or carbolic acid may be added as a preservative.

HECTOGRAPH.

Glue ..... 3 oz.  
 Glycerin ..... 15 fl. ozs.  
 Kaolin (fine powder)..... 6 drs.  
 Water ..... 1¼ fl. ozs.

HECTOGRAPH.

Cooper's Gelatin ..... 1 oz.  
 Pure glycerin..... 6 to 7 fl. ozs.

Soak the gelatin in cold water over-night, or until entirely swelled. Pour off the excess of water, and add the swelled gelatin to the glycerin previously heated on a salt-water bath (made by dissolving 2 ounces of common salt in 1 pint of water.) Continue heating for an hour, carefully stirring the mixture occasionally, and avoiding, as much as possible, the formation of bubbles or froth. Finally add 20 drops of oil of cloves to prevent decomposition, and pour it into a suitable form wherein it is allowed to solidify.

To prepare the pad for use, it is necessary to pass a wet sponge lightly over the face of the gelatin, and allow it to nearly dry before taking the first copy. The same is done after taking the desired number of copies. Washing is not necessary, however, when the pad is left unused for 2 or 3 days.

HECTOGRAPH PADS.

Hectograph copying pads should be made somewhat softer for winter use than for summer, which can be done by adding a little proportion of glycerin.

Good glue ..... 4 av. ozs.  
 Glycerin ..... 16 av. ozs.  
 Water ..... 8 fl. ozs.

Break up the glue and soak in the water for a few hours, then heat by water bath until melted, and add the glycerin and heat together for some time to evaporate part of the water; then strain into a shallow square tin to make the desired shape, and skin with a card to free from bubbles. This is improved by adding one ounce carbonate barium to the liquid while warm. The writing to be copied is done with hectograph ink, and transferred to the pad. Sheets of paper are then put on and copies made.

## HECTOGRAPH PAD.

Glue ..... 100 parts  
 Glycerin ..... 500 parts  
 Finely powd. kaolin or barium sul. 25 parts  
 Water ..... 375 parts

Soak the glue in the water until it takes up as much moisture as it will absorb. Drain and press out all the surplus, and place the container with the glue in a water bath. Heat until solution takes place. Meantime mix the barium sulphate and the glycerin and add to the hot solution of glue. Maintain heat for a few hours, in order to drive off excess of water, and pour into a shallow tin or zinc tray.

## HECTOGRAPH PAD.

Digest 11 parts of gelatin, parchment glue, or similar good kinds of skin gelatine, for some hours with 24 parts of water. Then allow the whole to liquefy in an oven, and add, as soon as the gelatin has dissolved and the mixture is uniform, 65 parts of glycerin (90 per cent). After thorough mixing of the whole the liquid can be poured into the form. It is necessary, of course, to prevent the formation of air bubbles, and to allow the mass to set for 24 hours before it is used.

## HECTOGRAPH PAD.

Glue ..... 7 ozs  
 Glycerin ..... 30 ozs.  
 Carbolic acid .....  $\frac{1}{2}$  oz.  
 Sulphur ..... 1 dr.

The glue should be soaked in water several hours before it is melted with the glycerin.

Barium sulphate is used as an addition.

## THE PAPYROGRAPH.

Next to the chromograph the papyrograph supplies the simplest means of taking a multiplicity of copies, and in fact, but for being more trouble, is much better than the chromograph when any large number of copies is desired, as from 500 to 600 copies may be made.

The paper on which the writing is to be made, is to be first varnished on one side with ordinary copal varnish and allowed to dry. The writing is to be done with a solution of concentrated lye, about one part lye to four of water. It should be colored with a few drops of some kind of ink, so that the writing will show.

PADS FOR RUBBER STAMPS.

Boil 35 parts of Japanese (tien-tian) gelatin in 3,000 parts of water until completely dissolved. Strain, while boiling hot, through flannel, add 600 parts glycerin return to the fire, and evaporate to 1,000 parts. With this liquid as a basis, make the ink of the color desired, using 60 parts of methyl-violet (3B) for violet, 80 parts eosin (BBN) for red, 80 parts of phenol blue for blue, 50 parts anilin green for green, and 150 parts of nigrosin for black. With this ink saturate the cushion of the padbox, and cover with mull. If at any time the surface becomes too dry, moisten with water or glycerin.

INK FOR WRITING ON CELLULOID.

An ink which flows easily and makes a legible and permanent inscription on celluloid is prepared by dissolving any of the coal-tar colors in acetic anhydride.

INK FOR WRITING ON CELLULOID.

Ferric chloride..... 10 parts  
 Tannin ..... 15 parts  
 Acetone ..... 100 parts

Dissolve the iron chloride in a portion of the acetone and the tannin in the residue, and mix the solutions.

Any pen may be used with the liquid. The ink is difficult to remove.

INK FOR CELLULOID GOODS.

A patent ink for writing or stamping celluloid consists of anilin color dissolve in carbolic acid with ether or alcohol or both. Ink so produced will not rub off celluloid goods.

CARMINE DRAWING INK.

The ordinary solution of carmine in ammonia water, after a more or less short time in contact with steel becomes blackish red, but an ink may be made that will retain its brilliant carmine color to the last by the following process, given by Diengler: Triturate one gramme of pure carmine with fifteen grames of acetate of ammonia solution, with an equal quantity of distilled water in a porcelain mortar, and allow the whole to stand for some time. In this way, a portion of the alumina, which is combined with the carmine dye, is taken up by the acetic acid of the ammonia salt, and separates as a precipitate, while the pure pigment of the cochineal remains dissolved in the half-saturated ammonia. It is now filtered, and a few drops of pure white sugar syrup added to thicken it. A solution of gum arabic cannot be used to thicken it, since the ink still contains some acetic acid, which would coagulate the bassorine, one of the constituents of the gum.

WATERPROOF DRAWING-INKS.

The base of this class of inks is usually a solution of shellac in water, effected by means of borax, and colored to suit.

One of the best formulas to prepare a solution specially adaptable for the manufacture of these inks is:

Powd. Bleached Shellac ..... 4 parts  
 Borax ..... 1 part  
 Water ..... 24 parts

To this solution, the coloring principles, as India ink, lampblack, the different tints and shades of aniline colors, etc., are added after being dissolved in or triturated with a certain quantity of water; a trace of acetic acid, alcohol, spirit of camphor or a volatile oil is generally added by the manufacturers of these inks. Can add gum arabic.

## IMPROVED DRAWING INK.

The addition of carbolic acid to 80 parts of the fluid India ink, while it does not impair its fluidity, causes it to dry rapidly, even in heavy lines, so that they can be varnished over. The proper amount of carbolic acid to be used in any case may be ascertained by adding drop by drop, the ordinary apothecary's solution of it in alcohol, until varnishing does not affect the definition of a test line by causing it to run. The addition of too much carbolic acid is indicated by the transparency in the line and inability to draw fine lines, a condition easily remedied by the addition of more of the fluid ink.

## INK FOR WRITING ON GLASS OR PORCELAIN.

So-called diamond ink for writing on glass is a compound of fluoric acid and barium; the latter has no effect, it being simply a white powder to give body to the acid. The ink can be used with a rubber hand-stamp, and it should be allowed to remain fifteen minutes, when the barium will brush off, leaving the design on the glass.

## INK FOR LABELING PORCELAIN JARS.

Rosin..... 20 parts  
 Borax ..... 35 parts  
 Alcohol..... 150 parts  
 Water ..... 250 parts  
 Nigrosin, a sufficient quantity.

Dissolve the rosin in the alcohol and the anilin color in the solution. Dissolve the borax in the water and mix the solutions.

Any other anilin color may be used instead of nigrosin, if desired.

## MARKING INKS FOR GLASS AND METAL.

## Black.

Fluid Indian ink ..... 11 parts  
 Sodium silicate solution ..... 1 to 2 parts

## INK FOR LABELING BOTTLES.

Ink which adheres to glass and takes the place of the paper labels on bottles, etc., is prepared as follows, according to the Werkstatt (Sci. Am.): Take 20 grammes of brown shellac, which is dissolved in 150 cubic centimeters of lamp spirit; then prepare a solution of 35 grammes of borax in 250 cubic centimeters of distilled water and pour the first solution slowly into the second. Now a dyestuff has to be added to the product received; for this 1 gramme of methyl violet is well suited. The ink prepared in this manner is said to be indestructible.

## INK FOR GLASS BOTTLES.

Copal, powdered..... 60 grs.  
 Oil lavender..... 1 oz.  
 Lampblack..... 6 grs.  
 Indigo ..... 2 grs.

Dissolve the copal in the oil of lavender which should be warmed and mix in the other ingredients.

CORROSION RESISTING INK.

An ink that is not affected by acids or other corrosives may be made as described under:

- Copal resin, in powder . . . . . 25 grs.
- Oil of lavender . . . . . 3 drs.

Dissolve by the aid of a gentle heat, then mix with

- Lampblack, in fine powd. . . . . 2½ grs.
- Indigo . . . . . ½ gr.

The resultant ink may be thinned with lavender oil or turpentine, if necessary.

WHITE INK FOR GLASS BOTTLES.

A little experimenting is necessary to produce a satisfactory marking ink which will work well with a rubber stamp and at the same time possess all of the other qualifications required of it. It is quite probable that a stamping liquid or ink made with copal varnish in which some white pigment like zinc oxide, white lead, barytes, or bismuth subnitrate has been triturated will answer the purpose. It may be necessary to apply a thin coating of varnish to the ink after it has had time to dry.

FOR WRITING ON GLASS.

