

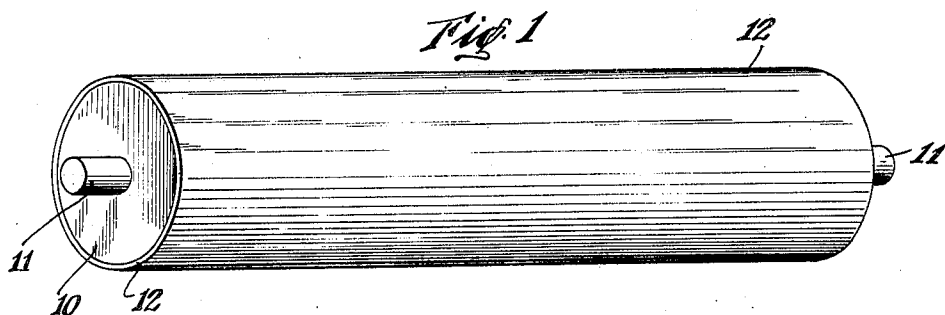
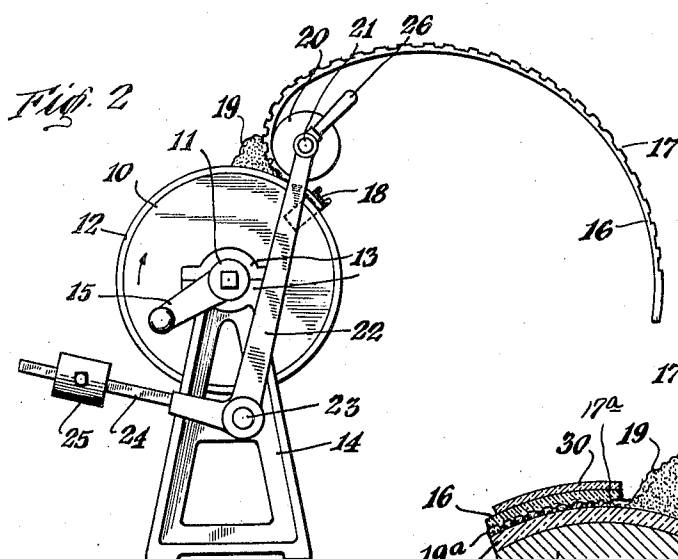
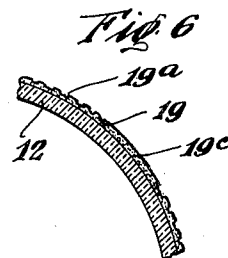
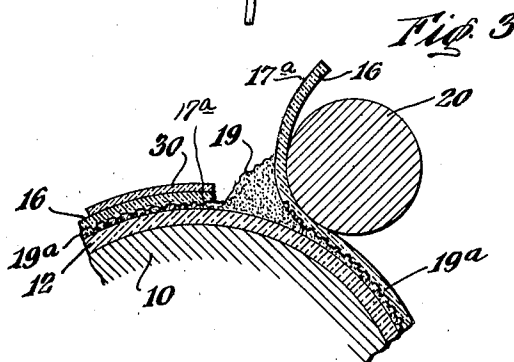
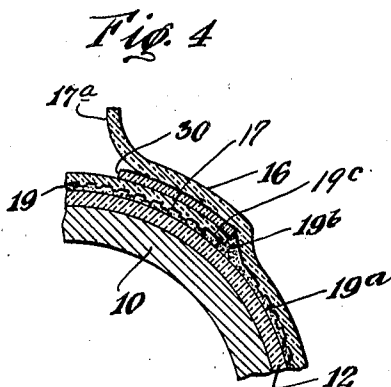
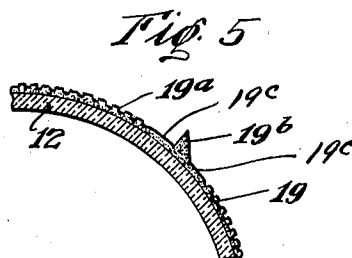
Nov. 17, 1936.

