E. E. STAFFORD.

PROCESS OF MAKING NICKEL PLATED HALFTONE PLATES.

APPLICATION FILED JAN. 16, 1922.

1,434,798. Patented Nov. 7, 1922.

FIG. 1

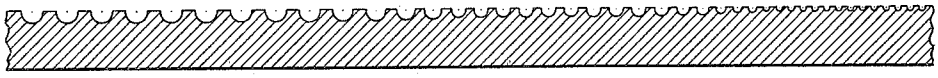


FIG. 2

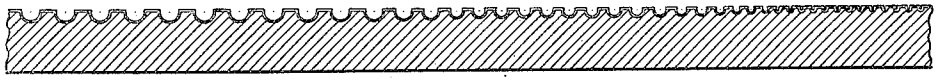
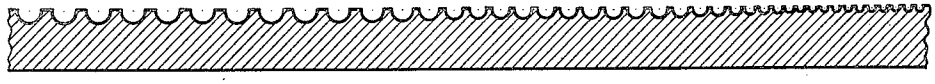


FIG. 3

FIG. 4



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# UNITED STATES PATENT OFFICE.

EARL E. STAFFORD, OF INDIANAPOLIS, INDIANA.

## PROCESS OF MAKING NICKEL-PLATED HALFTONE PLATES.

Application filed January 16, 1922. Serial No. 529,534.

*To all whom it may concern:*

Be it known that I, EARL E. STAFFORD, a citizen of the United States, and a resident of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Process of Making Nickel-Plated Halftone Plates; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

The object of this invention is the nickel plating of copper half tone plates so that they will be superior to copper half tone plates in the quality and perfection of the half tones printed or produced, and much more durable than the copper plate.

Half tone copper plates have been made and used in the art for about thirty years and to a very great extent, because of the fine quality of the work produced by them. As is well known the surface of said half tone plates consists of a vast number of points which stand in relief, and hollows which vary in size and depth. When the plate is inked just previous to taking an impression of it, the ink is distributed uniformly over the points and the difference between the heavy color in the blacks and the light tones in the high lights is due to the sizes of the points and the open spaces between the points.

In making the half tone copper plate, the polished surface of the copper is sensitized and a print made on this from the negative. The print when baked or hardened forms an enamel which acts as a resistance to the acid used in etching. The metal surfaces of the plate which are not covered by the lines and dots in print are left exposed to be eaten down by the acid, the parts being covered by the print being left in relief after the plate is etched. The character of half tone copper plates and the method of making the same is very familiar to those skilled in the art and no further explanation of the details thereof it is believed need be made.

In use a half tone copper plate very quickly becomes worn and dulled and the pictures printed therefrom indistinct and blurred. This is due to the softness of the copper metal which forms the plate. Another disadvantage of the copper plate is that it does not well release the ink in printing and, therefore, does not make as clear an impression as it would do if all the ink were released by the copper plate. A further disadvantage is that the ink has a disastrous effect on the copper. The acids of the ink make the copper corrode and it will assume a different color after a few hundred impressions. The net result is that with the copper plates only a relatively small number of good impressions can be made.

It has long been desired to improve the wear and durability and other characteristics of half tone plates, but no satisfactory process has, prior to the present one, been developed for accomplishing that result. Effort has been made to overcome this difficulty by making electrotypes or nickel plates from the original half tones. When the original half tone copper plate is nickel plated, the nickel fills the hollows in the middle tones and blurs the same so that it prints practically black if sufficiently nickel plated and thus makes the prints or impressions quite unsatisfactory.

The chief feature of this invention consists in the process of over-etching the half tone copper plates to a sufficient extent to offset the thickness of the deposit of the nickel, when the same is nickel plated, so that the nickel plated half tone would have the same character of surface as the copper half tone excepting that the surface would be nickel instead of copper.

It may be preferred by some, and in some instances, to remove the enamel before the over-etching is accomplished. By "over-etching" herein is meant etching beyond what would be done if the plate were not to be nickel plated, and to a sufficient extent to offset the thickness of the deposit of the nickel when it is nickel plated. This can be done either with or without the removal of the enamel. By "enamel" is meant any material on the plate that resists the acid.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings, Fig. 1 is a diagrammatic view of an original copper half tone plate in section, parts broken away and parts exaggerated. Fig. 2 is the same with said original copper plate nickel plated as anything else would be nickel plated. Fig. 3 is the same as Fig. 1 over-etched, that is, the surfaces of the hollows are etched to greater

extent and depth than in Fig. 1. Fig. 4 is the same as Fig. 3 with the over-etched copper plate nickel plated.

In carrying out the process herein, as stated heretofore, the first step is to make an original half tone copper plate by the process heretofore employed in this art and so that it will make good impressions or pictures, bringing out the middle tones as well as the shading and the high lights. In the diagram shown in Fig. 1, one portion of the plate is coarsely etched, the middle portion is medium and the right-hand portion is finely etched. This illustration is given merely for the purpose of explanation, as in half tones the different kinds of surfaces are distributed irregularly over the plate instead of as here shown. As shown in Fig. 2, if this original copper plate in Fig. 1 is merely nickel plated, it will blur the middle tones or surfaces of the plate, that is, fill the small hollows with nickel and partially fill the other hollows so as to change the character of the plate and particularly the impression or print which it will produce.

