

Nov. 18, 1930.

E. R. GILL, JR

1,781,902

MANIFOLDING

Filed Jan. 15, 1929

Fig. 1.

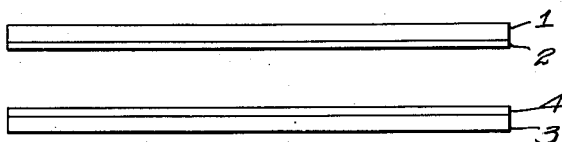


Fig. 2.

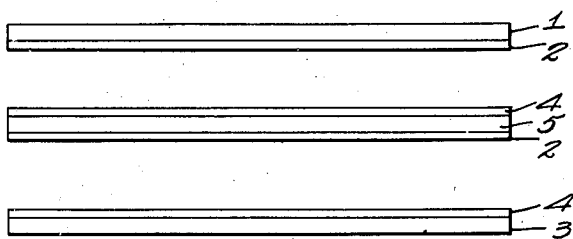


Fig. 3.

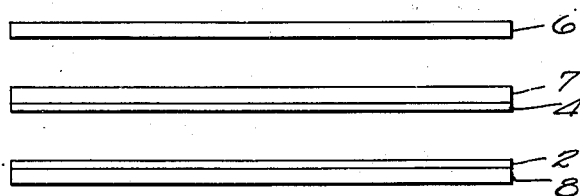
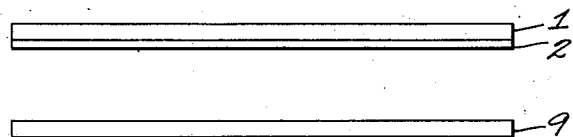


Fig. 4.



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## UNITED STATES PATENT OFFICE

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## MANIFOLDING

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My invention relates to manifolding and comprises a new method by which two or more copies of a writing may be made by a single impression.

5 Heretofore the usual method of securing a plurality of copies at a single writing has been to provide a sheet of so called carbon paper which has one or both of its surfaces coated with an ink which is capable of being transferred by contact pressure to the surface of a blank sheet of paper to produce a duplicate of the original writing. Such method is universally used in connection with typewriting machines and is also very extensively used in connection with hand written documents of various kinds, for example, orders for goods, sales slips, shipping receipts, etc.

Such method produces satisfactory copies or duplicates, but is open to the objection that carbon paper is expensive and its handling in order to place or arrange it in proper relation to the various sheets upon which copies are to be produced requires considerable time and soils the fingers.

In accordance with my invention any reasonable number of duplicate copies may be produced at a single writing without the use of carbon or ink coated paper, or any sheet corresponding thereto.

This result may be obtained in a number of ways, as by applying to the rear surface of the first sheet, that is, the sheet upon which the written impression is to be made by the typewriter ribbon or the pencil or pen of the user, and upon the front surface of the second sheet, which in use underlies the first sheet, chemical reagents which when brought into intimate contact with each other, will react to form an ink. Each sheet is ordinarily made of paper and various reagents may be used, resulting in inks of different colors, durability, etc. The number of copies of the original writing can be increased as desired by treating the rear as well as the front surface of the second sheet, and placing it in contact with a third sheet to the front face of which a reagent has been applied which is capable of reacting with that

on the rear face of the second sheet to form an ink.

In some cases the reagent instead of being applied to the surface of the sheet may be incorporated in the sheet during its process of manufacture. Numerous other modifications may be made in the carrying out of the invention and I do not desire to limit myself to any particular manner of using the invention, but to include all such methods and means, as are defined by the accompanying claims.

In order that the invention may be more fully understood, reference is hereby made to the accompanying drawing of which

Fig. 1 is an elevation showing a first and second sheet suitably prepared for carrying out my invention.

Fig. 2 is a similar view of a three sheet arrangement.

Fig. 3 is a similar view of a modified three sheet arrangement, and

Fig. 4 is a similar view of a two sheet modification.

Referring to Fig. 1, the rear surface of the first sheet 1, which may be ordinary typewriter paper or writing paper preferably not highly calendered, is provided with a reagent 2, and the front surface of the second sheet 3, also of paper similar to that of sheet 1, is provided with a reagent 4 which when brought into intimate contact with reagent 2 will react therewith to form an ink.

Many reagents are capable of producing such a result and many different kinds of ink can be so produced, and the invention is not limited to any particular reagents or ink.

I have obtained desirable results by applying to the rear surface of sheet 1 one of the gallic acid series, for example, ordinary gallic acid. Members of the gallo-tannic acid series, for example, tannic acid will also give good results. Other reagents which may be used in place of gallic acid and which are equivalent thereto are salicylic acid, oxysalicylic acid, and oxymesitylenic acid and its salts.