For marking prices, etc., on bottles, in fact for writing on glass in any shape, the pure alumina is recommended. The lines can be made as fine or as heavy as desired, and for this reason the aluminum pencil may serve for marking and graduating burettes, pipettes, etc. The nearer pure the metal is, the plainer and more serviceable the mark.

INK FOR GLASSWARE.

Sodium silicate is the basis of all these so-called inks. The following yields a good white ink:

- Sodium silicate . . . . . 3 parts
- Chinese white . . . . . 1 part

A mixture of nine parts barium sulphate with one part zinc oxide is preferable to the Chinese white.

Keep in stopped bottles; shake well before using. The writing is done with a steel pen.

WRITING ON GLASS.

The easiest way to write or paint on glass is to take a solution of fish-glue and distribute it with a soft brush over the surface of the glass. Of course the solution must be carefully filtered, and when it is applied to the glass pane the glass must be held over a stove or lamp in a slanting direction, to allow the surplus solution to flow off and to dry thoroughly without streaking. When the pane has been prepared in this way it is ready to write or paint upon. Even writing of microscopic minuteness can be applied to the prepared glass surface without the danger of the ink running. On this surface colors, India ink and any kind of pigment may be employed.

WRITING ON GLASS.

- Spermaceti . . . . . 4 parts
- Tallow . . . . . 3 parts
- Wax . . . . . 2 parts

Melt together. Add 6 parts of either red lead, white lead or Prussian blue. The mass is turned out in sticks. The marks can be easily rubbed out and save all labeling.

## INK FOR GLASS.

Shellac, bleached.....10 parts  
 Venice turpentine ..... 5 parts  
 Oil of turpentine ..... 5 parts  
 Lampblack ..... 5 parts

Dissolve the shellac and Venice turpentine in the oil of turpentine by means of a water-bath.

## INK FOR WRITING ON GLASS.

Two solutions are prepared, one a solution of 36 gm. of sodium fluoride and 7 gm. of potassium sulphate in 500 cc. of water, and the other a solution of 14 gm. of zinc chloride in 500 cc. of hydrochloric acid. When wanted, equal parts of the two are mixed and painted on glass by means of a camel's hair pencil.

## BLUE INK FOR USE ON GLASS.

Shellac, bleached .....10 parts  
 Venice turpentine ..... 5 parts  
 Spirit of turpentine.....15 parts  
 Indigo, in powder ..... 5 parts

Mix the shellac, turpentine and spirit of turpentine and place in a water-bath, under gentle heat, until solution takes place, and then stir in the indigo. May use lampblack in place of indigo.

## FOR WRITING ON GLASS.

Warm the glass to 50 or 60 degrees, C., until vapor is no longer deposited. Then bathe the surface with the following varnish, moving the plate as when applying collodion in photographic work. The varnish consists of 80 grammes of 95 per cent alcohol, 5 grammes of mastic in sheets, and 8 grammes of damar. The solution is made in a firmly-corked bottle on the water-bath, and then filtered. This varnish is very hard, brilliant, and transparent. Drawings in common or India ink can be made on this surface; after completion, a thin layer of gum is added.

This method can be used for marking bottles, designs for projecting on a screen, or for photographic purposes.

## INK FOR WRITING ON GLASS.

By rubbing up equal parts of lampblack and iron scale (hammer scale) with strong gum mucilage an ink is obtained which can be used for writing on glass.

## INK FOR WRITING ON GLASS.

Lacquer, brown .....300 grs.  
 Alcohol ..... 5 oz.

Dissolve, then mix, drop by drop, with a solution of borax, 2 ozs., in distilled water, 8 ozs. Color to suit with aniline dyes.

## INK FOR WRITING ON GLASS.

Probably as serviceable a substance as you can use is a thin dammar varnish made by dissolving dammar in benzol. The varnish is rendered less brittle by adding a few drops of solution of India rubber in benzol.

## INK FOR WRITING ON GLASS.

Brown shellac..... 3 drs.  
 Borax..... 4 drs.



Wood alcohol . . . . . 6 fl. ozs.

Water . . . . . 10 fl. ozs.

Dissolve the shellac in the alcohol and the borax in the water. Pour the shellac solution slowly into the borax solution with constant stirring. To this mixture add any desired coloring matter, e.g., fifteen grains of methyl violet, black or red.

INK FOR WRITING ON GLASS.

Resin . . . . . 20 parts

Alcohol . . . . . 150 parts

Borax . . . . . 35 parts

Methylene blue . . . . . 1 part

Water . . . . . 250 parts

Dissolve the resin and methylene blue in the alcohol and mix with the water in which the borax has previously been dissolved. For marking metallic surfaces.

INK FOR WRITING ON GLASS.

It is said that the following makes an ink that flows evenly on glass, does not spread and dries smoothly :

Bitumen . . . . . 2 parts

Lac copal . . . . . 1 part

Benzin . . . . . 10 parts

Lampblack, q.s.

Dissolve the bitumen and copal in the benzin and add lampblack sufficient to prevent running of the ink. Keep in a tightly stoppered flask. Shake thoroughly before using.

PENCILS TO WRITE ON GLASS, PORCELAIN, METAL, ETC.

The color is mixed with the body of wax and tallow warm, triturated, exposed to air for drying so that the mass can be pressed by means of a hydraulic press into round pencils in the same way as lead pencils are formed. The pencils are dried after pressing by exposing them to the air until they have the proper consistence, and are then glued into wood.

BLACK PENCIL FOR WRITING ON GLASS.

Lamp black . . . . . 1 part

Purified tallow . . . . . 1 part

White Wax . . . . . 4 parts

Black.

Purified tallow . . . . . 2 parts

White Wax . . . . . 3 parts

Lamp Black . . . . . 2 parts

Blue.

White Wax . . . . . 1 part

Purified Tallow . . . . . 2 parts

Prussian Blue . . . . . 3 parts

Dark Blue.

Prussian blue . . . . . 15 parts

Gum (acacia?) . . . . . 5 parts

Tallow . . . . . 10 parts

Pale Blue.

Prussian blue . . . . . 10 parts

Wax . . . . . 20 parts

Tallow . . . . . 10 parts

Red.

Cinnabar . . . . . 20 parts

Wax . . . . . 60 parts

Tallow . . . . . 20 parts

## White.

Purified Tallow.....1 part  
 White Wax.....2 parts  
 Bremser's White.....2 parts

## Yellow.

Chrome yellow.....10 parts  
 Wax.....20 parts  
 Tallow.....10 parts

## PENCIL FOR WRITING ON GLASS.

Yellow wax.....2 ozs.  
 Tallow.....3 ozs.  
 Spermaceti.....4 ozs.  
 Potassium carbonate.....1 oz.  
 Red lead.....6 ozs.

Melt the wax, tallow, and spermaceti and then stir in the powders; stir until nearly cold and then pour into glass tubes the thickness of a pencil. For black bone black.

## WRITING PENCILS FOR GLASS.

Stearin.....20 parts  
 Suet.....15 parts  
 Beeswax.....10 parts

Melt and add finely powdered

Red lead.....30 parts  
 Dry carbonate of potash.....5 parts

Let stand in a warm place, stirring occasionally, for one hour, and pour out in glass tubes.

## INK FOR WRITING ON GLAZED CARDBOARD.

Ferric chloride.....10 parts  
 Tannin.....15 parts  
 Acetone.....100 parts

Dissolve the ferric chloride in a portion of the acetone and the tannin in the residue, and mix the solutions.

## INK FOR WRITING ON GLAZED CARDBOARD

Shellac brown.....4 drs.  
 Alcohol.....4 ozs.  
 Borax.....7 drs.  
 Water distilled.....6 ozs.

Dissolve the shellac in the alcohol; Dissolve the borax in water. Pour the first solution slowly into the second and carefully mix them, after which add 12 grains of anilin dye of the desired color. Violet, blue, green, red, yellow, orange or black anilin dyes can be used.

Such inks may be used for writing on bottles, and the glass may be cleaned with water without the inscription being impaired.

## INKS FOR ENAMELED SURFACES.

English red, Prussian blue, ultramarine or other dry colors stirred into sodium silicate solution (water-glass) will make an ink that remains permanently on enameled surfaces. If a quicker dryer is wanted, dissolve 10 parts of bleached shellac and 5 parts of Venice turpentine in 15 parts of oil of turpentine, by the aid of heat over a water-bath. Stir in the dry colors and mix thoroughly. If not thin enough add a little more oil of turpentine.

MIMEOGRAPH INK.

For use with any kind of a stencil, ink must necessarily be thick — more like a paste than like writing fluid, and it would apparently be best to use for the coloring agent some substance not soluble in the liquid employed to carry it, as it would then have less tendency to “creep” under the edges of the stencil and so spoil the impression.

To grind a pigment fine enough for the purpose would be quite laborious if done by hand, but colors may be obtained in market ground in water, under the name of “distemper colors.” An addition of gum arabic or dextrin mucilage would be necessary to hold the pigment to the paper on drying, and a very small quantity of glycerin would prevent the mixture from drying too readily. Anilin colors ground with dextrin mucilage can also probably be made to answer.

The ink used for mimeograph copying process is of a pasty character, and almost any good stencil ink will answer the purpose. Try the following :

Shellac .....	2 ozs.
Borax .....	2 ozs.
Water .....	25 ozs.
Gum arabic .....	2 ozs.

Venetian red, lampblack, Prussian blue or any desired coloring substance, a sufficiency. Boil the shellac, borax and some water until they are dissolved; add the gum arabic and withdraw from the fire. When the solution has become cold, complete to twenty-five ounces with water and more of the coloring substance to bring the ink to a suitable consistency.

INK FOR SHOW CARDS.