O. R. SCHULTZ

2,060,828

METHOD OF FORMING PRINTING SURFACES ON CYLINDERS

Filed Oct. 5, 1932



INVENTOR
Oswald R. Schultz
BY
Reuben J. Carlson
ATTORNEY

UNITED STATES PATENT OFFICE

2,060,828

METHOD OF FORMING PRINTING
SURFACES ON CYLINDERS

Oswald R. Schultz, New York, N. Y., assignor to
Cellu-Type Plate Co., Inc., Union City, N. J., a
corporation of New York

Application October 5, 1932, Serial No. 636,261

10 Claims. (Cl. 41—25)

This invention relates to an improved method of forming printing surfaces on cylinders.

Printing cylinders having intaglio or half tone printing impressions in the surface thereof produced by etching, invariably differ in tonal qualities due to the operator's inability to control the etch. This lack of uniformity is highly objectionable where exact duplicate reproductions are desired, which must be produced from two or more cylinders. Further, much time and great skill is required to manufacture a printing cylinder which will produce satisfactory printing and such printing cylinders are expensive and consequently add greatly to the cost of producing so-called gravure printing.

In accordance with this invention, a printing surface is formed on the cylinder by molding the same from a matrix in which the tonal values of the printing surface are definitely controlled, so that any number of cylinders can be made whose printing surfaces have identically the same printing and tonal values.

An object of this invention is to provide a method of forming printing surfaces on cylinders in which the depth of the tonal values is definitely controlled.

Still another object of my invention is to provide a method for making a printing cylinder having a continuous and jointless printing surface thereon.

Another object of my invention is to provide a method of forming a photographically toned printing surface on a cylinder by which the depth and printing characteristics of the tonal recesses may be definitely and uniformly controlled in a simple, practical and economical manner to provide a printing surface from which a very high quality of printing may be produced.

Other objects of this invention will become apparent as the disclosure proceeds.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, and the manner in which it may be carried out, may be better understood by referring to the following description taken in connection with the accompanying drawing forming a part thereof, in which

Fig. 1 is a perspective view of a printing cylinder as it appears prior to the application of the printing surface thereon;

Fig. 2 shows the printing cylinder mounted on a frame and illustrates one step in the process of forming the printing surface on the cylinder;

Fig. 3 is an enlarged cross sectional view of a fragmentary portion of the printing cylinder, this view illustrating another step in the process of casting the printing surface thereon;

Fig. 4 is a view similar to Fig. 3 and illustrates a further step in the process of casting or moulding the printing surface on to the cylinder;

Fig. 5 is an enlarged cross sectional view of a fragmentary portion of the printing cylinder with the printing surface moulded thereon, certain irregularities being shown greatly distorted and enlarged for purposes of illustration; and

Fig. 6 is an enlarged cross-sectional view of a portion of the cylinder showing the integral continuous character of the molded printing surface.

Similar reference characters refer to similar parts throughout the several views of the drawing.

I have shown in Figure 1 a cylinder having a core or body portion 10 which may be formed of metal or any other suitable rigid material. Shaft portions 11 project from each end thereof and are suitably shaped to fit the journals provided therefor in the printing press. A backing layer 12 of suitable material, such as a nitro-cellulose or cellulose acetate composition, covers the core portion 10 of the cylinder. The backing layer may be moulded on to the cylinder in a number of ways. By way of example, the layer 12 may be applied by spraying or painting the backing material on to the core while in a plastic or flowable condition. The cylinder may then be placed in a lathe and cut or ground and polished so as to present a surface perfectly round, continuous and smooth. As a more practical and effective method of coating the cylindrical core 10, the core may be passed through a suitable aperture provided in a vat containing the backing material in semi-liquid condition. Means are provided around the aperture and within the vat for distributing the cellulose material smoothly and evenly around the core. One or more applications may be necessary to obtain the proper thickness. A backing layer of approximately eight one-thousandths of an inch has been found sufficient for effective "rotogravure" printing although the thickness of the layer may be varied within wide limits.

