

UNITED STATES PATENT OFFICE.

GEORGE R. CORNWALL, OF RYE, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
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ART OF PRINTING.

1,124,594.

Specification of Letters Patent.

Patented Jan. 12, 1915.

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To all whom it may concern:

Be it known that I, GEORGE R. CORNWALL, a citizen of the United States, residing at Rye, in the county of Westchester and State of New York, have invented new and useful Improvements in the Art of Printing, of which the following is a specification.

The invention relates to the printing art and more especially to planographic printing.

The invention has for objects the providing of a process for producing a character-impressing or composing agency or device adapted by the action of light to impress typographic characters upon a light-sensitive surface which is afterward prepared for printing planographically; for providing a character-impressing or composing agency or device of the kind indicated in the form of a line composing unit; for providing such an agency or device by the use of inked types, used singly or a plurality at a time, the character-impressing or composing agency or device produced comprising a material or surface having a line, or lines, of characters carried upon a surface, the characters and the surrounding surfaces having opposite properties with respect to the transmission of light, one being light arresting and the other light transmitting.

These and other objects of invention will more fully appear hereinafter.

The process included in this invention comprises the steps of sensitizing a light-transmitting material or surface, in printing thereon by means of types, to which a suitable light-arresting medium, such as an opaque ink, has been applied, typographic characters in a justified line or lines, so that the characters will appear upon the sensitized surface in such light-arresting medium, or defined upon such surface by the light-arresting medium covering the surrounding surface, then subjecting the said material or surface to the action of light, then developing it and then making a printing plate therefrom.

The invention contemplates further the extension of the steps of the method to a material or surface of such shape and form as to conveniently carry a single line of justified characters, and also further contemplates the extension of such steps to such a surface carried upon a line bar, said

surface being one of the surfaces of the bar itself, or a separate surface supported upon the bar.

The invention contemplates further the making of a printing plate from the line units or line bars so impressed, a plurality of said line units or line bars being used to produce the column or page upon the plate.

It will be understood that the typographic characters may be imprinted upon the surface either singly, in groups, or a line at a time, or in certain aspects of the invention a plurality of lines at a time.

The steps included in the invention may be carried out in various ways and one or more such ways will be set forth herein.

A line composing unit presents many advantages in the practice of the printing art as it affords a unit which is easily handled, and which provides of great latitude, flexibility and rapidity in the making of corrections, additions, subtractions, transpositions, or other changes necessary or desirable in bringing composed matter into the desired final form prior to making a printing plate.

In the production of planographic plates the design or letter-press matter is generally transferred to the surface of the plates by the use of transfer paper and the well-known transfer operation. Transfer impressions in some cases deteriorate greatly in quality from the original impressions and lose much in the beauty and sharpness of the characters. With a line composing unit which operates to impress or create characters upon a printing plate by the action of light the desirable properties of the line unit in letter-press composition are secured and the difficulties inherent in the transfer method are avoided, as well as other difficulties and objections. The characters of the letter-press matter may be placed or created upon the printing plate with all the sharpness and beauty of an original impression, and further reproductions may be multiplied to any desired extent with practically no deterioration from the said impression.

Other advantages as well as those outlined above are secured by the use of the line composing unit of the kind indicated.

A surface possessing the property of transmitting light, as well as being other-

wise suitable, may be taken of such shape and size as to accommodate a line of characters of the particular matter which it is desired to place upon the printing plate.

5 The said surface may be mounted or carried upon a suitable line bar for convenience in receiving or giving an impression or in the handling of the bar during the making of corrections, revisions, or other
10 changes. The said surface may, if desired, be integral with a line bar, and in the case of a bar of a light-transmitting material, it may be one of the surfaces of the bar itself.

15 In the manner of carrying out the steps of the process particularly described herein by way of illustration, the same will be described in relation with a light-sensitive surface which is the surface of a line bar, the line bar being of a light-transmitting
20 material. A line bar of a suitable material such as glass, which if desired may be annealed, is taken, and upon one of its surfaces a sensitive coating is applied. Such
25 bar may be "type high" and may also conform to the measurements of the point unit system, although this is merely a matter of preference or convenience.

The coating may comprise a layer of suitable material which is light sensitive or
30 which contains as one of its ingredients an agent which when acted upon by light will change the nature of the said layer or surface in a suitable manner. A suitable sensitive layer may be formed by one of the ordinary emulsions used on photographic
35 plates and which generally contain as their light-sensitive agent some compound of silver, such as silver nitrate, which either by the action of light, or by the action of light
40 in combination with the action of certain chemical substances, will form an opaque or light-arresting substance.

Another class of substances which are
45 suitable and convenient for use in this connection are certain colloidal substances which are convenient for forming a translucent or other light-transmitting layer or film upon a suitable surface, such as one of
50 glass, in which colloidal substances there is held in suspension certain salts of chromium, such as potassium bichromate or ammonium bichromate, which are susceptible to the action of light, but in a somewhat different
55 manner from the silver salts.

