To all whom it may concern:

Be it known that I, CHARLES W. SAALBURG, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented a certain new and useful Improvement in Processes of Etching Rolls to Mutually Register, of which the following is a specification.

This invention relates to processes of etching rolls to mutually register and more particularly to processes of etching copper rolls so that they will exactly register in multiple color or print work.

In prior processes of making etchings on copper or other rolls for multiple color or multiple print work, it has been found to be practically impossible to secure perfect registry, due to shrinkage, stretching and warping of the sensitive sheets of paper used. In such processes the necessary use of photography has introduced extra expense, delays, and inaccuracy of reproduction.

This invention has for an object the provision of processes of etching rolls which will secure perfect and accurate registry. It has for an object also the avoidance of photographic methods and the use of sensitized sheets of carbon or other paper. Another object of the invention is to secure better working and printing qualities in the rolls.

A further object is to etch rolls in such a manner that the printing will be sharp and certain in effect.

The invention accordingly broadly comprises a process of etching rolls comprising the steps of transferring to color rolls by shallow etching, a design containing registry marks from a key or master roll, supplying the color rolls with removable coatings, removing portions of the coatings registered with the design to be in color, etching the rolls and removing the coatings.

Although the invention may assume various specific forms and modifications, as defined in the claims, the following constitutes a preferred embodiment thereof.

A key or master roll, preferably of copper, is etched to produce the desired design or picture in its predominating tones, and registry marks are placed thereon at the four edges of the design. The key or master roll is placed on the usual press and a sheet of unstretchable ordinary white paper is impressed by the roll using a sticky ink. The whole wet surface on the paper is covered with a colored powder, preferably red chalk, which is then dusted off carefully with a dusting brush thus making the powder stick to the wet ink.

The copper rolls to be used for colors are next prepared, one roll being used for each color. The roll is placed on the press, polished and heated, and a solution of any hot wax such, for example, as beeswax, is rolled over the whole surface of the roll in a very even and thin coating. The roll is dried and the above prepared sheet of paper with the chalk is fed into the press so that it is offset on to the surface of the roll with the result that the chalk only comes off and adheres to the roll. The picture from the master roll will appear plainly on the tallow surface of the color roll, while the different register marks will be plainly seen thus forming a perfect guide for registering the colored designs. The registering marks are cut through on to the color roll with a fine needle or other point and the roll is then etched with ferric chloride. The etching must be very shallow or just enough to show where the picture belongs on the roll.

An impression is now taken with light blue ink or other light ink from the key or master roll on very thin paper having a fine rough rear surface, one paper being used for each color roll. The color roll is now again heated and a solution of beeswax, containing a hardening material such as asphaltum, is rolled with a clean rubber roller over the color roll until the surface is covered as thinly as possible. When dry, the thin paper which has been printed from the key roll is stuck on to the color roll with the rough graining in contact with the roll and with the registry marks corresponding to the marks on the copper color roll. In case the paper is opaque, the registry marks can be cut out so that the marks on the roll can be seen. The artist now draws upon this paper, with a pencil or pointed tool, the design to be in color. This process is repeated for each color roll, three colors being generally needed. As a result, the coating is removed where the pencil comes in pressure contact therewith through the paper, so that the etching liquid may attack the copper. The rough back of the paper provides for the
necessary graining so that numerous dots will appear on the coating and the corresponding particles of coating removed will stick to the paper. Having treated the paper, the roll is placed in the etching liquid whereby an etched impression of the desired color is obtained in perfect registry.

In order to make the grain or printing sharp or certain, a grain may be first put upon the copper cylinders, including the master cylinder, by means of an air brush and a thick varnish; and over this fine grain a wax coating of the character above described may be applied, in order to secure better depth in etching, more printing points and also longer printing life of the etching.

The colors may generally be red, blue and yellow, and the predominating tone brown and black; but these colors may, of course, be varied, or the various prints may be in the same or nearly similar color, since the kind of color is not of importance. Whatever colors are used perfect registry will be obtained so that there will not be any overlapping of designs or colors. In the printing, the colors are generally printed first and the predominating tone from the master roll is printed last.