The second step in this new process consists in over-etching the original copper half tone plate, after being completely finished, such as shown in Fig. 1. The over-etching is preferably accomplished by subjecting said original plate to a longer etching process, by leaving said plate in the etching solution longer, say ten or fifteen seconds longer, than if one would make in the usual way a half tone copper plate. The length of this additional period in the etching, in order to over-etch the plate, varies slightly according to the fineness of the screen, but those skilled in the art understand fully the effect of the fineness of the screen upon the length of time required for the etching solution to accomplish its work and, therefore, there is no difficulty in workmen skilled in this art in determining how much longer any particular copper half tone plate should be left in the etching solution in order to over-etch it for the purpose herein set forth. Such over-etched plate is illustrated in Fig. 3, which differs from Fig. 1 only in the depth of the hollows or recesses and lateral thinness of the points or projections in the metal plate.

The third step in this process consists in nickel plating the over-etched copper half tone plate by employing the usual nickel plating process so as to put the proper deposit of nickel on the surfaces, both the hollows and the points or projections, which will bring the dimensions of those parts back to exactly the same condition as in the original copper plate, as shown in Fig. 1. In other words, the over-etched copper plate is left in the nickel plating solution from fifteen to twenty minutes, according to the fineness of the screen and the voltage employed, with which those skilled in the nickel plating art are familiar.

The product of this process is a nickel plated half tone plate having all the characteristics of the usual original copper half tone plate, so far as accurate impressions and delicate printing are concerned, but the surfaces of the nickel plated half tone plates are very much harder, more lasting and durable than those of the copper plate and would stand five or more times the use in printing half tones than the copper plate would, and yet the cost of making the nickel plated half tone plate would not be more than five or ten per cent greater than the cost of the original copper half tone plate. Furthermore, the nickel surface releases the ink much better than the copper surface as it releases all of the ink and, therefore, makes a clearer impression or print than the copper surface. Also the acid in the ink does not injuriously affect the nickel surfaces or corrode them, nor does the nickel have any effect on colored inks, as delicate colors, such as yellow, pink and light blue, may be used and after several thousand impressions, the ink will be the same color as in the beginning of the operation, whereas with copper it would turn much darker. Therefore, the nickel plated half tone plate not only wears much longer and is more durable and is capable of producing more impressions, but it also produces much better impressions and prints and it is particularly important and advantageous in colored printing.

As stated before, the over-etching may be accomplished with or without removing the enamel, in carrying out this process.

The invention claimed is:

1. The process of making a nickel plated half tone plate, which process includes over-etching a copper plate to an extent equal to the desired thickness of the proposed nickel plate, and then nickel plating the same.

2. The process of making nickel plated half tone plates, which process includes over-etching a copper plate, and then nickel plating the same with a deposit of nickel thereon, substantially equal to said over-etching.

3. The process of making nickel plated half tone plates, which process includes over-etching a copper plate by leaving the same in the etching solution for approximately longer than if a copper half tone plate were to be ultimately made, the length of time depending upon the fineness of the screen used in making the picture to be plated, and then nickel plating the same by placing it in a nickel plating solution long enough to make a deposit of nickel equal to the over-etching according to the fineness of the screen used in making the picture for

the plate and the voltage used in the nickel plating.

4. The process of making nickel plated half tone plates, which process includes placing a copper plate in an etching solution and over-etching it by leaving it in said solution for approximately fifteen seconds longer than if the plate were not to be nickel plated, and then nickel plating the same by placing it in a nickel plate solution for approximately twenty minutes, substantially as and for the purpose set forth herein.

5. The process of making nickel plated half tone plates, which process includes as its essentially novel step over-etching a previously enameled and etched copper half tone plate after having removed the enamel so that the deposit of nickel thereon when nickel plated will leave the points and hollows of the surfaces of the metal plate the same as in the original copper plate.

6. The process of making a nickel plated half tone plate, which process includes enameling and etching a copper plate, removing the enamel, over-etching the copper half tone plate to an extent equal to the desired thickness of the proposed nickel plate, and then nickel plating the same.

7. The process of making nickel plated half tone plates, which process includes enameling and etching a copper plate, removing the enamel, over-etching the copper half tone plate, and then nickel plating the same with a deposit of nickel thereon substantially equal to said over-etching.

8. The process of making nickel plated half tone plates, which process includes enameling and etching a copper plate, making a copper half tone plate, removing the enamel, over-etching the same, and then nickel plating the same, substantially as set forth.

9. The process of making nickel plated half tone plates, which process includes enameling and etching a copper plate, removing the enamel, over-etching the copper half tone plate by leaving the same in the etching solution for approximately longer than if a copper half tone plate were to be ultimately made, the length of time depending upon the fineness of the screen used in making the picture for the plate, and then nickel plating the same by placing it in a nickel plating solution long enough to make a deposit of nickel equal to the over-etching according to the fineness of the screen used in making the picture for the plate and the voltage used in the nickel plating.

10. The process of making nickel plated half tone plates, which process includes enameling and etching a copper plate, removing the enamel, placing a copper half tone plate in an etching solution and over-etching it by leaving it in said solution for approximately fifteen seconds longer than if the plate were not to be nickel plated, and then nickel plating the same by placing it in a nickel plating solution for approximately twenty minutes, substantially as and for the purpose set forth herein.

In witness whereof, I have hereunto affixed my signature.

EARL E. STAFFORD.