The following recipe is said to give a remarkably good quality of ink for ticket-writing and the show cards that are used in store windows: Take four ounces white wax (clean), and one ounce and a half white soap. Melt, and when well amalgamated add of lampblack half an ounce. Mix well, heat strongly, and add of shellac one ounce. Again heat it, mix it well, cool, and bottle for use. You will find that with this ink lines may be drawn from the finest to the fullest without danger of its spreading.

COLORED INKS FOR SHOW CARDS.

The water-soluble anilin dyes afford a cheap and almost endless series of colored inks for show-card and sign writing. A little mucilage added to the aqueous solution is all that is necessary. Still handsomer, and not much, if any more costly are the wonderful metallic bronze powders now everywhere obtainable. As a medium for these, try the following :

Honey .....	15 parts
Alcohol .....	15 parts
Mucilage .....	120 parts
Water, sufficient to make .....	1000 parts
Bronze, powder, sufficient, or say..	100 parts

Rub the honey, spirit, mucilage and bronze together in a mortar, then add the water. Label: To be shaken before using

## SHOW CARD INK.

Asphaltum .....	2	ozs.
Venice turpentine .....	1	oz.
Lampblack .....	½	oz.
Spirit of turpentine.....	½	pt.

## SHOW CARD INK.

Asphaltum .....	8	ozs.
Venice turpentine.....	9	ozs.
Lampblack.....	2	ozs.
Spirit of turpentine.....	1	pt.

## SHOW CARD INK.

Shellac .....	} equal parts
Borax .....	
Gum arabic.....	
Pigment, q.s.	
Water, q.s.	

Boil the shellac and borax together with sufficient water to effect solution; then add the acacia and sufficient pigment to give the desired color. The thickness of the ink is regulated by the amount of water used.

## SHOW CARD INK.

Lampblack and turpentine will make a mark, and it sometimes stains the card where it should appear clean and white. Asphaltum varnish is the article for marking show cards. The letters may be first painted with India ink and the varnish put over them, but I use nothing but the varnish.

## GLOSSY MARKING INK.

A glossy marking ink for show cards generally consists of lampblack mixed thoroughly with sufficient turpentine to make it thin enough to flow from the brush. The addition of sugar, glycerine, or gum arabic will impart a gloss to the ink.

## ANILIN BLACK.

Water .....	5 ½	gals.
White starch .....	12 ½	lbs.
Dark British gum.....	4	lbs.
Aniline oil.....	8	lbs.

Hydrochloric acid, 8 lbs., (or, preferably a corresponding quantity of neutral anilin salt); boil and when quite cold add 4 ½ lbs., chlorate of soda, dissolve in a half gallon hot water, and just before the color is required for printing, 3 ozs. of vanadium solution which is made by dissolving 1 part by weight of vanadate of ammonia in 100 parts of water (about 1 ½ oz. per gallon of water.) This color requires two days' ageing, and is then run through a weak and warm solution of bichromate of potash.

## INK FOR WRITING ON PHOTOGRAPHS.

Potassium iodide.....	10	parts
Water .....	30	parts
Iodine .....	1	part
Gum arabic.....	1	part

Dissolve the iodide in the water and then add the iodine and dissolve. Finally dissolve the gum by agitation.

This liquid converts the silver salts into the iodide, and the writing thus appears nearly white on the dark ground.

MARKING INKS.

Marking inks are used, usually either for packages or boxes.\* For marking wooden boxes, Lamp Black rubbed to a thin paste with turpentine and a little Japan Dryer added, is usually employed.

MARKING INK.

Cochineal powdered.....2 ozs.  
 Cream tartar..... 2 ozs.  
 Mix, and add  
 Boiling water..... 8 ozs.  
 Allow the mixture to stand for a quarter of an hour, then neutralize by adding  
 Potassium carbonate..... 1 oz.  
 Again allow the mixture to stand for a short time, then add  
 Alum powdered..... 1 oz.  
 Gum arabic, powdered..... 1 oz.  
 Starch..... 2 ozs.

MARKING INK.

Manganese phosph..... 1 oz.  
 Hydrochloric acid..... 2 ozs.  
 Anthracine..... ½ oz.  
 Potass. chromat..... ¼ oz.  
 Gum arabic, a sufficiency.  
 Distilled water..... ¼ oz.  
 Dissolve the phosphate in the acid, add the anthracine to the potassium chromate and water, mix the solution, add a little gum and shake.

INK FOR MARKING BALES.

Potassium bichromate..... 3 ozs.  
 Extract of logwood..... 6 ozs.  
 Borax..... 6 ozs.  
 Shellac..... 1 ½ ozs.  
 Ammonia water..... 3 ozs.  
 Water, a sufficient quantity to make 2 gals.  
 Dissolve the potassium bichromate in 8 ounces of the water and add the solution to the logwood extract dissolved in 1 gallon of water; then dissolve the borax and shellac in the remainder of the water, by continued boiling. Mix all together while warm and add the ammonia and enough water to replace what may have been lost by evaporation.

WATERPROOF MARKING INK FOR BALES.

Shellac..... 2 ozs.  
 Borax..... 2 ozs.  
 Gum arabic..... 2 ozs.  
 Water..... 25 fl oz.  
 Pigment..... enough.  
 Boil the borax and shellac in the water until they are dissolved, add the gum arabic and allow to cool. Add water to complete 25 fluidounces and then stir in the pigment, using either venetian red, lampblack, ultramarine, or prussian blue. Black is improved by the addition of blue.

The foregoing preparation also makes a good *stencil ink*, if made thicker with pigment.

ANILIN MARKING-INK.

Nigrosin..... 30 grs.  
 Gum arabic..... 40 grs.

Rectified spirit..... 50 mms.  
 Hydrochloric acid..... 1 drm.  
 Hot water..... to 6<sup>o</sup>ozs.

The ingredients are dissolved separately in the water, and then the solutions are mixed, the mucilage being added last.

#### MARKING INK FOR SACKS.

Asphalt..... 1 oz.  
 Canada Balsam..... 1 oz.  
 Oil of Turpentine.. . . . . 4 oz.  
 Drop Black..... q. s.

Dissolve the two first-named ingredients in the Oil of Turpentine, and add enough Drop Black to make a cream.

#### MARKING INK FOR BALES.

Pure asphaltum..... 16 ozs.  
 Venice turpentine..... 18 ozs.  
 Lampblack..... 4 ozs.  
 Oil turpentine..... 2 qts.

Dissolve and mix thoroughly.

#### TAR MARKING INK.

Dilute 30 parts of coal tar with the same volume of benzin, and rub in thoroughly 3 parts of ivory black and 1 part of Prussian blue. The consistency may be varied by adding more or less benzin. This ink is intended to be used with a hand stamp.

#### MARKING INK FOR PARCELS.

If you dissolve asphaltum, grahamite, albertite, or any mineral of this character in naphtha or oil of turpentine to a thin fluid, you will obtain an ink to answer many purposes; to dry quickly, not to spread, and the markings to be nearly indestructible.

#### MARKING LIQUID FOR WOODEN BOXES.

Lamp-black rubbed up with spirit of turpentine in which a little rosin has been dissolved is an excellent marking fluid. A little Prussian blue deepens the color.

#### MARKING INK FOR WOODEN PACKAGES.

Dissolve asphalt in naphtha or oil of turpentine to a thin fluid. This dries quickly and the markings are nearly indestructible.

#### TICKETING INK FOR GROCERS' USE.

Dissolve one ounce of gum arabic in six ounces of water, and strain; this is the mucilage. For black, use drop black, powdered and ground with the mucilage to extreme fineness; for blue, ultramarine is used in the same manner; for green, emerald green; for white, flake white; for red, vermilion, lake, or carmine; for yellow, chrome yellow. When ground too thick they are thinned with a little water. Apply with a small brush. The cards may be sized with a thin glue and afterwards varnished, if it is desired to preserve them.

#### SHEEP MARKING INK.

Linseed oil..... 1 pint  
 Litharge..... 2 oz.  
 Lampblack..... 1 oz.

Boil together, and it is ready for use; and it will not crisp or injure the wool.

INK FOR BRANDING STOCK.

Shellac..... 2 qzs.  
 Borax..... 2 ozs.  
 Gum arabic..... 25 ozs.  
 Water..... 25 ozs.  
 Lampblack..... sufficient

Boil the borax and shellac in the water until dissolved. Remove the mixture from the fire and, when cool, add the gum arabic and sufficient water to make 25 ounces; then add enough lampblack to bring the whole to a proper consistence. For red ink use Venetian red instead of lampblack; for blue, use ultramarine.

DIAMOND INK.

The so-called "diamond inks" are liquids used for etching glass. The most common method consists in mixing ammonium fluoride with precipitated barium sulphate and decomposing with sulphuric acid. Here is a formula:

No. 1.

Ammonium fluorid..... 1 oz.  
 Barium sulphate..... 3 ozs.  
 Sulphuric acid, q. s.

Rub the two salts together, transfer to a platinum, lead or gutta percha vessel and add enough sulphuric acid to produce a cream-like paste. Apply with a quill or camel's hair pencil.

No. 2.

Ammonium fluoride..... 2 parts  
 Barium sulphate..... 2 parts  
 Hydrofluoric acid, fuming, sufficient

Mix the salts in a porcelain mortar, transfer to a platinum or lead vessel, and by means of a platinum wire, stir in enough of the acid to make a thin paste. Writing may be performed with a steel pen; allow the ink to remain on the glass for one-half, and then wash off with water. To make the etching more visible, rub in a little printer's ink.

FADING TRICK INK.