In applying the printing surface to the coated cylinder shown in Figure 1, the cylinder is rotatably mounted in a suitable frame having trunnions 13 in which the shafts 11 rotate. The trunnions 13 are supported on legs or standards 14. A crank 15 may be secured to one end of the shaft 11 for rotating the roll 10 in the trunnions 13, although it will be appreciated that any suit-

able driving apparatus, including necessary gearing, may be made use of.

A copy relief or matrix having a moulding surface 17 is clamped or secured at one end thereof against the backing layer 12 of the printing cylinder 10. For this purpose one or more adjustable clamping members 18 are provided which grip the end of the copy relief and press it down against the cylinder. Other well known means for positioning the end of the copy relief in fixed relationship to the cylinder may be used, clamping members 18 being shown for illustrative purposes only.

The matrix may comprise a backing sheet 16 of celluloid or other flexible material, and the moulding surface 17 may comprise water swollen gelatine which has previously been sensitized, exposed and water swollen to form the molding surface 17 in relief thereon. Reference is here made to my co-pending application, Ser. No. 518,649, filed February 27, 1931. In general such a relief surface is produced by photographing the object to be produced and exposing the sensitized gelatine surface through the photographic plate carrying the object image. The object image may be screened with a half tone or intaglio screen either by exposing the photographic plate through the screen in the camera, or by exposing the sensitized gelatine to light passing through the screen in the printing frame. After exposure, the screened photographically toned sensitized gelatine is then immersed in a tank of water, causing the unexposed portions of the gelatine to swell and form a relief surface carrying the screened image in reverse thereon. A water swollen gelatine copy relief is thus produced which carries the photographically toned image in minute detail. The half tone or intaglio screen need not be used if unscreened images are desired. It is also understood that, if desired, a portion only of the subject to be printed may be screened by subjecting corresponding selected portions of the sensitized gelatine to the action of the half tone screen, leaving other portions of the gelatine unscreened. While the water swollen gelatine copy relief above described provides an excellent matrix carrying the finest image details which can be made quickly and economically, it is understood that other relief matrices can be used in the casting process herein described. The printing circumference of the cylinder is sufficient in size to receive the full printing impression to be reproduced. The ends of the copy relief matrix may be provided with a margin, border or trim 17a to provide a smooth-non-printing marginal section 19c extending longitudinally across the cylinder adjacent the meeting ends of the matrix.

Compositions which have given eminently satisfactory results in actual service have been formed from a cellulose base reduced to a viscous, plastic state by a suitable solvent or solvents. More particularly, such a composition may be made by dissolving nitro-cellulose or cellulose acetate in a suitable solvent, such as acetone, ethyl acetate, butyl acetate, amyl acetate, butyl alcohol and similar well known solvents in commercial use. In order to get a plastic which will flow at the desired rate for molding purposes when a particular solvent is used and to obtain a liquid composition containing total solids of 20% to 50% or more, it is preferable to use a mixture of cellulosic bases. A plasticizer may be added but a plasticizer should be selected which will not materially decrease the hardness of the finished

product. Preferred plasticizers for cellulose nitrate are tricresyl phosphate, triphenyl phosphate, or dibutyl phthalate, and for the cellulose acetate I find that triacetin is a satisfactory plasticizer. These plasticizers, when used in the small amounts needed, appear to have very little effect on the hardness of the finished material, and yet give the material the desired plasticity and toughness. These improved cellulosic compositions are peculiarly adapted for the purposes of the present invention in that the compositions give a hard, resilient and tough product which wears well and which will receive and retain the finest impressions under conditions of use. Various resins rendered plastic by suitable solvents so that they can be molded in a relatively cold condition may also be used. It is understood that various materials initially moldable and adapted to take the impressions from the copy relief and maintain the same upon solidification are encompassed within the term plasticized material or moldable composition.

The backing layer 12 should be formed of a composition which will readily adhere to the cylinder and also form a strong bond to immutably secure the printing surface 19 to the cylinder. When a cellulose printing surface 19 is used the backing layer 12 may also be formed of cellulosic material, and where a moldable resin is used as the printing surface, the backing layer 12 may likewise be formed from material having a resinous base. In moulding the composition 19 which is to form the printing surface on to the cylinder, the composition, in a plastic, semi-fluid viscous state, is poured on the cylinder in the position shown in Figure 2, and is squeezed forward as the cylinder is rotated. A pressure roller 20 is mounted to rotate in a journal 21 provided at the upper end of an arm 22 of a pair of bell crank levers fulcrumed at 23 to the standard 14.