It will be apparent, by the use of the process of this invention, perfect registry is obtained between the various printing rolls, and that all photographic methods have been avoided in etching the various rolls. The process provides for a fine grain in the etchings and, by the use of the etched rolls a sharp and definite print may be obtained.

As many apparently widely different embodiments of the invention may be devised and I have described only one preferred embodiment, it is understood that I do not limit myself to the details of this embodiment, except as indicated in the appended claims.

I claim:

1. The process of etching rolls to secure registry, comprising the steps of transferring to a roll by shallow etching a design containing registry marks from a master roll, supplying the former roll with a removable coating, removing portions of the coating to register with the design to be printed in color or otherwise, etching the rolls, and removing the coatings.

2. The process of etching rolls to secure registry comprising the steps of transferring to color rolls by shallow etching a design containing registry marks from a master roll, supplying the color rolls with removable coatings, securing thereon in registry thin sheets having impressions of the design, drawing the color design on the sheets, etching the rolls and removing the coatings.

3. The process of etching rolls to secure registry comprising the steps of transferring to color rolls by shallow etching a design from a master or key roll provided with registry marks, printing thin papers having rough, near surfaces from the key roll, placing them in registry on the color rolls prepared by coating them with a removable coating, drawing the color design on the paper, etching the color rolls, and finally removing the coatings.

4. The process of etching copper rolls to register in color work comprising the steps of transferring to color rolls by shallow etching a design containing registry marks from a key roll, supplying the color rolls with removable coatings, removing portions of the coatings by pressure through a registering paper print of the key roll, said portions registering with the design to be in color, etching the rolls and removing the coatings.

5. The process of etching rolls to register in color work comprising the steps of transferring to color rolls by shallow etching a design from a key roll having registry marks, printing thin papers having rough, rear surfaces from the key roll, placing them in registry on color rolls coated with a removable coating, drawing the colored design on the paper, etching the color rolls, and finally removing the coatings.

6. The process of etching copper rolls to register in color work, comprising the steps of making an impression on a paper from a key roll etched in the predominating tones and registry marks, transferring the paper impression to an impressionable removable coating on one or more color rolls and marking registry marks on the latter, etching the color rolls very slightly, printing thin papers having a rough, rear surface from the key roll, placing them in registry on the color rolls coated with a removable coating, drawing the colored design on the paper, and then etching the rolls and finally removing the coatings.

7. The process of etching copper rolls to register in color work, comprising the steps of etching a key roll in the predominating tones, with registry marks thereon, printing sheets of unstretchable paper from this key roll with a sticky ink, dusting a colored powder onto the ink, feeding the paper onto a copper color roll prepared by drying thereon a thin, even coat of a tallow containing composition, whereby an impression of the key roll with its registry marks is made in the composition on the color roll, marking the registry impressions and main lines of the figure in the color roll, etching the roll only very slightly, printing a thin paper having a fine, rough, rear surface from the key roll, fastening the paper exactly registered on the color roll coated with a tallow containing a composition capable of re-
moval by slight pressure, drawing the design to be in color on the paper whereby the corresponding coating is removed from the roll, etching the roll, and finally removing the coating.

8. The step in the process of etching rolls to secure exact registry comprising transferring a design from a master roll having registry marks to another roll by very shallow etching of the latter roll.

9. The steps in the process of etching rolls to secure exact registry, consisting of transferring a design from a master roll having registry marks to an unstretchable sheet of thin material, making a very shallow etching in another roll from this sheet, and making another etching upon the roll for the color or print to be produced thereby.

10. The process of claim 1 with the added step of first placing a fine grain over the rolls.

11. The process of claim 2, with the added step of first placing a fine grain on the rolls.

12. The process of claim 3, with the added step of first placing a fine grain on the rolls.

13. The process of claim 4, with the added step of first placing a fine grain on the rolls.

14. The process of claim 5, with the added step of first placing a fine grain on the rolls.

15. The process of claim 6, with the added step of first placing a fine grain on the rolls.

16. The process of claim 7, with the added step of first placing a fine grain on the rolls.

In testimony that I claim the foregoing, I have hereunto set my hand this 11th day of February, 1921.

CHARLES W. SAALBURG.