Hill suggests phenolphthalein as an agent for producing trick writing. Writing with a fairly strong solution of this chemical on white paper the lines on drying are barely visible, but on exposing to ammonia vapor they come out a beautiful pink. Breathing on the sheet now will cause the writing to disappear again almost instantly.

INK, INDELIBLE FOR PLATE USE.

Dissolve pure sulphate of iron, 1 lb., in acetic acid, 1¼ lb., and add precipitated carbonate of iron, (sesquioxide), 1 lb., and stir till they combine. This should be done in an iron kettle over a slow fire. Then put in printer's varnish, 3 lbs., and fine book ink, 2 lbs., and stir till well mixed; and to complete it add Olhiops-mineral (black sulphuret of mercury) finely pulverized and sifted, 1 lb., mixed in thoroughly.

This was obtained from an old stencil plate cutter, who had made and sold it many years. The sulphuret of mercury gives it its indelibility. Of course, to be kept corked.

## TO TRANSFER PRINTING INK TO GLASS.

First, coat the glass with dammar varnish or else with Canada balsam mixed with an equal volume of oil of turpentine, and let it dry until it is very sticky, which takes half a day or more. The printed paper to be transferred should be well soaked in soft water and carefully laid upon the prepared glass, after removing surplus water with blotting paper and pressed upon it, so that no air bubbles or drops of water are seen underneath. This should dry a whole day before it is touched; then with wetted fingers begin to rub off the paper at the back. If this be skillfully done almost the whole of the paper can be removed leaving simply the ink upon the varnish. When the paper has been removed, another coat of varnish will serve to make the whole more transparent.

## WHITE STAMPING INK.

Rosin ..... 2 drs.  
Benzine..... 4 ozs.  
Zinc white,  $\frac{1}{2}$  oz., or sufficient.

Dissolve the rosin in the benzine, triturate the zinc white in a portion of the liquid, to a smooth paste, and mix all together.

The proportions of the ingredients may be somewhat varied according to the views of the party using the mixture. The ink must, of course, be shaken often during using, to keep the pigment in suspension. Used in stamping embroidery patterns.

## MARKING INK FOR PACKAGES.

Take lampblack and mix thoroughly with sufficient turpentine to make it thin enough to flow from the brush. Powdered ultramarine, instead of lampblack, makes a fine blue marking mixture for the same purpose.

## MARKING INK FOR PACKAGES.

Bichromate potash.....  $\frac{1}{4}$  oz.  
Extract logwood..... 4 oz.  
Hot water..... 2 gall.

Shake well and let it stand for about two weeks, shaking occasionally.

## MARKING INK FOR PACKAGES.

Logwood chips..... 1 lb.  
Water..... 1 gall.  
Bichromate of Potash.....  $\frac{1}{8}$  oz.  
Gum arabic.....  $\frac{1}{2}$  lb.

Boil the logwood chips in the water ten minutes; then stir in the potash, and boil ten minutes longer; add, when cold the gum arabic previously dissolved, and stir well in. This ink is said to flow well from the pen, and will mark cotton bags with either the stencil plate or block.

## MARKING INK FOR PACKAGES AND BOXES.

Extract Logwood..... 1 lb.  
Bichromate of Potash.....  $1\frac{1}{4}$  ozs.  
Hydrochloric acid.....  $1\frac{1}{2}$  ozs.  
Dextrine..... 8 ozs.  
Water..... 1 gall.

Boil the extract with the water, add the Bichromate of Potash and the Acid, and lastly the Dextrin. Allow to stand and decant.



· MARKING INK FOR COTTON BALES, ETC.

Extract logwood.....	1 lb.
Copperas.....	10 ozs.
Bichromate of potash.....	1 ½ ozs.
Hydrochloric acid.....	2 ozs.
Brown Sugar.....	1 lb.
Water.....	1 gal.

Boil the extract with the water, add the Bichromate of Potash, then the Iron and Acid, and lastly the Sugar. After standing decant.

MARKING INK FOR COTTON BALES.

Extract logwood.....	6 lbs.
Copperas.....	2 lbs.
Bicromate potassium.....	½ lb.
Molasses.....	1 qt.

Boil until it becomes liquid, add a little water now and then as required.

MARKING INK.

(For boxes and parcels.)

Gum arabic.....	10 lbs.
Logwood liquor, sp. gr. 1.09.....	3 gals.
Fustic acid.....	1 lb.
Iron nitrate solution sp. gr. 1.37.....	20 fl ozs.
Potassium bichromate.....	2 ½ ozs.
Water, a sufficient quantity.	

Dissolve the gum arabic in 1 gallon of water, strain and add the logwood liquor, mix thoroughly and let it stand 24 hours. Then stir in rapidly the bichromate, dissolving in 3 quarts of boiling water. Then add the nitrate solution and fustic extract. If too thick for use add sufficient lukewarm water to reduce it to a proper consistency.

By following these directions it is said that a jet-black indelible ink is produced. It may be made blue-black by omitting the fustic extract.

When no appliance is at hand for determining the specific gravity of the logwood and iron liquors, a sufficiently near approximation of the strength and proportions required may be ascertained by a few colorimetric trials.

The logwood liquor may conveniently be made by dissolving the extract in water, and the strength can then be easily regulated.

This gives a preparation greatly superior to the old-fashioned paint of turpentine and lampblack.

RED MARKING INK.

On using a solution of chloride of gold, in place of one of nitrate of silver, red marks may be produced instead of black. The so-called "Italian marking ink" is prepared in the following manner: 1 part of chloride of gold, or better, chloride of gold and sodium, is dissolved in 10 parts of water, and when the solution is to be used, a small portion of it is mixed, just previously to being employed, with an equal quantity of mucilage. The fabric is to be previously mordanted with a solution of 1 part of stannous chloride and 10 parts of gum arabic in 100 parts of water, and then dried and ironed. After the ink has been applied, the fabric is exposed to a gentle heat, and after the writing has assumed a handsome red color, the place is repeatedly washed with water.

## STENCIL INKS.

Stencil inks are made by mixing a solution of gum arabic or dextrin with some opaque color, to a stiff paste, and putting in moulds to dry. They may be made by the following general formula.

## STENCIL INK.

Gum arabic..... 1 lb.  
Water ..... 5 pts.

Mix and dissolve. Then add the coloring matter, sufficient to make a very stiff mass, and mould in round shallow tins or other suitable vessels.

## RED.

Copal ..... 20  
Oil of turpentine..... 24  
Cinnabar ..... 2

This ink is prepared in precisely the same manner as the preceding, but the addition of oil of turpentine should not be carried too far, otherwise the cinnabar, which is specifically very heavy, might readily deposit.

## COLORED INK FOR WRITING ON METAL.

With the use of the above-described basis mass, ink of almost any color may be produced, Brunswick green being used for green, ultramarine for blue, chrome yellow for yellow and aniline violet for violet.

## DULL BLACK.

Cupric sulphate (blue vitriol)..... 10 parts  
Vinegar..... 2 parts  
Gum arabic..... 4 parts  
Lamp black..... 2 parts  
Water ..... 10 parts

With this ink beautiful dull black writing can be executed on bright iron, zinc and brass, but not on copper and tin. For the latter two serves the following mixture:

Cupric sulphate ..... 10 parts  
Hydrochloric acid..... 4 parts  
Gum arabic ..... 4 parts  
Sal ammoniac..... 8 parts  
Lamp black..... 2 parts  
Water ..... 10 parts

## INK FOR MARKING ON STEEL.

Verdigris (acetate copper)..... 1 part  
Sal ammoniac..... 1 part  
Soot..... ½ part  
Water ..... 10 parts

Stir well; write with a quill.

## INK FOR MARKING ON STEEL.

Copper sulphate ..... 1 gr.  
Water..... 20 grs.  
Hydrochloric acid..... 2 drops  
Gum arabic solution, enough to make  
the ink an adhesive.

To make the writing appear at once add a little pyrogallic acid. Write with a copper pen.

## INK FOR WRITING ON METAL SURFACES.

Dissolve 2 ounces shellac in 1 pint alcohol, filter through chalk, mix with finest lamp black; forms a jet black lustreless ink, insoluble in water.

INK FOR WRITING ON METAL SURFACES.

Nitric acid ..... ½ lb.  
 Muriatic acid.....1 oz.

Mix and shake well together, and then it is ready for use. Cover the place you wish to mark with melted beeswax; when cold, write your inscription plainly in the wax clear to the metal with a sharp instrument. Then apply the mixed acids with a feather, carefully filling each letter. Let the acids remain one to ten hours, according to the appearance desired; then wash and remove the wax.

STENCIL INK.

If you require only a small quantity of stencil ink for use on paper, we recommend you to procure ordinary water colors, as put up in cakes for artists, the "moist" variety being the easiest to work. The brush for stencil work should be of short and firm bristles; by dipping in water and rubbing on the cake of paint, the brush becomes charged with the pigment. Care must be taken, of course, to so regulate the amount of water to the amount of pigment taken up that, that the "ink" so formed shall be rather thick; if a thin paint is employed it is almost certain to run under the edges of the stencil and so give a blurred copy.

If a large quantity of the ink is required it will apparently be more economical to prepare it by rubbing any required pigment with a strong solution of dextrin. The work may be lessened by buying colors ground in water, known in commerce as "distemper colors." For black, lampblack may be used; for red, Venetian red, or chrome red; for blue, Prussian blue, or ultramarine.

The durability of a paper stencil may be much increased by coating it with a solution of shellac in alcohol.

STENCIL INK.

An ink suitable for "branding" heads of barrels, etc., may be made by the following recipe:

Shellac..... 2 ozs.  
 Borax..... 2 ozs.  
 Gum arabic ..... 2 ozs.  
 Water ..... 25 ozs.  
 Lampblack, q. s.