To regulate the pressure exerted by the roller 20 against the copy relief, a weight arm 24, extending from each of the arms 22, is provided. A weight 25 rides on each of the arms 24 and the pressure exerted by the roller 20 can be regulated by adjusting the position of the weight.

A quantity of the moldable mass 19 is placed in position on the cylinder and immediately in advance of the molding face of the copy relief or matrix. Thereafter, the weight 25 is so adjusted on the arm 24 as to cause the roll 20 to bear against the matrix with desired pressure, forcing the relief surface 17 of the copy relief into the moldable mass. Upon rotation of the cylinder, the mass is spread over the backing layer 12 of the cylinder and a moulding of the mass to conform to the relief is effected.

The roll 20 is preferably laterally offset with respect to the vertical so that the moldable material 19 will remain in position on top of the cylinder. The printing surface 19a is thus moulded under uniform conditions of pressure, the material 19 being squeezed into position under the copy relief in a manner such as to drive out any air bubbles contained therein, and which will give a uniform printing surface 19a. The printing surface 19a is made sufficient in thickness to carry the full depth of the molding impressions in the matrix.

A gelatine or paper strip or other material 30, to which the material 19 will not adhere, is placed over the starting end of the matrix, as shown in Figures 3 and 4. When the roll 40 has completed its revolution, and the pressure roll 20 reaches the starting end of the matrix, the

plasticized mass 19 is squeegeed or forced by the pressure roller 20 up onto the non-sticking gelatine strip 30, if any excess be present. The material 19 is forced up against the end edge of the matrix comprising the backing 16 and the relief surface 17, and in so doing a little spine 19b, substantially of knife-like fineness, may be formed which extends longitudinally across the roll.

When the printing surface 19a has been completely formed, the surface is permitted to harden and set, which requires approximately 10 to 30 minutes when a moldable cellulosic mass is used. The time element will, of course, vary with the moldable material used. When the printing surface 19a has set to a sufficient degree, the pressure roll 20 is lifted off from the matrix by means of a handle 26. The matrix 16 is then stripped from the roll. The fin 19b is then removed and the surface made smooth and concentric. The fin 19b is preferably removed by scraping with a sharp knife or blade, which is suitably supported in a holder to permit the fin to be planed off to the proper surface level, after which the surface covered thereby is polished so as to present a non-printing surface 19c which extends in a relatively narrow strip across the surface of the printing cylinder. The fin 19b, formed by the above method, is so small and fine that no difficulties are encountered with respect to its removal.

The printing surface 19a, as illustrated in the drawing, may be considered an intaglio printing surface, but it is readily understood that a half tone or relief printing surface screened, unscreened, or only partly screened, may be molded from a matrix which has been correspondingly prepared. When completed the printing surface 19a and the non-printing surface 19c is continuous and unbroken, since the meeting ends of the moldable mass 19 become merged and flow together while the mass is still plastic, resulting in a molded layer free from any seam or joint.

The cylindrical printing surface is thus formed in situ, in one operation and without the application of heat. The resulting composite printing cylinder comprises a metallic body, a backing layer formed thereto, and a superimposed initially cold plastic composition which during the conforming process has also had imparted thereto a desired printing surface. The particular method and apparatus herein disclosed has been found to give excellent results in service. The printing cylinder may be reused by regrinding the cylinder to smoothness or removing the composition with a suitable solvent. When the printing surface is composed of cellulose material, amyl acetate solvent may be used to remove the same. A new printing surface may then be applied by the method described, or the new printing surface may be superposed on the original printing surface, depending on the thickness of the roll desired.