The carrying out of the steps of the process will now be described in connection with the sensitive silver emulsion or coating. After the emulsion is spread upon the bar the
60 said surface is for the time being protected more or less from the action of light, the amount of protection necessary depending on the degree of sensitiveness. With a surface of low sensitiveness, such as is sufficient for many purposes of this invention,

a dark room is not essential. Upon the said surface there is then imprinted by means of types a line of characters in a suitable light-arresting medium, generally an opaque ink, the line of characters being impressed there-
70 upon in justified relation either manually or by a suitable machine and either a character at a time or a plurality of characters at a time, or the entire line at once.

Suitable machines for placing the characters upon a line bar may be utilized, if desired, a machine of this general character adapted to place the characters upon the bar one at a time in justified relation being shown in application for patent Ser. No. 83
286,386 filed by me on Nov. 8, 1905 and a machine adapted for placing the characters upon such a bar in justified relation a line at a time being shown in application Ser. No. 279,683 filed by me on Sept. 22, 1905.

It will be obvious that the portions of the sensitized surface under the opaque printed characters would be protected from the action of light upon the exposure of the said surface to light, while the portions of the surface not protected by the opaque material would be subjected to the full action of light and the light-sensitive agent therein would undergo corresponding changes. After the exposure of the said surface of
85 the bar to the light it may be removed again from the light and the ink in which the line of characters was originally outlined removed. The said surface is then subjected to the action of a suitable developer, such for instance as pyrogallic acid or any other suitable developer, after which it may be passed through a water bath and then placed in a fixing bath of any suitable kind, such as an aqueous solution of sodium thio-
90 sulfate, commonly known as "hypo." The bars are then thoroughly washed in water, preferably running water, and may then be dried. The surface is very much improved by subjecting it to the action of a suitable hardening agent, such as formaldehyde or a solution of alum, or the hardening agent may be included in the "hypo" bath. Under the action of the developer, the portion of the character-bearing surface which
95 was exposed to the action of light will turn to a dense black color while the character-bearing portions which were protected by the ink will be dissolved away by the developer and the characters will then be carried upon the said light-transmitting surface, the characters and the surrounding surface having opposite properties with respect to the transmission of light.

In the particular case described above the characters will be light transmitting and the surrounding surface light arresting. Where it is desired to have the characters light arresting and the surrounding surface light transmitting this may be done by im-
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printing the bars with the characters in outline and the opaque ink or other light-arresting medium outlining the characters upon the surface of the bar.

Where a bichromated albumin or gelatin, or other chromated colloid, is used for the sensitive layer it may be spread upon the surface of the bar which is to be the character-bearing surface, and the line of characters impressed thereon substantially in the manner described above. After the line of characters has been so impressed the surface of the bar will be subjected to the action of light. It will be obvious as in a previous case the action of light will be unimpeded in the exposed portions but will be without effect in the covered or protected portions. The action of the light upon the chromic salt serves to render insoluble the colloid material in which the said chromic salt is suspended. This action is probably due to a breaking down of the said chromic salt and the liberation of oxygen which immediately combines with the colloidal substance to form a new and insoluble, or relatively insoluble, organic substance. After the exposure of the said bar to the light it may be subjected to the action of water, or preferably the said surface is first rolled up with a stiff ink and then subjected to the action of water. The portions of the coating which were not acted upon by the light are soluble or subject to the action of water, while the portions that were acted upon by the light will be insoluble or practically impervious to the action of water. The soluble portions will be carried away, or disappear, and the insoluble portions will be left upon the surface as a very thin, indurate layer of ink-taking material having the coating and ink upon it. The surface of the bar is then dried. If it is desired to strengthen the opaque layer, this may be done by dusting it with a suitable powder, such as talc or a bronze powder. This may be done before or after the application of water in developing the bar, as may be convenient. If done after development it is best done after the surface has been dried. The ink will then form an indurate opaque or light-arresting layer upon the said portions and the surface will have the characters thereon, the character portion and the surrounding portions having opposite properties with respect to the transmission of light. It will be obvious that by protecting the surrounding surface and exposing the character portions the reverse relation as to their properties with respect to the transmission of light may be obtained.

Various sensitized colloids are known. An excellent substance of this kind may be secured by following out substantially the following formula: Dissolve in about 100 cubic centimeters of distilled or filtered

water at the ordinary temperature thirty grams of commercial albumin; dissolve five grams of ammonium bichromate in about 100 cubic centimeters of distilled or filtered water; when dissolved the two solutions are to be thoroughly mixed together; about twenty cubic centimeters of concentrated ammonia are then to be added to the mixture which is then filtered and is ready for application to the carrying surface.