Boil the borax and shellac in the water until dissolved, add the gum, and when it has dissolved, cool, add enough water to bring the measure to 25 ounces. With this mix enough lampblack to give the ink the proper consistence for use with a stencil.

Colored stencil inks may be made by substituting for the lampblack in the foregoing formula. Venetian red, ultramarine blue, etc.

RED BRANDING INK.

Cinnabar ..... 7 parts  
 Carbonate magnesia..... 4 parts  
 Turpentine..... 1 part  
 Linseed oil ..... 6 parts  
 Rub down thoroughly until well mixed.

BLACK BRANDING INK.

Pine soot ..... 1 part  
 Prussian blue ..... 2 parts

Triturate together with a little glycerine: then add 3 parts of gum arabic and sufficient glycerine to form a suitable paste.

INK FOR MARKING ON METALS.

- (1) Nitric acid ..... 12½ parts  
 Copper..... 1¼ parts  
 Water..... 12½ parts

Clean the tin with dry whiting; write with a quill.

- (2) Copal ..... 10 parts  
 Oil turpentine ..... 12 parts  
 Lampblack..... 2 parts

Melt the copal in an iron ladle over a coal fire. When melted increase the heat until the copal begins to decompose, with the expulsion of thick heavy vapors. In case the mass should ignite, immediately extinguish the flame by placing upon the ladle a well-fitting lid kept on hand for that purpose. When the copal has been reduced to about four-fifths of its original bulk, take the ladle from the fire, and after allowing the mass to cool somewhat, add a small quantity of the oil of turpentine. In doing this great care is to be exercised, since, if the temperature of the mass is too high, the oil of turpentine will be ejected. Then add the remaining oil of turpentine, with constant stirring, and finally stir in the lampblack. If, after cooling, the mass should be too thickly fluid, add oil of turpentine until it has the proper consistency for writing. The finished ink, drying rapidly on exposure to the air, must be kept in well-closed vessels.

This ink can be used for writing on any kind of metal, the writing adhering especially well if the metallic surface is very bright and at the same time somewhat rough, which is effected by rubbing the place where the writing is to be executed with shave-grass. With the use of this basis-mass, ink of almost any color may be produced. Brunswick green being used for green, ultra-marine for blue, chrome-yellow for yellow and aniline violet for violet.

INDELIBLE MARKING INK FOR TIN.

Dissolve copper in concentrated nitric acid, taking care to leave a small quantity of the metal undissolved, and dilute the solution with equal parts of water. A quill pen will be best for writing with this ink, but, if not obtainable, any steel pen can be used. To avoid a too rapid corrosion of the steel pen it should be wiped before being laid aside. This ink will produce a jet black on tinned surface, lasting as long as the tinning. The surface to be written on should be first rubbed with some prepared chalk on a rag or chamois, and water must be poured over the surface immediately after writing. While water is poured on the writing, the surface must not be rubbed or touched. A piece of blotting-paper should be pressed to the surface to dry it. After being once perfectly dry, the black writing will be permanent. The finest as well as the heaviest lines can be shown by means of a pen or brush.

MARKING INK FOR TIN CANS, ETC.

- Blue vitriol..... 2 drs.  
 Muriatic acid..... a few drops

Water..... 4 ozs.  
Mucilage, sufficient.

The addition of a little pyrogallic acid renders the writing immediately visible, that is, while the pen is used.

INK FOR WRITING ON TIN.

Dissolve one part of sulphate of copper in 20 parts of distilled water; add a little mucilage and pyrogallic acid. Apply with a brush or a gilt pen.

INK FOR WINDOW SIGNS.

Bleached shellac ..... 10 parts  
Venice turpentine ..... 5 parts  
Oil turpentine..... 15 parts

Dissolve the shellac and Venice turpentine in the oil of turpentine by placing the bottle containing them in warm water. For blue ink — stir in 5 parts of finely pulverized indigo. For black — use a similar quantity of ivory black. For red — use Chinese vermilion.

INK FOR WRITING SIGNS.

Eosin B ..... 1 dr.  
Solution of perchloride of mercury.... ½ oz.  
Mucilage of acacia ..... 2 drs.  
Oil of lavender..... 1 drop  
Rectified spirit ..... 2 drs.  
Distilled water to ..... 4 ozs.

Dissolve the eosin in the solution of perchloride of mercury and 2 ounces of water, add the mucilage and mix, then add the oil of lavender dissolved in the rectified spirit and lastly, enough water to make 4 ounces.

SOLID MARKING INKS.

May be made by taking equal parts of gum arabic and some suitable coloring matter, and making them into a thick paste, putting in moulds or tins and allowing to dry hard. When used they are to be moistened with water and the brush rubbed over them as water-color paints. They are in fact water-color paints.

FOR BLACK.

Drop black .....  
Gum arabic, powdered..... equal parts

FOR BLUE.

Soluble Prussian blue.....  
Gum arabic, powdered..... equal parts

FOR GREEN.

Chrome green.....  
Gum arabic, powdered..... equal parts

FOR RED.

Scarlet lake.....  
Gum arabic, powdered..... equal parts

Other colors may be made ad libitum, in the same manner.

TAR MARKING INK.

Dilute 30 parts of coal tar with the same volume of benzine, and rub in thoroughly 3 parts of ivory black and 1 part of Prussian blue. The consistency may be varied by adding more or less benzine. This ink is intended to be used with a hand stamp.

PERPETUAL INK FOR TOMBSTONES, ETC.

Equal parts of Trinidad asphaltum and oil of turpentine. Use in a melted state to fill in the letters

and devices on tombstones, etc. Without actual violence it will last as long as the stone.

## INDELIBLE MARKING INK.

Asphalt in pieces ..... 2 ozs.  
Benzol ..... 8 ozs.  
dissolve, then add  
Coal tar ..... 8 ozs.

In using the ink employ an ordinary pen, and if it should be too thick, thin it with a little oil of turpentine. This ink does not spread and requires no heating. It never fades nor is it affected by anything under the sun.

WHITE MARKING FOR BLACK BOTTLES  
IN CELLARS.

Grind flake white or sulphate of barium with a little oil of turpentine, and any light-colored varnish to a proper consistency.

## RED MARKING INK.

Carmine is rubbed up with silicate of soda and sufficient of the silicate added to give the mixture a consistence to write well. It must be preserved in well-stoppered vials.

## COLORED STENCIL INK.

Shellac ..... 4 parts  
Borax ..... 1 part

Dissolve in a small quantity of boiling water and dilute with hot water to the consistency of a very thin syrup; to this add a sufficient quantity of logwood, or Brazil wood extract, or soluble coal tar reds, for red. For blue add to the lac solution soluble Prussian blue or blue carmine.

## STENCIL INK.

An excellent stencil ink for boxes and packing cases can be made by mixing lampblack, fine clay and gum arabic together. The lampblack gives the color, the clay furnishes a body, and the gum an adhesive. Water will answer as a solvent, but lampblack is so light that a few drops of vinegar or other acid will facilitate its admixture with the other ingredients. Any good adhesive substance, such as dextrine or gum tragacanth, may be found to answer as well as gum arabic to bind the mixture.

## INK FOR WRITING ON METAL SURFACES.

Chloride platinum .....  $\frac{1}{4}$  oz.  
Soft water ..... 1 pt.

To be kept in glass and used with a quill pen.

## INK FOR WRITING ON METAL SURFACES.

Verdigris .....  $\frac{1}{2}$  oz.  
Sal ammoniac .....  $\frac{1}{2}$  oz.  
Levigated lampblack .....  $\frac{1}{2}$  oz.  
Vinegar .....  $\frac{1}{4}$  pt.

Mix thoroughly.

## INK FOR MARKING ON STEEL.

Shellac ..... 2 ozs.  
Alcohol ..... 1 pt.

Dissolve and filter through chalk and mix with finest lampblack; forms a jet black lustreless ink.

INK FOR MARKING ON STEEL.

Copper sulphate, powdered..... 1 oz.  
 Sal ammoniac, powdered..... ½ oz.  
 Diluted acetic acid ..... 2 ozs.  
 Lampblack or vermilion..... q.s.

INDELIBLE INK FOR STAMP OR STENCIL.

Nigrosine ..... 1 oz.  
 Tannin ..... 2 drs.  
 Glycerine ..... 4 ozs.  
 Vanadate of ammonium..... 10 grs.

Other colors may be made from other anilines.

A very common way of marking tools is by using nitro-muriatic acid as an ink, first covering the surface to be marked with melted beeswax. When cold, the inscription is written through the wax to the metal with a sharp instrument, and the acid applied to the letters thus made, with a feather. After remaining from 1 to 10 hours according to the appearance desired, the acid is washed off and the wax removed.

INDELIBLE STAMPING AND STENCIL INK.

Asphaltum ..... 1 oz.  
 Oil turpentine ..... 4 ozs.  
 Black printer's ink..... 4 ozs.

Dissolve the asphaltum in the turpentine and mix it with the printer's ink. This should be thinned for stencil ink with an equal quantity of turpentine. Some formulas contain chloride of iron, half ounce.

INDELIBLE PASTE FOR STENCIL OR STAMP.

Nigrosine ..... 1 oz.  
 Nitrate of silver ..... 120 grs.  
 Dextrine ..... 3 ozs.  
 Aqua ammonia..... ¼ oz.  
 Water ..... q.s.

Dissolve the nitrate of silver in 2 ounces of distilled water, and add the aqua ammonia. Rub the nigrosine to a very fine powder with the dextrine in a mortar, and add the silver solution rubbing them together; then add water enough to make a thin paste.