In applying gallic acid, which is a light powder, the material may be rubbed on to the paper sheet by a felt covered roll. This

causes it to be distributed over the surface and to be rubbed into the minute depressions, pores and cavities of its surface. The sheet should then be brushed, as by a revolving brush, to remove loose or surplus particles of the acid.

The reagent 4 to be applied to the front surface of sheet 3 will be such as to react with reagent 2 of sheet 1 and in case gallic acid is used as described may be a ferric or ferrous salt, for example, ferric sulphate or ferric chloride either alone or a mixture of both. In using these materials a water solution of the salt or salts is applied to the paper and allowed to dry. It is desirable that the reagent 4 should not be completely dry, and I prefer, therefore, to add to the solution a small percentage of glycerine or other non-drying substance, or a hygroscopic ingredient.

In using certain reagents, where non-drying or hygroscopic ingredients are not present, the combination produced by the intimate contact of the reagents upon the two sheets may be colorless, but may be readily made visible by exposing same to steam or water spray or by breathing thereon. The use of such reagents is included within my invention.

In case it is desired to make more than one duplicate of the writing upon the first sheet, I provide the rear surface of the second sheet 5 with reagent 2, its front surface being provided with reagent 4, the reagents 2 and 4 of Fig. 2 being the same as those of Fig. 1 and applied in the same way. In addition a third sheet 3 is provided which is identical with the second sheet 3 of Fig. 1 and has the same kind of reagent coating 4.

Fig. 3 shows the application of the invention to a three sheet combination in which 6 is an ordinary sheet of paper without any ink-forming reagent, 7 is a sheet of transparent paper provided with the reagent 4 as previously described upon its rear surface, and 8 is a third sheet of paper having upon its front surface the reagent 2, applied as hereinbefore described.

In Fig. 4, the first sheet 1 with reagent 2 is the same as in Figs. 1 and 2, and the second sheet 9 is a sheet of paper within which a ferric or ferrous salt is incorporated during its manufacture in sufficient quantity to produce the desired result.

In practice, in order to avoid the use of sheets of different character necessitating the work of keeping them in separate containers or drawers and putting them together as used, I may use sheets which are all alike, for example the sheet 5 of Fig. 2 having reagent 4 on its front surface and reagent 2 on its rear surface. Such sheets may be superposed upon each other to produce the desired number of copies.

The word ink in the claims is intended

to include not only technical inks obtained by a combination of iron compound with a member of the tannic acid series, but also all colored compounds derived from the union of equivalent chemicals in the manner herein set forth.

Having described my invention, what I claim is:

1. The method of manifolding which consists in respectively providing the surfaces of two sheet members with chemical reagents which are capable of reacting with each other to form an ink, superposing said sheets with the reagent surfaces in contact and impressing written matter upon the outer surface of one of said sheets with pressure sufficient to bring said reagents into intimate contact with each other.

2. The method of manifolding by applying to the rear surface of a first sheet a chemical reagent and to the front surface of a rear sheet a chemical reagent which is capable of reacting with the first reagent to form an ink, superposing said sheets, and impressing written matter upon the front surface of the first sheet with pressure sufficient to bring said reagents into intimate contact with each other.

3. The method of manifolding which consists in applying gallic acid to the surface of a sheet, applying an iron salt and a hygroscopic substance to another sheet, superposing said sheets with the reagent surfaces in contact, and impressing written matter upon the outer surface of one of said sheets with pressure sufficient to bring said reagents into intimate contact with each other.

4. The method of manifolding which consists in applying gallic acid to the surface of a sheet, applying an iron salt and glycerine to another sheet, superposing said sheets with the reagent surfaces in contact, and impressing written matter upon the outer surface of one of said sheets with pressure sufficient to bring said reagents into intimate contact with each other.

5. In a manifolding system, superposed contacting sheets, the contacting surfaces being respectively provided with reagents capable of reacting when in intimate contact to form an ink.

6. In a manifolding system, superposed contacting sheets, the contacting surfaces being provided respectively with gallic acid and an iron salt.

7. In a manifolding system, superposed contacting sheets, the contacting surfaces being provided respectively with gallic acid and an iron salt and glycerin.

8. In a manifolding system, superposed contacting sheets, the contacting surfaces being provided respectively with gallic acid and an iron salt with a hygroscopic substance.

9. The method of printing which consists

in respectively providing the surfaces of two  
sheet members with chemical reagents which  
are capable of reacting with each other to  
form an ink, superposing said sheets with  
the treated surfaces in contact and apply-  
5 ing to one of said sheets concentrated pres-  
sure along a line or lines of the shape of a  
legible character to bring the reagent ma-  
terials which are subjected to such pressure  
10 into sufficiently intimate contact to cause  
them to react.

In testimony whereof, I have signed my  
name hereto.

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