Where the light-transmitting surface or light-transmitting medium is not a line bar or a portion thereof, but is in the form of a line strip, such as a flexible strip or film of sensitized paper, celluloid, or other suitable substance, it may be treated substantially as mentioned herein but for most uses of such a line strip or line film a suitable supporting device is necessary both in the making of the line unit and afterward in utilizing it for making impressions upon the plate which is to be prepared or used in printing planographically. In transferring impressions from the line bar, or line bars, to the surface of the planographic plate, the plate may be sensitized in a suitable manner, as by having a coating of a bichromated colloid, bichromated albumin, sensitized asphaltum, or other suitable sensitized agency. For certain purposes the material from which stripper negatives are made may be found very suitable, that is, a compound of rubber and collodion.

These various steps enumerated may be repeated with successive line bars or other line units until a composition is represented thereby. All necessary corrections, additions, subtractions, transpositions, or other changes necessary or desirable into the desired final form may be made, and a printing plate may be made therefrom.

From all the foregoing it will be understood that a process has been provided for producing a character-impressing agency and also a line composing unit of the character mentioned and possessing the advantages set forth, together with other advantages.

The invention, in its broader aspects, is not limited to the particular manner of carrying out the various steps of the invention described herein, nor to any particular manner of carrying out the said steps, as variations may be made therein without departing from the principles of the invention.

What I do claim as my invention and desire to secure by Letters Patent, is:

1. The process of producing a printing plate which comprises sensitizing the surface of a line bar, applying to a line of types a light-arresting medium, imprinting a line of characters upon the sensitized surface from the said types in the light-arresting medium, subjecting the said surface to the action of light, then developing the said sur-

face and then placing said line of characters upon a printing plate by means of said line bar.

2. The process of producing a printing plate which comprises the sensitizing of a line strip consisting of a light-transmitting material, imprinting a line of characters thereon in a light-arresting medium, subjecting the sensitized surface to the action of light, and then developing the said surface, and transferring the line of characters to the surface of a planographic printing plate.

3. The process of producing a printing plate which comprises the sensitizing of a line strip consisting of a light-transmitting material, imprinting in justified relation a line of characters thereon in a light-arresting medium, subjecting the sensitized surface to the action of light, and developing the said surface, repeating the foregoing steps with the successive lines of any composed matter, making such corrections, additions, subtractions, transpositions or other changes as may be necessary or desirable in bringing the composed matter into the desired final form, and then making a printing plate therefrom.

4. The process of producing a printing plate which comprises sensitizing the surface of a light-transmitting line bar, imprinting a line of characters thereon in a light-arresting material, subjecting the said surface to the action of light, and then developing the said surface, and transferring the line of characters to the surface of a planographic printing plate.

5. The process of producing a printing plate which comprises sensitizing the surface of a light-transmitting line bar, imprinting upon the said surface in justified relation a line of characters in a light-arresting medium, exposing the surface to the action of light, and developing the said surface, repeating the foregoing steps with the successive lines of any composed matter making such corrections, additions, subtractions, transpositions or other changes as may be necessary or desirable in bringing the composed matter into the desired final form, and then making a printing plate therefrom.

6. The process of producing a printing plate which comprises placing upon the surface of a light-transmitting line bar a coating consisting of a chromated colloid, imprinting upon the said surface in justified relation a line of characters in a light-arrest-

ing medium, exposing the surface to the action of light, dissolving away the portions unaffected by the light, drying the surface of the bar, and applying a suitable opaque ink or other light-arresting medium to the said surface, and transferring the line of characters to the surface of a planographic printing plate.

7. The process of producing a printing plate which comprises placing on the surface of a light-transmitting line bar a coating consisting of a chromated colloid, imprinting upon the said surface in justified relation a line of characters in a light-arresting medium, exposing the surface to the action of light, rolling up the entire surface with ink, and subjecting the surface to the action of water so that the portions unaffected by the light will be dissolved, repeating the foregoing steps with the successive lines of any composed matter, making such corrections, additions, subtractions, transpositions or other changes as may be necessary or desirable in bringing the composed matter into the desired final form, and then making a printing plate therefrom.

8. The process of producing a printing surface which comprises taking a line of types, applying thereto a light arresting medium, impressing the entire line of types at once upon the sensitized surface of a line bar in said light arresting medium, subjecting said impressed surface to the action of the light, developing said surface, and then placing said line of characters upon a printing plate by means of said line bar.

9. The process of producing a composing unit which comprises taking a line bar of light transmitting material, sensitizing a surface of said line bar, composing a line of types, applying to said line of types a light arresting medium, imprinting the line of types in said light arresting medium upon the surface of said line bar, and then developing said surface of said line bar, thereby producing thereon the line of characters, the line of characters and surrounding parts of said surface having opposite properties with respect to the transmission of light.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE R. CORNWALL.

Witnesses:

JOHN D. MORGAN,
CLARA PHILLIPS.