BLUE STENCIL INK.

*The Basis.*

Shellac..... 2 ozs.  
 Borax..... 1½ oz.  
 Water ..... 10 ozs.

Boil together until 10 ounces of solution is obtained.

*The Coloring.*

Prussian blue..... 1 oz.  
 China clay ..... ½ oz.  
 Powdered acacia ..... ½ oz.

Mix thoroughly and gradually incorporate the shellac solution.

BLUE STENCIL INK.

Prussian blue..... 2 ozs.  
 Lampblack..... 1 oz.  
 Gum arabic ..... 3 ozs.  
 Glycerine ..... q.s.

Triturate together the dry powders and then make into a suitable paste with glycerine.

## BLUE STENCIL INK.

China clay .....	1 part
Prussian blue .....	2 parts
Boiled linseed oil.....	q.s.

Mix intimately the china clay with the Prussian blue and make a paste of suitable consistency.

## INK FOR WRITING ON STEEL.

Sulphate of copper, water and sulphuric acid. Dissolve sulphate of copper in water, so as to make a liquid like ink; add a little sulphuric acid, and use for writing a quill pen. With this ink copper letters may be formed on iron or steel.

For metal stamps oil colors are the best, and the following is a good formula:

Indigo .....	8 parts
Linseed oil varnish.....	25 parts
Olein .....	5 parts
Castor oil.....	20 parts
Linseed oil.....	50 parts

Rub the indigo up in the varnish and add the olein, castor oil and linseed oil in the order named.

Other colors may be used, as for red, cinnabar, 25 parts; green, verdigris, 25 parts; black, lampblack, 12 parts, and anilin blue (oil soluble), 3.5 parts; scarlet, anilin scarlet (oil soluble) B, 3 parts.

## MARKING INKS IN CAKES FOR BRUSH OR STENCIL.

These are made by rubbing some pigment with dextrine or gum arabic in solution and running the solution into boxes or moulds. They are the same as water-color paints and are to be used by wetting the surface with water and the brush rubbed over them. Make a thick mucilage of dextrine or gum arabic and stir in the pigment to a stiff paste. For black, use drop black or ivory black; for blue, soluble Prussian or ultramarine blue; for green, chrome green; for fine red; rose pink, scarlet lake or carmine; for cheap red, Venetian red, red lead, etc.

## INDELIBLE INK FOR ZINC LABELS.

A correspondent of the London Garden says: "Many years ago a friend gave me a simple receipt for ink for writing on zinc, which I have constantly used since. It is 12 to 16 grains bichloride of platinum dissolved in 1 ounce distilled water. If kept corked, a small bottle will last many years. The zinc labels must of course be cleaned before using. This is readily done by rubbing either with fine emery paper or with very dilute oil of vitriol. Then simply write the name and allow the ink to dry. I have used labels of this description for years, and have never lost a name since adopting them. They have been found equally suitable for the house or the open air."

## INK FOR WRITING UPON ZINC AND TIN.

Chlorate of potassium.....	60 parts
Sulphate of copper.....	120 parts
Aniline blue (water soluble).....	1 part
Acetic acid.....	100 parts
Pure water, q.s.....	1,800 parts



Dissolve the chlorate of potassium and sulphate of copper in 1,400 parts of water, and dissolve the aniline blue in 400 parts of water, and add to it the acetic acid. Then mix both solutions. Upon zinc this ink is applied directly by writing with a steel pen. If to be used on tin or tinned iron, first free it from grease by ether, then rub over with a solution of equal parts chloride zinc and hydrochloric acid. Of course, to write with this ink upon any surface the latter must be thoroughly clean.

LIQUID FOR WRITING ON ZINC.

Formerly platinum chloride was used for this purpose, but it is costly, and unless carefully used, easily spoils. In place of it, the Pharmaceutische Zeitung recommends 1 part each of potassium chlorate and copper nitrate, dissolved in 18 parts of warm water; with the addition of sufficient gum arabic to make the liquid flow easily from a pen. The plate to be written on must be thoroughly clean. The writing should be allowed to remain for a few moments, in order to "take hold" well on the surface, after which the plate should be rubbed over with a woollen rag on which has been smeared a bit, the size of a pea, of the following preparation: Yellow soap, 1 part; Japan wax, 3 parts; distilled water, 21 parts. Boil together for an hour and a half or two hours, or until the wax has been dissolved in the soap and water.

TO WRITE ON ZINC.

Immerse the zinc for a moment in dilute sulphuric acid, rinse and wipe dry. Then, with ordinary steel pen, use solution of chloride of antimony as a writing fluid.

INK FOR ZINC LABELS.

A correspondent recommends the following as an ink for zinc only, that will endure for years, cuts slightly into the metal, has a black color, and is as legible after a dozen years as when newly written: "Take one part verdigris, one part sal ammoniac, half part lamp-black, and ten parts of water; mix well, and keep in a bottle with a glass stopper: shake the ink before using it. It will keep any length of time. Write it on the label with a steel pen not too fine-pointed. It dries in the course of a minute or two."

INK TO PRINT UPON BRASS OR ZINC.

This ink is said to resist muriatic and nitric acid.

Soft water . . . . . 1 pint  
 Chloride potash . . . . .  $\frac{1}{4}$  oz.  
 Keep in glass and use with a quill pen.

HORTICULTURAL INK.

Giving indelible writing on zinc or brass labels when used with a quill pen, consists of bichloride of platinum dissolved in distilled water.

HORTICULTURAL INK.

The following preparation is used as an ink on zinc labels for plants:

Potassium chlorate . . . . . 1 dr.  
 Copper sulphate . . . . . 2 drs.  
 Aniline blue . . . . . 5 grs.

Acetic acid.....2 drs.  
Water .....4 ozs.

Dissolve the chlorate and sulphate in 3 ounces of the water and the aniline blue in the remainder with the acetic acid. Then mix the solutions.

#### INDELIBLE INK FOR ZINC LABELS.

First let the label oxidize a little by dipping it in water for a day or two before using, and then write with a common lead pencil.

#### SHOEMAKERS' BURNISHING INKS.

Most of these inks contain copperas dissolved in 10 to 12 parts of water. The tannin in leather strikes a blue-black color with this solution, and exposure changes the color to deep black. Mixtures of oil and lampblack are said to be used by some.

#### BURNISHING INK.

Boil 4 ounces shellac and 1 ounce of borax with sufficient water to the consistence of a syrup, and add a few drops of strong ammonia water. A small amount of soap is sometimes also added. Add a sufficient quantity to the ink to obtain the desired result. Instead of the above, soap is often used alone, or with a trace of glycerine, ammonia or gum arabic.

#### SHOEMAKERS' INK.

Dissolve an equal quantity each of copperas and gum arabic in a small quantity of hot water and add a very little extract of logwood to the solution. If the ink gums, dilute it a little with hot water.

#### BELJO'S FINISHER'S INK.

Extract of logwood.....2 ozs.  
Sulphate of iron.....2 ozs.  
Water.....7 pts.

Boil thoroughly and then add:

Bichromate of potash..... ½ oz.  
Gum arabic.....1 oz.

Dissolve in hot water 1 pint. Boil well and strain: apply with a brush or rag to the sole. When quite dry polish with bees-wax.

#### SHOEMAKERS' INK.

Alcohol.....1 pt.  
Tincture of iron.....3 fl. ozs.  
Extract logwood.....1 oz.  
Powdered galls..... ½ oz.  
Olive oil..... ½ oz.

#### SHOEMAKERS' BURNISHING INK.

Extract logwood .....2 ozs.  
Tinct. of iron.....2 fl. ozs.  
Sweet oil ... .....2 fl. drs.  
Diluted alcohol.....O, i.

#### SHOEMAKERS' INK.

Extract logwood.....4 ozs.  
Bichromate of potash.....  
Ferrocyanide of potash .....aa 12 grs.  
Rain water ..... Cong i.

#### SHOEMAKERS' BURNISHING INK.

One of the best blacks for coloring edges can be made from iron filings and pure cider vinegar. Put the iron filings, shavings, or scraps in an iron kettle,

cover them with good cider vinegar and allow the mixture to stand two months, stirring frequently; then strain off the liquor and store in small bottles. It will produce a true black, that will not turn blue after exposure, like vitrol black.

SHOEMAKERS' INK.

Iron sulphate..... 4 ozs.

Powdered galls..... 4 ozs.

Boil together with a pint of water, strain, and make up to 15 ounces, and add 2 ounces of mucilage of acacia.

SHOEMAKERS' INK.

Extract logwood (solid French)..... 7 lbs.

Bichromate potash..... 7 ozs.

Iron liquor ..... 5 gals.

Water..... 7½ gals.

Dissolve extract of logwood in hot water, add iron liquor, then lastly add bichromate of potash and stir well in a wooden bowl, rummage well when draining or bottling.

SHOEMAKER'S INK.

Nigrosin ..... 1 oz.

Gall ink (without gum)..... 2 pts.

Dissolve by vigorous shaking, and add to it the following:—

Ground shellac ..... 2 ozs.

Borax, powdered..... 1 oz.

Water ..... 12 ozs.

Dissolve and strain.

SHOEMAKERS' INK.

Crushed galls ..... 1 lb.

Extract of logwood ..... 4 ozs.

Water..... ½ gal.

Boil together for half an hour, strain, and wash the strainer with water to ½ gal. Again boil for ten minutes with 3 pints of water, to which ½ lb. of copperas and ½ lb. of gum arabic are added, and strain into the other decoction. Separately mix together.

Fine lampblack..... 6 ozs.

Salicylic acid..... 3 drs.

Methylated spirit..... 8 ozs.