While certain novel features of the invention have been disclosed and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. The improved process of forming printing surfaces on cylinders including attaching one end of a copy relief to the surface of a cylinder, placing a plastic composition on said cylinder in advance of said copy relief, and thereafter rolling said copy relief over and upon said cylinder so as to force out the excess plastic and mold the

printing impressions carried by said copy relief in the plastic composition retained upon the cylinder.

2. The improved process of forming printing surfaces from cellulosic plastics, including attaching one end of a copy relief to a backing, placing a cold-plasticized cellulosic composition on said backing and in advance of said copy relief, and thereafter rolling said copy relief over and upon said backing, whereby to force out excess plastic and impart the desired printing surface to the material retained upon the backing, and thereafter removing the copy relief from the so formed printing surface.

3. An improved method of forming cylindrical printing surfaces including forming a cellulosic backing upon the surface of a cylinder, positioning one end of a copy relief strip against the surface of said cylinder, placing a predetermined mass of a cold-plasticized cellulosic composition on said cylinder and in advance of said copy relief, and thereafter pressure-rolling said copy relief on said cylinder and said plastic composition whereby the latter is squeegeed between the backing and the copy relief so as to mold the printing impressions carried by said copy relief in the plasticized composition retained upon the cylinder, stripping off the said copy relief from the finished surface, and removing the fin formed at the meeting ends of the copy relief.

4. An improved method of forming printing surfaces on cylinders including, securing one end of a copy relief strip to said cylinder with the impression side of said strip adjacent the cylinder, placing a mass of plasticized cellulosic material on said cylinder and in advance of said copy relief on said cylinder whereby said plasticizing material is squeegeed between the cylinder and the copy relief, forced into intimate adhering contact with the cylinder, and molded by the copy relief, stripping off the said copy relief from the finished surface, and removing the fin formed at the meeting ends of the copy relief.

5. The improved process of forming printing surfaces on cylinders including, providing a copy relief having printing impressions in reverse in the surface thereof, placing plasticized material between the impression side of said copy relief and the cylinder to be treated, rolling said cylinder and copy relief together so as to force out the excess plasticized material therebetween and mold the desired printing impressions in the plasticized material retained upon the cylinder.

6. The improved process of forming printing surfaces on cylinders including, providing a copy relief having printing impressions in reverse in the surface thereof, placing a plasticized composition on said cylinder in advance of said copy relief, and thereafter rolling said copy relief over and upon said cylinder so as to force out the excess plasticized material and impart the desired printing surface to the material retained upon the cylinder and removing the fin formed in the material at the meeting ends of the copy relief.

7. An improved method of forming cylindrical printing surfaces including, providing a copy relief having printing impressions in reverse in the surface thereof, imposing a predetermined mass of plasticized cellulosic material upon said cylinder and in advance of said copy relief, and thereafter pressure rolling said copy relief on said cylinder and said plastic material, whereby said material is squeegeed between the backing surface and the copy relief surface and forced into intimate contact with the backing surface and

molded with the impressions carried by said copy relief.

8. An improved method of forming a cylindrical printing surface including, providing a copy relief having embossed impressions therein, placing a plasticized cellulosic material between the embossed side of said copy relief and the cylinder to be treated, rolling said cylinder and copy relief together whereby the plasticized material is squeegeed between the cylinder and the copy relief surface, forced into intimate adhering contact with the cylinder and embossed by the copy relief, stripping off the said copy relief from the finished surface, and removing the fin formed at the meeting ends of the copy relief.

9. An improved method of forming cylindrical printing surfaces including, forming a backing layer upon the surface of a cylinder, fixing an end of a copy relief strip to the cylinder surface,

imposing a mass of plastic material on said cylinder and in advance of said copy relief, and thereafter pressure rolling said copy relief on said cylinder and said plastic material so as to mold the printing impressions carried by said copy relief in the plastic material retained upon the cylinder.

10. The improved process of molding a printing surface on a cylinder including, providing a water swollen gelatin copy relief having photographically toned printing impressions in reverse in the surface thereof, placing a moldable material on said cylinder in advance of said copy relief, and thereafter rolling said cylinder and copy relief together so as to mold the printing impressions carried by said copy relief in the moldable material retained upon the cylinder.

OSWALD R. SCHULTZ.