To this add some of the ink to form a smooth cream, and mix with the bulk.

POWDER FOR MAKING SHOEMAKERS' INK.

Powder galls ..... 2 ozs.

Copperas ..... 1 oz.

Sulphate of copper..... ½ dr.

Powdered gum..... 1 dr.

Pour a quart of boiling water upon the powder and let it stand for a week.

BLACK LEATHER INK.

(A) Nut galls ..... 10 parts

Gum arabic..... 1 part

Water ..... 100 parts

(B) Ferrous sulphate ..... 1 part

Gum arabic..... 2 parts

Indigo carmine ..... ½ part

Water ..... 10 parts

Apply solution A to the portion of the leather to be written on, and when dry write with solution B. The

writing produced in this manner has a beautiful black color and penetrates deeply into the leather, especially if the lower side of it has been thoroughly moistened.

## PENCILS FOR LEATHER.

Lampblack .....	3 parts
Tallow .....	2 parts
Beeswax .....	4 parts
Hard soap, in shavings .....	6 parts

## PENCILS FOR LEATHER.

Lampblack .....	2 parts
Spermaceti .....	2 parts
Hard soap, in shavings .....	2 parts
Beeswax .....	8 parts

Melt the fats, then gradually introduce the soap, and lastly the pigment.

## PRINTING INK.

In Germany, an ink prepared as follows has been used, and is said to yield a very clear and fine impression when properly prepared: Venice turpentine,  $2\frac{1}{4}$  ozs.; soap in thick paste,  $2\frac{1}{2}$  ozs.; oleine, rectified, 1 oz.; carbon black,  $1\frac{1}{4}$  oz.; Paris blue,  $\frac{1}{4}$  oz.; oxalic acid,  $\frac{1}{8}$  oz.; water,  $\frac{1}{4}$  oz. The three last ingredients are mixed into a paste. The turpentine and olein are mixed at a gentle heat, the soap and carbon then introduced, and, after cooling, the blue paste is added, the whole being ground beneath a muller till very fine and smooth.

## INK FOR AMATEUR PRINTERS.

Balsam of copaiba .....	9 ozs.
'Very dry,' yellow soap .....	3 ozs.
Pure sperm oil .....	1 oz.

Shave the soap, and boil it together with the other substances until the soap is dissolved. Then add the color desired in sufficient quantity. The more color the more body. Painters' dry colors make the best colors, and must be well pulverized before they are added. Anilin colors must be treated with alcohol first.

If a quick drying ink is wanted, add to the base half an ounce of Burgundy pitch, and if a varnished ink, one ounce of pure Venice turpentine. To thin the ink, use sperm oil; but it must be well incorporated with the ink by the roller before the roller touches the type, otherwise the oil will take off the impression.

## PRINTING INKS.

Bone black is unsuitable alone, but is sometimes used in admixture with lampblack. Prussian blue used in small proportion deepens the tone and indigo is used for the same purpose.

These or other pigments when colored inks are required are mixed with a resinous vehicle the result being a variety of paint. This vehicle is usually a combination of linseed oil, resin and soap. The first two form the adhesive material, while the last is said to cause the ink to adhere uniformly to the face of the type; to coat it completely with the smallest quantity; to leave the face of the type readily and easily attach itself to the paper; to wash readily from the type; and to prevent (in a measure) the formation of a "skin" on the ink. An excess of soap tends to give a bad "dis-

tribution" and consequently uneven impression, and hinders drying so that the ink "sets off" when the printed sheets are pressed.

To produce a printing ink of good quality the following process has been given.

Put 6 quarts of raw linseed oil into an iron pot of 4 or 5 gallons capacity and heat until the escaping vapor will burn. Remove the heat and allow the vapor to burn until a drop of the oil when cooled can be drawn out into strings half an inch long. Then extinguish the flame by placing the cover on the pot and stir until frothing has ceased. Then gradually add 6 pounds of resin, and when that has dissolved  $1\frac{3}{4}$  pounds of dry brown or turpentine soap, in fine shavings, stirring well after each addition. Lastly, replace on the fire and bring to a boil. This constitutes the "varnish" to which any desired color may be imparted by grinding into it by means of a paint mill or a slab and muller any suitable pigment.

For black the following addition to the quantity of varnish above prepared is recommended:

Prussian blue.....	5	ozs.
Mineral lamp black.....	4	lbs.
Ordinary lampblack.....	$3\frac{1}{2}$	lbs.

When a colored ink is to be made, a suitable pigment is substituted for the lampblack and blue in the foregoing formula, and white soap for the dark-colored article.

Copaiba and Venice turpentine are, sometimes used in the making of varnish for the finer kinds of ink.

There is no essential difference between inks used for printing from type or from drawings on stone; the term lithographic ink is applied to compounds by which the drawings are made. A typical formula is: Tallow, wax, soap, shellac, equal parts. Paris black, enough to color.

Melt the tallow and wax together in a suitable pan and add the soap in small pieces, waiting for each to melt before adding more. Continue the heat, ignite the fumes and allow to burn until the mixture is reduced to about two-thirds its original bulk. Then extinguish the flame, add the shellac and finally the black, which must be very finely ground in a little turpentine. The mass is then cast into sticks of convenient size.

#### BLACK PRINTING INK.

An extemporaneous superfine black ink may be made by the following formula:

Balsam of copaiba (pure).....	9	ozs.
Lampblack.....	3	ozs.
Indigo and Prussian blue, each.....	$\frac{1}{2}$	oz.
Indian red.....	$\frac{3}{4}$	oz.
Yellow soap (dry).....	3	ozs.

Grind the mixture to an impalpable smoothness by means of a stone and muller. Canada balsam may be substituted for balsam of copaiba where the smell of the latter is objectionable, but the ink then dries very quickly.

This is said to be an excellent ink for giving good effect to highly finished wood engravings.

Colored printing inks are made in a similar way from the following pigments: Carmine, lakes, vermilion,

chrome yellow, red lead, orange red, Indian red, Venetian red, for red; orange chrome, chrome yellow, burnt terra di senna, gall-stone, Roman ochre, yellow ochre, for orange and yellow; verdigris, Scheele's green, Schweinfurt green, blues and yellows mixed, for greens; indigo, Prussian blue, Antwerp blue, cobalt blue, charcoal blue, for blue; luster, bronze powders, etc., for metallic colors; and umbria, sepia, etc., for brown.

It is necessary to prepare two kinds of varnish, varying in consistence, from more or less boiling, to be occasionally mixed together as circumstances may require; that which answers well in hot weather being too thick in cold, and vice versa. Large characters also require a thinner ink than small ones. Old linseed oil is preferable to new. Yellow resin soap is preferred for black and dark colored inks, and white curd soap for light ones.

A good varnish may be drawn into threads like glue, and is very thick and tenacious. The oil loses from 10 to 14 per cent by the boiling.

#### PRINTER'S RED INK.

Linseed oil .....	8 pts.
Resin .....	4 lbs.
Dry brown soap .....	2 lbs.
Vermilion or chrome red .....	q.s.

Boil oil till smoke arises; then apply a lighted paper fastened on the end of a stick, remove the pot from the fire, and allow the oil to burn until it can be drawn into strings about half an inch long; now add the resin and the soap, the latter cautiously, as it causes a violent ebullition. Then grind the mixture with the pigment, either on a stone with a muller, or in a suitable paint mill.

#### PRINTING INK.

A printing ink is prepared by first dissolving iron in sulphuric, hydrochloric, or acetic acid. Half the solution is oxidized by means of nitric acid, after which the two halves are mixed, and precipitation is produced by ammonia. The precipitate is filtered, washed and mixed with equal parts of tannic and gallic acid, which produces a black bordering on blue. The black is washed and dried, then mixed with linseed oil; and the ink obtained is suitable for either letter-press printing or lithography.

#### INDELIBLE PRINTING INK.

For the production of printing ink fast to washing, take 5 parts of acetic acid and dissolve therein 1 part of lunar caustic. Stand away this solution for one day, and add 20 parts of copal varnish to which a little lampblack is added. Since the brown shade of the lunar caustic coloring predominates after repeated washings, especially if the wash is exposed to the sun, it is advisable to give the print a greenish appearance by moistening it lightly with a few drops of water, in which a little potassium iodide has been dissolved. This ink should be used as fresh as possible, and the lunar caustic dissolved in acetic acid, and the copal varnish solution should, therefore, each be kept in a closed flask from which the quantity necessary for the print is taken each time in the said proportion.

A GOOD CHEAP PRINTER'S INK.

Paraffin .....	25	lbs.
Colophony gum.....	45	lbs.
Fine lampblack .....	15	lbs.
Yellow soap .....	½	lb.

Dissolve colophony and soap over fire, then remove it and add paraffin and lampblack and grind through color mill while warm.

BLACK PRINTING INK.

Balsam copaiba .....	9	ozs.
Lampblack .....	3	ozs.
Indigo or Prussian blue.....	1¼	oz.
Indian red.....	¾	oz.
Turpentine soap, dry.....	3	ozs.

Ground between a muller and stone to impalpable fineness. This is said to be an excellent ink for giving good effect to highly finished wood engravings.

PRINTING INK.

Venice turpentine.....	2¼	ozs.
Soap in thick paste .....	2½	ozs.
Olein, rectified.....	1	oz.
Carbon black.....	1¼	oz.
Paris blue.....	¼	oz.
Oxalic acid.....	⅛	oz.
Water .....	¼	oz.

The three last ingredients are mixed into a paste. The turpentine and olein are mixed at a gentle heat, the soap and carbon then introduced, and after cooling, the blue paste is added, the whole being ground beneath a muller till very fine and smooth.

PRINTING INK.

Balsam of copaiba.....	9	ozs.
Very dry yellow soap.....	3	ozs.
Pure sperm oil.....	1	oz.

Shave the soap and boil it together with the other substances until the soap is dissolved, then add the color desired in sufficient quantity. The more color the more body. Painter's dry colors make the best colors, and must be well pulverized before they are added. Aniline colors must be treated with alcohol first.

If a quick drying ink is wanted, add to the base half an ounce of Burgundy pitch, and if a varnished ink, one ounce of pure Venice turpentine. To thin the ink, use sperm oil; but it must be well incorporated with the ink by the roller before the roller touches the type, otherwise the oil will take off the impression.

PRINTING INK.

Venice turpentine.....	17	ozs.
Soft soap.....	20	ozs.
Rectified olein.....	8	ozs.
Burntsoot.....	12	ozs.
Paris blue.....	2	ozs.
Oxalic acid.....	1	oz.
Water .....	2	ozs.

Gradually warm the turpentine and olein together; put the soap on a marble slab and gradually add, continually rubbing the mixture of turpentine and olein; when well mixed, add the burnt soot, which must be first well powdered and sifted; then add the Paris blue, dissolved in the oxalic acid and water, continu-

ally rubbing the composition on the stone. A solution of soda in water is sufficient to thoroughly cleanse the type.

#### PRINTING INK.

Balsam copaiba .....	36 ozs.
Lampblack .....	12 ozs.
Paris blue .....	5 ozs.
Indian red .....	3 ozs.
Resin soap .....	12 ozs.

For colored inks use white soap instead of the resin soap.

#### RED PRINTING INK.

Balsam of copaiba .....	12 ozs.
Dry yellow soap .....	3 ozs.
Vermilion or chrome red .....	q.s.

Warm the mixture and grind it to an impalpable powder on a stone or in a suitable mill.

#### REMOVING PRINTER'S INK FROM CARDS.

Ordinary printer's ink is soluble in benzol, benzin, oil of turpentine, and a number of similar solvents. Probably benzol would be the best agent to use on cardboard. It should be applied with a camel's hair pencil, removing the surplus and dissolved material with strips of absorbent paper. The condition in which the cards will be left will depend entirely upon the skill of the operator and the nature of the paper or board upon which he operates. The "C. P." or "Crystallizable" benzol is best for the purpose.

#### RED BROWN LITHOGRAPHIC INK.

Mutton tallow .....	4 parts
Curd soap .....	4 parts
Yellow wax .....	4 parts
Orange shellac .....	3 parts
Mastic resin .....	2 parts

For coloring matter take sufficient of a compound prepared by mixing in dry powder.

Prussian brown .....	15 parts
Vermilion .....	1 part
Lampblack .....	1½ part

All parts are by weight. Melt together the tallow, soap and wax, and while almost hot enough to ignite, gradually work in the mastic resin in fine powder, and when this has all incorporated, add the shellac and directly it has become homogeneous by mixing well (you must keep the compound hot enough to melt these readily, or it will form in lumps and not unite with the other ingredients), then add the coloring matter and cut up into discs or cakes. When it has set hard enough for use, the ink is rubbed down in lavender oil (oil of spike lavender is the cheapest) or else in water, as preferred for the work in hand.

#### OLIVE GREEN LITHOGRAPHIC INK.

The ingredients for this are identical to those for red brown. For coloring matter take 8 parts of the following:

Yellow ochre .....	2 parts
Lampblack .....	1 part

and just sufficient indigo to produce the desired olive hue. The method of manufacture is precisely the same as for red brown ink.



## LITHOGRAPHIC INK.

Venice turpentine .....	1 part
Lampblack .....	2 parts
Hard tallow soap.....	6 parts
Mastic, in tears.....	8 parts
Shellac .....	12 parts
Wax.....	16 parts

Melt, stir and pour it out on a slab.

INDELIBLE INK FOR PRINTING ON COTTON  
AND LINEN FABRICS.*Intended for chlorine bleaching.*

One part of coal tar mixed with one part of benzine, and one-tenth part of lampblack. It can be made thicker or thinner by using more or less benzine.

## NEW PENCIL AS A SUBSTITUTE FOR INK.

The writing yielded by this pencil is capable of being reproduced by the copying machine. It is very black and does not fade on exposure to the light. The mass for these pencils is prepared as follows: Repeatedly boil 10 parts of best logwood in 100 parts of water, straining each time. The liquid is then evaporated until it amounts to 100 parts, and is then allowed to boil in a pan of stoneware or enamel. To the boiling liquid nitrate of oxide of chrome is added in small quantities until the bronze-colored precipitate, formed at first, is re-dissolved with a deep blue coloration. This solution is then evaporated in a water-bath to a syrupy consistency, with which is mixed well-kneaded clay in the proportion of 1 part of clay to  $3\frac{1}{2}$  of extract. A little gum tragacanth is also added to obtain a proper consistency.

It is absolutely necessary to use the salt of chrome in the right proportion. An excess of this salt gives a disagreeable appearance to the writing, while if too little is used the black matter is not sufficiently soluble. The other salts of chrome cannot be used in this preparation, as they would crystallize, and the writing would scale off as it dried. The nitrate of oxide of chrome is prepared by precipitating a hot solution of chrome alum with a suitable quantity of carbonate of soda. The precipitate is washed till the filtrate is free from acid. The precipitate thus obtained is dissolved in full nitric acid so as to leave a little still undissolved; hence the solution contains no free acid, which would give the ink a dirty red color. Oxalic acid and caustic alkalis do not attack the writing. Dilute nitric acid reddens but does not obliterate the characters.

## PENCILS FOR MARKING LINEN.

Mixed 4 parts powdered pyrolusite with 16 parts of thoroughly dried alumina, add to this a solution of 6 parts of nitrate of silver in 10 of distilled water. Rub and knead the mass thoroughly. Pencils are formed from this and dried. Use for marking linen.

PENCILS FOR WRITING ON GLASS, PORCELAIN  
AND METAL.

These pencils are prepared by mixing the colors with the fat in warm vessels, and grinding them to an impalpable powder. They are then allowed to cool until they have acquired the proper consistency for

being transferred to hydraulic presses, in which the mass is treated and shaped similarly as the graphite in the presses for ordinary pencils.

The following formulas for the composition of such pencils are those used at the factory of A. W. Faber, of Stein, near Nürnberg, Germany.

1. *Black*—Lampblack, 10; wax, 40; tallow, 10.
2. *White*—Zinc white, 40; wax, 20; tallow, 10.
3. *Pale blue*—Prussian blue, 10; wax, 20; tallow, 10.
4. *Dark blue*—Prussian blue, 15; gum arabic, 5; tallow, 10.
5. *Red*—Cinnabar, 20; wax, 60; tallow, 20.
6. *Yellow*—Chrome yellow, 10; wax, 20; tallow, 10.

#### PENCILS FOR WRITING UPON GLASS.

1. Water, 2; minium, 1; tallow,  $\frac{1}{4}$  to  $\frac{1}{2}$ .

Melt the ingredients together, stir thoroughly and cast the mass into sticks. An addition of more tallow make the mass less hard.

2. Tallow, 5; wax, 10; tallow soap, 10; minium, 10.

Melt together the tallow, wax and soap, and stir into the melted mass the minium; continue the stirring as long as permitted by the consistency of the mass. Shape the mass, before it entirely hardens, into sticks the thickness of a thin lead pencil. Before use it is recommended to lay the sticks in a moderately warm place, since they become quite brittle and break readily, especially after lying for some time.

#### INDELIBLE PENCILS.

Kaolin .....	8 parts
Finely powd. manganese dioxide ....	2 parts
Silver nitrate .....	3 parts
Mix and knead intimately with	
Distilled water .....	5 parts
Then dry the mass and enclose it in wood pencils.	

#### WAX PENCILS FOR COLORED WRITING UPON TIN, WOOD, ETC.

##### 1. *Red.*

Carnauba wax .....	20 parts
Ceresin, natural .....	40 parts
Japan wax .....	40 parts
Cinnabar .....	15 to 25 parts

NOTE.—The first three ingredients must previously be boiled with water until they cease to yield anything to the latter.

##### 2. *Carmine.*

Carnauba wax, white, best .....	20 parts
Japan wax, white, best .....	15 parts
White wax, best .....	15 parts
Carmine .....	25 parts
Cinnabar (imitation) .....	25 parts

##### 3. *Red.*

Carnauba wax, white .....	30 parts
Japan wax, white .....	25 parts
White wax .....	25 parts
Cinnabar, Chinese (gen.) .....	20 parts

##### 4. *Blue.*

Carnauba wax .....	25 parts
Ceresin, natural .....	25 parts
Prussian blue .....	50 parts

## WRITING TABLETS.

Make a mixture consisting of 80 parts of white linseed oil varnish, 10 parts purified oil of turpentine, 4 parts of glycerine, 3 parts of benzine and 3 parts of petroleum. Apply this to the ruled or lined side of any good heavy paper and set aside to harden. This it will do in about five days, but it is best to let stand for one week. Make a second mixture of 70 parts of the varnish, 10 parts oil of turpentine, and sufficient oxide of zinc to give it the consistency of a thick broth. Apply this to the varnished surface with a broad, smooth pencil and let dry. The lines will show through. Two of these prepared plates are then glued together, back to back, and a strip of paper gummed around the edges, or one of them may be glued to a stiff pasteboard. If left free, the surface that is not treated absorbs moisture and causes the paper to roll, thus breaking and spoiling the surface. There is nothing in the method that would prevent a person from making the "slates" on a small scale, though, of course, they could not be made so economically as in quantities.

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